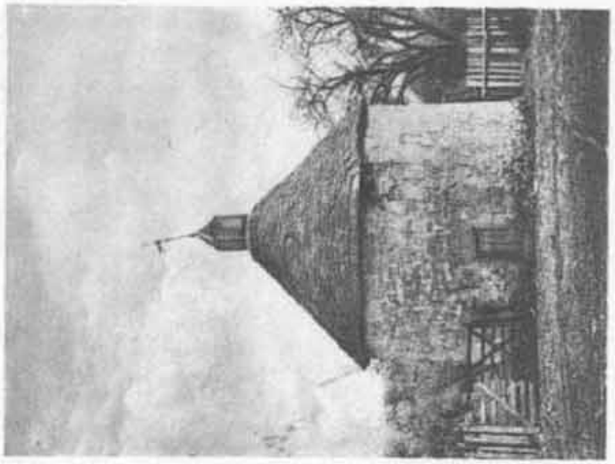
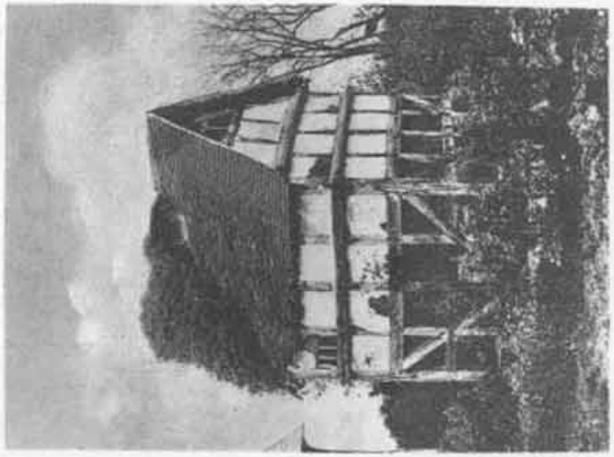


PIGEON HOUSE, WIGMORE GRANGE.
DEMOLISHED 1888.



PIGEON HOUSE, PUTSON, HEREFORD.
DEMOLISHED 1889.

PHOTOGRAPHED AND PRESENTED BY ALFRED WATKINS,
FOR WOOLHOPE TRANSACTIONS.

TRANSACTIONS

OF THE

WOOLHOPE

NATURALISTS' FIELD CLUB.

[ESTABLISHED 1851.]

1890—1891—1892.

"HOPE ON" "HOPE EVER"

HEREFORD:
PRINTED BY JAKEMAN AND CARVER, 4 & 5, HIGH TOWN.

1894.

OFFICERS FOR 1892.

President:—Mr. William Henry Barneby.

Vice-Presidents:—Rev. Sir George H. Cornewall, Bart.
Sir Herbert Croft, Bart.
Rev. Augustin Ley.
Dr. T. A. Chapman.

Central Committee:—Mr. Joseph Carless.
Mr. James Davies.
Mr. Thomas Hutchinson.
Mr. C. G. Martin.
Mr. O. Shellard.

Editorial Committee:—The President.
Rev. Wm. Elliot.
Mr. H. C. Moore.

Treasurer:—Mr. H. C. Beddoe.

Auditor:—Mr. James Davies.

Honorary Secretary:—Mr. H. C. Moore.

Assistant Secretary:—Mr. James B. Pilley.

LIST OF MEMBERS,

1892.

HONORARY MEMBERS.

Bevan, Rev. Canon W. Latham, M.A., Hay Castle, Brecon.
Brodie, Rev. P. B., M.A., F.G.S., Rowington Vicarage, Warwick.
Cooke, Dr. M. C., A.L.S., LL.D., 2, Grosvenor Villas, 146, Junction Road, Upper Holloway, London.
Cornu, Maxime, Mons., Docteur des Sciences, Muséum d'Histoire naturelle, *Culture*, Rue Cuvier, Paris.
du Port, Rev. Canon, M.A., Denver Rectory, Downham, Norfolk.
Geinitz, H. B., Dr., Professor of Geology, Dresden.
Hogg, Dr., F.H.S., 99, St. George Road, Pimlico, London.
Houghton, Rev. Wm., M.A., F.G.S., F.L.S., Preston-on-Wealdmoors, Wellington, Salop.
Howse, Mr. T., F.L.S., Glebefields, Edgeborough Road, Guildford.
Lockyer, Mr. Alfred, Stanley Road, Woodford, Essex, Hon. Librarian, Epping Forest Field Club.
Melville, Mr. W., Professor, Queen's College, Galway, Ireland.
Perceval, Mr. Cecil H. Sp., Henbury, Nr. Clifton, Bristol.
Phillips, Mr. Wm., F.L.S., Canonbury, Shrewsbury.
Phillips, Mr. E. Cambridge, F.G.S., Member of the Permanent Ornithological Committee, The Elms, Brecon.
Plowright, C. B., M.D., F.L.S., King's Lynn, Norfolk.
Purchas, Rev. W. H., Alstonfield Vicarage, Ashbourne.
Renny, Mr. James, The Almners, Chertsey.
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Vize, Rev. J. E., M.A., F.R.M.S., Forden Vicarage, Welshpool.
Watkins, Mr. M. Burton, Treaddow, Hentland, Ross.
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With, Mr. G. H., F.R.A.S., F.C.S., 7, Bridge Street, Hereford.
The President of the Cotteswold Naturalists' Field Club (Lucy, Mr. Wm. C., F.G.S., F.A.S., Brookthorpe, near Gloucester).
The Secretary of ditto (Wethered, Mr. Ed., F.G.S., F.R.M.S., 4, St. Margaret's Terrace, Cheltenham).
The President of the Malvern Naturalists' Field Club.
Vice-President of ditto (Hill, Rev. R. P., Broomsberrow, Ledbury).
President of the Caradoc Field Club (Mr. W. E. Garnett-Botfield, Bishop's Castle).
Vice-Presidents of ditto.
Secretary of ditto (Cobbold, Mr. E. S., Church Stretton).
President of the Cardiff Naturalists' Field Club.
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President of the Dudley Midland Geological and Scientific Society and Field Club (Cochrane, Mr. Chas., Green Royde, Pedmore, near Stourbridge).
Hon. Secretary (Madeley, Mr. W., Martin's Hill House, Dudley), and Joint Secretary for Field Meetings (King, Mr. Wickham, Pedmore House, Stourbridge).
President of the Oswestry and Welshpool Naturalists' Field Club.
Hon. Secretary of ditto.
President of the Severn Valley Club (Dr. Callaway, F.G.S., &c., Sandon, Wellington, Salop).
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Hon. Secretary of ditto (Fretton, Mr. Geo. F.S.A., 88, Little Park Street, Coventry).
President of the Worcester Naturalists' Field Club.
Hon. Secretary of ditto.
Hon. Secretary of the Midland Counties' Naturalists' Society (Badger, Mr. E. W., *Midland Counties' Herald* Office, Union Street, Birmingham).

ORDINARY MEMBERS.

Acton, Mr. T. B., Grove Road, Wrexham.
Apperley, Mr. H. G., 8, St. Ethelbert Street, Hereford.
Ashley, Rev. G. E., M.A., Stretton Rectory, Hereford.
Attwood-Mathews, Mr. B. St. John, Pontrilas Court, Hereford.
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Ballard, Mr. John Edy, High Street, Ledbury.
Banks, Mr. W. H., Ridgebourne, Kington.
Barker, Rev. H. A., M.A., King's Pyon, Weobley, R.S.O., Hereford.
Barker, Rev. J., M.A., Eardisland, Pembridge, R.S.O.
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Bayliss, Mr. P., Homend, Ledbury.
Beavan, Rev. T. M., M.A., Woolhope, Hereford.
Beddoe, Mr. H. C., Castle Street, Hereford.
Bevan, Rev. J. O., M.A., F.G.S., F.R. Met. Soc., Vowchurch.
Bird, Mr. C. P., Drybridge House, Hereford.
Black, Rev. C., Colwall. Ledbury.
Blashill, Mr. T., F.Z.S., Spring Gardens, London, S.W., and 29, Tavistock Square, W.C.
Blathwayt, Mr. C. G., Walney House, Hereford.
Blathwayt, Lieut.-Col. L., Eagle House, Batheaston, Bath.
Bond, Mr. R. W., Eaton Bishop, Hereford.
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Bradney, Mr. J. A., Talycoed Court, Monmouth.
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Brodribb, Rev. W. K., Putley, Ledbury.
Bull, Mr. Ernest Henry, St. John Street, Hereford.
Burlton, Mr. T. Davies, North Eaton, Leominster.
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Burrough, Rev. Charles, M.A., Eaton Bishop, Hereford.
Butler, Mr. Cecil, Dulas Court, Pontrilas, R.S.O., Hereford.
Butler, Mr. Edward (address unknown).
Caddick, Mr. Edward, Wellington Road, Edgbaston.
Campbell, Capt. J. E. R., Tillington Court, Hereford.
Capel, Rev. Canon Bury, M.A., Abergavenny.
Capel, Rev. A. J., M.A., The College, Hereford.
Carless, Mr. Joseph, jun., St. John Street, Hereford.
Carrington, Mr. Samuel, Bodenham Road, Hereford.
Chance, Mr. T. G., 6, King Street, Hereford.
Chapman, T. A. (M.D.), Firbank, Hereford.
Chapman, Paul (M.D.), St. John Street, Hereford.
Clarke, Mr. Robert, 4, Portland Street, Hereford.
Cleasby, Mr. P. C., Barbourne, Worcester.
Cobbold, Rev. R. H., M.A., Ross.
Colt-Williams, Mr. E. W., M.A., Hagley Hall, Rugeley, Staffordshire.
Cooke, W. H., His Honour Judge, Q.C., M.A., F.S.A., 42, Wimpole Street, Cavendish Square, W.
Cooke, Mr. C. W. R., M.P., M.A., Hellens, Much Marcle, Dymock, Gloucestershire.
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Cornewall, Rev. Sir G. H., Bart., M.A., Moccas Court, Hereford.
Crespi, Dr. A. J. H., Cooma, Wimborne.
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Davies, Mr. Gilbert, Grey Friars' House, St. Nicholas Street, Hereford.
Davis, Mr. Luther, Solicitor, Abergavenny.
de Winton, Capt. R. H., Graftonbury, Hereford.
Doughty, Major Chester, Hereford.
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Elliot, Rev. W., M.A., Brinsop, Hereford.

Ellwood, Mr. M. J., 25, Draper's Lane, Leominster.
Fitzsimons, J. B. (M.D.), King Street, Hereford.
Forbes, Mr. J. Stuart, Gazerdine, Ledbury.
Fortey, Mr. Charles, Abbey Villa, Ludlow.
Giles, Mr. W. B., Newport House, Almeley, Eardisley, R.S.O.
Glendinning, J. (M.D.), Larchfield, Abergavenny.
Godsell, Mr. G. H., 6, King Street, Hereford.
Grant, Mr. W. J., King's Acre, Hereford.
Grasett, Rev. J. E., Allensmore, Hereford.
Green, Rev. C. E. Maddison, M.A., Ledbury.
Greenly, Mr. E. Howorth, M.A., Titley Court, Titley, R.S.O.
Hadfield, Mr. G. H. Moraston, Ross.
Hall, Mr. H. S., Dormington Court, Hereford.
Hagreen, Rev. C. S., M.A., Marden, Hereford.
Hebb, Mr. W., Solicitor, Church Yard, Ross.
Holloway, Rev. E. J., M.A., Clehonger, Hereford.
Hopton, Major-General Edward, Cagebrook House, Eaton Bishop, Hereford.
Hopton Rev. M., M.A., Canon Frome, Ledbury.
Horton, Rev. A. W., M A., Dewsall, Hereford.
Humfrys, Mr. W. J., Bridge Street, Hereford.
Hutchinson, Mr. Thomas, Aylstone Hill, Hereford.
Ingham, His Honour Judge, R. W., Sugwas Court, Hereford.
Inman, Mr. Thomas Frederic, Kilkenny House, Sion Hill, Bath.
Ireland, Rev. W., M.A., Lucton, Kingsland, Hereford.
Jones, Rev. A. G., M.A., Yarkhill, Hereford.
Kempson, Mr. F. R., Birchy Fields, Bromyard.
Kynnersley, Mr. T. F., Leighton Hall, Ironbridge.
Lambe, Mr. John, Bridge Street, Hereford.
Lambert, Rev. Willis F. A., M.A., F.L.S., F.R. Geog. Soc., Peterchurch.
Lambert, Rev. W. H., M.A., Stoke Edith Rectory, Hereford.
Lane, J. Oswald (M.D.), Bridge Street, Hereford.
Le Brocq, Mr. W. P. J., Proprietary School, Brecon.
Llanwarne, Mr. Thomas, St. Martin Street, Hereford.
Levason, Mr. Arthur G., Bridge Street, Hereford.
Levason, Mr. Peyton, Bridge Street, Hereford.
Lewis, Rev. Plaskett C., Oldcastle, Pandy, Abergavenny.
Ley, Rev. A., M.A., Sellack Vicarage, Ross.
Lilley, J. H. (M.D.), 34, Castle Street, Hereford.
Lilley, Mr. Charles E., Bodenham Road, Hereford.
Lilwall, Mr. Charles James, Llyddyadyway, Cusop, Hay, R.S.O.
Lloyd, Mr. J. W., Post Office, Kington.
Lubienski, Count Louis, Rotherwas Park, Hereford.
Marshall, Rev. H. B. D., M.A , Norton Canon, Weobley, R.S.O.
Martin, Mr. C. G., High Street, Hereford.
Matthews, S. R. (M.D.), St. Owen Street, Hereford.
Meadows, Mr. Thomas, Aylstone Hill, Hereford.
Merriman, Mr. J. J., 45, Kensington Square, London.
Moffatt, Mr. H. C., Goodrich Court, Ross.
Moore, Mr. H. C., 26, Broad Street, Hereford *(Honorary Secretary)*.
Morris, Mr. J. Griffith, 135, St. Owen Street, Hereford.
Nicholl, Mr. D. S. W., F.L.S., F.Z.S., The Ham, Cowbridge, Glamorganshire.
North, Rev. H., M.A., Breinton, Hereford.
Oakeley, Rev. W. Bagnall, Newland, Coleford, Gloucester.
Oldham, Capt. E. Dansey, Hampton Park, Hereford.
Paris, Mr. T. C., Hampton Lodge, Hereford.
Paynter, Rev. T. B., How Caple, Ross.
Pearl, Surgeon-General, W., Stuston Lodge, Scole, Norfolk.
Perry, Deputy-Surgeon-General, Wm., Hinton Cottage, Hereford.
Phillips, Mr. Thomas, Wellington, Hereford.
Phillott, Rev. Canon H. W., M.A., St. John Street, Hereford.
Phillott, Mr. G. H., Plâs Trevor, The Park, Cheltenham.
Pilley, Mr. James B., 2, High Town, Hereford *(Assistant Secretary)*.
Pilley, Mr. Walter, Eign Street, Hereford.
Piper, Mr. G. H., F.G.S., Court House, Ledbury.
Poole, Rev. Wm., M.A., Hentland Ross.

Powell, Rev. T. Prosser, Dorstone, Hereford.
Prescott, Mr. Charles Warre, King's Pyon House, near Weobley, R.S.O.
Pulley, Mr. Joseph, Lower Eaton, Hereford, and Green Park Chambers, 90, Piccadilly, W.
Purchas, Mr. Alfred, Broad Street, Ross.
Rankin, Mr. James, M.P., M.A., Bryngwyn, Hereford, and 35, Ennismore Gardens, Princes Gate, London, S.W.
Riley, Mr. John, Putley Court, Ledbury, Herefordshire.
Robinson, Mr. E. L. G., Poston, Vowchurch.
Robinson, Mr. Stephen, Lynhales, Kington.
Rootes, Mr. Charles, St. Owen Street, Hereford.
Rootes, Mr. W. Rudge, Woodside House, Ross.
Salwey, Mr. Theophilus, Ludlow.
Severn, Mr. J. P., Penybont Hall, Penybont.
Shackleton, Rev. Thomas, M.A., Broomy Hill, Hereford.
Shellard, Mr. Orlando, Barton Manor House, Hereford.
Sheperd, Mr. Robert John, Pemberton House, Hay.
Shepherd, Rev. W. R., Preston-on-Wye, Hereford.
Southall, Mr. Henry, F.R. Met. Soc., The Graig, Ashfield, Ross.
Southall, Mr. H. J., Solicitor, South Street, Leominster.
Stanhope, Rev. The Ven., The Hon. B. L. S., M.A., Byford, Archdeacon of Hereford.
Stephens, Mr. Edwin, Broomy Hill, Hereford.
Sugden, Mr. H. G., Warham House, Hereford.
Swainson, Capt. E. A., The Woodlands, Brecon.
Symonds, Mr. J. F., Broomy Hill, Hereford.
Tatham, Rev. F. H., M.A., Wing Vicarage, Leighton Buzzard, Bedfordshire.
Trafford, Mr. Guy, Michaelchurch Court, Hereford.
Turner, Mr. Thomas, F.R.C.S., St. Owen Street, Hereford.
Vachell, Mr. C. T., 38, Charles Street, Cardiff.
Vaughan, Rev. F. S. Stooke, M.A., Wellington Heath, Ledbury.
Vevers, Mr. Henry, St. Owen Street, Hereford.
Warner, Rev. R. W., M.A., Almeley, Kington.
Watkins, Mr. Alfred, Hampton Park, Hereford.
Watkins, Rev. Morgan G., M.A., Kentchurch, Hereford.
Wegg-Prosser, Mr. F. R., 26, Eaton Square, London, W.
Weyman, Mr. Arthur, Solicitor, 54, Mill Street, Ludlow.
White, Mr. J. Eales, Ledbury Road, Hereford.
Whitfeld, Mr. W. C., Baggallay Street, Whitecross Road, Hereford.
Williams, Mr. Thomas, H.M. Inspector of Schools, Leominster.
Williamson, Rev. H. Trevor, Bredwardine, Hereford.
Wood, J. H., (M.B.), Tarrington, Ledbury.

MEMBERS ELECTED.

1889.

Banks, Mr. W. H., Ridgebourne, Kington.
Brierley, Rev. H., Upper Bullinghope, Hereford.
Butler, Mr. Cecil, Dulas Court, Pontrilas, Hereford.
Crespi, Dr. A. J. H., Cooma, Wimborne.
Dunn, Rev. J., Dymock, Gloucester.
Ireland, Rev. W., Lucton, Kingsland, Hereford.
Le Brocq, Mr. W. P. J., Proprietary School, Brecon.
North, Rev. H., Breinton, Hereford.
Oldham, Capt. E. Dansey, Hampton Park, Hereford.
Paynter, Rev. T. B., How Caple, Ross.
Sharland, Mr. W., 26, Broad Street, Hereford.
Southall, Mr. H. J., Solicitor, Leominster.
Trafford, Mr. Guy, Michaelchurch Court, Hereford.

1890.

Barker, Rev. H. A., Kings Pyon, Hereford.
Barneby, Mr. W. H., Bredenbury Court, Bromyard.
Blathwayt, Lieut.-Col. L., Eagle House, Batheaston, Bath.
Bodenham, Mr. Frederick, Elmhurst, Aylstone Hill, Hereford.
Bond, Mr. R. W., Eaton Bishop, Hereford.
Bowen, Rev. L., The Vicarage, Talgarth.
Brodribb, Rev. W. K., Putley, Ledbury.
Burnside, Rev. F. R., Much Birch, Hereford.
Carrington, Mr. Samuel, Bodenham Road, Hereford.
Chance, Mr. T. G., St. James' Street, Hereford.
Easton, Mr. H., Corn Square, Leominster.
Ellwood, Mr. M. J., 25, Draper's Lane, Leominster.
Forbes, Mr. J. Stuart, Gazerdine, Ledbury.
Godsell, Mr. G. H., 7, St. Owen Street, Hereford.
Hopton, Major-General Edward, Cagebrook House, Eaton Bishop, Hereford.
Kynnersley, Mr. T. F., Leighton Hall, Ironbridge.
Lubienski, Count Louis, Rotherwas Park, Hereford.
Moffatt, Mr. H. C., Goodrich Court, Ross.
Sheperd, Mr. R. T., Pemberton House, Hay.
Stephens, Mr. Edwin, Broomy Hill, Hereford.
Stretch-dowse, Mr. J. D., 14, Welbeck Street, London, W.
Sugden, Mr. H. G., Warham House, Hereford.
Swainson, Capt. E. A., The Woodlands, Brecon.
Vachell, Mr. C. T., 38, Charles Street, Cardiff.
White, Mr. J. Eales, Ledbury Road, Hereford.

1891.

Bird, Mr. C. P., Drybridge House, Hereford.
Bayliss, Mr. P., Homend, Ledbury.
Black, Rev. C., Colwall, Ledbury.
Blathwayt, Mr. C. G., Walney House, Hereford.
Giles, Mr. W. B., Newport House, Almeley, Eardisley, R.S.O.
Hagreen, Rev. C. S., Marden, Hereford.
Lewis, Rev. Plaskett C., Oldcastle, Pandy, Abergavenny.
Nicholl, Mr. D. S. W., F.L.S., F.Z.S., The Ham, Cowbridge, Glamorganshire.
Pearl, Surgeon-General W., Stuston Lodge, Scole, Norfolk.
Perry, Deputy-Surgeon-General Wm., Hinton Cottage, Hereford.
Prescott, Mr. Charles Warre, Kings Pyon House, near Hereford.
Williams, Mr. Thomas, H.M. Inspector of Schools, Leominster.

RULES

OF THE

Woolhope Naturalists' Field Club.

I.—That a Society be formed under the name of the "Woolhope Naturalists' Field Club," for the practical study, in all its branches, of the Natural History of Herefordshire, and the districts immediately adjacent.

II.—That the Club consist of Ordinary Members with such Honorary Members as may be admitted from time to time; from whom a President, four Vice-Presidents, a Central Committee, Treasurer, and Honorary Secretary be appointed at the Annual Meeting to be held at Hereford in the early part of each year. The President and Vice-Presidents to change annually.

III.—The Central Committee shall consist of Five Members, resident in the city or in its immediate vicinity, with the President, Vice-Presidents, Treasurer, Auditor, and Honorary Secretary, *ex-officio*. It shall be empowered to appoint an Assistant Secretary; and its duties shall be to make all the necessary arrangements for the meetings of the year, and take the management of the Club during the intervals of the meetings.

IV.—That the Members of the Club shall hold not less than three Field Meetings during the year, in the most interesting localities for investigating the Natural History of the district. That the days and places of such regular meetings be selected at the Annual Meeting, and that ten clear days' notice of each be communicated to the Members by a circular from the Secretary; but that the Central Committee be empowered, upon urgent occasions, to alter the days of such regular Field Meetings, and also to fix special or extra Field Meetings during the year.

V.—That an Entrance Fee of Ten Shillings shall be paid by all Members on election, and that the Annual Subscription be Ten Shillings, payable on the 1st of January in each year to the Treasurer, or Assistant Secretary. Each Member may have the privilege of introducing a friend on any of the Field days of the Club.

VI.—That the Reports of the several meetings and the papers read to the Club during the year, be forwarded, at the discretion of the Central Committee, to the *Hereford Times* newspaper for publication as ordinary news, in preparation for the *Transactions* of the Club.

VII.—That the cost of any lithographic or other illustrations be defrayed by the author of the paper for which they may be required, unless the subject has been taken up at the request of the Club, and in that case, the cost of such illustration, to be paid for from the Club funds, must be specially sanctioned at one of the general meetings.

VIII.—That the President for the year arrange for an address to be given in the field at each meeting, and for papers to be read after dinner; and that he be requested to favour the Club with an address at the Annual Meeting on the proceedings of the year, together with such observations as he may deem conducive to the welfare of the Club, and the promotion of its objects.

IX.—That all candidates for Membership shall be proposed and seconded by existing Members, either verbally or in writing, at any meeting of the Club, and shall be eligible to be balloted for at the next meeting, provided there be FIVE Members present; one black ball in three to exclude.

X.—That Members finding rare or interesting specimens, or observing any remarkable phenomenon relating to any branch of Natural History, shall immediately forward a statement thereof to the Hon. Secretary, or to any member of the Central Committee.

XI.—That the Club undertake the formation and publication of correct lists of the various natural productions of the County of Hereford, with such observations as their respective authors may deem necessary.

XII.—That Members whose subscription shall remain for *three* years in arrear, after demand, be held to have withdrawn, and their names shall accordingly be omitted from the list of Members at the ensuing Annual Meeting.

XIII.—That the Assistant Secretary do send out circulars, ten days at least before the Annual Meeting, to all Members who have not paid their subscriptions, and draw their particular attention to Rule XII.

XIV.—That these Rules be printed annually with the *Transactions*, for general distribution to the Members.

THE FOLLOWING MEMBERS WERE ELECTED DURING THE YEAR 1892.

Andrews, Mr. C. Davies, Leominster.
Baker, Mr. E. J., Thornbury House, Whitecross Road, Hereford.
Banks, Mr. W. G., Little Birch.
Bennett, Rev. H., Colwall, Malvern.
Bickham, Mr. Sp. H., Underdown, Ledbury.
Brown, Mr. Langton, 4, Shakespeare Terrace, Green Street, Hereford.
Cockcroft, Mr. J., Free Library, Hereford.
East, C. H. (M.D.), Grosmont, Pontrilas, R.S.O.
Firmstone, Rev. E. R., Kilpeck, Hereford.
Harington, Sir Richard, Bart., Whitbourne Court, Worcester.
Harrison, Mr. Spencer Henry, The Hermitage, Burghill.
Howells, Dr. Thomas, Talgarth.
James-Trevor, Mr. T. C. G., Canon Bridge, Madley, Hereford.
Kilpeck, Rev. W. de, Gate House, Widemarsh Street, Hereford.
Lea, Rev. T. S., Tedstone Delamere, Whitbourne, Worcester.
Leigh, Mr. H. G., Editor *Hereford Times*.
Lewis, Mr. Richard, The Cedars, Hampton Park, Hereford.
Little, Colonel J. C., Meyrick House, Meyrick Road, Whitecross Road, Hereford.
Morgan, Rev. W. T., Llanigon Vicarage, Hay.
Parker, Mr. Alfred, Kington.
Phillips, Mr. H. C. B., The Knoll, Tupsley, Hereford.
Philpott, Rev. F. O., Little Marcle, Ledbury.
Purchas, Mr. H. Maurice, Chasedale, Ross.
Seaton, Rev. Douglas, Goodrich, Ross.
Sugden, Mr. J. P., The Cottage, Ledbury.
Trumper, Rev T. W. Walwyn, Clifford Vicarage.
Wadworth, Mr. H. A., Breinton Court, Hereford.
Wallis, Mr. E. L., Hampton Park, Hereford.
Wheeler, Mr. G. W., Bodenham Road, Hereford.
Wiltshire, Mr. John, Shirehall, Hereford.
Wood, Rev. R., Overton, Ludlow.

And at the Annual Meeting the following were proposed to be balloted for at the next meeting in 1893:—
Binstead, Rev. C. H., Eardisley, R.S.O.
Conder, Mr. C. E., Newcourt, Colwall.
Foster, Rev. A. W., Brockhampton Court, Ross.
Hawkins, Mr. J. F., Kinnersley.

OFFICERS FOR 1890.

President: -	Sir Herbert Croft, Bart.
Vice-Presidents: -	Dr. T. A. Chapman.
	Rev. Preb. Wm. Elliot.
	Rev. Augustin Ley.
	Mr. H. Southall, F.R.Met.S.
Central Committee:	Mr. J. Carless.
	Mr. James Davies.
	Mr. Thos. Hutchinson.
	Mr. C. G. Martin.
	Mr. O. Shellard.
Editorial Committee:	The President.
	Rev. Preb. Wm. Elliot.
	Mr. H. C. Moore.
Treasurer: -	Mr. H. C. Beddoe.
Auditor: - -	Mr. James Davies.
Honorary Secretary:	Mr. H. C. Moore.
Assistant Secretary:	Mr. James B. Pilley.

OFFICERS FOR 1891.

President: - -	The Rev. Sir George H. Cornewall, Bart.
Vice-Presidents:	Sir Herbert Croft, Bart.
	Rev. C. Burrough.
	Rev. Augustin Ley.
	Dr. T. A. Chapman.
Central Committee:	Mr. J. Carless.
	Mr. James Davies.
	Mr. Thos. Hutchinson.
	Mr. C. G. Martin.
	Mr. O. Shellard.
Editorial Committee:	The President.
	Rev. Preb. Wm. Elliot.
	Mr. H. C. Moore.
Treasurer: -	Mr. H. C. Beddoe.
Auditor: - -	Mr. James Davies.
Honorary Secretary:	Mr. H. C. Moore.
Assistant Secretary:	Mr. James B. Pilley.

MEMBERS DECEASED.

1890.

Feb. 17.—Cam, Mr. Thomas.
,, 3.—Knight, Mr. J. T.

1891.

June 24.—Banks, Mr. R. W.
Sept. 29.—Bodenham, Mr. F.
May .—Docking, Mr. J.
Mar. 4.—Price, Rev. D.
Nov. .—Stanhope, Hon. Rev. W. P. S.

1892.

Sept. 28.—Acton, Mr. T. B.
Dec. 27.—Ely, Rev. E. A.
July 30.—Watkins, Mr. Burton M.

WOOLHOPE NATURALISTS' FIELD CLUB.

PRESIDENTS
FROM ITS ESTABLISHMENT IN 1851.

1851 Club formed in the Winter months.
1852 Lingwood, Mr. R. M.
1853 Lewis, Rev. T. T.
1854 Symonds, Rev. Wm. S., F.G.S.
1855 Crouch, Rev. J. F.
1856 Wheatley, Mr. Hewitt.
1857 Lingen, Mr. Charles.
1858 Brown, G. P., M.D.
1859 Crouch, Rev. J. F.
1860 Banks, Mr. R. W.
1861 Lightbody, Mr. Robert.
1862 Hoskyns, Mr. Chandos Wren.
1863 Hoskyns, Mr. Chandos Wren.
1864 Crouch, Rev. J. F.
1865 Steele, Mr. Elmes Y.
1866 Bull, H. G., M.D.
1867 Hoskyns, Mr. Chandos Wren.
1868 McCullough, D.M., M.D.
1869 Rankin, Mr. James.
1870 Cooper-Key, Rev. H.
1871 Cam, Mr. Thomas.
1872 Steele, Mr. Elmes Y.
1873 Davies, Rev. James.
1874 Davies, Rev. James.
1875 Robinson, Rev. C. J.
1876 Chapman, T. A., M.D.
1877 Morris, Mr. J. Griffith.
1878 Phillott, Rev. H. W.
1879 Armitage, Mr. Arthur.
1880 Knight, Mr. J. H.
1881 Ley, Rev. Augustin.
1882 Blashill, Mr. Thomas, F.R.I.B.A.
1883 Piper, Mr. Geo. H., F.G.S.
1884 Burrough, Rev. Chas.
1885 Martin, Mr. C. G.
1886 Piper, Mr. Geo. H., F.G.S.
1887 Elliot, Rev. Wm.
1888 Elliot, Rev. Wm.
1889 Southall, Mr. H., F.R.Met. Soc.
1890 Croft, Sir Herbert, Bart.
1891 Cornewall, Rev. Sir George H., Bart.
1892 Barneby, Mr. Wm. Henry.

TRANSACTIONS FOR THE YEARS 1890, 1891, 1892.

TABLE OF CONTENTS.

1891.

1892.

THE WOOLHOPE CLUB.

The Honorary Treasurer's Account for the Year ending 31st December, 1889.

Dr.

	£	s.	d.
To Balance from Bankers as per last Account ...	63	9	1
" Entrance Fees	6	10	0
" Subscriptions, including Arrears	77	0	0
" Donations for Illustrations—	£	s.	d.
Mrs. Bull	10	0	0
Mr. Blashill	1	5	0
Mr. Lloyd	0	10	0
	11	15	0
" Subscriptions to "Flora of Herefordshire" ...	70	0	0
	£228	14	1

Cr.

	£	s.	d.
By Landlord of *Saracen's Head* Inn, for taking Daily Register of Wye during 1888 ...	1	0	0
" Wright, for Cartage of Fossils from Eardisland	1	0	0
" Jakeman & Carver, Stationers ...	10	2	11
" " " ...	100	0	0
" " " ...	9	9	6
" Joseph Jones, Stationer ...	0	14	0
" " ...	1	4	
" Cheque Book ...	0	2	0
" Assistant Secretary for 1888 ...	10	0	0
" Honorary Secretary's Incidental Expenses ...	3	0	0
" Postages and Incidentals, including Balance due to Assistant Secretary as per last Account of 4s. 3d. ...	4	1	0
" Balance in hands of Assistant Sec.	0	19	0
	5	0	0
" Balance in Bank ... "	87	1	8
	£228	14	1

Examined and found correct,

April 2nd, 1890. JAMES DAVIES, *Auditor.*

The Honorary Treasurer's Account for the Year ending December 31st, 1890.

Dr.

1890—Jan. 1.	£	s.	d.
To Balance from Bankers as per last Account ...	87	1	8
,, Balance in hands of Assistant Secretary ..	0	19	0
,, Entrance Fees	12	10	0
,, Subscriptions for 1890	88	0	0
,, Arrears	13	10	0
,, Volumes of *Transactions* sold	14	0	0
,, Donations for Illustrations of Volume, 1883, 1884, 1885:	£	s.	d.
Rev. F. T. Havergal	1	5	0
Mr. J. Carless, jun.	1	5	0
,, F. R. Kempson	2	10	0
,, C. G. Martin	1	5	0
,, G. H. Piper	1	5	0
,, J. B. Pilley	1	5	0
	8	15	0
To Dr. Lilley in excess of his Subscription	0	0	6
,, Donation by Mr. H. Southall towards Illustrations of Dr. T. A. Chapman's "Entomological" Paper ...	1	1	0
	£225	17	2

Cr.

1890.	£	s.	d.
By Landlord of *Saracen's Head* Inn for taking Daily Register of Wye, 1889.	1	0	0
,, Ditto, ditto, 1890	1	0	0
,, J. Noble, Fittings to Barometer, Repairing, &c.	0	18	9
,, Balance due to Hon. Secretary for Incidental Expenses in 1889	1	15	0
,, Hon. Secretary's Incidental Expenses for 1890	4	15	0
,, Jakeman & Carver, Printing in 1889 ...	5	7	2
,, ,, ,, ,, *Transactions*, and Binding in 1890	136	15	0
,, Printing Notices, &c., in 1890	4	0	3
,, Joseph Jones, Paper and Envelopes	1	8	6
,, Assistant Secretary's Salary, 1889....	10	0	0
,, ,, ,, ,, 1890.... ..	10	0	0
,, ,, ,, Postages, &c., 1890	4	0	0
,, Balance in hands of the Hon. Treasurer	44	17	6
	£225	17	2

Examined and found correct,

April 8th, 1891. JAMES DAVIES, *Auditor.*

The Honorary Treasurer's Account for the Year ending December 31st, 1891.

Dr.

Jan. 1.	£	s.	d.
To Balance in hands of Treasurer brought from last Account	44	17	6
,, Entrance Fees	4	10	0
,, Subscriptions for 1891	78	0	0
,, Arrears	1	10	0
,, Rev. W. D. V. Duncombe, in excess of his Subscription	0	0	6
	£128	18	0

Cr.

1891.	£	s.	d.
By Donations to Hereford Free Library Committee for Cases in Museum	10	0	0
,, Jakeman & Carver, Printing in 1891 ...	5	10	0
,, Joseph Jones, Stationery for 1891.. ...	1	18	6
,, Honorary Secretary, for Postage, &c. ...	3	10	0
,, Assistant Secretary, for Postages, and Sundry Payments in connection with Field days for 1891	5	3	11
,, Assistant Secretary's Salary for 1891 ...	10	0	0
	36	2	5
,, Balance in Treasurer's hands	92	15	7
	£128	18	0

	£	s.	d.
Balance in Bank on 31st December, 1891	98	5	7
Deduct Cheque to Jakeman & Carver, not cashed	5	10	0
	£92	15	7

Examined and found correct,

March 22nd, 1892. JAMES DAVIES, *Auditor.*

The Honorary Treasurer's Account for the year ending December 31st, 1892.

1892.	Dr.	£	s.	d.
Balance in hand, brought forward from last account		92	15	7
To Entrance Fees		14	0	0
,, Subscriptions received for 1892		90	10	0
,, Arrears of Subscriptions received		4	0	0
,, Three Volumes of *Transactions* sold ...		1	10	0
,, Two copies of Index, 1851 to 1882		0	2	0
,, Excess of his Subscription by Rev. W. D. V. Duncombe		0	0	6
	£202	18	1	

1892.	Dr.	£	s.	d.
By Dr. M. C. Cooke, for "British Desmids" ...		2	0	0
,, Dr. Paul Chapman, Donation towards University Extension Lectures on Geology ...		10	0	0
,, W. H. St. John Hope, Hon. Sec. Society of Antiquaries, Subscription for 1891 ...		1	0	0
,, Jakeman & Carver, for Printing		9	13	0
,, ,, ,, Printing *Transactions* of the Club from 1886 to 1889		134	15	0
,, Joseph Jones, for Stationery		2	1	3
,, Honorary Secretary, for Postages, &c. ...		3	8	0
,, ,, ,, Editorial Correspondence *re* Volume of *Transactions* ...		0	12	0
,, Colouring Strata of a Geological Plan ...		2	2	0
,, Assistant Secretary for Postages and sundry Payments in connection with the Field Days for 1892		6	15	9
,, Cheque Book		0	2	0
,, Railway Fares and Luncheons to Chepstow and Brecon Beacons	£ s. d. 14 4 8			
Less received...	13 3 8			
		1	1	0
,, Assistant Secretary's Salary for 1892 ...		10	0	0
,, Dr. T. A. Chapman, first payment towards guarantee of £16 for Illustrations of "The British Acronycta and their Allies" ...		10	0	0
,, Balance in hands of the Hon. Treasurer ...		9	8	1
	£202	18	1	

April 1st, 1893.

Examined and found correct,
JAMES DAVIES, *Auditor.*

ILLUSTRATIONS.

Errata, Corrigenda, et Addenda.

N.B.—The *Addenda* and *Corrigenda*, connected with the Volumes previous to the year 1890, will be found at the end of this Volume, at the commencement of the Index 1883 to 1892.

Page 11.—Eight lines from the bottom for 172, read 172—,

Page 31, line 31.—The date of the latest authenticated living specimen of the Great Auk was 1844.

On February 22nd, 1894, an egg of the Great Auk was sold at Mr. Steven's Auction Room in King Street, Covent Garden, for 300 guineas. The purchaser was Sir H. Vauncey Crewe, Bart. This egg was originally bought by Yarrell from a fisherwoman at Boulogne. In 1856 upon the death of Yarrell, it was sold for 20 guineas to Mr. Bond in this same Auction Room. In 1875 it came into the possession of Baron Louis d'Hamonville, of Marronville, Meurthe, France, by whose orders it was to-day sold.

Page 72.—With reference to our remarks respecting the 6th legion, in correction of the statements made on lines 16 to 18, we subjoin the following information on the authority of Mr. F. Haverfield, writing from Christ Church, Oxford, under the date of April 21st, 1893 :—

"The invading army of Aulus Plautius in A.D. 43 included four legions :—

1.—Leg. ii., Augusta, which remained in Britain till the evacuation and was at Caerleon.

2.—Leg. ix., Hispana, which was cut to pieces somewhere about A.D. 100—120. Till then it was at York.

3.—Leg. xiv., Gemina, which left under Nero.

4.—Leg. xx., Valeria victrix, which remained to the end and was at Chester.

Instead of Leg. xiv. (or at least some few years after its departure) came Leg. ii., adjutrix pia fidelis. This left again before A.D. 95. We know that it was at Chester and Lincoln, whether permanently or not cannot be said : even if permanently it could only be for a few years. No legion, so far as we know, came to take its place.

Instead of Leg. ix., Hadrian brought Leg. vi., Victrix, which succeeded it at York till the evacuation.

From Hadrian onwards the legionary garrison of Britain therefore consisted of Leg. ii., Augusta ; Leg. vi., Victrix ; Leg. xx., Val. Victrix.

Incidentally, portions of other legions seem to have been in Britain. Thus the army of invasion in A.D. 43 included a detachment from Leg. viii., Augusta, and Hadrian brought bits of that legion and of Leg. xxii. primigenia, and there are one or two other less certain cases. But these detachments came, did their work, and went ; they do not seem to have belonged in any sense to the army of the province. Of course that army included other 'auxiliary' troops beside the legions. It is perhaps fair to conjecture that the reduction of the legions from 4 to 3, consequent on the departure of the Leg. ii., adjutrix, may coincide with the pacification of the country. We find a new judicial authority set up about that time."

Page 104, line 1.—We have recently received from Paul Foley, Esq., the following information regarding the excellent brickwork of Stoke Edith House :—The bricks were, I believe, either local or were obtained from the neighbourhood, probably from Ashperton Park. About 1,500,000 were used, and they were made by one Simon Peter. In the documents I find charges for "carriage" and also for "faggots" to bake them.

Page 167.—For "crater if a volcano" read "crater of a volcano."

Page 211.—*(a.)* The footnote which ought to have appeared on this page (bearing reference to line 16) appears at the bottom of page 212.

Page 212.—Transfer the footnote *(a.)* to the previous page 211.

Page 279.—Treasure Trove.—The "tall, elegant vessel with a perforated cover, tapered like a pepper-box," &c., &c. For a representation of a similar vessel, see "Old English Plate," 4th edition (Murray, 1891), No. 50, Salt (1607) at Christ's Hospital, London, on page 257 ; and the following extract from page 255 of the same volume :—"At the very end of the sixteenth century we find a circular bell-shaped salt, or spice-box, in three tiers or compartments, much in fashion, but only for a few years. They are no doubt the "Bell" salts of contemporary inventories. "The bell salt of silver with his cover" was an item in the will of Sir Thomas Scott, of Scot's Hall, which is dated 1594 ; and a Durham will of 1593 refers to "a white bell salt," as well as to a "trencher salt." The specimen illustrated (No. 50) belongs to Christ's Hospital, London, and is fourteen inches high. Its style of ornamentation speaks for itself, and is very representative of its period. The two lower compartments form salt-cellars, and the upper one serves as a pepper-caster. A second specimen was in the collection of Mr. Octavius Morgan ; and a pair, one of 1599, and the other of the following year, are, or were, in the possession of Sir G. Dasent."

Page 283, line 27.—To the list of Churches with a tumulus in the immediate vicinity, add Staunton-on-Arrow, Llancillo, and Much Dewchurch.

Page 319, line 10.—Change the punctuation, which, when corrected, should be printed as follows :—"one two hundred feet from, the other close to, the Road Bridge."

Page 323, line 1.—For Hock Cut read Hock Crib.

Page 323, line 11.—For Kingroad read King Road.

Page 323, 3 lines from the bottom.—Bab-el mandeb should be Bab el-mandeb.

Page 352, line 1.—For Peak of Teneraiff read Peak of Teneriffe.

Page 358.—Insert date of Fungus Foray, Tuesday, September 20th, to Thursday, September 22nd, 1892.

Page 359, three lines from the bottom.—For Red Grouse Cock and Partridge Hen, read Male Pheasant and Female Grouse (see page 378, line 1).

Page 360, line 24.—For Tulsane's read Tulasne's.

Page 404, line 4.—Now known as *Phacops Davisii*, the head showing that the glabella is largest in front. This trilobite may also be found one mile from Builth in a cutting on the road leading to Aberedw on the south bank of the Wye.

Woolhope Naturalists' Field Club.

April 10th, 1890.

The Annual Meeting of this Club took place in the Woolhope Club Room, on Thursday, April 10th, and was well attended. The Volume of *Transactions* for 1883, 1884, 1885, illustrated with a speaking likeness of the late Dr. Bull as a frontispiece, was distributed. The thanks of the Club were accorded to the Editorial Committee, and to Mr. Robert Clarke for his valuable help in preparing so many of the Illustrations, especially those of the numerous ancient camps which had been so systematically examined and treated of by the late Dr. Bull.

A letter was read from the President elect, Sir Herbert Croft, Bart., placing his resignation of the office of President in the hands of the Club, due to his having accepted an unexpected "retainer" which required his services in Queensland and New South Wales, whence he did not expect to return home until July 25th. His resignation was not accepted, Mr. Southall having agreed, by invitation, to act for Sir Herbert during his absence.

The days and places of Field Meetings were fixed as follows:—Friday, May 30th, Stokesay, in conjunction with the Caradoc Club. Tuesday, June 24th, Kingsland, Eardisland, and Monkland. Thursday, July 31st (Ladies' Day), Berkeley Castle. Tuesday, August 26th, Brecon Beacons.

Mr. H. C. Beddoe was elected Honorary Treasurer, *vice* Mr. Cam, deceased.

The Rev. H. A. Barker was elected a member of the Club, and nine names were given in to be balloted for at the next meeting.

A guarantee of £16 was given to assist Dr. T. A. Chapman in the illustration of subjects on Entomology, to which he has devoted much attention, on the stipulation that the grant was not to be included in the expenses of the present year.

In reply to a circular from "The British Association for the Advancement of Science" it was considered that some assistance could be given by some members of the Club whose attention was devoted to Photography towards the "Collection, Preservation, and Systematic Registration of Photographs of Geological Interest in the United Kingdom."

The following books received since the last Annual Meeting, were laid upon the table:—Smithsonian Report, Part 1 of 1886; North American Fauna, Nos. 1 and 2, United States Department of Agriculture; The English Sparrow in North America, Bulletin 1, United States Department of Agriculture; Report of Professor Joseph Henry, Secretary of Smithsonian Institution, for 1867, 1869, 1870, 1876, four reports altogether; British Uredineæ and Ustilagineæ, by Chas. B. Plowright; 33rd Annual Report of Proceedings Warwickshire Naturalists and Archæologists Field Club, 1888; Proceedings of Bristol Naturalists'

Society, new series, Vol. 6, part 1, 1888; The Origin of the Cotteswold Club from its formation to May, 1889; Cardiff Naturalists' Society, Vol. 20, part 2, and Vol. 21, part 1; Proceedings of Geologists' Association, Vol. 10, number 9, Vol. 11, numbers, 2, 3, 4, and 5; Essex Naturalist, or Journal of the Essex Field Club, Vol. 3, numbers 1 to 6, and Vol. 2, numbers 7 to 9; President's Address and Sectional Address of British Association for the Advancement of Science at Newcastle-on-Tyne, 1889; and a collection of minerals from Mount Vesuvius presented by the Rev. J. O. Bevan.

The question of providing without delay a suitable repository for the Herbarium including, besides the Flora of our county, the Lichens and Mosses given to the Club by the Trustees of the late Rev. J. F. Crouch, and that of placing the books belonging to the Woolhope Club within access of the members, was relegated to the Central Committee to negotiate with the Free Library Committee. The minutes of the meeting of the Central Committee on February 15th, 1889, having been read over, this negotiation was considered now a matter of paramount urgency, since the Club, and consequently the County, have, owing to the absence of suitable cabinets, lost many objects of natural history, and also some valuable geological specimens which have been found worthy of a position in the Natural History Department of the British Museum at South Kensington. The retiring President, at the conclusion of his address, notified his willingness to contribute to a special fund for making the Museum worthy of our County, and there are now hopes that the long needed subsidy will be obtained which the Free Library Committee requires.

When the ordinary business of the day had been transacted, Mr. H. Southall delivered his retiring address, and in the evening Mr. Alfred Watkins, by means of the oxy-hydrogen lantern, reproduced upon the screen a series of photographs, the results of many years' observations, representing the Pigeon Houses of Herefordshire. His treatment of the subject gave evidence of careful observation in his travels over the county. The remains of what he considered the earliest Norman Columbarium were to be found at Cowarne Court, similar in construction to that now to be seen at Garway, which, as is known by an inscription over the door, was built in 1326 by Brother Richard, one of the Knights Templars, which body founded a preceptory at Garway. Mr. Watkins traced these buildings in chronological order down to the picturesque dovecots of the present day. One of the most conclusive facts in favour of the value placed upon pigeons as a source of food supply was that, as was shown by inscriptions, the pigeon house was built before the mansion itself, the occupiers of which depended upon it partly for their daily food, was finished.

The following members attended the meeting :—Mr. H. Southall (President), the Revs. J. Barker, W. Bowell, Preb. W. Elliot, E. J. Holloway, Augustin Ley, H. B. D. Marshall, M. G. Watkins, H. T. Williamson, Dr. T. A. Chapman, Messrs. F. Bainbridge, H. C. Beddoe, R. Clarke, James Davies, T. Hutchinson, O. Shellard, H. J. Southall, H. Vevers, Alfred Watkins, James B. Pilley (Assistant Secretary), and H. C. Moore (Honorary Secretary).

RETIRING ADDRESS

[Of the President, Mr. H. Southall, F.R., Met. Soc.]

Gentlemen of the Woolhope Naturalists' Field Club: My term of office has now nearly expired, and the one remaining duty, in accordance with rule and custom, is to deliver my retiring address. Before however vacating the chair, permit me to thank you one and all for the uniform and constant consideration and kindness, I may say indulgence, you have shown me during the last year, as well as for the distinguished honour you conferred upon me when you elected me President of our renowned Club. In comparing our mode of annual election, with that in force in some other societies where the same President continues in office for many years in succession, we have at any rate the advantage of freshness and variety; and if the words of the poet are true, "that some are and must be greater than the rest;" still, those who are less distinguished may at least serve as a setting to their more brilliant compeers, and help if only by way of contrast to bring them out in better and brighter relief. I think that there can be no question that the gentleman you have chosen as my successor is one well qualified for the post. He has been present with us at most of our Field Meetings of late, and has taken a great interest in our proceedings, and he will, I am satisfied, spare no pains or trouble to make the coming year a successful and agreeable one. His knowledge of the county, and the very long period during which members of his family have been prominently connected with it, may also enable him to contribute some valuable additions to our records. I am sure you will excuse his enforced absence for two or three months, and join with me in wishing him a safe and pleasant journey to the Antipodes, as well as a speedy return. I understand he proposes to be with us at the Ladies' Day excursion in July next. I regret to have to record the death, during the past year, of one honorary, and three ordinary members. The former, the Rev. Miles Joseph Berkeley, of Market Harboro', was a distinguished member of the Linnean Society. He appears to have paid us a visit for the first time on the occasion of the Fungus Foray in 1873, when he was introduced as "A veteran botanist and horticulturist." In the address of the President in 1875, he was described as "A Nestor of Mycologists." He was unanimously elected an honorary member in 1874, and presented no less than 97 apple grafts to different members of the Club, some of which, I have no doubt, have already produced much good fruit. He appears to have been with us at several subsequent forays, and to have been of much assistance in naming some of the more difficult species collected. One or two papers of his are printed in our *Transactions*. We have also this year to mourn the loss of one of our oldest members, Richard Hereford, Esq., late of Sufton Court. His name is mentioned as a member in our *Transactions* of 1866, but he probably joined the Club some years previously. He ever took a warm interest in our doings, and although he was not prominent in any special branch of science or natural history, yet his genial presence at our

meetings was always acceptable. His energy even when an octogenarian was remarkable, and he was a fine example of the Old English gentleman. By the death of Mr. Thomas Cam, J.P., the Club has also lost one who rendered good service for many years. His name occurs as far back as 1851. He was President in 1871, and filled the office of Treasurer from 1876 down to the date of his death. At the Annual Meeting in April, 1878, he presented to us a complete set of Nature-printed plates of the English ferns, which were then laid out for the inspection of the members, and excited much interest. For many years the soirées given by him at his residence in Hereford, during the Fungus Meeting, were largely attended, and were often times of pleasant and lively intercourse, as those who enjoyed his hospitality in October last can abundantly testify. I have also to mention the decease of Mr. J. H. Knight, who was President during 1880, the same year that he was Mayor of Hereford. In view of the gaps thus made in our ranks I would urge the necessity of endeavouring to secure an accession of useful members to take the places thus left vacant. I am happy, however, to state that so far there is no sign of decay or languishing, and that our numbers are well maintained. We must bear in mind, nevertheless, that our character as a club, gained as it has been by steady, hard work in the past, can only be preserved by real work in the future; and that we should be far more than a mere picnic club, enjoyable as our excursions may be, and I think they were never more so than last year. As our indefatigable Hon. Sec,, Mr. Moore, has furnished very full accounts of our five meetings, I need do no more than summarize briefly the work accomplished. We were favoured with fine weather throughout, had no broiling or soaking experiences, as in some former years, and we had without exception pleasant and interesting gatherings. All were well attended, unless some exception be made for the Fungus Foray, which did not prove so successful as sometimes, or so productive to the collectors. The last two or three seasons, for some reason not very clearly known, have been unfavourable for fungus growth. There are but few of our members who take much interest in Mycology, and had it not been that our illustrious visitors from a distance again favoured us by their presence, as well as by reading some excellent papers, I fear we should not have had much to record this year. With respect to our other meetings; you will remember that our first excursion was to Titley, Eywood, and Presteign, a part of the county but little previously explored. The well marked portion of Offa's Dyke near Titley station was interesting to some of us, who knew it in the extreme south of the county, as presenting a slightly different appearance. Whether it was originally intended as a boundary, or a fortification, it could have possessed but little value as a military earthwork. It probably marked a border line which was jealously guarded on both sides, and may have been a considerable protection against cattle marauders. Several rare plants were found in a boggy wood close by. The Buckbean, Marsh cinquefoil, and Marsh violet are all of them scarce in Herefordshire, probably on account of the few real bogs still left undrained. A new station for one of our scarcest plants has lately been found in this neighbourhood, *Teesdalia nudicaulis*. Though the botanists had a fairly good day, still the principal honours may be probably due to the archæologists. The paper read,

containing notes on the Harley family, was a good sequel and supplement to that contributed on the same subject at Brampton Bryan. Those describing Knill Church and Court took us back to the time of the Crusades, an inscription, on the arch of the front door of the Court, cut in Early English characters at the recent restoration of the building, having the date of 1187. The Parish Registers of Presteign commence in 1561. We were allowed to inspect them, and they furnish much valuable information. The detailed accounts of the ravages of the Plague are very striking. They appear at Presteign to have had three separate violent outbreaks. That in 1593 was specially severe. But in 1610, and again in 1637, it was excessively fatal in its effects, so much so that in one month alone one hundred and forty-eight deaths occurred in a population probably numbering not more than two thousand persons. At any rate the usual mortality was only about fifty per annum. And in 1593 considerably more than three hundred deaths were attributed to plague. They had thus three visitations in 44 years. At Chester, where in 1637 the grass is said to have grown knee-deep in the streets, and where there is now remaining an inscription on an old house recording its occurrence, it is said, that no less than seven separate outbreaks occurred in 93 years. I find no notice of the plague in 1593 in other places in Herefordshire, but in 1610 the Assizes were moved to Leominster because of the prevalence of the plague in Hereford. At Ross, the plague in 1637 appears to have been as bad as that in Presteign, for on a stone cross in the Churchyard the deaths from plague are recorded as numbering three hundred and fifteen, and to the present time there is a considerable area of adjacent ground still unused for burial. The same thing occurs in Leominster Churchyard. As far as I know, however, there is no written record, and the memory of it is only preserved by tradition. It would be interesting to inquire whether there are any further accounts of plagues preserved, either in parish registers, or other historical documents. Whitecross, near Hereford, is reported, I believe on good authority, to be a monument of perhaps the greatest pestilence recorded in history—the black death of 1347-8. A good deal of evidence has been obtained in Norfolk of its extraordinary prevalence and remarkable ravages in that county; but I have only seen slight allusions to its effects in this neighbourhood, nor have I read any account of the plague visiting Herefordshire since 1637, although what is called the great plague in London occurred in 1665, twenty-eight years later—the last time I believe it has attacked any part of Great Britain. Amongst other places of interest at Presteign, the Pinetum at Silia is specially remarkable as showing how many choice firs can be well grown if properly planted and sheltered. They are, however, rather too thickly planted in places, and there is a danger before long of some of the best specimens being spoilt by overcrowding, as the beauty of a tree is soon spoilt by any deformity. The rich-coloured Japanese maples were of unusual size and luxuriance.

The Ladies' Day at Newland and Monmouth was another successful meeting. At Monmouth, you will remember, we were kindly cicerone by Dr. Willis, who showed us the lions of the place, and at Newland we were not only hospitably entertained by Mrs. Bagnall-Oakeley who contributed a paper on the neighbourhood of Newland, but we also listened to an excellent paper descriptive

of Newland Church, by the Rev. W. Bagnall-Oakeley. The visit to St. Briavel's Castle and Church was also an attractive part of the day's programme.

Our excursion to Clifford and Hay Castles a month later enabled us fully to explore them, and by the help of appropriate explanations and descriptions to understand something of the history of these two important fortresses. Nothing could exceed the kindness of Canon Bevan and his wife and daughters in making us at home in their castellated residence.

The Geologists were glad at our next meeting to be conducted once more by Mr. G. H. Piper to the Ledbury Passage Beds, and it was clearly our own fault if we did not follow his lucid remarks, as he pointed out the position and characteristics of each in succession. On re-visiting the sites of the old camps, on the Herefordshire Beacon and Midsummer Hill, and searching again for the remains of the primeval dwellings of the prehistoric races who are supposed to have had a settlement in some of the secluded spots in the vicinity, we sadly missed the company and guidance of the late Rev. W. Symonds, of Pendock, whose enthusiasm used to impress itself upon us all, and who seemed almost able to bring up again, not only the actors of the long past, but the very scenes themselves in which they figured. I have certainly never known his equal as a "guide, philosopher, and friend" to any party he might accompany. On the last occasion I had the pleasure of meeting him, he expressed a wish that the geology of our county might be still better worked up, as he felt quite sure that even the Old Red Sandstone would yield more than it had yet done in Herefordshire. As I am no geologist, I may be wrong in assuming that very little of a fossiliferous character has yet been discovered; though I well remember finding in a quarry near Leominster ripple marks, and what appeared to be the track of some living creature on the sand. The fact is, almost every branch of Natural History wants more enthusiastic workers and students, and it is certain that when once a study is entered upon with real zest, the idea that science is dry is at once dispelled. The pleasure which such pursuits give, and which they continue to give even after half a century's trial, is undoubtedly great, at any rate my own humble experience testifies to it. What are called the pleasures of life often pall, and by their monotony or repetition weary and bore us. Sir G. Cornewall Lewis said "life would be tolerable but for its pleasures." Not so, I contend, with the study of nature, for the further you go in it, the more you find of intense interest to attract you. I would, therefore, urge upon our youth especially, if only for the selfish plea of personal advantage, that they should make a diligent study of some department of Natural History or Science, feeling perfectly certain that they would never regret doing so. May I be allowed before I conclude to make a special appeal on behalf of Meteorology? I do not mean the mere mechanical work of measuring rainfall daily, though I am glad we have so many observers in Herefordshire, but I allude to a careful and thoughtful observation of all atmospheric phenomena. Meteorology has one advantage—that it is never out of season; nor does locality much matter. A few good instruments are of course required, but, as one of the best observers at the Meteorological Office said to me the other day, we want, above all, men who will think and work out the many

problems which our regular, systematic, and comparable observations now present to us for solution. Rapid progress has been, is being, made, and though some people seem almost inclined to deny that Meteorology is one of the exact sciences, or perhaps even a science at all—because, I presume, we cannot as yet predict the approach of a storm with the same precision that astronomers can the occurrence of a transit, an eclipse, or an occultation—still, I maintain that many of the laws which govern our atmosphere are already definitely and positively ascertained. We know, for instance, that the existence of cyclonic conditions within a certain area will produce certain well-known effects, and that as the storm advances, which it more frequently does in an easterly direction, the weather will have certain distinct characteristics in advance and also in the rear of the depression; that the wind will circulate round this in a known direction, and that its force will be in proportion to the steepness or otherwise of what are termed the barometric gradients. It is true that the course which any storm may take, or the rate of speed at which it will travel, is not exactly known, although a good guess can generally be made on both these points. The area affected is so widespread and the contributory causes so various and complicated, that we have to solve a very intricate problem indeed. Nevertheless every year improves the accuracy of our forecasts of coming weather, so that the last accounts show that a very fair degree of accuracy has been obtained already. It must be borne in mind that some hurricanes move with extreme rapidity, and suddenly impinging upon our western shores traverse our islands with remarkable quickness; it is not much wonder then that without the necessary knowledge of weather conditions over the Atlantic, a thousand miles at least to the westward of us, we should occasionally be surprised before there is time to give the needful warnings. Much attention is now being given by the Royal Meteorological Society to thunderstorms, particularly as regards the effects of lightning upon buildings and animals struck by it. Some interesting photographs were exhibited at one of our last meetings in London of lightning flashes. It is curious that the typical forked appearance usually given by artists has never been represented in any of the instantaneous photographs taken. The classification and nomenclature of clouds are also now receiving special notice. Our late neighbour, the Rev. Clement Ley, has been working for many years at the subject, and is now one of our leading authorities, and I believe is about to bring out a new treatise relating to it. It is perhaps not generally known to what extent clouds vary in height, the range being as much as ten miles or more. The differing appearances which the different forms of clouds present are remarkable, and it is very important that a knowledge of these should be more commonly possessed, especially by observers.

I should like to make another appeal for better accommodation in our Museum-room. A hundred pounds, or perhaps somewhat less, would furnish all drawers, cases, or tables required for collections which cannot now be properly displayed. I am aware that this sum cannot be spared from our regular funds, especially as we have enough material ready for another volume of *Transactions*, and I think that the publication should not be delayed longer than necessary.

The volume which has come into our hands to-day will, I think, be found to reflect great credit on the editor, and to contain a large variety of very interesting matter, and also to compare very favourably with previous ones. To revert for a moment to our Museum, we have such excellent premises, thanks to Mr. Rankin, that it is a pity, that for want of a comparatively small sum of money, we should allow our present unsatisfactory and imperfect arrangements to suffice, especially considering the other Museums in our neighbourhood, such as those of Ludlow, Worcester, Shrewsbury, &c. I can only say further that I shall be glad to contribute towards a special fund with the view of making our Museum worthy of our county. These must be my last words, except once more to thank you for your patience in listening to me so long.

HEREFORDSHIRE PIGEON HOUSES.

[The substance of a Lecture given with Photographic Lantern Illustrations, to the Club, April 10th, 1890, by ALFRED WATKINS.]

The Illustrations from Photographs by the Writer.

THE dwelling houses, churches, and religious houses, which remain to us from a past generation, are in little danger of being swept away without a full record being made of their character and use, through the labours of many willing workers.

But in the case of the more humble buildings of which I speak, the same cannot be said. In our own county there are still a large number of interesting examples left, but each decade lessens the number, and out of a list of thirty-four demolished pigeon houses which I have compiled, not one has, to my knowledge, been described or illustrated. Of the seventy-four existing examples which I have surveyed (and photographed for the most part) only one, that at Garway, had previously been described.

It was this consideration which induced me to make as complete a survey as possible of the dovecots of Herefordshire. It is perhaps well to define the class of building I wish to investigate, viz., the substantial tower-like building, the direct descendant of the Norman columbarium, built from the ground for the one chief purpose of housing pigeons for breeding purposes, although in later days they have been built in two stories, the lower part being put to other uses.

The mere loft over stables, or picturesque barrel dovecot on a pole, or cluster of nesting boxes against a wall, I do not include.

I have no new light to throw upon the question as to when the English people first kept pigeons in dovecots; but nothing I have seen tends to disturb the usual opinion that it was the Norman conqueror who first introduced into England the massive pigeon tower which has served as type for so many succeeding generations, and with it the feudal "right of dovecot" which survived until the time of Elizabeth, under which the lords of the manor and rectors alone possessed the right of maintaining a dovecot.

The earliest example in Herefordshire (and probably the finest in England) still stands in capital preservation at the Church Farm, Garway, in the secluded Monnow Valley. This building has been so fully and accurately described and illustrated by the Rev. John Webb in vol. xxxi. of the *Archæologia*, 1845, that there is no need for me to go into full details. It is, like all those of Norman origin, circular, stone built, the top domed over with stone leaving a two feet opening for the pigeons to enter. Mr. Webb assigns its building to the Knights Hospitallers, successors to the Knights Templars, the latter order having founded a preceptory on the site where the pigeon house now stands; and he deciphers an inscription which may still be seen in a half obliterated condition on a tympanum over the doorway to be as follows:—"In the year 1326 brother Richard built this columbarium." Some mason marks—crosses of the two knightly orders, and the

word Gilbertus—are inscribed on the stones lining the interior, each one of which is carefully dressed to the interior curve of the building. The walls are three feet ten inches thick and are lined from floor to arch with tiers of nesting holes, 666 in all. Perhaps it may be as well at this point to describe the pigeon holes or nest holes in this building as their construction is similar in dovecots of all periods. The openings of the holes are about six inches square, and they recede about fourteen inches into the substance of the wall. If the cavity were of the same size throughout its depth, the bird would not have room to sit upon her scanty nest, it therefore enlarges right or left into an L shaped cavity about ten inches in width. The holes are arranged twenty inches apart in rows, each row or tier being ten inches above the one below. An alighting ledge of stone projects underneath each alternate tier of holes, the intermediate tier of holes being without alighting ledges. I cannot guess at the reason for this, but I find these alternate ledges copied in pigeon houses of many styles for several centuries. Then the nest holes of one tier enlarge to the right hand, the tier above enlarges to the left; this plan of construction seems to be almost invariable in stone and brick buildings; in only one case I found the holes enlarge to both sides of the entrance.

At another Herefordshire preceptory of the Knights Hospitallers—Dinmore—the dovecot stood until about a century ago.

There is but one other instance existing in the county of the domed-over stone roof of castle-building times, and this at a place formerly called Syfervest (there was a family of that name), but now Cowarne Court; the present roof is of the usual conical type, but the broken masonry inside where the springing of the arch commenced is unmistakable.

I shall now briefly glance at the examples which are to be found in that interesting peninsula of Gower, an English-speaking district in the heart of Wales, bristling with castles, and ancient camps, and full of interest to the archæologist. There, at three of the castles, viz.—Oystermouth, Penrice, and Oxwich—are still to be found dovecots, slightly varied in type, but all circular, stone built, and without wood-framed roof. Those at Oxwich and Oystermouth are partly demolished, but show signs of the domed roof. At Penrice the dovecot, which stands close outside the outer wall of the Castle, is in perfect condition, and of rather unusual type. It is circular—as all early examples are—10 feet inside diameter, walls 4 feet thick, 20 feet high, gradually tapering to an aperture in the top of about 2 feet, and lined throughout with nest holes, each provided with a rough projecting stone as alighting ledge.

Mr. Freeman (*Arch. Camb.* 1850) pronounces this Castle to be "not older than Edwardian times."

It was my good fortune to identify a fourth, and perhaps more interesting dovecot on this coast. In the sea cliff, close to Port Eynon, a curious structure called Culver Hole often attracts attention. It consists of a cave or chasm, closed in by means of a massive stone wall, 60 feet high, and 10 feet thick at the base, the wall being pierced with five windows. Inside, a rude stone stairway in the upper part gives access to a large number of pigeon holes lining the wall. Curiously enough, the fact that this structure was built as a pigeon house pure and simple,

does not seem to have occurred to a writer in the Archæologia, vol. 29, who describes and sketches it, or to any other writer on the district. A rather difficult climb showed me that the holes—some hundreds in number—were nest holes of the true L shape, and by no possibility could they have been intended for any other purpose. The name too—Culver is an old English word for a dove—proves the matter. Local tradition says the place was built by a Mansel of Hen-y-llys, the same family as the builders of Oxwich Castle, which possesses a dovecot. But why should a dovecot be constructed in this lonely and unusual situation? (High tides wash the floor of the cave). This was a puzzle until I remembered that the Wild Rock Dove still inhabits this coast line, that in former times they were far more plentiful, that they nest in the numerous caves and clefts, and that all our domestic pigeons are direct descendants of, and will inter-breed with, these wild doves (*Columba livia*). Here, then, is the inevitable conclusion I arrived at; that in castle-building times, a dovecot was built in the cliff with the evident intention of enticing and perhaps partly domesticating the wild pigeons. With what success will probably be never known.

A farm-house pigeon which I purchased in Hereford Market is absolutely identical in colour and markings with the true Wild Rock Dove. They may be seen and compared in our local Museum.

But to return to Herefordshire. This county possesses no examples or records of castle dovecots; some of the circular stone ones, however—direct descendants of the Norman patterns—are interesting. At Court House, Richard's Castle, is one with three dormer windows in the roof; the walls are three feet eleven inches thick, and it contains 630 nest holes (one of similar design occurs at Kyre Park, Worcestershire). This example, and in fact most of the circular ones, is fitted with a revolving ladder, a contrivance to enable the owner to reach all the nest holes. In the centre of the building an upright beam is fixed on pivots free to revolve; it carries two horizontal arms which in their turn carry an upright or sloping ladder, free to sweep round the inner circumference of the building. The revolving ladder was evidently not fitted to the earlier Norman buildings, and was only adopted when timber framed roofs took the place of stone domes for dovecots. I see no reason, therefore, to suppose that the idea came from the French.

At Wigmore Grange—the Abbey was founded by Hugh de Mortimer in Stephen's reign—the round stone pigeon house was needlessly destroyed in 1888; it was built of dressed stones of uneven size, and among the stones when pulled down were some carved corbels; it was, therefore, probably built when the abbey was demolished at the Reformation. The vane was dated 172, but this was probably not the date of the building.

The dovecot which stood on the site of the ancient palace of the Bishops of Hereford, at Bosbury, was only pulled down in 1884, but I can hear of no description or drawing of it. It seems probable that it existed when Bishop Swinfield's Roll of Household Expenses was written in 1289, for this mentions "pigeons from the columbarium of the manor of Bosbury," and the Rev. John Webb describes it as like the one at Garway (1326).

The wall thickness of a pigeon house gives some rough information regarding its age, as the earliest examples had the greatest substance of walls, and the most recent ones are seldom more than 2 feet 6 inches thick. The circular pigeon house at Holme Lacy is entirely distinct in style from local examples, and was probably designed by an architect from later French examples. No pigeon holes are formed in the substance of the wall in this case, and wooden boxes had therefore to be added.

All but one of the eleven Herefordshire circular pigeon houses are built of stone.

When an alteration took place in the structure of domestic buildings in the direction of timber framing instead of massive stone walls, the change spread to pigeon houses, and square buildings became the rule; for timber work does not lend itself to circular forms. The square shape is in the majority in Herefordshire, and forty-one still exist. Very picturesque some of them are, especially when the roof is four gabled, and the surmounting wooden lantern through which the pigeons enter reproduces the same form, as at the Moor Farm, Hereford. The date of this particular style is given at Luntley, 1675; curiously enough the house is dated one year later, and an outbarn, 1672. This is the second instance I have found in which a dovecot was built before the house; for at Bromtrees Hall the octagonal pigeon house is dated 1721, and on the leaden water pipe heads against the house 1723 is cast.

The smallest pigeon house I have seen is in a garden at Mansel Lacy, and the stone front of the adjacent house is fitted up with a number of nesting holes. I have met with no other instance of true pigeon holes in the walls of a dwelling house.

Most curious of all is the richly carved and ornamented square timber built example at Buttas, or Butt House, King's Pyon, built by George and Elizabeth Karver, in 1632. Local tradition says that the middle chamber (there are three stories) was a falconry, and the structure of the building seems to bear this out. The date and initials are carved in raised letters in panels on the N. side.

In many of the square pigeon houses the structure is of timber (oak framing), and the walls are filled in with "wattle and daub," brick being often substituted at a later date. The nest holes are continuous tiers of boxes formed of oak strips and boards, the perpendicular divisions between the boxes are not at right angles to the wall, but set at a considerable angle, in order to give the same accommodation for the length of the sitting bird that the L shape of the nest holes in brick or stone affords.

A pigeon house of this type was pulled down in 1889 at Putson—a suburb of Hereford; the roof was single span.

Pigeon houses were usually close to the house, and sometimes in the court yard "because the master of the family may keep in awe those who go in or come outt" as the Sportsman's Dictionary (1725) remarks.

This delightful old book has a good deal to say on the matter, and as a precaution against the encroachments of rats, describes how tin plates should be fastened at a certain height at the outward angles of a square pigeon house, "so

that when the rats come to them and cannot catch hold of them, they may fall upon the iron spikes which are usually fixed at the bottom, or the place you foresee they may fall." At the square stone pigeon house at the Dairy Farm, Bollitree, these plates are fixed fifteen feet up. They are like the angle plates on a packing case. The iron spikes I have not seen. Rats have always been a source of danger to pigeons, and seem able to climb up the walls and gain entrance at the top. A number of Herefordshire dovecots are provided with a projecting string course on the outside, which baffles the climbing rats.

The square wooden pigeon house at Ashton is said to have been moved from an orchard (still called Pigeon House Orchard) at Berrington Hall, being brought up on rollers by several yoke of oxen. The way in which the foundations are prepared seems to confirm this statement.

Many of the later square pigeon houses are brick built, as the handsome example at Eardisland, where the walls run up outside the eaves, the roof being four gabled; the vane on the four gabled lantern is in the shape of a fish, for a good trout stream—the Arrow—flows at the foot of the building.

The great diversity of vanes on these buildings is an interesting feature, and many of them are dated. The following are instances: Dragon, square shield with coat of arms, claw-shaped, double-headed eagle (arms of family), fox, and serpentine claw. The common weather cock only occurs in two instances, and the modern arrow I have not noticed at all. A ball on a pole is a frequent terminal to the lantern. At Foxley is an hexagonal pigeon house; the only example in the county.

Octagon is the most modern shape for pigeon houses, although the earliest example—at Hellens—is dated 1641 in large stucco letters on the brickwork, together with the initials $_{F}{}^{W}{}_{M}$ for Ffoulkes and Margaret Walwyn; curiously enough the vane bears another date, E W 1753. The octagon pigeon houses, of which there are twenty-one instances in Herefordshire, are all—save one stone example—built of brick, and fitted again with the revolving ladder, which being quite useless in a square building was never found in it. The nest holes are, as in the circular buildings, formed in the solid substance of the wall. The wall thickness is 2 feet to 2 feet 2 inches, instead of the 3 feet 10 inches, the early examples of castle building times; in fact, I have found that the thickness of wall is a rough criterion of the age of a pigeon house.

Most pigeon houses of later days are fitted up with an inside trap in the apex of the roof, which is worked by means of a hanging cord, and enables the owner to catch the birds to replenish his larder. The large pigeon houses have always been studied from the food point of view, and members of the pigeon fancy never seem to use them. Even in the oldest English book on fancy pigeons—"Moore's Columbarium," 1735—it is the "loft" and not the "house" which is always referred to.

It was in the seventeenth and eighteenth centuries that the bulk of existing pigeon houses seem to have been built, and the custom suddenly stopped in the beginning of the present century, for none appear to have been built since about 1810. "Mangel Wurzels killed them," says Chancellor Ferguson, and there

is no doubt that since the general introduction of the system of winter feeding of cattle, and the consequent abundant supply of fresh meat during that season, the demand for pigeons as food has been greatly limited.

In our forefathers' time, when salted meat was the staple for the winter, it is no wonder that the roomy pigeon house with accommodation for at least 500 couples was considered an indispensable adjunct to the larder at a country house.

At the present time pigeons are kept in only about a third of these buildings.

From the "English Illustrated Magazine," by permission of Messrs. Macmillan & Co

HEREFORDSHIRE PIGEON HOUSES.

A Survey made in 1888-89 by Alfred Watkins, Hereford.

Round Pigeon Houses—Stone Walls.

Locality.	Inside diameter	Wall thickness	Nest holes	Lantern	Revolving ladder	Remarks
Cowarne Court	18'	3'—9"	To ground, ledges each alternate tier Upper loft only	None	None	Has evidently been domed over, probably late Norman
Sufton (Old)				Octagon	None	Vane—A double-headed eagle 1M 1764; structure (stone, now brick faced) much older
Richard's Castle (Court House)	16'	3'—11"	630	3 gabled	Yes	3 dormer windows in roof, only instance in county
Garway	17'—3"	3'—10"	To ground 666	None	None	Dated 1326, in perfect order, top domed over, finest example in England (see Archæologia, vol. 31, 1845)
Tarrington (Aldersend)	16'	2'—9"	576	Round	Upright one and trap at top	String course outside to baffle rats, irregular holes, bottle shape
Colwall (Barton Court)	15'	3'—1"	To ground	None	None	No traces of arched roof, ledges to each alternate course of nest holes
Holme Lacy (Home Farm)	15'		Separate wooden cues in upper loft	Fine one with projecting gallery and vane	A light one	Design quite different to others, probably taken from French examples
Stoke Prior (Bury House)	13'—6"	3'	To ground	Square	None	Rudely built, alighting ledges to each tier of holes
Netherwood (Bromyard)		2'—9"	To ground	Square	Yes	
Stockton bury	14'	2'—9"	To ground	Octagon	Yes	Four lancet windows in walls, vane E B 1759

Round Pigeon House—Brick Walls.

Locality	Inside diameter	Wall thickness	Nest holes	Lantern	Revolving ladder	Remarks
Showle Court	17'	2'—2'	To ground	Round	None	Brick alighting ledges

Square Pigeon Houses—Stone Walls.

Locality	Outside size	Roof	Nest holes	Lantern	Vane	Remarks
King's Caple Court	15'	Pyramid	Upper loft only	Square	Claw shape	Upper part built of brick, now used as a silo
Much Marcle, Rocks Place						
Oreop (Pigeon House Farm)	12'	Single Span	Upper loft	Demolished	None	
Webton	14'	Single Span	Upper loft	Square	None	Upper part built of brick M
Kimbolton (Bach Farm)	16'	Four gables		Square	Gone	Cellar underneath, inscription 1747
Middleton (Nurton Court)	20', 2'—8" thick	Single Span	850	Square	Serpentine Claw	Two outside string courses. Three square headed windows. Date of old house 1631
Middleton (Moor Abbey)	16'	4 gabled	Upper loft	Square	None	
Eaton Bishop (Green Court)	14'	Demolished	To ground			Only part of walls left; upper part was brick and timber
Wootton Leysters		Single Span				
Alton Court (Ross)	16'	Pyramid	Upper loft	Square	None	Modern
Bollitree Castle	9'	Pyramid	Upper loft	Octagon	None	
Bollitree (Dairy Farm)	11' by 9"	Pyramid	Upper loft	Rectangular	Plain flag	Plates of sheet iron are bent round outside angles of walls 18ft. up, to keep rats from climbing
Eccleswell Court	14'	Pyramid	640 in wooden boxes upper loft	Plain		Three pointed lancet windows, probably not originally a pigeon house, walls only 18" thick

16

Square Pigeon Houses—Timber Framed Walls.

Locality	Outside size	Roof	Nest holes	Lantern	Vane	Remarks
Butt House (King's Pyon)	11' by 11'	4 gabled	In loft only	None	None	Richly carved, middle chamber overhangs, inscription GE K 1632
Byford Court	18' by 18'	Pyramid	In loft only	With lead OG Top	None	
Hereford (Moor Farm)	12'6" by 12'6"	4 gabled	In loft	4 gabled	None	Same date evidently as Luntley (1673)
Luntly Court		4 gabled	To ground	4 gabled	A fox	Dated 1673, barge boards carved
Lugwardine	11'3" by 11'3"	Pyramid	To ground	Square	None	
Pontrilas Court	17' by 17'	Pyramid	Upper loft	Square	Ball top	Plaster coving under eaves
Bidney	14' by 14'	Single span	Gone	Square	None	Timbers are notched to form a very neat ornament
King's Pyon (White House)	14'3" by 14'3"	Pyramid	500 in upper loft	Square	None	Lower part stone built
Mansell Lacy	9' by 9'	4 gabled	Gone	None	None	In garden of house with nest holes in house front. Smallest one seen
Putley Court	10' by 10'	4 gabled	Gone, upper loft only	Octagon	Ball top	On four posts, all wood built
Barton Court (Pembridge)	11' by 11'	Single span	Upper loft	Square	None	Lower part stone built, entrance for pigeons in gable
Lawton's Hope (Canon Pyon)	14' by 14'	Single span	To ground	Square	None	A large stone raised on wood blocks in middle of floor
Ashton (Leominster)	18' by 20'	Single span hipped	Upper loft	Octagonal lead top	Ball top	All wood framed and board, said to have been moved bodily from Berrington

17

Square Pigeon Houses—Brick Walls.

Locality	Outside size	Roof	Nest holes	Lantern	Vane	Remarks
Eardisland (Porch House)	20' by 20', 2' 6" thick	4 gabled	Upper loft	4 gabled	A fish	Walls run up outside gables, lower room has windows
Bosbury House (The Razes)	15' by 15'	Single span	Close to ground	Square	None	
Little Tarrington	15' by 15'	Pyramid	Wooden in upper loft	Square	None	
The Haywood (near Hereford)	16' by 16'	Pyramid	To ground	Square	Serpentine claw	Vane dated T.D. 1690, an outside string course against rats
Much Marcle (Vicarage)	16' by 16'		Gone			Altered and added to stables
Madley (Fields Place)	20' by 20'	Pyramid	Upper loft	Square	Yes	A granary below
Canon Bridge House	11' by 11'	Pyramid	To ground	Square	A fox	Brick string course half way up
Little Dilwyn	13' 9" by 13' 9"	Pyramid	Upper loft	Square	A cock	Walls 1ft. 10in.
Eardisley Park	20' by 20'	Pyramid	Upper loft	Square	Yes: bears a defaced coat of arms	
Hoarwithy (Mill)	12' by 12'	Pyramid	Upper loft	Square	None	
Wormbridge Court	13' by 13'	Pyramid	Upper loft	Square lead top	Ball top	A tall building
Stoke Prior (Great House)	17' 6" by 17' 6" 2 ft. walls	Pyramid	Upper loft	Square	None	Upper loft level with garden, nest holes pointed tops
Drayton (Brimfield)	11' by 11'	4 gabled	To ground	Square	None	Date about 1830
Bollingham (Eardisley)	9' by 9'	Single span	Upper loft wood boxes	None		Upper part of wood, entrance in gable
Ledbury (Mr. Biddulph's Lodge)	11' by 14'					Now converted into a cottage

Hexagon Pigeon House—Brick Walls.

Locality	Outside size	Roof	Nest holes	Lantern	Vane	Remarks
Foxley	22 ft. wide 35 ft. high	Pyramid	200 in upper loft	Hexagon	None; ball on pole	Three chambers: lower one, ice house, entrance for pigeons under eaves. Only brick building remaining of the old mansion

Octagon Pigeon House—Stone Walls.

Locality	Sides	Revolving Ladder	Nest holes	Lantern	Vane	Remarks
Castle End (The Lea)	5'—6"	Remains of one in upper loft	180 upper story	Gone		Corners with dressed stone blocks, roof falling into bad repair

Octagon Pigeon Houses—Brick Walls.

Locality	Sides	Revolving Ladder	Nest holes	Lantern	Vane	Remarks
Whitwick (Cowarne)	13'—4"	A complete diagonal one 2 tiers	432 to ground	Octagon, bad repair	None	Ice cellar beneath, walls 2ft. thick, Trap to close top
Weston Beggard (Pigeon House Farm)	9'—3"	Yes	To ground	Octagon	None	Panelled sides with ◇ in blue brick
Dilwyn	9'—10"	Yes	To ground	None	Dragon	Entrances under gables
Wellington (Stock Farm)	7'—9"	Yes, Diagonal 2 tiers	To ground	Octagon	Hollow, copper ball and pole	A circular mass of brickwork, with nesting holes at base of ladder; plaster coving under eaves, ◇ on sides in blue brick
Credenhill Court					Ball and pole	Same period as the following
Old Weir (Sugwas)	6'—9"	Yes	To ground	Square	Ball and pole	
Bodenham	7'—0"	None	Upper loft	Octagon	Yes	
Burghill Vicarage (The old Manor House)	8'—8" 22ft. to eaves	Yes, to ground	627	Octagon	None	Walls 2ft. 2in. thick dated E 1 1 1717
Burghill Court (The new Manor House)				Octagon with lead domed top		
Staunton Park	8'—0"		To ground	Decorative with lead O G top		In deer park

Octagon Pigeon Houses—Brick Walls—(*Continued*).

Locality	Sides	Revolving ladder	Nest holes	Lantern	Vane	Remarks
Bromtrees Hall (Bishop Frome)	7'—0" 2ft. thick	one each side	To ground	Octagonal lead top	Claw	On vane E. S. 1721. Date on lead waterpipes' heads on the house is 1723
Canon Frome Court	7'—4"			Octagonal lead top	Yes, a cock	
Hermitage Farm, Burghill						
Poston Lodge, Peterchurch				Lately restored		
Tyberton Court	8'—6"		Upper loft	Plain	No	3 storeys
Eywood, Kington	20ft. diameter	No	To ground	Octagon	Ball on pole	Walls plastered outside
Newport House (Almeley)	8'—9" 2ft. thick		Originally to ground	Large octagon	Ball on pole	
Hellens (Much Marcle)		No	None left upper storey	Octagon	Flag with date	Date in large plaster letters on walls W F.M. 1641. Date on vane 1753 E.W. A middle floor supported by post in centre with joists radiating
Bishopstone	6'—0"		To ground	Square	No.	
Hill Court, Ross						

75 Pigeon Houses.

Pigeon Lofts with Lanterns projecting above Main Buildings.

Locality	Remarks
Marley Court	Vane a bull
Belmont Farm	
The Moor, Hay	Square stone with lantern and vane
Middlewood, Clifford	
Mansell Lacy Court	Over entrance to yard
Holmer Park	Over an aviary built of pillars from Hereford Old Town Hall
Chilstone, Madley	Wooden loft over farm buildings with vane

Pigeon Houses now pulled down.

Locality	Remarks, and when demolished
Round Stone.	
Wisteston Court, Marden	Lined with brick, 1872
Old Court, Bosbury	Similar to one at Garway, mentioned in Swinfield MSS. of 1289, pulled down about 1884
Stoke Edith (Home Farm)	10 years
Pigeon House Farm, Ross	
Amberley Court	50 years
Derndale	About 1872
Tillington Court	
Dinmore Manor House (Knights Hospitallers)	A century ago
Wigmore Grange	1888, date in vane 172—Photographed 1878
Eardisland	
Square Timber Framed.	
Litley	Pyramid roof 30 years
Livers Ocle	5 years
Preston Wynne	1887
Norton Canon	
Putson	16ft. square, single span roof, brick lantern like a chimney, wooden boxes to floor, photographed, 1888, demolished 1889
Lower Hamnish, Kimbolton	
Lower Bullingham Farm	
Noakes Court	30 years
Stretford Court	20 years
Upper Wintercott	20 years
Upper Maund Common	14 years
Square Stone.	
Rowden Abbey	Inscribed "Anthony Rowden, Gent 16—"—30 years
Rudhall, Ross	15 years

Pigeon Houses now pulled down—(*Continued*).

Locality	Remarks, and when demolished.
Square Brick.	
Breinton, Pigeon House Farm	Converted into a Farm House
Clehonger Court	15 years
Newtown Farm, Hereford	25 years
Shape Unknown.	
Letton Court (Old House)	
Wormesley Grange	
Underdown, Ledbury	
Pigeon House Farm, Marstow	
Pigeon House Farm, Westhope Hill	
Bunshill	
Kenderchurch	
Pigeon House Farm, Letton	Near the rail is a tump, called "Pigeon House Tump."
Octagon.	
The Upper Hyde, Leominster	

Pigeon Houses in Gower, Round—Stone Walls.

Locality	Inside diameter	Wall thickness	Nest holes	Remarks
Oystermouth Castle	13'	2'—10"	About 14" deep, alighting ledges to each tier	Three parts demolished, signs of domed roof, height 8'—6" to string course
Penrice Castle	10'	4'—0"	Openings 7" by 8," rude alighting stones	About 20' high, rather conical in shape
Oxwich Castle	13'	3'—3"	No alighting ledges	Roof and one third of walls demolished
"Culver Hole," Port Eynon		10' at base, 2' at top	Lining upper part of wall and inside of window openings, no alighting ledges	This is a cave in the sea cliff closed in by a massive wall 60' high, pierced with five windows

PIGEON HOUSE, THE MOOR FARM, HEREFORD.

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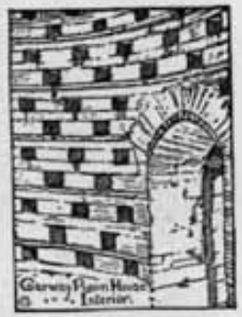
DOVECOT AT GARWAY, DATED 1326.

TYMPANUM OF GARWAY DOVECOT.



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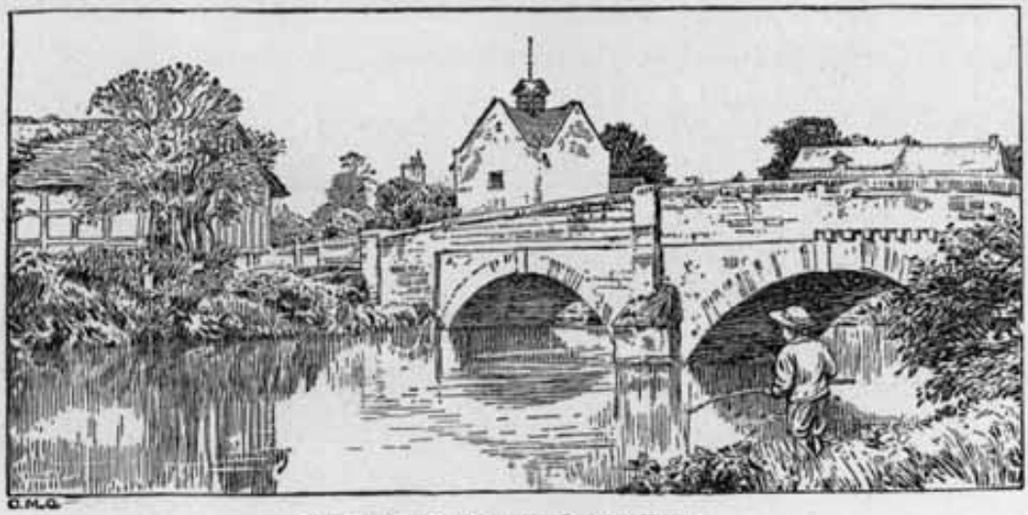

EARDISLAND BRIDGE AND PIGEON HOUSE.

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Woolhope Naturalists' Field Club.

MAY 30TH, 1890.

JOINT MEETING WITH THE CARADOC CLUB.

ON Friday, May 30th, the first Field Meeting of the Club was held at Craven Arms, in union with the Caradoc Field Club, who, under the Presidency of the Rev. J. D. La Touche, were met at Craven Arms Railway Station. The interval between the arrival of the trains from Hereford and Shrewsbury was occupied in the transaction of some business of the Club, which included the election of nine new members and the proposal of seven others. Some further delay was occasioned by picking up reinforcements from various quarters, a delay which was the cause of sundry *contretemps* throughout the day, of a character however generally humorous rather than serious. Eventually the whole party, mustering about seventy in number, marshalled by their respective Honorary Secretaries, having taken their seats in seven carriages, drove to Clungunford House, distant about four miles, where they were received by Mrs. Rocke and her son, Mr. J. C. L. Rocke, who, without delay, proceeded to exhibit their magnificent collection of British birds, the result of some forty or fifty years' assiduous work by the late Mr. Rocke. The members, amongst whom were a few excellent ornithologists, were astonished at the display of almost every specimen of bird which has ever been acknowledged as having visited Britain, including, amongst many varieties, a fine specimen of the Great Auk, and embracing, in the collection of eggs, one of this now extinct bird. Mrs. Rocke, staff in hand, conducted the members over the Museum, case by case, pointing out especially the most rare birds, with a history of their capture or locality whence obtained, a reference to the manuscript list supplying further information.

Whilst the attention of the members was riveted upon Mrs. Rocke's descriptive details, they were interrupted by the unwelcome sound of the whistle, Mr. La Touche taking advantage of the opportunity to propose a vote of thanks, which was seconded by Mr. George H. Piper, who expressed the universal regret of the members that Mrs. Rocke's hospitable intentions must be so abruptly cut short.

Leaving to the ornithologists the task of drawing up a report of this, perhaps, matchless private collection, unequalled not only in point of varieties, but also as regards the magnificent specimens themselves, and the faultless life-like manner in which they, without exception, are set up, we must record our gratitude to Mrs. Rocke and her son for their very kind reception of the Club, for the entertainment for body as well as the ornithological treat, and for the valued

and much-appreciated privilege they so kindly extended to the members of viewing this unique collection at any future period when time should not be so limited as at present.

Resuming their seats in the brakes, the party proceeded towards Leintwardine, time not permitting an inspection of Clungunford Church, a stone building of Early Decorated style, whose register dates, according to Kelly's Directory, from 1559. A tumulus situated N.E. of the Church, circular in form, 15 feet high, 103 feet at the base, and 49 feet at the summit (of which an account may be found in *Hartshorne's Salopia Antiqua*, page 102), was carefully opened several years ago, and afforded an unmistakable evidence of cremation having been adopted in those earlier ages. On the right-hand of the road, about two miles distant, near Broadward Hall, upon the right bank of the river Clun, another tumulus was observed, where some ancient weapons have been discovered which are now in the British Museum. After a drive of about another three miles Leintwardine was entered, some members approaching by Watling Street which runs upon its eastern side, direct to the site of the old bridge, of which some traces of oak timbers, blackened with age and deposit, are said to be still found. The advance guard made for the camp. Mr. Fortey conducted it to the north-west angle, where the ancient vallum and fosse are clearly discernible, being more conspicuous here than elsewhere. The Rev. J. W. Colvin, the vicar, also attended, as also Mr. Hugh Thomas Evans, who has been resident thirty-six years, and who assisted the late Rev. W. D. Ingham by his observations and information in drawing out the plan of Leintwardine which accompanied Dr. Bull's excellent paper on Roman Stations and Towns in Herefordshire (see *Woolhope Transactions*, 1882, page 251). If any member ever had any doubts after reading that paper, that Leintwardine and the Roman town of Bravinium are identical, such doubts were assuredly at once set at rest by the evidence of his own senses, supplemented by Mr. Fortey's demonstration *in situ* to day. On the way to the Church Mr. H. T. Evans stopped to exhibit in his house specimens of ancient pottery, and, in the shed in the rear, portions of the antique screen from the Church. The Church was next visited where the Rev. J. W. Colvin showed excellently preserved parish registers dating from October 2nd, 1547, and not as erroneously stated in Kelly's Directory from 1530. The order for the establishment of parish registers was given by Henry VIII., temp. 1536, but as only eight registers are known to exist prior to 1538, it does not appear to have been at once generally acted upon. In the parish registers of Leintwardine there is the usual gap during the period of the civil wars; in this case the interval embraces from 1642 to 1656.

The Rev. T. AUDEN read to the members assembled in the Church the following

NOTES ON LEINTWARDINE.

LEINTWARDINE is an example of an unusual thing—the formation of a Saxon village within the very fortifications of a Roman camp. In general the remains of old Roman cities and stations were shunned by the Saxons as haunted ground, but the important position of Leintwardine near the two streams probably caused this superstitious dread to be overcome. Mr Hartshorne (*Salopia Antiqua*, p. 484) derives its name from the Celtic word for water, which is found in *London* and *Lancaster*. In Saxon times Leintwardine was the head of a hundred containing 40 manors, several of which are now in Herefordshire and Radnorshire. At the date of *Domesday*, Picot de Say, the founder of Clun Castle, held a small portion of the manor of Leintwardine proper, but the greater part was in the hands of Ralph de Mortimer. In Saxon times it had been held by King Edward, and was of considerable importance. In 1086 it possessed a Church, a priest, and a mill, which paid an annual rent of 6s. 8d. and six sticks (a stick consists of 20) of eels. There were several superior tenants, with a Provost, and a knight (*unus miles*), who possessed several tenants of his own. Later, it became a member of the *Walcheria* of the Mortimers, that is the independent jurisdiction, round their Castle of Wigmore. At the death of Edmund de Mortimer (II.) in 1332 it was stated that he had possessed there a dilapidated messuage, 80 acres of arable land, 6 of pasture, 15 of meadow, and the Bosc called Moktre, with the rents of various tenants.

The Church was, in Saxon times, the head of a large parish, only one other manor of Lenteurde Hundred (Wistanstow), being mentioned in *Domesday* as possessing a priest.

Hugh de Mortimer, between 1181 and 1185, gave the Church of Leintwardine and the mill there to Wigmore Abbey. Bishop Swinfield visited the Church, May 13, 1289, when the Abbot of Wigmore as Rector provided entertainment for him and his suite. The Bishop then gave alms of 12d. to the "Recluse of Leintwardine." In 1291, the Church of Leintwardine, with its chapels of Burrington and Downton, was stated to be in the deanery of Clun. In 1330, Roger de Mortimer, Earl of March, founded a Chantry in Leintwardine Church for ten chaplains to celebrate Mass daily for the souls of himself, his ancestors, and his successors. For this purpose the Earl intended to give the Advowson of Church Stretton, but this was not carried out. His design was, however, completed from other resources, as in the 14th century "nine chaplains chanted daily in Leintwardine Church prayers for the souls of Edward III., Isabella, his mother, Philippa, his queen, Henry, Bishop of Lincoln, the Earl of Lincoln, his Countess Joan, with all the faithful departed." In the Church was a "regular appointed choir, with stalls yet remaining; thither the *Monks* (Canons) of Wigmore repaired in processions, and the Abbot delivered an annual sermon on the festival of the Virgin, the patron

Saint." This must mean the chantry, as the Church is said to be dedicated to St. Peter and St. Paul, though the "King's Book" calls it St. Mary, and it has been attributed to St. Mary Magdalen. At the time of the dissolution of monasteries the Abbot of Wigmore received £36 15s. 5d. from Leintwardine. This living was at that time held by John Stiche, whose preferment was valued at £8 3s. 4d., less 7s. 8d. for synodals and procurations. Henry VIII.'s Commissioners accused John Smart, the last Abbot of Wigmore, of many evil deeds; among them that he had neglected Leintwardine Chantry, and had stripped £40 of silver plate from an image of the Virgin which adorned the Church, and appropriated the proceeds. The Advowson passed later into the hands of the Harleys, Earls of Oxford, one of whom, Sir Edward Harley, about 1659, presented to it a zealous Puritan, Richard Hawes, Vicar of Kentchurch. He was ejected after the Restoration, and afterwards lived with his son-in-law, the ejected Vicar of Weobley. He seems to have been a man who learnt much from his experience of life, for Calamy does not give him the highest character in his earlier ministry, though he died in humble faith, respected by all who knew him, Churchmen and Nonconformists alike.

Now to return to the proceedings of the day:—

The movements of the members over the ground were so rapid that they would have delighted the heart of Cæsar. These strategical manœuvres somewhat perturbed the peaceable inhabitants and "gentle fishermen" of this head centre for grayling. The suddenness of the occupation of their village was their first surprise, nor was their consternation lessened when the strangers, alighting hurriedly—the lost time not having yet been recovered—were discovered to be armed with hammers of various forms and proportions; one, especially, a most uninviting weapon, suggestive of a boarding pike of a Viking warrior, and wielded by a member of formidable stature, created quite a diversion, dispersion we mean, for it spread dismay far beyond the range of the muscular arms of its stalwart owner. The minds of the villagers began to be appeased when they found that the strangers had entered the Church, the majority of them cherishing the hope that the mission was—if not of an ecclesiastical—at least of a peaceable character; whilst some few, having perceived that some of the strangers had scaled the Church tower, and were making observations therefrom, still maintained their fears; but when our field force, returning from the Church, issued from the village, following their patriarchal leader towards the Church Hill Quarry, distant about half a mile, the villagers peaceably resumed their usual occupations, the object of pursuit of the strangers having been explained to them by a promising young girl, who had probably passed the sixth standard, in the following terms—"There's a mine up that hill, there's gold in it!"

Upon assembling at the quarry on Church Hill, the rear-guard was again met with, who indiscreetly attempted to remonstrate against the celerity of our advance-guard; they were soon silenced, censured, and put to shame for preferring to linger over the pleasures of Mrs. Rocke's hospitable table, and severely reprimanded for their lack of promptitude in assembling at the first sound of the whistle. Upon the summit of Church Hill, amongst other fossils, *Monograptus colonus* was found, which is a common fossil in the beds of the Lower Ludlow age. The Rev. J. D. La Touche read a paper upon the forms of star fish, *Ceratiocaris*, *Pteraspis*, &c., which had been discovered in the Lower Ludlow formation exhibited here.

Reassembling at the village, seats in the brakes were resumed, and the members soon began to ascend the rising ground, whence a good view was obtained of Coxwall Knoll, an eminence distant about two miles west of Leintwardine.

A reference to the *Woolhope Transactions*, 1882, page 182, gives us the most interesting paper read by the Rev. Charles Burrough, in which Coxwall Knoll forms the central feature in the last battle of Caractacus, whence the retreat was made to Gaer Ditches (Caer Caradoc), distant about four miles further north-west. Neither Mr. La Touche nor Mr. Auden support Mr. Burrough, but consider from the surrounding features that Breidden Hill in Shropshire, about one mile and a half from the Railway Station at Middletown, on the Shrewsbury and Welshpool Railway, has stronger claims to be considered the site of this last battle, although there is no "Caer Caradoc" in that neighbourhood (Tacitus Annal. liber xii. c. 35).

Still continuing the ascent until an elevation of more than 700 feet was reached (Leintwardine Bridge being at 394 feet), the members dismounted at the quarry at Mocktree Hill, where was a striking exposure of Aymestry and Lower and Upper Ludlow Rocks—in which amongst many characteristic fossils, which here are very abundant, they found good specimens of *Orthoceras ludense*, *Orthis lunata*, &c., and many other fossils of which drawings are to be found amongst the 820 illustrations upon the 22 plates of a *Handbook of the Geology of Shropshire*, by Rev. J. D. La Touche, vicar of Stokesay. In the Quarry on the left-hand side after leaving Mocktree Hill, Mr. E. S. Cobbold observed from the carriages what appeared to be a case of "contemporaneous denudation," an exposure as if the lower beds had been cut into by some current action while still soft, and a superincumbent stratum of rock had come in afterwards and filled the hollow, the beds above being parallel with and conformable to, and probably containing the same assemblage of fossils as the lower beds. Unfortunately time would not permit of an examination of the beds here, and especially of those at the bottom of the supervening mass, to see if there was any indication of change in sediment or fossils. It appeared a grand example of a very exceptional occurrence, and somewhat surprising in the mudstones and shales of the Ludlow beds. In sandy beds formed near the coast, or in shallow water, the phenomenon is common enough. It is noticeable as having the appearance at first sight of an "unconformity," but there is a great difference between this and a case of beds upheaved and cut down before the newer beds were deposited.

Proceeding towards Forge Bridge, the members alighted at the top of the lane leading thereto, at the bottom of which, upon the left-hand side, is an exposure of rocks, where, at the height of about five feet from the ground, are found the so-called fish bone beds, composed, as the Rev. J. D. La Touche explained, of fish defences, and of fish spines rather than bones. Here the Viking-

looking weapon was again to the front, to the dismay of a grand old gardener and his wife. The old man continued his digging upon the heights above until he was disturbed by finding his garden allotments undergoing the process of being gradually undermined; remonstrance being in vain against a force of seventy armed enthusiasts, limited to a day of only eight hours, he, submitting to his fate, calmly viewed the scene from a discreet distance. The members, determined to obtain their object, persevered in their mining operations, and shortly found *Platyschisma helicites* above the bone bed, accompanied by *Modiolopsis* and *Orthonota* and *Holopella*, an assemblage of fossils which tells us that the bone bed should be close at hand, and that the Passage Beds to the Old Red are also somewhat near. The novices in geology were now initiated into the specialities of the Viking-pike—for it must be explained that the fish bone beds vary in thickness from an almost microscopical line without breadth to sometimes the comparatively large aggregate of eight inches. In this instance it occupied several minutes before it could be discovered at all, although many pocket microscopes were in the field, and were used to determine the scales and fish defences when found. The point of the Viking-pickaxe was able to penetrate the thin band of strata where the orthodox geological hammer could not succeed in obtaining an entrance; consequently, when the fish bone bed had once been discovered the services of this useful instrument were in much request.

The proportionately allotted time to be devoted to exploration of the fish bone bed having been already outrun, several members still lingered to admire the picturesque scenery of the valley of the Teme here, with the weir above the bridge; but so vehemently was the whistle blown, that in their anxiety to resume their seats in the carriages with the least possible delay, their consciences pricked with the reprimand they had received in the earlier portion of the day, the members hurriedly departed, leaving the grand old gardener and his wife still in ignorance as to the cause of this unprovoked attack upon their allotments at their very foundation.

The drive from Leintwardine to Onibury by way of Mocktree, besides presenting so many objects of geological interest, exhibited in the clear atmosphere of to-day charming distant landscapes, Bringewood Chase Hill being the most conspicuous feature upon the right or south-eastern side, whilst upon the left the successive escarpments of the hills named Swan-hill, Saddle-hill, and Brand-hill, extending to View Edge or Yeo Edge, form a striking object, only, however, to be seen from an elevated position in the carriage, owing to the hedges being, at present, of remarkable height and density.

The intended residence of Mr. Allcroft was pointed out upon the left shortly before reaching Onibury. The mansion is being built of Downton Sandstone from the immediate vicinity. A few hundred yards after passing the railway crossing at Onibury, on the road to Craven Arms, in a quarry upon the right hand side, is found a grand exposure of the Downton Sandstone and Transition Beds between the Silurian and Old Red Sandstone. These same Passage Beds are known to the members of the Woolhope Club as they exist at Ledbury Railway Station, at the mouth of the tunnel, and have been again and again demonstrated by Mr. George

H. Piper; measurements of their successive strata are given in his paper—see page 138 of *Woolhope Transactions*, 1884. It was with some regret that the members heard the announcement that the Passage Beds here were so overgrown by vegetation that, with the limited time to-day at their disposal, a halt here would be useless. The thicknesses of the Beds in succession will be found in Mr. La Touche's paper.

The next objects of importance seen in the day's route, but not visited, were Norton camp upon the right, Yeo Edge, the habitat of *Astrantia major* upon the left, and Stokesay Castle, Church, and Vicarage, the residence of the Rev. J. D. La Touche, President of the Caradoc Club. The members dined at the Craven Arms, Mr. H. Southall presiding. After dinner the Geology of the Passage Beds was explained in a paper by Mr. La Touche, and Mr. George H. Piper, in a humorous reply, acknowledging on behalf of the Woolhope Club their disappointment in not being able to view and examine to-day the Passage Beds of which they had heard so much, congratulated the party upon the pleasure with which they would remember this successful joint Field Meeting of the two Clubs, over a country so instructive in its geological features.

The large party was composed as follows:—The Caradoc Field Club, under the Rev. J. D. La Touche, President, marshalled by their Honorary Secretary, Rev. T. Auden, brought about thirty members. In the place of Sir Herbert Croft, Bart., Mr. H. Southall presided for the Woolhope Club, who mustered in force amounting to about forty members. There were present:—Mr. G. H. Piper, F.G.S., a former president; Dr. T. A. Chapman, Dr. J. H. Wood, Revs. G. E. Ashley, H. A. Barker, J. O. Bevan, William Bowell, C. Burrough, Preb. Wm. Elliot, J. E. Grasett, Preb. C. E. Maddison Green, A. G. Jones, H. B. D. Marshall, H. North, R. Rennington, Hon. W. P. S. Stanhope, M. G. Watkins, Major Doughty, Captain E. Dansey Oldham, Messrs. Robert Clarke, G. Cresswell, James Davies, J. W. Lloyd, T. C. Paris, O. Shellard, H. C. Moore, Honorary Secretary, and James B. Pilley, Assistant Secretary; with the following visitors—Hon. and Rev. Preb. Hanbury, Rev. H. P. Prosser, Lieutenant Colonel Blathwayt, Messrs. William Davis, Froysell, Bagett Haggard, James Nott, Prescott, and others. Of the Caradoc Club the following—Rev. J. D. La Touche, President, Rev. T. Auden, St. Julian's, Shrewsbury, Honorary Secretary, Revs. N. Cooper, Oxon Vicarage, W. G. D. Fletcher, St. Michael's, Shrewsbury, R. W. Gleadowe, of Frodesley, J. Lewis, of Ford Vicarage, E. Myers, A. T. Pelham, of Cound, G. B. Powell, of Munslow, and J. G. Swainson, of Wistanstow, Messrs. Beacall, Blunt, A. Bratton, Burson, Edgar Sterling Cobbold, of Church Stretton, Charles Fortey, of Ludlow, W. E. Garnett-Botfield, of Bishop's Castle, Oldroyd, Thomas Phillips, F. Sandford, with a few others, whose names were not ascertained.

THE COLLECTION OF BRITISH BIRDS AT CLUNGUNFORD HOUSE.

[By Rev. M. G. Watkins.]

On arriving at Clungunford House, May 30th, 1890, the Woolhope Club, together with those members of the Caradoc Field Club who had joined the excursion, were received by J. C. L. Rocke, Esq., and Mrs. Rocke. They at once ushered the party into the room which holds what is without doubt the finest private collection of stuffed British birds in the kingdom. Many were the exclamations of delight before the visitors began in earnest the work of examining the specimens one by one. The birds were stuffed by Shaw, of Shrewsbury, and are most tastefully arranged in glass cases round a long room built for the purpose. The first glance round is very striking, so varied and graceful are the attitudes of the different birds, large and small, while their plumage, mostly of the brown and sober hues which befit our misty skies and rainy climate, contrasts beautifully with the few birds of more brilliant feathers, favoured children of the sun, which every now and then are found more or less bewildered on our shores, such as the Golden Oriole, the Roller, and Bee-eater. Leaving these brighter-hued birds out of consideration, the tender gray and brown and black plumage, which is so conspicuous among our native birds, composes wonderful harmonies of colour wherever the eye falls in this splendid collection. Nature works as many marvels with these sober hues under our leaden skies as she does with her more brilliant and metallic shades of vivid red and green and gold in the Tropics, only in the one case it requires an educated eye to notice them, whereas prodigality of colour at once forces itself upon the attention.

The first case which attracts the visitor is that which contains four Golden Eagles, two of which are tending a pair of callow eaglets, if birds can be so described which are clad in the curious snow-white down of infant eagles. Grand and majestic are the old birds, acknowledged sovereigns of all other British birds. The Falcons, Kite, Hawks, and Buzzards are equally true to nature, and are beautifully grouped in their respective cases. Among the Owls several specimens of the pretty little Scops Owl *(Scops giu)* were especially noticeable, and a grand Eagle Owl (*Bubo ignavus*). The Fly-catchers (*Muscicapidæ*) were well represented, and a case held several each of the Titmice, the Crested Tit (*Parus cristatus*) being very conspicuous. Here, too, were at least two specimens of that rare East Norfolk bird, the Bearded Titmouse *(Panurus biarmicus)*, which, however, is not really a Titmouse. Seldom have we seen finer specimens than the case of Wagtails; here *Motacilla flava* (the Blue-headed Wagtail), which has been said to occur near Hereford, might be carefully studied. Among the *Corvidæ* that bird which is seldom seen anywhere, the Cornish Chough *(Pyrrhocorax graculus)*, was to be found, and near it a fine *Corvus cornix* (Grey Crow) of which a specimen was procured for the Hereford Museum two years ago from Kentchurch Park.

The three Woodpeckers, which were indisputably native, were accompanied by a Continental specimen of the Great Black Woodpecker (*Picus martius*) concerning which, as a Herefordshire bird, there has been so much controversy. Many looked curiously at it, partly, we may be sure, to familiarise themselves with its appearance should good fortune some day bestow upon them an opportunity of seeing it alive in the county, partly from the factitious interest which attaches to it as the subject of so much incredulity on the part of those who not unreasonably ask for scientific proof of its occurrence in England. Two fine Sand Grouse *(Syrrhaptes paradoxus)* betrayed at a glance to an ornithological eye this bird's relationship to the Pigeon. So much has been written on the Sand Grouse since its last irruption into Great Britain in 1888 that nothing here need be said of it. A Capercaillie contrasted well with its smaller relatives, the Black and Red Grouse, while there was an excellent series of the Ptarmigan in summer and winter plumage, and the various shades which are intermediate in this beautiful bird. The Bustards were admirably represented, and the size of the Great Bustard *(Otis tarda)* caused many to regret its disappearance from the English fauna, if for no other reason because of the interesting feature its presence would create on some such plain as Salisbury or Thetford. The Little and Macqueen's Bustards *(O. tetrax* and *Macqueeni)* were also conspicuous. There was only time among the *Limicolæ* to notice *Cursorius gallicus*, the Cream-coloured Courser, a bird now very rarely seen anywhere, and of which the last appearance in England dates as far back as 1870. The Stone-Curlew and the Dotterel were also much admired. The Avocet (*Recurvirostra avocetta*) must not be forgotten. It also has become a very rare bird in Great Britain, although it used to breed at the mouth of the Trent. Not many ornithologists now living have seen this bird in nature.

The Petrels form another family of birds, well represented in the cases at Clungunford, and the Stormy Petrels *(Procellaria pelagica)* as usual formed the centre of an admiring group of visitors. Opposite the Golden Eagles at the other end of the room is a case of Auks and Puffins, conspicuous above all, being the glory of this collection, a beautifully set-up Great Auk *(Alca impennis)*. This bird, as is well known, has become extinct during the last fifty years, the latest authenticated specimens having been procured at Eldey, near Iceland. The bird before us was obtained from the Continent, and has passed through the hands of several previous owners. The bird itself is not unlike a large specimen of the Common Guillemot, so well known to most people who have been yachting round our coasts. It could not fly, having only rudimentary wings, but was a most expert diver. It is evident that a bird of this size which could only progress in one element had no chance of long surviving the invention of firearms. Like the Dodo, the Great Auk died in the struggle for existence. Remains of it have been found in prehistoric kitchen middens in Caithness and Denmark, and some bones have been picked up in guano deposits on Funk Island, off the coast of Newfoundland. About 71 or 72 specimens of the bird itself yet remain. These are distributed among public and private collections in England and America. It laid one egg only when nesting, and its bite was severe. It never flapped along the surface of the sea but at once dived. It used to abound in Newfoundland, and when seen

was a sure indication of land to sailors (see *Field*, April 3rd, 1875). About 1870 the last public sale, it was believed by the late Dr. Bree, took place of the Great Auk and its egg. The bird was knocked down to Mr. Cook, Oxford Street, for £95, the egg to the late Lord Garvagh for £63. They both came from Mr. Houghton's collection. In 1880 two eggs were sold at Stevens's rooms, one for 102 guineas, the other for 100, Lord Lilford buying both. It is curious to note the advance in the value of an Auk's egg. At present the tendency is ever to increase, and an egg or two would be a valuable property, like a New River share. In 1887 another was sold for 160 guineas to Mr. Field. This egg had belonged to the Rev. H. Burney, who had bought it in 1865 for £33 10s. It was one of four discovered in a long-forgotten dust-covered box in the Museum of the Royal College of Surgeons. Advancing to 1888, a Great Auk's egg was sold at Stevens's for £225. It had been in the last owner's possession since 1851, when he had given £18 for it. It may be roughly estimated that were there another, in good condition, to appear now in a sale-room it would be worth at least £300. Professor Newton estimates that there are 77 skins or mounted birds in existence, and 69 eggs. These facts may be useful and are trustworthy.

Mr. Rocke has also a splendid collection of eggs in his cabinets, but time sadly interfered with the pleasure which it would have given bird-lovers had they been able to examine them at leisure. As it was, we noted a typical series of Guillemot eggs, varying from almost pure white to dark green, covered with curious markings. The Great Auk's egg, as the gem of the collection, was equally eagerly inspected. It is whitish with markings somewhat resembling the eggs of the Guillemot on its broad end, and was regarded with much interest by the ornithologists present. Little more need be said of this fine private collection of British birds and their eggs, save to call attention to the beautiful Long-Tailed Duck *(Harelda glacialis)*, and to a specimen of that very rare bird, the Red-Breasted Goose *(Bernicla ruficollis)*. Seldom does a bird-lover find so rich a treat provided for him as the contents of this Museum, and many were the grateful acknowledgments made by all those who had the privilege of inspecting the Clungunford stuffed birds and their eggs.

But Mrs. Rocke's kindness did not stop here: tea and coffee and light refreshments were provided for all, and most of the visitors availed themselves of these viands, as there was still a long drive in prospect and much hard work in geology to be done before dinner at the Craven Arms. As they left, there was but one feeling of the courtesy and thoughtfulness of their hosts in opening so valuable a collection to the Woolhope and Caradoc Clubs. No better course of instruction in Ornithology can be imagined than a careful inspection of so representative a Museum of British birds and their eggs.

WOOLHOPE CLUB,

FIELD DAY, May 30: 1890.

GREAT AUK'S EGG REAL SIZE

In the collection of J. C. L. ROCKE Esq.

CLUNGUNFORD.

F. CLARKE
del: 1890.

THE COLLECTION OF BRITISH BIRDS AT CLUNGUNFORD HOUSE.

[By James B. Pilley.]

The joint meeting of the Caradoc and Woolhope Clubs, at Craven Arms, wil long be remembered by the ornithologists who were present, from the opportunity then afforded of seeing the magnificent collection of British birds at Clungunford House, near Leintwardine. The late Mr. Rocke devoted between 40 and 50 years of his active life to obtaining specimens of all the species found in these islands, and spared no expense or trouble in the pursuit of his object. It is impossible to say, without seeing all the well-known collections in private mansions, that this is the finest and most complete, but certainly it appears improbable that there can be finer specimens, or that they could be set up in more life-like attitudes than those here represented. The birds were in as perfect a condition as they could well be if not in a living state, and it was marvellous that they retained such freshness of plumage, without a single instance of staleness about any specimen such as is sometimes detected in the inspection of museum collections. A large room is devoted to this collection, which is arranged in cases against the walls. Two large glass cases are placed in the centre, containing some of the smaller species, such as Thrushes, Finches, Warblers, &c. The arrangement is according to Yarrell's list, with the exception of one case containing the Great Auk and others, which is placed at the top of the room opposite to the Eagles. We therefore commence our inspection by looking at the latter, and noble looking birds they are. The case contains five mature specimens and two young ones in the down, the latter with the old birds. A White-tailed or Sea Eagle was obtained in the north of Scotland. A very large specimen of the same species had been kept in confinement for a great number of years, and was supposed at the time of its death to have been nearly 100 years old. With these were a pair of Golden Eagles, much lighter in plumage than the usual type. Keeping to our left we next come to the Ospreys and some of the other large birds of prey; one of the specimens with a struggling fish in its talons was very realistic. Adjoining this case were the Falcons, Buzzards, and Harriers, the latter a connecting link between the Hawks and Owls. These specimens attracted great attention, and deservedly so. They were in perfect condition and artistically set up, and comprised examples of Iceland Falcons, Peregrines, Hobbies, Honey Buzzards, Marsh, Hen, and Montagu's Harriers, and many others. The adjoining case contains fine varieties of the Kite, Common and Rough-legged Buzzards; a wretched Wild Duck in the talons of its captor, struggling to escape, looks most life-like. The next group elicited remarks of well-deserved admiration. This was the case containing the Owls. In the centre were a pair of those noble looking birds the Eagle Owls, flanked by examples of the Snowy Owl, while around in most natural positions were grouped Long-eared, Short-eared, Hawk, Barn, Tawny, Tengmalm's, down

to the diminutive Scops, little larger than a Blackbird. This formed a most interesting study for the naturalist. To follow the natural order of arrangement, we next take the two cases in the centre of the room, containing the Shrikes, Fly-catchers, Thrushes, Warblers, specimens of the rare Firecrest, Blue-throat, Tits, numerous examples of the Bearded Tits (now fast decreasing in numbers), the various Wagtails, Pipits, Larks, and Finches, fine specimens of the Common and Parrot Cross-bills, and numerous other species, all, not only the residents, but the occasional visitors, full of interest.

We now resume our progress round the room to look at the families of Crows and Woodpeckers. The showy Rollers and Bee-eaters look somewhat out of place among their more sombre companions, reminding the observer of the gaudy denizens of the tropics. All the Crow family were represented, also the Woodpeckers, including the Great Black, which Mrs. Rocke thought should have a place in the British list. A portion of the trunk of a tree with its branches afforded ample means of showing the mode of nesting, and the habits of this family, to perfection. That peculiar looking bird, the Hoopoe, was represented by three specimens, one of which was obtained near to the house. The various species of Dove, Partridge, Quail, and Pheasant, next attract our attention, a fine male Pheasant holding the post of honour in the centre. On either side are observed the Common, and Red-legged Partridge, and Quails, while a miniature tree affords a resting-place for the Doves and Nightjars. The more solitary game birds occupy the next case—the Capercaillie, Black and Brown Grouse, and Ptarmigan—and are admirably arranged. That noble species, the Great Bustard (male and female, with young) make a fine group. Included with them are the lesser Bustard, and several Plovers—the Norfolk, Golden, Green, and others. The adjoining case contains the same family of birds in greater variety of plumage, showing in the case of the Ptarmigan the great difference between its appearance in winter and summer. A grand pair of Great Bustards, with young, next attract attention, and a feeling of regret is felt that such noble birds should be now extinct in these islands. Other species of the family are noticed—the Little and Macqueen's. The arrangement of the next case is very artistic, and contains many species of Plovers, several examples of the Avocet, Black-winged Stilt, Golden and Ringed Plovers. The case of Bitterns and Herons is very effective. Specimens of the Common and American Bittern, the Night, Great White Heron, Egret, and others, form a fine group. The various species of Curlew, Godwits, Snipe, Sandpipers, in various stages of plumage, make a beautiful case and attract great attention from the visitors. There is another group of this family, containing fine specimens of Ruffs and Reeves in breeding plumage, and many others of this interesting family known to naturalists under the designation of Waders. Various species of Geese next come under notice, the Bernacle, Brent, Bean, White-fronted, Grey Lag, and others. The adjoining case contains a Mute, and Bewick's Swan, and various Ducks. With the latter is an example of the rare and very beautiful species called Steller's Eider Duck. The plumage is difficult to describe, but it is a lovely combination of metallic green, satin white, and rich dark blue. The next case comprises many

species of this order, we notice Golden Eyes, Scaup, Tufted, Long-tailed, the richly marked Harlequin, and other beautiful species. Yet another case of this numerous family, containing fine examples of Sheld, Eider, Scoters, Goosanders, and other showy species. The Great Northern Diver is in the centre of a beautiful group of the Divers, which comprise the Grebes, Black and Red-throated. This case attracted great notice, so life-like were the specimens, nearly all in breeding plumage, and set up with consummate skill. "How much like it is to the Razor-bill next to it," is the remark of a member, as we look upon that extinct bird which at one time was wantonly destroyed by sailors, who little thought the time would come when a specimen would sell for nearly its weight in gold. This is the Great Auk *(Alca impennis)*. Mr. Rocke bought this specimen in Holland. According to Professor Newton, the total number of skins of this species known to be in existence is about 77. This great rarity is surrounded by Gannets, Cormorants, Puffins, Guillemots, and similar species. It is needless to say this case is left with great reluctance. We now complete our inspection of the birds by just glancing at the Gulls, Terns, and Petrels, and regret is expressed on all sides that the length of the programme did not allow time to inspect the treasures which were left with only a passing glance. This beautiful and elegant family always wins admiration whether looking at them set up by the taxidermist, or when they relieve the dull monotony of the sea by their elegant flight and graceful motions.

Last to be seen were the fine collection of eggs. A few minutes only could be allotted to them. Of course the great object of interest was a specimen of the egg of the Great Auk, which was bought at the sale of the late Mr. John Gould's collection. It is richly marked, contrasting much with the engraving in "Morris's Eggs of British Birds." There are about seventy known at the present time, the greater number in the British Isles. A gentleman in Scarborough has 20 in his possession. This, with a remarkable series of the eggs of the Common Guillemot, containing the most extraordinary varieties, deep green, white, wood brown, with more or less darker markings, completed the inspection.

Such is the record of this magnificent private collection of British Birds as faithfully as can be now given from memory and the absence of notes, due to the limited time at disposal during a far too brief and hurried visit.

Leaving Leintwardine Church the majority of the party walked to the Church Hill Quarry, distant about half a mile, where many forms of Star fish, Ceratiocaris, Pteraspis, etc., have been discovered in the Lower Ludlow Formation. Here the Rev. J. D. La Touche gave the following notes:—

The Asteroidea, or Star fishes, of which a great variety were found at Church Hill some years ago, though occurring very locally in the Palæozoic strata have a very wide range in point of time. The earliest known specimen in Great Britain is that of Palasterina Ramseyensis obtained in the Tremadoc, or Upper Cambrian beds of Ramsey Island, off the S.W. coast of Wales, near St. David's. The genus Protaster has been observed in the Ordovician or Lower Silurian strata, and in the Upper Silurian at Kendal four species have been noted. At

Church Hill here, a specimen of Protaster Miltoni, nearly a foot wide from tip to tip of the rays, has been discovered. The persistency of these organisms from the remote period at which these rocks were deposited, down to the present day is remarkable; for though there are certain structural differences, which make it probable that the ancient starfishes belong to genera and even families distinct from any living forms, their general appearance is wonderfully like those with which we are familar on our shores, some of them closely resembling the modern Pteraster and Palasterina. Mr. Salter remarks that the chief characteristics which distinguish the palæozoic from the modern forms are the shallowness of the ambulacra or furrows running along the underside of the arms, and the square plate-like form of the ambulacral scales; though in some specimens even these differences are not persistent, and he writes with considerable reserve in relation to the points of difference between them and the modern type. To the hardness of the calcareous covering with which these creatures, like their present descendants, were protected, we, of course, owe the excellent state of preservation in which, for the most part, they are found. The great slabs crowded with beautiful specimens of Palæocoma Marstoni displayed in the cases of the Ludlow Museum must excite the admiration of all who examine them. No less than ten species are spoken of by Murchison as having been found on this spot, and I believe many more might be added since Salter wrote on the subject in 1857. Mr. Alfred Marston, *e.g.*, possesses, amongst others, a quite unique specimen, in which the five original rays are, at a short distance from the centre, each subdivided into five subsidiary rays, so that the total number would be 25. This possibly may be a monstrosity, but the great variety of these beautiful forms at this early period almost suggests the thought that in the dim remote past, nature was more variable and plastic than now. The Asteroidea are low in the scale of the animal kingdom. They are classified above the Cœlenterata, which include the corals, and below the Annulosa, including the worms and trilobites. They are here associated with many other forms of great interest, with a Pterygotus of great size, Ceratiocaris of several species, a Limulus, of which but one specimen, I believe, has been found by Mr. Marston, with Encrinites, Bryozoa, and the ordinary Graptolites of the Lower Ludlow Rock, though one rare species of these last may be collected in the lane that leads to Trippleton. But one of the most interesting discoveries at this spot has been that of the fragment of a Pteraspis, the earliest known fossil fish, a fact which caused Sir R. Murchison, in the last edition of his "Siluria," to modify his former contention that the fishes of the bone bed, which occurs at the top of the Upper Ludlow formation, were the oldest Icthyolites. He says, indeed, that the concession is a slight one, since the position of the Pteraspis is still scarcely beneath the centre of the Ludlow Formation as a whole. Murchison belonged to that school of geologists who believed in the distinct creation without descent from previous ancestors, of successive types of animal life on the globe, and he clings rather pertinaciously to his dictum that the first fishes only made their appearance at the close of the Silurian epoch. The champions of that hypothesis are in the somewhat embarrassing predicament of having from time to time to make concessions like that to which I have just

referred. Nor could Murchison have stopped where he did, since within the last few months, the Hon. W. Drummond has been so fortunate as to find another specimen of a form closely allied to Pteraspis, viz., a Scaphaspis, in Stoke quarry nearly at the base of the Lower Ludlow. The following extract from Darwin's famous book, "The Origin of Species," in which he adduces a very striking instance to show how extremely "liable we are to error in supposing that whole groups of species have suddenly been produced," bears strongly on this point. "In a memoir on fossil sessile cirripedes, I have stated that, from the number of existing and Tertiary species; from the extraordinary number of individuals of many species all over the world, from the Arctic Regions to the Equator, inhabiting various zones of depth from the upper tidal limits to 50 fathoms; from the perfect manner in which specimens are preserved in the oldest Tertiary beds; from the ease with which even a fragment of a valve can be recognised; from all these circumstances, I inferred that had sessile cirripedes existed during the Secondary period, they would certainly have been preserved and discovered; and as not one species had then been discovered in beds of this age, concluded that this great group had been suddenly developed at the commencement of the Tertiary series. This was a sore trouble to me, adding, as I thought, one more instance to the abrupt appearance of a great group of species. But my work had hardly been published when a skilful palæontologist, M. Bosquet, sent me a drawing of a perfect specimen, of an unmistakable sessile cirripede, which he had himself extracted from the chalk of Belgium. And, as if to make the case as striking as possible, this sessile cirripede was a Chthamalus, a very common, large, and ubiquitous genus, of which not one specimen has at yet been found even in any Tertiary stratum. Hence we now positively know that sessile cirripedes existed during the Secondary period; and these cirripedes might have been the progenitors of our many Tertiary and existing species." (Darwin).—*Origin of Species*, p. 304.

The carriages were then rejoined and the drive resumed to Onibury, a halt being made at Mocktree to inspect a striking exposure of the Aymestrey and Lower and Upper Ludlow Rocks; here the geologists were in their element, and the constant tap tap of the hammers gave evidence of their zeal. Some distance further the vehicles were again left and the party walked to the Forge Bridge, a beautiful spot, near which a section of the Ludlow Bone Bed was inspected. The drive was then continued to Onibury, and through Stokesay to Craven Arms, where dinner was provided at the hotel, and enjoyed with a zest such a field day gives. After dinner, the learned President of the Caradoc Field Club read the following paper:—

The term Passage or Transition Beds is applied to those strata which indicate, by the fossil remains entombed in them, a more rapid change than ordinary in the physical condition of the earth's surface at the time of their formation. It may easily be supposed that when vast tracts of lands were either being elevated above or sinking beneath the surface of the ocean, or large areas were being converted from salt to fresh water, the altered physical conditions must have produced a corresponding effect on the organic life of the period, and conversely where we find a striking change in the fauna of the various successive

strata, older types being rapidly replaced by new, it is reasonable to conclude that the change is chiefly due to those secular upheavals or depressions of the earth's surface, of which we have numerous examples in various parts of the world in the present day. The existence, then, of these Passage Beds between strata like those of the Silurian system which tell us of geologic epochs of long continuance, during which but little change took place in the prevalent fauna, and others in which much higher types occur, is a fact of much interest in helping us to ascertain to some extent the configuration of the land in those distant times, and in throwing light on the succession of life on the globe. The Passage Beds which we have here especially under consideration are those which occur at the summit of the Silurian series and below the base of the Old Red, and we have every reason to suppose that they represent an epoch when great areas of what had previously been salt water were becoming vast land-locked lagoons, or fresh-water lakes. A similar phenomenon must have occurred in the Trias period, when the salt beds of Cheshire were formed in the depressions filled with inland salt lakes resembling the Caspian Sea. It is true that the barrier no longer remains which would have been required to cut off these inland lakes from the ocean. It has been swept away in the course of time by denudation. But the gradual change both in the lithological character of the earlier rocks and in their fossil contents are almost as convincing proofs of its having once existed as if we could now behold it. Every one who has hammered at the Silurian rocks must be struck by the gradual change from the mud-stone nature of the Wenlock beneath to the more shaly condition of the Lower Ludlow above, and so on to the distinctly sandy character of the Upper Ludlow. As for the strata of limestone, the Aymestrey and Wenlock, that occur in these rocks, I have long maintained that they are due to segregation and not to any distinct alteration in sedimentary deposit. Now what does this gradual change from a more argillaceous to a more arenaceous rock denote, but that a slow upheaval of the earth's crust was going on during all that long time, and that it culminated in the separation of the area covered by the Old Red Sandstone from the rest of the land? A change which we may realise to our minds if we suppose the bed of the Atlantic, over which there is being constantly deposited successive layers of impalpable ooze, which in time would harden into shale—suppose, I say, the whole of this up-raised, we should then have above the shales a series of coarser deposits washed down from the contiguous land, the material for future sandstones, and, perhaps, ultimately pebbly beaches, the material for future conglomerates. In order to keep clearly before our minds the succession of beds which this day's excursion brings under our notice, I may here briefly enumerate their sequence. At the very summit of the Upper Ludlow rock we find what is called the Bone Bed—a very singular deposit chiefly composed of the remains of fish defences, accompanied by Beyrichia, a minute bivalve crustacean, and fragments of Pteraspis and Lingula. Professor Lapworth has explained the conditions under which this remarkable deposit was formed by supposing that it took place in still water, into which for long ages no sediment was carried, and that it is composed of the remains of the innumerable generations of fishes that from time to time inhabited its tranquil depths. It is in this district, at

least, succeeded by another thin layer in which the prevalent fossil is Platyschisma Helicites, a gasteropod shell, and Lamellibranchs. Then succeeds a stratum called the Downton Sandstone, which in several places reaches a thickness of 50 or 60 feet, and this is followed by the Passage Beds proper, which pass conformably into the Old Red Sandstone above them. Thus from the Bone Bed to the Old Red, the intervening strata may be considered as transitional. The district throughout which these beds have been detected is very extensive. We had an opportunity recently of examining a magnificent exposure of them at the mouth of the Ledbury Tunnel, though no trace of the Bone Bed has, as far as I am aware, been detected in that locality. The thickness of the Passage Beds there, according to Mr. Piper's careful measurements, is very great. It would seem that towards the west the beds diminish in thickness, though their relative position in the series remains the same. Measurements made at the lane from Onibury leading to Norton are as follows:—Commencing at the top, and in succession, we have grey shale, 14ft.; red shale, 7 inches; grey, 3ft.; red, 2ft.; grey rubbly shale, 28ft. with Eurypterus, Beyrichia, Lingula cornea; hard sandstone, 1ft.; thin layers of red and grey, 5ft.; red, 5ft.; yellow shale (possibly summit of the Downton Sandstone), 15ft. Unfortunately the whole section, which a few years ago was very well marked and instructive, has been much obscured by overgrowth and the crumbling of the rock, due to exposure. Travelling still further west we find the same beds, recently discovered by Mr. Garnett-Botfield, at the Reilth, near Bishop's Castle, but of still reduced dimensions. Here the enormous quantities of the gasteropod Platyschisma with which they are accompanied is truly remarkable. Far apart from here, at the eastern limit of the county near Bridgnorth some years ago Mr. Randall was so fortunate as to discover a fine exposure of the very same series in Darley Dingle and Linley Brook, a full description of which is given Vol. xix., part 3, Quart. Jour. Geol. Soc. Here too the beds, though small in dimensions, are perfectly distinct and present the same succession both of lithological character and of organic life as elsewhere. Lastly, the fossils which distinguish this series tell us clearly enough of a mighty change in the physical condition of their environment. The discovery of Pteraspis in the Lower Ludlow, to which I have already referred, shows that during the Silurian epoch fishes had already made their appearance. The occurrence of specimens is, indeed, extremely rare; though this fact, as Darwin and Lyell have long since shown, is no proof that in certain favourable localities the family may not have been abundant during the epoch. The probability is that the earlier rocks are deep sea deposits, whereas the Pteraspis and such creatures frequented shallower waters, and it would be a very exceptional circumstance for an individual to find himself drifted out so far from his usual habitat. Professor Prestwich observes that these early fishes, of which the chief characteristic is the stout shield or carapace with which the head is covered, while the rest of the body is without any protection, probably, like a fish that now frequents the Delta of the Nile, lived with the hinder parts buried in the mud and sand while the strong armour that shielded their heads gave them the power of watching for and seizing their prey in safety. In the Downton Sandstone moreover are found in abundance the first

indications of vegetation; many slabs are covered with Carbonaceous fragments among which we must specially notice the minute organism Pachytheca, which has of late attracted much notice, and justly, since it is a striking instance of a fragile organism such as an alga lasting from Palæozoic down to present time with but little apparent change. These facts—the mud-loving Cephalaspis and Pteraspis, the Phyllopods, of which the existing species belong to fresh or brackish-water types, the occurrence of vegetable remains, the Bone Bed with its vast accumulation of fish defences, pointing to a calm, undisturbed lake or estuary, in which the bodies of its inhabitants quietly sank to the bottom as they died—all indicate the approach of a period when dry land rose from the surface of the Palæozoic sea, and which before long was to make its existence known to after times by the plant remains, Equisetaceæ, Lycopodiaceæ, &c., that are found in the Old Red Sandstone, and the vast coal deposits and the insects of the Carboniferous era.

In an amusing speech Mr. Piper expressed the pleasure the Woolhope Club had derived from meeting their Caradoc friends, and the party then separated, returning from Craven Arms station at 6.35 and 6.45 p.m. respectively. Although the morning looked very threatening the day turned out beautifully fine, the clear atmosphere showing the fine distant landscape through which the visitors journeyed. The whole of the arrangements for the party, which were very satisfactory, were made by the Rev. T. Auden, of Shrewsbury, and Mr. H. C. Moore, of Hereford.

Woolhope Naturalists' Field Club.

JUNE 24TH, 1890.

THE members of our Club are indebted to the Rev. Joseph Barker, Vicar of Eardisland, not only for the excellent programme drawn out for their Field Meeting on Tuesday, June 24th, but also for the continuity of interest maintained throughout the day by the successive series of papers read by him upon local subjects. The party, having trained to Leominster, took seats in the breaks there ready for them, and having driven through the town, dismounted at a place distant about one mile, where the old road, leading to Cursneh Camp, by Waltons, branches off to the right from the Kingsland road: from various positions on the ascent of the hill the places of local interest in the neighbourhood and their historical associations were pointed out, as condensed in the following paper by Mr. M. J. Ellwood:—

"Leaving Leominster by New Street, anciently known as Caerneveh Street, we pass on the right the old fortified mound Conigar, Conygar, or Kunnygar. The origin of the name, like the origin of so many names in these border counties, where British, Anglo-Saxon and Roman are so intermixed, is not altogether clear. Some authorities give it as Kenelm's-gaer, or Kenelm's fort, taking its name from one of the Saxon kings who ruled over Mercia. John Hackluyt, of Eaton, A.D. 1592, leaves on record that a brass plate affixed to the wall of the south side of the Priory Church had an inscription in Saxon characters—'My forefathers did build upon this my town . . . Christ loved me and was my righteous defence always. I have loved Christ, and for His love my lands I forsook (gave), but my Kingsland and also my Kenelmworth I do not forgive. I am Christ's Kenelme, and Kenelmbald is my kinsman at Clinton.' The name may be a corruption of Coning-gaer, the king's fort; or after all simply Conygar, 'rabbit warren,' of which I am told there are several in other counties. They are supposed to occupy sites of Roman places. In the Conigar meadows may be traced part of the fortified entrenchment and fosse originally surrounding the town. Caerneveh Street led to the Silurian Camp of Cursneh, or Caerne Hill, at the foot of which lies the Waltons, traditionally a Roman settlement of some importance. The name Caer-ne-veh probably signifies a fortress, the prefix Caer or Car signifying a fortified place. It is interesting to note that so many of the more ancient military works bear the prefix Car or Caer. These old fortresses were a series of natural or artificial mounds with embankments and deep fosses. There are few traces of trenches or earthworks on the hill, and although reputed to have been occupied by the Romans, neither measurements nor configuration favour the tradition. It is said that a body of the Yorkists from Leominster encamped on the hill, and that just opposite, at Eyton, they were defeated by the

Lancastrians prior to the battle of Mortimer's Cross. At a later period, according to 'Price's History of Leominster,' a severe encounter took place between the forces of Lady Jane Grey, and those of Queen Mary, the latter receiving considerable aid from the inhabitants of Leominster and the immediate vicinity. Success attended Mary's cause, and the queen being so satisfied with the gallant behaviour of her Leominster friends, granted them a fresh charter and many additional municipal privileges. During the contests between Charles I. and the Parliament, Cursneh-hill was the scene of many fights. The views from the summit are very extensive and varied. There to the north is Croft Ambery, another British camp of elliptical form, with double ditch and rampart; to the north-west Wapley Camp; to the south-west the dark ranges of the Black Mountains, with a peep of the Brecon Beacons when the day is clear; Ivington Camp to the south; and away to the south-east Risbury and Black-caer-dun Camps. On descending the hill to the west, we see in front what is now called Corner Cop or Cornhill Cop, thought to be a corruption of Caer-ne-cop, a sepulchral eminence. To our immediate right is Cholstrey. Price gives the old name as Cerlestren. Williams in his Leominster Guide asserts that Cholstrey was a Roman settlement. It is close to the Waltons. The name is evidently derived from Cester, Chester, or Casterley, a camp field, from the Latin Castra, a camp. There are traces of a road leading from Cholstrey in the direction of Stagbatch and Wall-end, and possibly forming a means of communication between the colony at [Cholstrey and the military road of Watling-street, running from the south through Stretford, Monkland, Street, Mortimer's Cross, and Wigmore, to the north."

The height of the mowing grass prevented the members ascending to the summit of Cursneh hill, 354 feet high, so, keeping to the footpath, they were met by the carriages which had made the circuit of the camp by the main road, and resuming their drive the party proceeded by Cholstrey to Kingsland, where, at the Church, they were met by the Rev. Joseph Barker. After an inspection of its Early Decorated architecture of the 13th century, the high pitched old timber roof of the nave, the chancel with its decorated barrel roof, the embattled tower with buttresses, its porch on both the north and south, with the small building at the east end of the north porch, which is called in Murray's "Hand Guide to Herefordshire" a Volka's Chamber, the members had the pleasure of listening to the following :—

NOTES ON KINGSLAND CHURCH.

[By the Rev. Joseph Barker, M.A.]

The notes I have made to read to you on this beautiful Church of St. Michael, and the Sepulchre Chamber (to which special attention is invited), are culled mostly from a most interesting article in an old number of the *Gentleman's Magazine*, November, 1826, by S. R. Meyrick, who begins it with some words which must leave a sweet sound in the ears of all who live in Herefordshire.

"I have lately," he says "been passing some time in that 'Garden of England,' or rather Paradise of the World, the County of Hereford, and in some parts of it not very much frequented."

There was no Kingsland Railway Station and no Woolhope Club in those days, and this visit must have been paid, I fancy, at such a season as this, in the bright days perhaps of

". . . . . jolly June, arrayed
All in green leaves, as he a player were."

Speaking of a paradise, too, Mr. Meyrick must have been thinking of our apples.

In the prosecution of his inquiries relative to Kingsland he was assisted by much information from his friend Edward Evans, Esq., of Eyton, and with Mr. Meyrick's article to the *Gentleman's Magazine* was forwarded a pencil sketch of the south-east view of the Church, by Mr. Evans' talented daughter, of which a print is given.

"The Church of Kingsland," he goes on, "struck me as particularly curious, retaining, as it does, the only existing specimen in this county of a chamber for the Holy Sepulchre." The present Church of Kingsland was built in the reign of Edward I., by Edward, Lord Mortimer, who made his younger son, Walter, rector thereof, giving him full right to all the tithes, and dedicating it to St. Michael, the Archangel. It consists of a nave and side aisles separated by octagonal columns, supporting ten pointed arches, 79ft. by 44ft. 9in.; a chancel 38ft. by 19ft.; what is now used as a vestry, 11ft. by 14ft.; a porch 8ft. 10in. by 10ft. 2in.; the chamber of the Holy Sepulchre, 9ft. 4in. by 4ft. 9in.; and a tower at the west end. The architecture is all of one period, the leading feature being a square inscribed in a quatrefoil, or a triangle on a trefoil.

The greatest curiosity in Kingsland Church is what is termed the Volkre's Chamber, which, though I will not go so far as to say it is a corruption of Sepulchre's Chamber, was, I have no doubt, for that purpose. This is a small building by the side of the porch, from which is an entrance to it, and it receives light from unglazed windows on its east and north sides. Within, out of the thickness of the church wall, has been formed an arch, such as all monumental arches of the time, and within, a kind of altar; at the back, another open window,

consisting of four lights for the convenience of those within the church. The great arch is elegantly ornamented.

In Plates xxi. and xxxii. of the Vetusta Monumenta, vol. iii., are representations of the Holy Sepulchre in the churches of North Wold, in Norfolk, and Heckington, in the county of Lincoln, with a paper, well worthy of being read, by the late Mr. Gough. The latter one is of the time of Edward I. or II., and, therefore, approximates to the date which I have assigned to the curious chamber at Kingsland. Besides the remains of a holy Sepulchre in Lincoln Cathedral also of this period, and absurdly called the tomb of S. Remigius, this gentleman enumerates no less than fifty in different parish churches. In all these cases the position of the sepulchre was in the north wall, but in one only in that of the Church (*i.e.* the nave) as at Kingsland, the others being in that of the chancel. Mr. Polwhele, in his history of Devon, vol. ii., p. 82, speaking of Holcombe Burnell Church, says, "On the north wall of the chancel, near the altar, is a curious piece of imagery in alto relievo, representing the Resurrection of our Saviour, and the terror of the Roman soldiers who guarded the Sepulchre; in the wall is an opening through which the people in the north aisle of the nave might see the elevation of the Host." So here, at Kingsland, above the tomb and within the arch is a square aperture, divided into four compartments by mullions and pointed arches for the same purpose.

Such is Mr. Meyrick's account of this Kingsland Volkre Chamber; and when our visit is made to Eardisland Church, the second on to-day's list, there will be seen another tomb of the Holy Sepulchre, though not by any means so large and ornamental as this one, but a canopied arched niche in the wall on the south-east side of the present nave which formerly was the chancel. And on the front of that arch there is a triangular stone, now plain, on which were represented, when Dingley visited the Church in the reign of Charles II., upon a shield, all the instruments of the Crucifixion.

I may be allowed, too, to mention a circumstance in which I have personally felt great interest, that in the chapel of Christ's College, Cambridge, where, years ago, I spent happy days, has lately been brought to light a sepulchre or cupboard-like receptacle ornamented with figures representing Christ's Resurrection, with attendant angels and sleeping soldiers who guarded the tomb. These are mentioned in the College accounts as "Th' ymage of Christe's ressurrection . . . with the iiii. knyghtes and the sepulchre." The four knights were the sleeping soldiers.

The use of the sepulchre in olden times was this: On Maundy Thursday the celebrant consecrated two reserved hosts, one of which was consumed on Good Friday, and the other deposited, together with a crucifix, in the Holy Sepulchre on that day, on which occasion a solemn office was performed, called "Tenebræ." There they remained till the morning of Easter Sunday, when both were taken out at a solemn and elaborate service, which typified Christ's Resurrection, the removal being made on a sudden during a very loud chorus of voices and instruments, to represent the rending of the tomb. The Host being then elevated, the Priest exclaimed, *Surrexit, non est hic!*

It was usual for watchers to guard the sepulchre during the whole time from Good Friday to Easter morn. And in many places a sort of sacred drama was performed at the sepulchre by priests and others dressed to represent the two angels, the three Marys, and other actors in the sacred story. Some circumstances in these ceremonials might require the sepulchre to be made large enough to admit the officiating priests to go into and out of it, which may account for this chamber at Kingsland, and the apertures on all sides that the people might witness the ceremonies.

In some notes which our Honorary Secretary (Mr. Moore) kindly sent me there is mention of an extract from "Testamenta Vetera," to the effect that one Thomas Lord Dacre, 1531, left certain sums for his tomb to be built and employed for such like use, &c.—*e.g.*: "The tomb to be used as the Easter sepulchre to rejoice at the uprising of our Lord and Saviour from the grave, and the hope through Him for a joyful Resurrection." Again, it is recorded in the negotiations of Cardinal Wolsey by Cavendish, that in Peterborough, in the last Holy Week of his life, he rose early on Easter Day to the Resurrection, and on that day went in procession in his Cardinal's hat and vestments.

Time will not permit me to give further particulars of the dramatic services, or "Passion Plays," which were years ago performed at these sepulchres. Any one who may care to know more respecting them will find a very interesting account of them and of other old Easter customs in the first volume of Hone's Everyday Book, pp. 431 to 435, and in the article I have named in the *Gentleman's Magazine*, and the other books referred to.

One might wish to linger over many other historical places and names in Kingsland, for there is no parish in the county of greater interest. There is its battle plain at Westfield, and Battle or Gospel Oak still living and bearing acorns. There is the Manor of Street on the Roman road, where formerly stood a chapel, from which a brass plate with a black letter inscription was taken and preserved in Meyrick's time at Eyton Hall. With regard also to the place we have next to visit, tradition says there was once a castle at Kingsland, and the remains of the large tumulus and earthworks, you will see, give some countenance to the assertion. This said castle, however, must have been on a very confined scale. Again, it is supposed that in the mound was buried the body of Merwald, King of Mercia, who founded a nunnery at Leominster in the year of Christ 658.

But, leaving suppositions, let me just bring to notice a former worthy of Kingsland (rector at the beginning of the century,) Dr. Sneyd Davies, an elegant scholar and poet, worthy of remembrance. In memoirs of him, written by his friend, the Lord Justice Harding, are literary gleanings and letters containing curious and most interesting notices of places and people hereabout in that day. Thus about the Presteign roads, the Judge, speaking of Dr. Davies and Dr. T. Thomas, then rector of Presteign, says: "They met occasionally in the alternate character of host and of guest; but, notwithstanding their vicinity, the roads, which are now desperate enough to rival antiquity were, I should think, in those days, what a celebrated wit in our profession called, 'The feathered way', because none but the birds of the air could pass over it."

Again, he is generally facetious upon these roads, and in one of his early banters upon them, he calls the rocks on one side "Comb lane" and on the other, "Scylla and Charybdis."

On the conclusion of Mr. Barker's paper, Mr. Moore remarked that we must be careful to dissociate the dramatic Passion Plays referred to from the "Sepulchre" and the "Resurrection" as ceremonials conducted in accordance with the rites of the Roman missal; that is to say, the "Resurrection" ceremony is a religious function, and in no sense a mystery play acted in the Sepulchre. This religious ceremony is referred to in the following extract from page 96 of Vol. iii., of "The Church of our Fathers," 1852, by Daniel Rock, D.D. "From the early part of Maundy Thursday till Easter morning the Blessed Eucharist was kept in what was called the 'Sepulchre,' and night and day crowds thronged to watch and worship there."

In the history of Kingsland Church, as just given us by Mr. Barker, there is an absence of association with any particular branch or order of the Roman Church; had any evidence of such existed some light might have been thrown upon the connection of any processional from this chamber, at the east end of the north porch, a very unusual, perhaps unknown, position for the "Sepulchre," with the ceremony of the Resurrection upon Easter day.

In the present day the representation of the Dead Christ is still conducted; and even in our own country there is one branch (viz.: the Carmelites from Mount Carmel), who in their one church in London retain this holy ceremony, and who upon Easter Sunday morning form a procession for conveying the Holy Eucharist to the altar for the ceremony of the Resurrection.

Easter chambers in the chancels of churches are more common than is generally supposed. In our own county, besides Eardisland, mentioned by Mr. Barker, there is one in Foy Church. One was discovered a few years ago walled up in Letton Church. But perhaps the most beautiful Sepulchre Chamber in our kingdom is to be seen at Heckington, in Lincolnshire, of which a detailed description with a plate is to be found in a book by the Venerable Edward Trollope, F.S.A., entitled "Sleaford and the Wapentakes of Flaxwell and Aswardburn, in the County of Lincoln," price 10s., published by William Fawcett, Sleaford, 1872 (W. Kent & Co., 23, Paternoster Row). As the exact character of the mediæval office of the Sepulchre is but little known, a translation from the original, which is in Latin, will be found in that book. The original constituted a MS. ordinary of the Church of Rouen, whence it was extracted by Du Fresne, and is contained in the "Vetusta Monumenta," Vol. III.

Now a few words as to the meaning of the word, which being pronounced Volker, is spelled in so many ways. In Murray's handbook to Gloucestershire, Worcestershire, and Herefordshire, 3rd edition, page 301, we are told that "on the east side of the porch is one of those curious places built for the residence of a recluse, known as the Volka's Chamber." In Black's Guide we are informed that it is "a retired place formerly occupied by penitents;" but, probably being in the same difficulty as ourselves, the author prudently refrains from venturing to

THE VOLCA CHAMBER, KINGSLAND.

From "Nooks and Corners of Herefordshire,"
by kind permission of the author, Mr. H. Thornhill Timmins.

spell the word. Elsewhere it is spelled Volca, Volka, Volkar, Volker, Volkre, Volchre.

To add to the numerous traditions connected with this unique site for such a chamber, Mr. Moore contributed another, which existed two or three centuries ago, extracted from the manuscripts of Richard Walwyn, who died in 1750, who copied copiously and verbatim from the valuable manuscripts of Thomas Blount, of Orleton, antiquary, who was born in 1614, and died in 1679. The extract is as follows:—

"On ye left dore into ye Church is a little Apartment vulgarly said to be built by one Vaukel yt built ye Church, as a tomb for himself, and so goes by yt name, but more probably it was designed for a place for Penitents, where they might look into the Church and hear prayers, but were not to be admitted into communion till after they had showed signs and proof of yr repentance and amendment."

Judging from the style of architecture, it is probable that this chamber was built to enclose a tomb at a later period than the close of the 13th and beginning of the 14th century, which is the date of the Church; but as regards the application of the word Volka to the chamber, we are inclined to think that it signifies nothing more or less than the Folks' Chamber. Mr. Michael Ellwood informs us that there are near Leominster certain meadows known as the Volker or Volka meadows*; that they were common land prior to 1838; indeed the Volka and Eaton Common lands were the last enclosed in 1856-7 under the provisions of the General Enclosure Act. Townsend says "Volka implies Common," and V and F are interchangeable, hence it is sometimes called Folka or Folk-land. Price, in his history, writes Folkey. "Folk," in Anglo-Saxon, signifies people; and the affixes, er, ar, &c., imply "belonging to." Hence Volker chamber becomes simply the people's chamber.

The Rev. A. Rogers, St. Ethelbert's, Leominster, who arrived in the churchyard just before Mr. Moore had ceased speaking, was called upon to say a few words; he regretted that he had not had the advantage of being in time to hear Mr. Barker read his paper, but from a few words he had heard he gathered that it was sought to establish a connection between the Volka chamber and the "Sepulchre" of the Holy Week ceremonies. The Rubric of the Missal providing for the reservation of the Blessed Sacrament quite disconnects that ceremony from the Volka chamber. On Maundy Thursday two Hosts are consecrated; the one is consumed by the priest during Mass as usual; the other is placed in a chalice, covered with the paten, and wrapped in silk, and at the conclusion of Mass is carried in procession to a chapel or altar of repose, whence it is again carried on Good Friday to the altar and consumed by the priest. Now this rubrical custom is not only still observed, but has existed for many centuries, and in many pre-reformation churches having no second chapel or side altar we find a recessed arch,

*These meadows are situated south of Leominster, at the confluence of the rivers Arrow and Lugg, on the left of the railway line proceeding from Leominster to Hereford. In the Ordnance Map the spelling adopted is "Volca."

usually in the chancel opposite the sedilia, where the Blessed Sacrament was placed. Mr. Barker was going to show them such arches at Eardisland, near that portion of the church which formerly formed its chancel. But it was a vulgar error to call this altar or place of repose a "Sepulchre," and he, the Rev. A. Rogers, did not know how this common abuse crept in. We have then so far a distinct rubrical custom, nor did he know of any rubric permitting the Blessed Sacrament to be taken out of the church during Holy Week, excepting of course for administration to the dying. Now this chamber was a distinct building, entered from without the church, this constituting its peculiarity and difference from an ordinary mortuary or chantry chapel. Of course he was not in a position to assert that it never was used as a place of reservation, but it seemed to him unlikely, such use being so completely opposed to the rubric making provision elsewhere. He would mention that the priest is under obligation to carry out the rubrics of the missal, and is not at liberty to introduce innovations. On the other hand the Volka chamber was, to begin with, certainly a mortuary chapel. It had undoubtedly been a burial place, and there was the altar with its mensa upon which Mass would be offered for the repose of the soul of the dead, and so he (Father Rogers) continued firmly of the opinion that it was erected for this purpose only.

The members, when the Rev. Father Rogers' remarks were concluded, left the churchyard and took the footpath towards the tumulus, situated about two hundred yards west of the Church. The irregularities of the ground between the Church and the mound showed the water courses of the original streams, before they had been diverted into their present direct course a few yards further south-west of the mound, and there were sufficient indications to lead one to believe that the mound had been formerly moated. It is traditionally reputed to be the burial place of Merwald, son of Penda King of Mercia, and brother of Penda his successor, the first Christian monarch of the State. Merwald founded a convent of nuns at Leominster, and was father of Milburga, who founded the Priory at Wenlock. The mound measures 32 yards at the top. Its situation in a plain is not such as to give ground for thinking that it has ever been one of the old stockaded mounds, which are so numerous, and which indicate the fierceness of the struggle and the persistence of the attack in this important western edge of the Marches, where the Britons rallied, pressed hard by the West Saxons, who started from Hampshire and the Isle of Wight. The elevated ground visible from here is thickly studded with camps, whose position and figure show them to be British; and moated mounds are numerous both within and without Offa's Dyke, evidencing both the extent of the English conquests and the manner in which they were maintained before and during the eighth and ninth centuries. These moated mounds were afterwards, in many instances, especially when situated upon favourable sites, taken advantage of by the Normans, treading very closely in the footsteps of the English, who made their defences of a stronger and more permanent character, and sometimes enclosed the mound, as will be seen when our Club visits Berkeley Castle on July 31st, where the Norman building still exists enclosing the original earthen mound, and forming what is called a Shell Keep.

Leaving the tumulus the members directed their steps to the next object on the programme of the day, namely, a visit to inspect the fine collection of British birds' eggs in the possession of Dr. R. Williams, of Kingsland. Here the Assistant Secretary (Mr. James B. Pilley) was in his element. Nevertheless, time could only be allowed him to make sufficient memoranda for the following notes upon

THE COLLECTION OF EGGS OF BRITISH BIRDS BELONGING TO DR. ROBERT WILLIAMS, OF THE CROASE HOUSE, KINGSLAND.

This fine collection comprises specimens of the eggs of nearly all the British birds, and of many North-American species.

Among the former are clutches of the Golden White-tailed, and Spotted, Eagles, a long series of Ospreys, very richly marked, many beautiful varieties of the Kestrel and Sparrow-Hawk, also Kites, Buzzards, and Harriers. A detailed account of the eggs of almost every British bird not being called for, our remarks will be confined to local and the more rare species. Many of the Owls are here, including the Great Eagle-Owl, Snowy, the Long-eared, Short-eared, and several other species. The nest of the Pied Flycatcher was found last year; the first time it has been recorded in the county; its eggs are to be seen. Also the Grasshopper Warbler. Its nest is so artfully concealed, often at the bottom of a tuft of coarse grass, that it is very difficult to detect. The eggs of the Cuckoo, with companion eggs of the Hedge-Sparrow, Robin, Sedge Warbler, and (most unusual occurrence) the Song Thrush, affording such a contrast both in size and colour, is a feature of much interest; but especially so are the pair of eggs of the Sand Grouse, from the fact of this bird having invaded this country in large flocks in 1888, and having disappeared as mysteriously as it appeared; its egg resembles that of the Moorhen, rather smaller and of a greenish shade. Nearly all the Game birds' eggs are here, including those of the Capercaillie, Great Bustard, &c. Series of the beautifully-marked and elegantly-shaped eggs of the various Sand-pipers, Gadwits, Snipes, Crakes, and Phalaropes, with local specimens of the Woodcock. The various species of Swans, Geese, Ducks, and Grebes make a very extensive exhibition, including a great number of species; very noticeable also are a clutch of the Whooper Swan and very dark varieties of the Little Grebe, nearly black; the egg when freshly laid is white. The strangely-coloured Divers, including the Great Northern, Black, and Red-throated. A long series of the Common Guillemot, containing many richly-marked specimens, the various Terns, Gulls and Petrels forming an endless variety of markings and colourings, must bring this record to its conclusion.

Thanks having been accorded to Dr. Williams for the great treat afforded to them by the examination of so representative an exhibition of eggs of British birds, the members, resuming their seats in the carriages, continued the drive through the village of Kingsland as far as the stone pedestal, erected by public subscription in 1799 to commemorate the battle of Mortimer's Cross. The site of the battle was one mile further north; the so-called Battle Field Oak or Gospel

Oak, now a shattered wreck although it still produces acorns, occupied about the centre of the Lancastrian position. An inscription upon the pedestal gives a few details of the results of the battle, and the strength of the forces engaged under their respective commanders. It records the date as occurring on February 2nd, 1460, whereas modern historians would designate it 1461. The "New style" of the Calendar was introduced into England in the year 1751, before which period the legal year did not commence until the 25th March, consequently by the Old style, the year would be called 1460 until that date (March 25th) arrived. Measurements of the oak tree will be found in *Woolhope Transactions* 1870, page 307, and a description of the battle upon page 2 of the same volume, but those who desire a more full account should read it in Richard Brooke's *Visits to Fields of Battle in England of the Fifteenth Century*,* published in 1857, and a reference to Shakespeare's Henry VI., part III., Act 2, Scene I., will add still further interest to the subject.

The Woolhope Club would desire to bring local public opinion to bear against allowing this monument to be defaced. Were it not that much is expected from the Authorities of the County Council, the aid of the Society of Antiquaries or of the Inspector of Ancient Monuments would have to be invoked.

Leaving Kingsland, the route was directed to Eardisland, where the members were received and most hospitably entertained by Mrs. Barker and her family at their picturesque residence, Staick House. After refreshments they paid a visit to the Church, and re-assembled in its large porch, where they had the pleasure of listening to the following paper on

* What has become of "the ancient spur, of the description called the prick-spur, of steel, plated with silver?" which Mr. Richard Brooke says was presented to the Museum at Hereford in 1839, and which he saw in the Museum in May, 1855, on the occasion of his second visit to the site of the field of battle. Where are now to be seen "the large buckle, perfectly plain, the small buckle, rather ornamented," all found on the field of battle in 1854, which were exhibited to him by the Rev. R. D. Evans, Rector of Kingsland, when he visited the locality for the third time in May, 1856? Where are the arms, swords, and spear heads which, within the recollection of Rev. R. D. Evans were presented to the Museum at Hereford? At that period the Museum was in the Castle Green, under the auspices of the Hereford Philosophic and Literary Institution, long since defunct. It is seriously hoped that these and many other objects of local interest will be restored by selfish collectors to their appropriate position in the Museum at the Free Library, Hereford.

ERISLONDE, ALIAS EARDISLAND, ALIAS ARELAND.

[By Rev. Joseph Barker, Vicar.]

So does this place appear among the livings discharged of this Deanery in Bacon's *Liber Regis* of 1786; and in Dingley's *History from Marble*, compiled in the reign of Charles II. and printed for the Camden Society in 1867, we have it Erdestland. I have also seen it Aresland; being on the banks of the river Arrow we find too Areland, *vel* Eardisland, *quasi* Arrow-land; and we have even now in these days of general education sometimes Yurzland. There are various conjectures respecting the meaning of Eardisland, and in my endeavour to get at its right interpretation I have received much kind help from a respected member of our Club, Chancellor Phillott, and also from the Professor of Anglo-Saxon at Cambridge, the Rev. Dr. Skeat.

A common idea prevails that the name is "Earl's-land," and from the circumstance of the parish adjoining those of Kingsland and Monkland this would not at first seem unlikely. Flavell Edmunds, not at all I fear a trustworthy authority, explains Herdisland, now Eardisland as the herds fee-farm-land, but Professor Skeat says, "where he found that the Anglo-Saxon Len (error for Læn) meant a fee farm, I don't know. It is clearly 'land.'" He also considers a guess of Chancellor Phillott's "Earl Harold's-land" in an abbreviated form a bad shot. Eardisland does not find a place in *Domesday* I believe, but *Domesday* says (this from the Chancellor's letter) that Alured the Spaniard held Pembridge, Stretford, a place called Ewre, and other lands. Also that these lands were formerly held by Earl Harold or his son. These all adjoin Eardisland, and therefore is it not likely that Eardisland may mean in an abbreviated form "Earl Harold's land?"

But Professor Skeat considers that "this contradicts the first law in phonetics, that in contraction the strongest syllable never drops; and surely 'Har' is the strongest syllable in that combination."

In the first letter I had from him he writes, "You do not tell me the most helpful thing, viz., how you pronounce it. In fact it is almost impossible to express pronunciation by our miserable Protean alphabet. I suppose it is 'Urdzl'nd' where 'ur' is like the 'ur' in burn. And I suppose that the 'd' is inherent, and therefore the spellings Erislonde, Areland, are of no particular account. I should say the chances are that it is derived from the Anglo-Saxon Eard, a dwelling-place, a home, once very common, but now obsolete. The genitive is *Eardes* which would have passed into 'yardz' or 'erdz' either. If you sound the word as three syllables, *i.e.*, if the 'i' counts, then you may be sure that something has been suppressed. And as 'Eardes-land,' land of a dwelling-place, is not really good Anglo-Saxon (for the word would have been compounded *Eard-land*, which indeed occurs), I should say it is extremely probable that it stands for *Eardulfes land*, much as Leminster is for Leominster, and Wo'ster for Worcester, and all the rest. In fact, the first part must have been a man's name;

and Eard is never a name. *Eardulfe's lea* actually occurs in a Charter of Æthelred, and the etymology *Eardulf* is well-known, it is from 'Eard' a home, and 'wulf' a wolf. 'Wolf of the home' sounds like nonsense, but it has a thousand parallels. Our ancestors used to make up names just in this way, by combining elements that make no sense; often in order to stick to some prefix. Thus Ead—blessedness, happiness, is the well-known royal prefix, and occurs in Ed-ward (happiness—ward), Ed-red (happiness—counsel), Ed-gar (happiness—spear), Ed-wy (happiness—war), and all the rest. So my guess at present would be for Eard-wulfes-land, the land or 'home-farm' of Mr. Eard-wulf. But this rather assumes that the 'i' was, or is sounded." When I replied to this letter and said the 'i' in Eardisland was not sounded, but that in Dingley's *History from Marble*, it was called Eardestland, the Professor kindly wrote: "the pronunciation is what I thought. Of course if the 'i' had been kept, it would have been clearer. But the old spelling Erdestland will do just as well. The 't' is the well-known excrescent 't' which is so often wrongly introduced after 's,' as amids-t, amongs-t, betwix-t, &c., for old English amiddes, amonges, betwixe. So Erdestland really means Eardesland, in which 'es' was a syllable. I should say that settles it. The rustic 'Yarzland' is a more faithful representation of the old sound than Urzland is," and further on he wrote, "I have little doubt that Eardulfes land is all right. It cannot be applied to 'Earl' or to 'Herd.'" Here, then, I am inclined to feel satisfied that the place 'in which we take the liberty of residing' is the land of the wolf's home, and may not a part of the parish named "Bearwood" be the wood of the Bear?

In notes on Eardisland, I will begin, as in duty bound, with the Church, which, though it may not be looked upon as quite a joy, like many in the county, we may still call "a fair place." It is dedicated to St. Mary, and may have been built by a "Gentle Mortimer," as the arms of that powerful family were seen on a shield in one of the windows when Dingley visited the Church. *Liber Regis* reports the living as *antiently* belonging to the Priory of "Shene," and, after the dissolution, to John Booth, Esq., 1663-69; Robert Price, and John Dutton Colt, Esqs., 1726; James Kinnersley, Esq., 1772. I find there were different religious communities founded at Shene, and among them a Priory of Carthusian Monks by Henry V., which probably is the one named in *Liber Regis*. Shene or Sheen (*Saxon* resplendent), so called from its delightful situation, is the present Richmond in Surrey.

It will be seen at once, that the Church was not built as Kingsland, at one and the same period, the nave (80ft. long by 24ft. 6in. wide) being a much earlier structure than the chancel (27ft. 4in. long by 18ft. 6in. wide), forming indeed the ancient Church, and the tower (20ft. by 15ft.) having been erected only 160 years ago.

We have entries in an old parish book, *The Eardisland Journal*, that the ancient tower, which had a steeple (see Dingley's sketch) collapsed from age, and the present one was built at a cost of £155, by Thomas Hooper, of the parish of Yarpole; this was the lowest tender.

During the restoration in 1864, under the architectural superintendence of Mr. Henry Curzon, the chancel arch was re-built, and in stripping the plaster

from the wall there were evident indications of the chancel having originally terminated with the present nave, the wall having three lancet lights, and a round or oval window above. The small South doorway would be the original priests' door. But I will give a brief account of the antecedent history of the Church, so far as the Archæologist can divine, with which I was kindly furnished by Mr. Curzon for our Parish Magazine in 1869.

"The Church," he says, "is one of a type of ancient churches, of which many examples are found in the diocese of Hereford. The distinctive peculiarities of this type are as follows:—The long wide nave without aisles, porch, and main doorway on the south and smaller doorway on the northern side, the ample chancel, and the western tower often as wide as the nave.

The original building appears to have been erected about the end of the 12th century; it was of the simplest form, namely, a long nave, the eastern end serving as the chancel, the doorway on the south side now blocked up being the priest's entrance: the piscina and aumbry, accessories of the altar, also remain. The square opening near them was provided with a shutter, and was no doubt an alms-window. A western tower may also have formed part of the original edifice. The ancient Church was lighted with very narrow lancet windows, four of which still exist, and in the east wall where now is the chancel arch was a triplet arrangement of three lancets with a circle above.

The porch is of a later date than the early Church; later still is the three light window on the south side inserted in the place of an original lancet to supply a want of light in the interior.

The chancel, vestry, and the two easternmost windows of the nave are the work of the 14th century builders, and both in design and execution are extremely good. The neighbouring churches of Pembridge and Kingsland were built almost entirely at this period. The external tomb on the south wall of the chancel was probably intended to receive the mortal remains of the founder. The tombs in the nave are of a later date; one of them is noticed in the Dineley (Dingley) MSS. (circa 1683) in the possession of Sir Thomas Winnington, Bart. It bears no inscription; the centre shield at the finish of the canopy is noted as being curious, and is carefully illustrated; it bears on a field or, a Latin cross gules between a cock, ladder, nails, sponge, spear, vestment, and other attributes of the Crucifixion.

The nave had anciently, beyond all doubt, a high-pitched roof, but at the time the restoration was undertaken no trace remained of such a roof, and only two tie beams of the 15th century roof which followed it. The roof then existing dated about the end of the 16th century, and was designed on a thoroughly bad constructive principle. The porch roof was of the same description, and the low pitch led to the lowering of the original gable. Happily these two roofs are restored to their original lines and now harmonize fitly with that of the chancel.

The tower was built 160 years ago to replace one which fell, and in falling shattered the bells. These were re-cast by a lady parishioner. The former tower is shown in a little view of the Church in the Dineley (Dingley) MSS. before referred to. It would there seem to have been the original one, that is of the same date as the nave, with later insertions and parapet. It was of the full width of the nave,

a circumstance common in this type of Church. The evidence the Dineley (Dingley) sketch supplies as to the width is supported by the conditions of the old walls of the nave where the present tower recedes from them. It is evident that they have been severed at that point and afterwards made good with masonry of a different fashion. The present tower has no pretension to architectural device; its builders had no other object than to build a loft for the bells. They lived in the darkest age which architecture had known, in England at least, since the days of the very early Saxons. What wonder, then, that the little done about that time in and about the rest of the building, in the way of new windows, gallery, &c., was only adding one incongruity to another?

The chancel arch removed at the time of the Church restoration was of about the same date as the chancel itself, but of a much plainer style and inconveniently narrow."

I wish Mr. Curzon's had not been so wide.

"The chantry screen now placed before the organ is a good example of the woodwork of the 15th century."

And I wish this screen was back in its old position. So far Mr. Curzon's account of the Church.

I would draw special attention to the small square window on the south side at the east end of the nave, which Mr. Curzon calls an "Alms window," as it certainly may have been, but I rather conceive it is one of those remarkable windows found in a great number of churches, called "low side windows," or sometimes "lepers' windows," the purpose of which is now generally considered to have been for the administration of the Sacrament to lepers or to sick persons during time of plague. "No example of these windows," Mr. Parker says, "has been noticed of a date prior to the Early English style, and the majority are later, though they are found inserted in Norman churches. The theory adopted by the Ecclesiologists was that a light was burnt on the altar, which might be seen from the outside through these windows, and thus they gave them the name of Lychnoscope."

On the same side of the nave under the two-light decorated south window, which most likely was inserted for additional light at a later period, will be noticed the canopied arched niche, known as the tomb of the Holy Sepulchre, of which a drawing was given by Dingley, and in his time on the triangular stone at the top, now plain and mutilated, were represented upon a shield all the instruments of the Crucifixion, and on another shield a coat of arms. In the "History from Marble," we are told: "In the window is seen these arms, differing from that on the monument, whose bearing is argent and gules, the same with Marten of the West seen in the Temple Church of London." There were also at that time other coats of arms in the windows, though none now, those of St. Owen (formerly of Burton Court), Barry of six gules and or, Mortimer, and Hopton argent, a lion rampant sable.

There are several other monuments of antiquity in the Church, one of interest in the floor under the leper window, with a black letter inscription, which I should be glad if any member of the Club will help to decipher. All at present

made out is—"Hic jacet . . . . Burtonii cujus animam propitietur Deus. Amen." And in the chancel will be seen a flat stone inscribed with old ornamental letters. "Here lieth the body of John Brewster, of Burton Court, gent., who departed this life 10th May, Anno Domini, 1684." There are also monuments to the Evans and Kinnersley families.

On the outside near the chancel door is an ancient monument within a niche in the wall, with ornamental carved work on the stone, which in Hill's MSS. of 1712 is thus spoken of: "The altar monument under the arch has a cross upon it, but no inscription. The inhabitants believe it was erected in memory of the founder of the Church" (that must be the chancel), "and indeed it seems coeval with the fabric."

I must just notice our beautiful bells, of which we are justly proud. They are five in number, and sweet sounding, but who that lady parishioner was who gave them to the Church in 1728 I cannot tell; would that her name was known, for it ought to be had in remembrance. The bells were cast by Abel or Abraham Rudhall, of Gloucester, of a family famous as bell founders from 1684 to 1828, and of that class of Englishmen, who were once more common than now, called good Church and State people, for all their bells are said to bear such epigraphs as ours do. No. 1, Prosperity to the Church of England, A.R. 1728. No. 2, Peace and good neighbourhood, A.R. 1728. No. 3, Prosperity to the parish, A.R. 1728. No. 4, George Kinnersley, Gt. and Ion. Davies, churchwardens, A.D. 1728, and No. 5, I to the Church the living call, and to the grave do summon all, A.R. 1728.

It is often remarked that Eardisland is a very healthy place, and certainly most of us living here have reason to thank God for the blessing of health. Our parish register of deaths too, with respect to old age of those committed to the ground in our churchyard, will compare favourably I think with most others, for since 1778, or 112 years ago, no less a number than 38 had reached the age of ninety and upwards, for we find entries in the register of twelve who departed this life at the age of 90, three at 91, seven at 92, one at 93, one at 94, two at 95, two at 96, five at 97, two at 98, one at 100, one at 103, one at 108, the record of the three last burials being as follows:—

1777.—February 18th, David Davies, alias Davy Mawr, aged 103.

1819.—Elizabeth Perry, Streamford, May 30th, age 108.

1854.—Ann Bounds, Barewood, March 9th, age 100.

There is also an entry in 1676 of a Widow Hill, of Eardisland, 111 years old.

I may just mention that I possess the stone china sugar basin of the 108 years old Elizabeth Perry, and will gladly dispense sugar, which Viscount Sherbrooke, when Mr. Robert Lowe and Chancellor of the Exchequer, called "the delight of childhood and the solace of old age," from this relic of antiquity to any Woolhopean brother who will come to my old home for tea.

We must now leave the Church and visit some other objects of interest in Eardisland village. We shall go first to the moated mound, which is on the north-east side of the Church, and almost adjoining the churchyard. This is named on an old map of the Court House Farm, to which it belongs, "The Fortress." And it may have been a place of defence; a notion, too, prevails that the mound

afforded a place of refuge to the ancient people of Eardisland from the incursions of the Welsh, and that they were used to drive their cattle upon it to keep them out of the way of the marauders. I rather conceive this moated mound to have been the site of a Saxon habitation, or stronghold. Such were in olden times erected on a mound like this, piles of wood being probably driven in the ground round the edge, and thus forming a strong fortress. The ancient strongholds, being of timber, would account for no remains being left, though there are often no traces even of castles built of stone, the materials having been carried elsewhere for some more modern structure. The measurements of the mound are as follow:—Diameter, 94 feet; length of slope from the water to the summit, 33 feet; the area on the top, 6,942 $\frac{2}{7}$ square feet, and at the base, 11,694 $\frac{4}{7}$ square feet; the height would be about 17 feet. There is another smaller mound, not moated, which we shall visit, not many hundred yards away, in a meadow belonging to the glebe by the river, which, as yet, is a puzzle to antiquaries. From its being in a field called "Monks Court," and belonging to the living, may it not possibly have been a mound on which the monks of old held their court for tenants and others to do "suit and service," and other right observances, where, too, court laws and orders were promulgated? Out-of door courts are held, as we know, to this day, as at Stretton on Dunsmore in Warwickshire, and Tynwald in the Isle of Man. But whoever may not agree with the supposition, I shall only be too glad for him to suggest another.

Of Herefordshire dove-cotes we have two remaining, one at the Porch House, the other at Burton Court, and I show a pencil drawing of one formerly standing in the Court House yard very near to the Moated Mound. Mr. Watkins told us about them all in his most interesting and able lecture on the night of April 10th last in the Woolhope Club-room, and exhibited beautiful views of them, with many others.

I should not forget to mention that the old timbered house on the bridge, the upper part of which Mr. Clowes has most kindly fitted up as a reading-room, was formerly the Grammar School, founded by William Whittington, Esq., by will dated 24th December, 1617. The headmaster is required to be a graduate of Cambridge or Oxford, and he receives his nomination from the representatives of the Earl of Macclesfield, and is licensed by the Bishop. The present Vicar is now headmaster, *without pay*, but has the honour of being, as he believes, the only licensed schoolmaster in the Diocese of Hereford. A whipping post stands at the north side of the old house, but is no longer a terror to naughty boys.

On our way to Burton Court we shall pass two oak trees deserving of notice. They stand on the private footpath by the main road, and measure at five feet from the ground 14ft. 6in. and 13ft. 3in., and their lower branches from the butt extend about 50 feet on each side. There is another oak tree in a field near with a circumference, at 5ft. from the ground, of 15ft. and a diameter, foliage spread, of 40 yards north and south.

At Burton Court is a small camp, supposed to have been occupied by Henry Prince of Wales, afterwards Henry V., when he opposed Owen Glendower. At the division of the family estates, made at the death of Robert, third Earl of

Essex, the Manor, which came from the Mortimers to the Devereux family went to the Marchioness of Hertford and then to the Thynnes. It was the seat of the St. Owen family for many generations, then the Downtons, Cotes, of Cotes, county Stafford, occupied by the Crofts of Croft Castle, and before 1750 became the property of John Brewster, so to the Evans family, and it was sold in 1863 to the present owner, John Clowes, Esq.

By the kind permission of Mr. Alison Johnson, the hall of the 14th century will be seen, on the walls of which are many trophies. The spears, knives, and firearms are chiefly from Afghanistan, the heads and horns of animals from the Himalayas, and the large fans are Japanese.

These trophies of war and of the chase, the house, garden, and the site of the camp, commanding a prospect of peaceful nature were all duly inspected and admired. Amidst these surroundings we were reminded lived that close observer of nature, Rev. Canon W. E. Evans, the talented pious author of *The Songs of the Birds, or Analogies of Animal and Spiritual Life.*

Stretford Church was next visited, a temporary halt having been made near Stretford Bridge on the old Roman road (Watling Street). This quaint little Church was visited by the British Archæological Association on September 8th, 1870, and its antiquity was on that occasion pointed out by Mr. F. R. Kempson, as proved by the little window in the north wall of date early in the 12th century, and the little round window in the west end, as well as by the ancient font. The northern portion was early Norman, and when an addition was made to the Church upon the southern side, it was made similar in size and form, one roof being thrown over both the old and new buildings, the intermediate arcade coming under the ridge of the roof. Screens of a later period are preserved in each portion.

The Rev. G. A. Blakely (Rector of Stretford) read a short account of the restoration of this Church.

In the northern portion are two tombs bearing effigies, which, by some members, were considered nearly identical. but the following extract from page 395, Vol. xxvii, of 1871, Proceedings of British Archæological Association, are the remarks of the Rev. C. Boutell upon this subject, "The tomb with two effigies appeared to refer to the father and mother of the knight in the other niche. The knight has a lower covering on his mail, and extra guard on the leg. You do not get, in this instance, pure mail; armour of another kind is introduced. This is one step in the development of armour. The effigy of the father has pure mail armour. The date is 1330. The other is about twenty years later. The vestment or surcoat worn by the older figure, cut short in front and long behind, had ceased to be used in 1340. I hesitate whether this one may not be as old as 1320, but a part of the armour is like 1320, and the rest like 1330, so that it may be between those dates. The costume of the lady is very simple. You will notice the excellent effect of the drapery. The sculptors of the 14th century, in cutting the drapery, appear to have been always mindful of the fact that their effigies were

to be recumbent. I commend the effigies generally as examples of military equipment. They fill up a void space in our knowledge of the development of armour of the first and second quarters of the 14th century. The heraldry strikes me much. The well-known arms of the de Bohuns resemble very closely the arms upon this shield. The difference seems to show that one of this family may have married a younger daughter of the de Bohuns. The Bohun arms are a bend cotised between six lions rampant; whereas this coat has birds instead of lions."

The Rev. JOSEPH BARKER supplies the following

NOTES ON STRETFORD.

STRETFORD gives the name to the hundred in which it is situated. Humphrey de Bohun had it in the reign of Henry III., and not long afterwards it came into the possession of the Delaberes, from whom it passed to Sir Michael Lyster (in right of his wife, Elizabeth Delabere, heiress of Sanacre Delabere). He died seised of it in 1552. At the close of the same century it was purchased by John Aubrey (grandfather of the antiquary), and sold about the year 1660 to Herbert Croft, Bishop of Hereford, with whose descendants it continued until the sale of the Croft Castle estate. The present Lord of the Manor is Arthur H. Wall, possibly related to that worthy gentleman, Mr. Thomas Wall, who was Vicar of the parish in Dingley's time (circa 1675). The Church is small but very interesting. It is not built east and west, but obliquely. On the cross-beams of the roof are the arms of Devereux, Delabere, and Baskerville, and a cross, "perhaps the arms of the Hospitallers (Blount, who visited it), and in the Church a large case of stone," which, tradition says, was the shrine of the martyrs Cosmas and Damian, to whom the Church is dedicated. In the north aisle are the recumbent effigies of a knight (with a shield bearing the arms of Delabere) and his wife, and an exact counterpart of the same figures in the Church. The ball-flower canopy, which Dingley sketched, and the stone bases have been removed.—See History from Marble, f. 93.*

Below the Church there is a spring dedicated to the same saints as the Church, and supposed to possess many virtues.

COSMAS AND DAMIAN.

They were brothers, born in Arabia, who studied science in Syria and became eminent for skill in physic. They were Christians, and never took any fee, on which account the Greeks called them (Ἀναργυροι) Anargyri, *i.e.* without fees. They lived in Ægea or Egæa, in Cilicia, and were remarkable both for the love and respect which the people bore them, and for their zeal in the Christian faith. When the persecutions of Diocletian began to rage, it was impossible for persons of so distinguished a character to be concealed. They were apprehended by order of Lysias, Governor of Cilicia, and, after some torments, were beheaded for their faith. Their bodies were carried into Syria and buried at Cyrus. Theodoret, who was bishop of that city in the fifth century, mentions that their relics were then deposited in a Church there which bore their names.

The Emperor Justinian (A.D. 527) out of religious regard for them, enlarged, embellished, and strongly fortified Cyrus, and built an edifice in honour of these martyrs (grateful for their having interceded for his recovery from a

*Mon. Insc. to Mr. Thomas Wadeley, of the Court of Stretford, d. April 4, 1716, æt. 56. There is a pedigree of the family in the First Visitation of the County, 1683.

dangerous illness), in room of a Church dedicated to them at Constantinople. He also built a Church to them at Constantinople. Their relics were removed to Rome.—*From Butler's "Lives of the Saints."*

Many thanks are due to Mr. Barker for the above interesting communications, to which Mr. Moore adds the following extract from "The Breviary," for September 27th, kindly supplied by Rev. Father Rogers.

DIE XXVII. SEPTEMBRIS,
IN FESTO S.S. MARTYRUM
COSMÆ ET DAMIANI.

Oratio.

Præsta, quæsumus, omnipotens Deus, ut, qui sanctorum Martyrum tuorum Cosmæ et Damiani natalitia colimus, a cunctis malis imminentibus, eorum intercessionibus liberemur. Per Dominum nostrum Jesum Christum Filium tuum: qui Tecum vivit et regnat in unitate Spiritus Sancti Deus, per omnia sæcula sæculorum. Amen.

Lectio.

Cosmas et Damianus, fratres Arabes, in Ægea urbe nati, nobiles medici, Imperatoribus Diocletiano et Maximiano, non magis medicinæ scientiâ, quam Christi virtute, morbis etiam insanabilibus medebantur. Quorum religionem cum Lysias Præfectus cognovisset, adduci eos ad se jubet, ac de vivendi instituto, et de fidei professione interrogatos, cum se et Christianos esse, et Christianam fidem esse ad salutem necessariam, libere prædicarent, deos venerari imperat; et si id recusent, minatur cruciatus, et necem acerbissimam.

Verum, ut se frustra hæc illis proponere intelligit: Colligate, inquit, manus et pedes istorum, eosque exquisitis torquete suppliciis. Quibus jussa exequentibus, nihilominus Cosmas et Damianus in sententiâ persistebant. Quare ut erant vincti, in profundum mare jaciuntur: unde cum salvi ac soluti essent egressi, magicis artibus Præfectus factum assignans, in carcerem tradit, ac postridie eductos, in ardentem rogum injici jubet: ubi cum ab ipsis flamma refugeret, varie et crudeliter tortos securi percuti voluit. Itaque in Jesu Christi confessione martyrii palmam acceperunt.

From Stretford Church, the carriages conveyed the members to Monkland. Upon arrival at Monkland Church, the Vicar, the Rev. J. Padfield, met the members and kindly showed them over the Church, exhibiting its beauties and important features. The Rev. Joseph Barker read an extract from his paper, which is now given in full, preceded by an extract from Dugdale's Monasticon, and from manuscripts lent by Miss Baker, sister of the late Sir Henry Baker.

DUGDALE'S MONASTICON VII., 1026, BRITISH MUSEUM, PRIORY OF MONKLAND AND MONKESLEN.—TANNER CALLS IT LENA, MONCKESLEN, MONKENLANE, OR MUNKLAND.

Ralph Toney, the elder, having given Temp. Will. Rufi the Manor and Church here to the Abbey of St. Peter's at Castellione or Conches in Normandy, it became a cell of Benedictine Monks to that foreign house. It was sometimes reckoned as parcel of the alien Priory of Wooten Warwen in Warwickshire, and

as such was granted during the wars with France to the Carthusians at Coventry, and confirmed, 22 Ric. II., but after the suppression this Priory of Monkenlane with all its appurtenances was annexed to the Dean and Chapter of Windsor, 13 Ed. IV. (extracted at British Museum, January, 1813). This etching is by Mrs. J. Severn Walker; the drawing was prepared for "The Ilam Anastatic Drawing Society." The work from which the lower portion of the sketch is copied is entitled, *History from Marble.* The Camden Society in 1868 printed Mr. Dingley's book, with an introduction by John Gough Nicholls, F.S.A. The tricking of the coat attributed to Hastings, Earl of Pembroke, has in the copy given in Mr. Dingley's Book, the word Argt. on the shield crossed through, and the note reminds the reader of the marriage of the Earl with a daughter of Roger Mortimer, Earl of March; the note thus seems to intimate a doubt in its writer's mind. If it was sought to honour the family of Mortimer, how is it explained that their bearings are not quartered with those of the Earl of Pembroke? Edmondson, in his *Complete body of Heraldry*, gives the arms of Tony or Tonne in whom the manor of Monkland was undoubtedly vested as Ar. A. Maunch gu. Ralph de Tony held Monkland shortly after the conquest, and Edmondson gives the coat as borne in about 1205—Henry III. reign. This coat may be rather attributed to Tony than Hastings, Earl of Pembroke. Mr. John Gough Nicholls speaks of the other two family bearings as Leinthall empaling Lanton—Edmondson does not recognise the family of Lanton—Mr. Berry does, but attributes to them a very dissimilar coat. The Leinthalls, of Bisselsleigh, Berks., bear one of the arms empaled on the one shield. Ar. on a bend cottised sa 3 mullets or. And the Leinthalls, of Dorset—Sable a bend pisilly ar.—the one coat is thus disposed of—the remaining bearing cannot be spoken of with equal confidence. Sir Rowland Leinthall had for his second wife, Lucy, the fourth daughter of Baron Grey, of Codnor—the family of Grey, or at least some of its branches, bore Barry of six ar. and az., and although not quite the coat, it is not very unlike—and is probably what was intended.—*From a MS. lent by Miss Baker.*

MONKLANE VULGO MONKLAND.

Mon. Ang., Vol. I.

In this town there was anciently a small Priory of Benedictine Monks, founded by Ralph de Tony, senior, and confirmed by Whittin, Bishop of Hereford *(valua dignitate Herefordensis Ecclesiæ)*. They were endowed with the Manor and Church, Monkland with other lands, and it being as a cell to the Abbey of Conches in Normandy, was suppressed by Act of Parliament, held at Leycester, in the second year of King Henry V., among Prioryes alien. I find elsewhere,

Pat. 22, R. 2 & 3, m. 4.

that the Manor of Monkenlane in Herefordshire was part of the possessions of the Priory of Wotton, in Warwickshire—which also appertained to the said Abbey of Conches. It appears also that King Henry V. gave the Priory and the lands thereto belonging to Sir Rowland Lenthale and Margaret his wife. But when King Edward IV. attained the Crown he resumed that grant and gave this

Pat. Dat. 29 Jan. 13 Ed. iv.

Manor or Priory with the tithes to the Dean and Canons of St. George's Chappel, in the Castle of Windsor, in pure and perpetual almes, who now enjoy it. I find the Rector of this Church mentioned by the name of Personatus Capellæ de

Monklone. The said Dean and Canons have also the patronage of the Vicarage.

Liber Niger. Heresd. In King Edward I. tyme the *bona temporalia* of this Religious house were thus returned into the Exchequer.

ABBAS DE CONCHES.

Idem habet apud Monklone unam carucatam terræ et valet per annum	xl^{s}
De anno redditu cum molendino	x marcas
De prato ibidem	1 marcam
De pasturâ	x^{s}
De bosco reddendo	viij
De Placitiis et Equisitis	6^{s}
Et de alio redditu ibidem...	xxx^{s}
Item habet in manerio de Albedeley de redditu Assise	iij^{s}

Pat. 3 & 4. Ph. & Mry. 7. Certain lands in this parish and a rent of 2s. issuing out of Trinity lands in Lemster were heretofore given ad perpetuam sustentationem lampadis in Ecclesia, and were granted by King Ph. and Mary Q., to Sir Edward Hastings, Knt., their Chamberlain, and his heyres.

*Copied from MSS. notes towards a "History of Herefordshire" by Dr. Blount, of Orleton (which he says he began in August, 1575), by Thomas Blount, Esq., now belonging to Mr. Blount, a solicitor in Usk.—From MSS. lent by Miss Baker.**

*Thomas Blount, of Orleton, Antiquary, was born 1614, and died in 1679. The first volume of his MSS. on localities, A to K, has unfortunately been missing for many years. An opinion has been expressed that some day or other it may be found, under a wrong and misleading name, in the British Museum. The second volume commences at the letter L with Laysters. Copies are to be found in the library of the late Major Clive at Whitfield, one among the collections of the late Mr. R. B. Phillips, of Longworth, in the library of St. Michael's Priory, Belmont, and a third, we believe, in the possession of the family. The "Walwyn" collection of the late Mr. R. B. Phillips is also deposited in the same library at Belmont. Richard Walwyn's MSS. (1749, he died in 1730) contain numerous extracts copied verbatim from Blount's MSS., therefore we have every reason to hope that in them are preserved many records from Blount's missing volume A to K. There are also MSS. in St. Michael's Priory, Belmont, occasionally illustrated by pen and ink sketches of churches, &c., of one James Hill, of London, 1712-1718. We can bear testimony to the very obliging courtesy of the Very Rev. Prior Raynal in allowing us to inspect and take extracts from these MSS. whenever applied to.—Ed.

The following account of the old Church and its restoration by Mr. Street, is taken from the *Ecclesiologist* of August, 1866 (No. clxxv.)

ALL SAINTS' CHURCH, MONKLAND, HEREFORDSHIRE.

We briefly noticed in our last number the restoration of this little village Church, and two excellent photographs of the interior, by Mr. W. H. Warner, of Ross, which had been sent us. We are now enabled, by the kindness of Sir Henry Baker, to present our readers with one of the photographs, and take the opportunity of adding a more detailed account of what has been done.

The old Church consisted, we are informed by Mr. Street, before its restoration was commenced, of a western tower, nave, chancel, and vestry. Of these the chancel was a poor, modern erection, having been built some thirty-five years ago, and the vestry was a more recent and sightly addition. The nave was more interesting. It retained in each side two original Romanesque windows, which were placed high up in the walls (about eleven feet from the floor), and were mere slits, six inches wide and three feet in height. Their position proved that the whole of the nave walls were Romanesque; but they were the only architectural features which remained of the original fabric. Subsequently other windows were inserted, two of two lights in the south wall, and one of two lights in the north. The dimensions of the nave were only 48ft. by 17ft. 6in., so that the lighting of the building was sufficient, and (the new windows having been inserted at a much lower level than those originally built with the wall), extremely picturesque in the way of light and shade. This will be seen well on reference to our illustration, and the effect is one which is very suggestive, because it is too rarely that in new buildings any attempt is made to manage with skill any such very effective disposition of the openings.

The south-western and north-western windows were close to the entrance to the chancel, and the existence of a piscina in the sill of the former showed that there had once been an altar against the chancel screen. The tracery of these inserted windows is peculiar. One of them has two lights, with a quatrefoil above, and an enclosing label which takes a trefoil outline. The other, of somewhat similar tracery, has a simply arched enclosing label; both were rude and irregular in their workmanship, and evidently executed by mere country masons; and their happy position in the walls is a good instance of the unconscious skill which these simple mediæval workmen so constantly displayed. The date of these inserted windows was probably circa A.D. 1270; the original walls dating from about A.D. 1100. Here it should be mentioned that the Norman work was almost all executed in calcareous tufa. Rough and rude as this material is, it has been as far as possible retained (as the photograph will show) in the re-building. It is very rarely that this material is to be found in any English buildings, and it was specially important therefore that it should not be condemned here on account of its roughness. The old roof existed on the nave. It appeared to be of the same

date as the inserted windows, and had pointed arched braces framed to every pair of rafters throughout its length.

At the west end of the old Romanesque nave a steeple was built circa A.D. 1220. This is a most admirable example of good design and extreme simplicity. It is 21ft. 6in. square outside, and only 41ft. high to the top of the walls, rising 6ft. only above the ridge of the nave roof. It has buttresses at the angles, with bold weatherings and simple lancet belfry windows of one light on each face. A good corbel table, with moulded corbels under a chamfered course, forms the cornice. Here the masonry is admirable, and the stonework, never having been touched with whitewash, nor the equally defiling hand of the "pointing" mason, had obtained the most lovely colour of which lichen and stone are capable. The tower was surmounted by a great boarded framework, which had some of the elements of the picturesque, but more of the ugly, and which was clearly not antique.

The old doorways had disappeared, no trace remaining of any on the north side, whilst that on the south was an insertion of late thirteenth century date, with a timber porch, probably of the same age, but very much decayed.

The font—a rude cylinder—is probably coeval with the original foundation of the Church.

It may be assumed that the Romanesque Church consisted of a nave and chancel only, and that the western tower was an addition to the length of the fabric.

Such was the account of the old Church, given by Mr. Street; and its appearance when he was called in to restore it was certainly hopeless enough. A new chancel was a necessity, as there was nothing old remaining, and the existing chancel was some four or five feet shorter than the old one, as was proved, not only by the testimony of some of the parishioners, but by the remains of the original foundations which were discovered by excavations. There was no chancel arch. The nave-roof was decayed, and had pushed the wall so much out of the perpendicular, that, in spite of a huge buttress which had been built against one of them, they were quite unsafe. Then the masonry of the nave walls was so rough, and the cut stone so rude, that most men would have proposed to build an entirely new Church. But what has actually been done proves clearly that it is possible to rebuild in so conservative a fashion as to lose few, if any, of the links that bind us to the past. Here in the rebuilt Church we have solid new walls, but every wrought stone put back in its old place, and the old roof repaired, made good, and again presenting exactly its old appearance. In pulling down the modern chancel walls, the remains of a good two-light window, of early 14th century character, were found built up in the walls; these have been carefully copied and inserted in the new south wall. The new chancel-arch and the eastern-window of three lights, as well as the low stone screen by which the chancel is divided from the nave, are built of local stone, and blend admirably both in design and colouring with the old work. The eastern window has been filled with stained glass by Hardman, and is one of his most successful efforts, representing in the centre our Lord in glory, with the saints "harping with their harps" on either side, and a

very happy group of earthly singers, singing from a book on the bough of a tree, with shepherds piping, &c., below, and above, angels with different instruments of music. The whole design and tone of colouring is good, and accords, not only with the dedication of the Church, but with the objects of the compilers of "Hymns Ancient and Modern," by whom it was given. Below the window is a very effective reredos, which has in the centre a crucifix sculptured in alabaster, under a canopy of Purbeck marble, and on the other side two figures—the B. V. Mary and "the other Mary" on the north, and S. John and S. Mary Magdalene on the south. The ground is Salviati's mosaic. On either side of the reredos the east wall is lined with stone, filled in with geometrical patterns incised in coloured cement. The altar, raised on three steps, is of cedar with oak tracery and walnut panels, with an ebony cornice below the old oak mensa which has been retained. There are sedilia and a double piscina (one half being used as a credence table) in the south wall, with simple bold moulding. The pavements are all of Godwin's tiles. The roof of the chancel is boarded and panelled, and covered with painted decorations, executed from Mr. Street's designs by Harland and Fisher. At the north side of the chancel the vestry has been lengthened so as to afford space for an organ as well as for the choir and clergy, and an arch opened in the wall, which the organ front fills, just over and behind the stalls. The organist sits in the vestry and at the west end of the organ, and has immediate communication with the choir by means of shutters which open at the side—a very convenient arrangement, where (as is so often the case in the country) the organist must be a woman. The organ was designed by Sir Frederick Ouseley, and was built by Mr. Walker, and is a particularly effective and sweet instrument. It consists of two manuals and independent pedal organ.

The compass of the great organ is CC to G^3, 56 notes.

1. Open Diapason, front pipes, spotted metal ... 8 ft.
2. Dulciana, front pipes, spotted metal ... ... 8 ft.
3. Stopped Diapason, metal to Fid. G, bass wood ... ... 8 ft.
4. Principal ... ... 4 ft.
5. Flute, wood, open ... ... 4 ft.
6. Fifteenth ... ... 2 ft.
7. Mixture, three ranks ... ...
8, 9, and 10 are spare slides ... ...

The compass of the swell organ is tenor C to G in alto, 44 notes; but wind chest is made an octave higher, with the additional pipes in each stop to complete octave coupler (56 notes). The lowest octave of keys to C C is carried down from second octave of pedal bourdon, doubly grooved.

11. Stopped Diapason ... ... 44 pipes 8ft.
12. Gemshorn ... ... 44 ,, 4ft.
13. Cornopean ... ... 44 ,, 8ft.
14, 15, and 16, are spare slides ... ...

The pedal organ comprises C C C to F tenor.

17. Bourdon (large scale) ... ... 30 pipes 16ft.

Couplers: Swell to Great, Swell, Octave super, Great to Pedals. Three composition pedals.

The chancel stalls and desks for boys are of oak, the latter supported on iron standards. In the nave the fittings consist of simple moveable oak benches, litany desk, lectern, and pulpit. The lectern is perhaps rather commonplace, but the pulpit is singularly good. It is of oak, with tracery panels of walnut, with statues of the four Latin Doctors at the angles, and a richly-carved cornice. Both it and the reredos were executed by Mr. Earp. A centre corona, which is seen in the photograph, has since been wisely removed to the tower, and two more hanging coronas added in the chancel, the lines of light at the side being very effective.

The old south porch has been carefully restored and repaired, and the wooden belfry having been removed, a timber-framed spire covered with oak shingle (not an uncommon feature in Herefordshire), has been erected in its place. The restoration is now complete, and in place of a building in which, owing to modern alterations and to decay of the fabric, there was little that was pleasant to the eye, the vicar and his flock may be congratulated on having one which is not only pleasant to see, but which is in every respect such as it was some hundreds of years ago. Not a single old feature has been destroyed or altered: the necessary re-building has been so faithfully and carefully done, that few persons would think it had ever been done at all. Nor is there any attempt to deceive in this; it was simply an attempt to do all that was necessary without any unnecessary alterations. So old stones, which some people might condemn, have been built up again in their old places with advantage in every way; and Mr. Street has done, in his very best style, a work which may be taken as a fair protest against that far too fashionable mode of restoration which begins by condemning every stone which is rough or uneven, or just a little damaged or decayed, and ends by giving us, not restorations of anything which has existed before, but spick and span new buildings, of no architectural or archæological value.

We ought to add that the organ was Sir Henry Baker's gift to the Church, and that the whole expense of the chancel was defrayed by him, chiefly with money derived from the publication of "Hymns Ancient and Modern." The parishioners voted in vestry a considerable sum for the nave, which has been, or is to be, supplemented by gifts from friends and neighbours.

The beautiful Lych-gate, made of oak, at the entrance of the Churchyard, and the window (representing the Good Shepherd) in the chancel, both designed by Mr. Street, were erected to the memory of the Rev. Sir Henry W. Baker, Bart., Vicar of Monkland, by the subscriptions of relatives and friends. They were dedicated to Almighty God at a special service held on December 17th, 1878.

From Monkland the party proceeded to Leominster, where, after dining at the Royal Oak, a vote of thanks was accorded to the Rev. Joseph Barker, who had contributed so much towards the local history of all the places embraced in the day's route. The Club highly appreciates the valuable addition to the history of the county covered by his numerous interesting papers.

The following is a list of the members and visitors who attended:—Rev. Augustin Ley, who presided, in the absence of Sir Herbert Croft, Bart.; Revs. H. A. Barker, Joseph Barker, W. Bowell, W. K. Brodribb, W. Ireland, H. North; Captain Swainson, Drs. T. A. Chapman, Alfred Crespi, and J. H. Wood; Messrs. H. G. Apperley, H. C. Beddoe, R. Clarke, Luther Davis, M. J. Ellwood, G. Hadfield, W. Hebb, C. J. Lilwall, Peyton Levason, T. Meadows, T. C. Paris, W. Pilley, A. J. Purchas, J. Riley, H. C. Moore (Honorary Secretary), and James B. Pilley (Assistant Secretary); and the following visitors:—Rev. Father A. Rogers, Dr. Cockcroft, from Chiselhurst, Mr. Sam. Carrington, Mr. Wm. Davis, from Malvern, Mr. G. H. Godsell, Mr. C. J. Saxby, Stuart Forbes, from Gazerdine, Ledbury, and Mr. H. G. Sugden, of Warham.

The following gentlemen were to-day elected members of the Club:—Mr. R. Warwick Bond, Mr. Godwin Chance, Mr. Stuart Forbes, Mr. H. C. Moffat, Mr. Edward Stephens, and Mr. H. G. Sugden.

Woolhope Naturalists' Field Club.

LADIES' DAY, JULY 31ST, 1890.

BERKELEY, and its Castle and Church, were visited on Thursday, July 31st. The members travelled from Hereford through Ross to Lydbrook Junction, thence by the "Severn and Wye and Severn Bridge Railway" through the Forest of Dean, over the Severn Bridge to Sharpness, reaching Berkeley Castle, distant less than one mile from the Berkeley Station, about two o'clock. During the interval of waiting at Ross, some business of the Club was transacted. The Rev. J. O. Bevan was elected delegate to the British Association Meeting at Leeds; congratulations were voted to our Honorary Member, Dr. C. B. Plowright, on his appointment as Hunterian Professor or Lecturer on Comparative Anatomy and Physiology, at the Royal College of Surgeons; a list of subscriptions for a mahogany cabinet for Natural History objects in the Museum of the Free Library was opened; and other business of a more general character was concluded.

At Lydney the Romans had a settlement of some importance. Some of our members have pleasant recollections of visiting the two Roman camps in Lydney Park, and of inspecting the beautiful tesselated pavements *in situ* of the Roman villa, which had been unearthed and exposed for our benefit in August, 1874, and the large collection of articles of Roman civilization in the Museum of the Rev. W. H. Bathurst at Lydney Park (see *Transactions*, 1874, page 32). From the discoveries of sculptured stones, coins, tiles, bricks, &c., in the neighbourhood of Berkeley, it is probable that it formed a military post of occupation to defend the passage across the Severn to Aylburton, near Lydney. Berkeley is situated in the region inhabited by the Dobuni, when the Romans, under Aulus Plautius, a general of the Emperor Claudius, occupied the district. He was recalled about A.D. 50. About this period the chain of camps extending from the Antona (Nen) to the Severn is supposed to have been built. The legend of the Witch of Berkeley, immortalized in a ballad by Southey, dates from the reign of Edward the Confessor. Berkeley Castle occupies the site of a Nunnery, to the disestablishment of which, owing to the subtle and despicable artifice of Godwyn, Earl of Kent, allusion is made in *Domesday Book*. The fact of Tilhere, Bishop of Worcester in 778 having been previously Abbot of Beorclea, as also Etheldune, one of his successors at Worcester in 915, points to the existence of a religious house at Berkeley in the 8th century.

It is locally believed that the oak tree, whose massive trunk, still living, is to be seen at the entrance to the Deer Park, is the same as is referred to in *Domesday* as a boundary mark. In *Domesday* it is recorded that at Ness (probably Sharpness) was a castellum claimed by Roger. Roger died in 1096. William the

Conqueror bestowed the large manor of Berkeley upon Roger de Berkeley, Lord of Dursley. Henry II., son of Matilda and Geoffrey, depriving its possessor because of his taking part with King Stephen, gave it to Robert Fitzharding, the son of Harding, the King of Denmark's son. This deed of gift is preserved amongst the muniments of the Castle. The manor has continued vested in his posterity through twenty-six generations of Berkeleys down to the present Lord Fitzhardinge, its owner, with the exception of an alienation of sixty-one years, four months, and twenty days, when it was vested in King Henry VII. and his heirs male until the death of Edward VI. without issue in 1553.

It is interesting to compare the present inhabitable condition of Berkeley Castle with the ruined state of other important fortresses along the western edge of the Marches in the adjacent frontiers of Gloucester, Hereford, and Shropshire. In *Mediæval Military Architecture* Mr. George T. Clark records as follows:—"The Normans trod very closely in the footsteps of the English, and their fortresses, for the most part, occupied ancient sites. Chepstow, Goodrich, Kilpeck, Ewias, Hereford, Ludlow, Wigmore, Richard's Castle, Cleobury, Brampton, Bishop's Castle, and Clun, were either places of great strength or held by powerful Barons, whilst St. Briavels, Wilton, Penyard, Weobley, Croft, Clifford, Whitney, Eardisley, Huntington, Lingen, Hopton, Lee Botwood, Stoke Say or Wattlesborough were either fortified houses or castles of inferior strength. Upon the line of the Severn, in the rear of these, there were but eight of any importance: Bristol, Berkeley, Gloucester, Hanley, Worcester, Hartlebury, Bridgnorth, and Shrewsbury. Of these, Gloucester, Hanley, and Worcester are gone. Of Bristol there remains only a portion of a crypt; of Bridgnorth a part of the keep; of Shrewsbury a fragment of a Norman gate house, and older than all the mound that gave character to the whole; whilst Berkeley has been inhabited from its foundation up to the present day, and with one temporary alienation to the Crown has always been in one family."

In 1154 King Henry II. visited Berkeley. At this period the building of the Shell-keep around the already existing mosted earthen mound, which is 22 feet above the ground level, was commenced. This occupation of a previously existing defensive mound is an interesting feature, of which we see instances occasionally, such as at Kilpeck and Ewyas Harold, which points to the occupation of this site as early as the 9th century. This Shell-keep is nearly circular, with a diameter of about fifty yards, the surrounding wall of rough rubble masonry has one large rectangular tower on the north, and three smaller semicircular towers on the enceinte. There is a large breach or opening in the wall on the side exposed to the Church, being originally a small breach made in the assault by the Parliamentarian forces under Colonel Morgan, to whom the Castle, then held by Sir Charles Lucas, surrendered on September 26th, 1645. The breach was enlarged by the orders of Cromwell, as was the case at Kenilworth Castle, with the object of rendering the Castle untenable as a place of defence, whilst not interfering with its use as a habitation.

The entrance to the Castle is over the moat spanned by a permanent bridge, built in 1587 by Henry Lord Berkeley. The gatehouse, called the Porter's Lodge,

leading to the outer court, is said to have been built by Maurice Fitzharding, who died in 1189. Some calcareous tufa was observed in the archway, and in the crown of the vault are three square holes, *meurtrières*. The outer court, or barbican, is a triangular platform covering the main inner entrance. It contains a large and curious Chinese bell, weighing 1 ton 7 cwt., with inscriptions in Chinese characters, which was taken from a Buddhist temple at Tsckee in China, December, 1864, and was presented by Capt. Dew, H.M.S. Encounter. Upon the right of the outer court a low battlemented wall, overlooking the terraces and lawn, serves as a parapet. Another arched gateway in the walls of the castle-building leads to the inner court. This gatehouse is of the same date as the outer gatehouse, and grooves for the portcullis are here seen. The inner court, roughly rectangular in shape, contains on the immediate left the Shell-keep, on the right the domestic apartments and the Chapel connected with the kitchen, billiard room, &c., opposite, by the fine baronial hall, having on this inner side four deep-mullioned windows. At the entrance to the great hall is an archway formed of two ribs of a whale which was captured in the Severn in the year 1620. The seven-ribbed roof of the hall, facetiously described as like the ribs of a ship, when in process of building, turned bottom upwards, is of the period of Edward III. Armorial bearings of the Berkeley family from the year 1115 to 1785 are represented in the stained-glass windows; the walls are covered with family portraits and stags' heads; a large chandelier is formed of antlers of stags; and over the fireplace are suspended banners carried at Culloden. A broad oak staircase leads from this hall to the private apartments and the Chapel. The Chapel retains its original square-panelled roof. It has a rather flat apsidal east end of three faces. The gallery at the opposite end, of more recent date, serves as the family pew. On the south side the outer wall, probably portion of the original Norman building, fourteen feet thick, is pierced by a mural passage, opening into the Chapel by four foliated arches. On one of the walls is an inscription in black letter, in Latin and Norman French, of passages from the Holy Scriptures, ascribed to Lord Berkeley's chaplain, Trevisa. John Trevisa, of Cornwall, who was Vicar of Berkeley between 1350 and 1412, known as the translator of Higden's "Polychronicon," one of the first books printed by Caxton, undertook the translation of the Scriptures from the Vulgate into the English tongue. He was a cotemporary of Wycliffe who held the Prebend of Aust in the Collegiate Church of Westbury-on-Trim in the same county. The inscription on the wall may have been seen by the Martyr William Tyndale, who is supposed to have been born in this neighbourhood. A monument erected to his memory in 1865 on Nibley Knoll is visible from the castle heights, but the entire revision of the New Testament in 1534 remains his noblest monument. Although the place of his birth is disputed it is known that his brother Edward received a grant in 1529 of the manor of Hurst, in the parish of Slymbridge, and that the same Edward was appointed receiver of the rents and other payments due to the Crown from the Berkeley lands in 1519 during the alienation of the estates to the Royal Family. (Patent Rolls. 11, Henry VIII., Part 2; Membranes 19, 20.)

The cellar below the Chapel is not exhibited to visitors, but it is said that

the roof is vaulted and groined in three hexagonal bays springing from three shafts of late Norman character.

Access to the Shell-keep is obtained by a flight of stone steps, over which is a small room, evidently originally a guard room, which is exhibited as the bed room occupied by King Edward II. when a prisoner in Berkeley Castle from April 15th, 1327 until his murder on September 21st of the same year. The once elaborately embroidered Arras tapestry covering the walls is faded and discoloured; the worm-eaten narrow couch of the attendant is still exhibited; so also the quilt and the time-worn bed-hangings of leaves of black velvet, embroidered with gold, on a crimson ground, are all carefully preserved from even the touch of visitors; but as regards the wooden four-poster bedstead we must confess that the mouldings, especially the upper lozenge carvings, savour very much of work of the Tudor period. The entrance to the platform of the Shell-keep is under a handsome full arched doorway with tympanum through a vaulted passage in the wall of the keep, entering the keep under an archway with Norman mouldings; the adjacent building on the right, now used as the muniment room, is an ancient Chapel. In the tower which projects into the court on the south is a circular dungeon, 25 feet deep, into which it is said that King Edward II. was thrown.

With reference to the murder of King Edward, the family of Berkeley is absolved from any responsibility. The monarch was first delivered into the hands of Thomas, Lord Berkeley, who had espoused the cause of Edward's disloyal Queen, Isabella, sister of the King of France, and open favourite of Roger Mortimer, but owing to the humane manner in which he was treated, he was withdrawn from Lord Berkeley's charge, and delivered into that of Lord Maltravers and Sir Thomas Gournay who exposed him to most cruel treatment, and finally justified themselves for his murder by their interpretation of the following words written without any punctuation by Adam, Bishop of Hereford:—

Edvardum occidere nolite timere bonum est,

which may be interpreted either as

Don't slay Edward, to fear to do so is good,
or Don't be afraid to slay Edward, to do so is good.

In the fourth year of Edward III., Roger Mortimer was condemned for treason and executed. During an interval of seven years judgment upon Thomas Lord Berkeley was postponed from Parliament to Parliament, and finally he was acquitted, being found not guilty save of "some fault of negligence." A quotation from Bacon will happily conclude these reflections:—"It is a pleasant thing to see an ancient castle or building not in decay, or to see a fair timber tree sound and perfect; how much more to behold an ancient family which hath stood against the waves and weathers of time!"

From the Castle, the members proceeded to the Church, over which they were conducted by the Vicar, Rev. J. L. Stackhouse, and the Curate, Rev. E. A. Addenbrooke. The Church is a fine and beautiful building, with various

styles of architecture, the south door and font are of Norman character. The clustered pillars with foliated capitals supporting seven well proportioned arches give an imposing character to the nave, whose north walls are relieved by the restoration of the geometric and arabesque designs in red and black distemper. These and the central part of the west front were probably built temp. Edward I. by Thomas II., Lord Berkeley, A.D. 1281 to 1321. Fine alabaster tombs bearing effigies of members of the Berkeley family are found in the beautiful sepulchral chapel on the south side of the chancel, built A.D. 1417 to 1463 by James, the eleventh Lord Berkeley. The rood-screen and the Perpendicular windows in the chancel are of a later period. There is a memorial of Dr. Edward Jenner, the discoverer of vaccination, who was born at Berkeley, and died there in 1823. During the restoration of the Church a Roman tile was discovered at a depth of nearly four feet beneath the soil in the chancel. It has been preserved by being built into the south side of the chancel arch near the lectern. It bears the inscription

DCLVI,

which has been rendered as Decurio Legionis Sextæ. We cannot call to mind any record of any sixth legion in our island. The legions brought over by Aulus Plautius were the 2nd, 9th, 14th, and 20th. A Roman legion consisted of about 6,000 foot soldiers, with a large force of cavalry, augmented by any number of auxiliaries recruited from the locality. Vespasian, in command of the 2nd of these legions, was sent against the Belgæ and Dumnonii in the south-west, which part of the island, together with the Isle of Wight, he reduced to submission; afterwards under the command of Pœnius Postumus, this legion took up its quarters in South Wales at Isca of the Silures (Caerleon), at Glevum (Gloucester), or at Corinium (Cirencester). The 9th legion, under the legate Petilius Cerealis, proceeded against the Iceni to defend their frontier against the Brigantes. The 14th, under the proprætor Suetonius Paullinus, after destroying the Druids in the Isle of Anglesea, re-kindled the war against Caractacus and the unconquered Britons who had retired into the fastnesses of Gwynedd (North Wales). The 20th legion, under Agricola, A.D. 60 to 77, was engaged in Anglesea and North Wales, and in the celebrated action against Boadicea. The City of Chester still preserves durable memorials of this legion, styled "Valens Victrix."

In the churchyard, the tower is detached from the Church at a distance of about 50 yards. We have similar instances of detached towers in our own county, no less than six, namely, Bosbury, Holmer, Ledbury, Pembridge, Richard's Castle, Yarpole. The tower of Marden originally was detached, and at Garway the tower is connected with the body of the Church by a covered passage, but in no instance do we find them separated by so large an interval as at Berkeley. The selection of this site was evidently with the view of preventing archers on the summit of the tower commanding the Keep of the Castle. As a matter of fact the attack in the Civil wars was made from the churchyard; the old oak door of the Church retains traces of damages then inflicted; and the large breach in the wall of the Keep is directly opposite the churchyard from which the siege was conducted.

From the Church the Vicar conducted the members to inspect the massive arbour in the Chantry garden in which Dr. Jenner laid the foundation of the system of vaccination which has since proved so great a blessing to mankind of every nation all over the globe.

The members afterwards assembled in the Vicar's garden, where, amongst other plants, the following more rare specimens were observed:—A healthy *Bambusa metake* or large Bamboo of fifteen years growth, also *Arundinaria falcata* or lesser Bamboo. *Rudbeckia californica* and *Harpalium rigidum* two finely grown plants, probably both North American, of the sunflower type. *Rhus toxicodendron* or poison ivy, and at the foot of trees on the lawn were plants of *Cyclamen hederifolium*. Near the greenhouse flourished a handsome specimen of the later-flowering Christmas rose *Helleborus colchicus* with strikingly handsome foliage.

To the members assembled in the garden was read the following paper:—

"ON THE NAMES OF PLANTS."

[By Rev. Sir George H. Cornewall, Bart.]

The subject on which I propose to make a few remarks to-day is one for which no apology is needed. The origin of Plant names possesses an interest to those of our members who have devoted attention to scientific botany, no doubt; but apart from these, all persons who, without entering thoroughly into the classification of plants, have occupied themselves in the cultivation of them, or can be in any sense described as lovers of flowers will be glad, I believe, to take advantage of any light which may be thrown upon the matter.

Such persons must often have found it difficult to commit to memory the barbarous collection of syllables which in so-called Latin goes to make up the specific name of some, maybe, insignificant plant, and may be tempted to agree with the little boy who, walking in an arboretum with his father, could not help asking him why such a very small tree should have such a very long name.

But when we attempt to propound some system by which the source of such names may be reached, or to discover well marked divisions in which they may be conveniently arranged, the magnitude, I might almost say the impossibility, of the task soon becomes apparent; and it will be noticed that botanists, aware of the difficulty of giving distinctive names to new genera, have been content, in compliment to some notable inquirer in the same branch of study, to name the plant after him. There is no doubt some difficulty in pronouncing some of their names correctly, such as Fuchsia, Dahlia, Eschholtzia; nevertheless the system has its merits, and has immortalized the leading botanists of their day by plants named after them.

But a curious and inquiring mind is not altogether satisfied with these, and would, if possible, find in those names the use of which is familiar to him (and which cannot be so explained) some distinctive character claimed by the plant under notice, handed down from remote antiquity, and preserved on account of its fitness and its truth. If such be his expectation he will no doubt be disappointed. The scientific botanist has little to gain from the study of Plant names, and the vastness of the task before him will soon be appreciated.

In the first place in seeking the origin of Plant names he will have to make himself acquainted in a measure with languages the most varied, tracing some names up to the Hebrew and Sanskrit, and even when dealing with languages more familiar, such as the Greek and the Latin, he will be met with descriptions of the loosest and vaguest kind; whether he is examining Pliny's Natural History, or Virgil's Georgics, he will hardly be able to identify any plant with certainty; he will find that later botanists have confused the ancient names of plants of the Mediterranean region with plants of a more northern land, and often enough the name, in discovering the real meaning of which he hoped that he was bringing to light matter of great interest, he finds is one which owes its origin to

the belief in astrology, in mythology, or in some extravagant healing virtue which had been ascribed to the plant in question.

Let me take two instances of this confusion. When we find the word Smilax in an ancient author, we might naturally conceive that it alluded to the common prickly trailer of the Mediterranean region, a well-known species of the Sarsaparilla family, used in the Churches at Cannes for Christmas decoration, a plant very characteristic, with its heart-shaped spotted leaves, its abundant thorns, its wiry stem, its marked climbing habits, and its bunches of berries, like clusters of small red grapes, which hang in the most graceful manner beneath its thick interlaced evergreen foliage. Theophrastus mentions this plant as a tree of the πρινος kind, but the prinos is identified as the Ilex, or if not the Ilex the dwarf prickly oak, which is very like it—the Quercus coccifera. What likeness is there between the two except that they are evergreen? But Dioscorides and Plutarch make the Smilax synonymous with the μηλος or yew; again what resemblance between this large massive forest tree and a delicate climber, except that they both bear berries and are evergreen?

Dioscorides further mentions a vegetable Smilax, dressed and eaten like our French beans, and Theophrastus describes a rough Smilax—Smilax τραχεια. By this Sprengel conceives is indicated the wild convolvulus—Convolvulus sepium. Euripides and Aristophanes both mention the Smilax. Of which of these plants were they speaking? I leave it to a future Solomon.

Another instance I may give of the disappointment which may meet the searcher into the origin of plant names.

The name Celandine has a charming poetic rhythm. No sonneteer but would wish to enrich his verse with the word celandine. There is no doubt about the derivation of the word; surely it must have something sweet to say anent those golden stars which peep out upon us in early spring from hedge-bank and garden.

The name comes to us through the French chelidoine, from the Greek χελιδων, a swallow, and it would seem quite a conundrum to find a link between the two—Why is a celandine like a swallow?

The answer is easy. Is it not well known, and have not Pliny and Aristotle carefully observed it, that the young of the swallow, when their eyes are injured, are instantly cured by the mother bird who applies celandine to the wound,

Cæcatis pullis hâc lumina mater hirundo
(Plinius ut scripsit) quamvis sint cruta, reddit.

And William Coles, also quoted in Prior's book, writes:—"It is known to have such skill of nature; what wonderful care she hath of the smallest creatures, giving to them a knowledge of medicine to help themselves, if haply diseases annoy them. The swallow cureth her dim eyes with celandine, the weasel knoweth well the virtue of herb grace, the dove the verven, the dogge dischargeth his maw with a kind of grasse; it were too long to reckon up all the medicines which the beastes are known to use by nature's directions only."

So much for Celandine; but if such instances prove that much accurate

knowledge is not to be gained by the study of Plant names, still it cannot be denied that the subject is very fascinating. It cannot be disregarded if it is desired to explore either the ancient roots of various languages, or the movements of the nations who spoke those languages. Such study may even throw a light on the habits of the nations who carried with them these plant names, and attest the advances made by them in civilization.

Take the birch tree. We have the word substantially the same in all Scandinavian and Tuetonic languages, but in Sanscrit and in Hindi, bircht and birchk are also found; birchk—our own birch, with k added in the language of Northern India. What deductions do we make from these facts? Is it a proof of migration of eastern nations to the west? or of the northern nations reaching in their southward journey the Himalayas? Can we find a clue here as to the migrations of Scythians, Saxons, and other like problems?

Another tree is found in northern languages—Anglo-Saxon, Swedish, German—nearly identical with our own, the hawthorn. "Hay" or "haw" meaning "hedge." It is thus a testimony as to the use of hedges, dating from a very early period, among the Germanic races.

Isaac Taylor, in "Words and Places," points out how very distinctive of the Anglo-Saxon race is the idea of inclosure. England is pre-eminently the land of hedges and inclosures; there are no hedges in France. But in Anglo-Saxon names the suffixes frequently denote an enclosure of some kind, and he instances as such "ton, ham, worth, stoke, stow, fold, park, hay, burg, bury, borrow," remarking that these suffixes prove how intensely the nation was imbued with the principle of the sacred value of property; how eager each man was to possess some spot which he might call his own and guard it from the intrusion of others.

The names of plants mentioned in Scripture are an interesting study, and are not entirely without result. We may reasonably suppose that, as regards the vine, the olive, the pomegranate, wheat and barley, we have the correct translation of the Hebrew word, but with many of them there is great difficulty in identifying them.

Take the mention of the aah tree in Isaiah; there is no aah indigenous in Palestine. The Septuagint translates it pine; the rose of Sharon is believed to be the *narcissus tazzetta*; the lilies answering to the Hebrew Shushan are interpreted to be the tulip; the iris and the water-lily, the lilies of the field of the New Testament being universally claimed as indicating the red anemone, which is so abundant in Palestine, and of such remarkable beauty.

We have the Greek words in the Septuagint version to compare with the Hebrew, but often there is no connection between them. For instance, the Greek Ελαια, the olive, bears no resemblance to the Hebrew Zaith, or the Hebrew Tamar, the palm, to the Greek Φοινξ.

But in certain names applying more particlarly to gums and fragrant plants, the names are almost identical in the two languages.

Cinnamon, cummin, hyssop, myrrh, nard, galbanum, are examples.

The word cane may also be mentioned, for, like the word sack, it is nearly identical in Hebrew, Greek, Latin, and English. The word sack, as I have said,

runs through all European language, as if to teach us that a man with a sack to hold what he may gather, and a stick or cane to support his steps and beat off the enemy is fully equipped for whatever may betide.

Turning now to plants derived from the Greek, it will be only possible in a short paper to touch very lightly on one or two well-known plants by way of example.

Aconite is said by Pliny to be derived from εν ακονᾶι, among the rocks, owing to the situation where it is usually found, a very uncertain guide.

As regards Greek myths which cling round the names of such plants as Narcissus and Hyacinthus; in the case of Narcissus, the name of the plant is older than the myth attached to it. It is so called from its soothing properties. Our word narcotic is derived from the same root.

Narcissus' amazement at beholding his beauty in a pellucid pool, and his becoming violently enamoured of himself, and at last dying in the agonies of unrequited love, is described at great length by Ovid. The circumstance that he was changed into a flower occupies but two lines, and it was a yellow flower (*croceum*) into which he was metamorphosed.

In the story of Hyacinthus the myths vary. It is allowed that either from the blood of Hyacinthus or Ajax a plant sprung with the letters A I visible on its leaves or flowers.

Some declare that *Lilium bulbiferum* satisfies the conditions. Others claim that the mystic letters may be read on the *Gladiolus ramosus*, and the epithets applied to Hyacinth, very dark, pale, white, make the difficulty of identification still greater.

Equal difficulty will be found in investigating such names as Helenium, as derived from Helen; Centaurea, from the Centaur; Adonis, Achillea, from Achilles; Peeonia from Peeon; and others; and when we reach names derived from Latin we fail to be satisfied with the result of our investigations. For example, Ranunculus is the diminutive of the Latin word meaning a frog; the ranunculus is, therefore, the little frog, alluding to the aquatic habit of some species; a very unworthy designation for so noble and varied a family.

But plant names of purely Latin origin are comparatively rare. It will be useless to detain you by examining further examples.

The nomenclature of cereals is not without instruction. Our wheat, our oats, and our barley came to us from northern nations; the roots of these names being traced to Anglo-Saxon, High German, and Scandinavian dialects.

Wheat is the white grain, as opposed to black barley and oats.

Barley, or Beerleg, is the grain from which beer is made.

Oats is the edible grain, the main food of these early people.

There is interest also in tracing the transformations or corruptions of words, of which, before concluding my paper, I may offer a few examples. Quince—the word is derived from the French coing or coignasse, a quince; but there is an older Provencal word codoing, which shows to us that coing is truly a corruption of the Latin cydonia, a quince, and this, a translation of the Greek κυδωνιον which offers no description of the characteristics of the plant, but is a name

derived from a city in Crete, Κυδωνια. Daffodil and eglantine do not repay exploration. Daffodil owes its origin to the French affrodille, a corruption of asphodel. Eglantine is from the old French aiglant, synonymous with the Latin aculeatus, prickly. Two English plants, treacle mustard and mithridate pepperwort, cannot fail to excite our curiosity, being so strangely labelled. Mithridates, King of Pontus, invented a marvellous concoction as a potent vermifuge and antidote to all animal poison. It was often called Triacle or Theriacum, perhaps because viper's blood was one ingredient, and these two plants are supposed to to have been used in compounding this ancient drug. Apricot is a curious word. We should have been satisfied to find it derived from the Latin apricus. Surely the glowing bloom of the Apricot suggests strongly the idea of sun ripening. Prof. Skeat will not allow us to do this. He points out that the original word was apricock, and this he derives from the Portugese allricoque, but allricoque is traced by Littré to the Arabic al-barqûq and then it is found that this latter is a corruption of the late Greek πραικοκιον, the same word as præcoquem, the accusative of præcox early; the apricot being thus described, with the usual want of accuracy, as the early peach, persica præcox.

The genus Lysimachia (Loosestrife) is a word of which we are able to give a satisfactory explanation. Pliny tells us that it was so named from a certain King Lysimachus, whose power of appeasing strife was no doubt greater than the plant in question.

I have only time to indicate various sources not yet mentioned from which plants have taken their names. Plants named from countries in which they flourished: Arabis, from Arabia; Iberis, from Iberia; Peach, from Persia, and others. Plants owing their names to ecclesiastical legends: St. John's Wort, St. Barbara's Cress, St. Barnaby's Thistle, St. Dabeoc's Heath, and St. Patrick's Cabbage. Plants owing their names to supposed medical virtues, founded in many cases on what is known as the doctrine of signatures, that is, the idea that plants in the form of their leaves or corolla so indicate their natural fitness to cure diseases; a plant with kidney-shaped leaves would be effective in curing diseases of the kidneys. As examples of plants with supposed medical virtues may be named—barrenwort, birthwort, saxifrage, whitlowgrass, sanicle, lungwort, spleenwort, and liverwort; and with a similar notion of curative power, eyebright is said to be used by the linnet to clear its sight. Hawkweed is said by Pliny to perform a similar office for the hawk.

In the above hasty view of the origin of Plant names, it will be seen that most plants were given names in an age when scientific exactness was not possible, when superstitious ideas as to plants were prevalent, when the examinations of distinctive characters were faulty; there would appear, therefore, to be but one means whereby the botanist can assure himself of the name of any given plant, that is, by the Latin specific and generic name which botanists in all countries have agreed to assign to it; that is its name. It has no other. The popular names given to plants in England, in France, in Germany, are interesting, but they are an uncertain guide. In Britten and Holland's *English Plant Names*, it is stated, that "cuckoo flowers" is applied to at least ten different species,

"cowslip" to eight or nine. "Bachelors' Buttons" to many more. It may tend to popularize the study of plants in England, to endeavour to find English names for species hitherto only known by a Latin equivalent, but it must be at best but a doubtful expedient, and in this age when the traveller on the Continent meets at every step new floral treasures, he will be compelled, in consulting books of reference, to revert to the names made use of by the scientific world, and to adopt that nomenclature which is understood by all nations.

Thanks having been given to the Rev. Sir George Cornewall for his paper, and also to the Vicar, his family, and Curate, the members employed the short interval remaining by a rapid inspection of the town, and after fortifying themselves at various refreshment rooms therein found, assembled at Berkeley Station at 5.15 for the special train to Lydney, where, after being subjected to a series of shrieking, snorting, puffing and blowing proceedings, relieved periodically by sundry stationary halts, found themselves eventually shunted on the Great Western line for a pleasant return journey home along the banks of the Severn to the junction at Grange Court, a picturesque change of scenery to the outward journey.

A list of the members and visitors attending is appended:—Sir Herbert Croft, President; Mr. H. Southall, Vice-President; Mr. Geo. H. Piper, F.G.S., a former President; Revs. J. O. Bevan, W. K. Brodribb, C. Burrough, Sir Geo. H. Cornewall, W. D. V. Duncombe, J. E. Grasett, E. J. Holloway, M. Hopton, A. G. Jones, W. H. Lambert, A. C. Lee, H. North, T. P. Powell, W. R. Shepherd, Hon. Ven. Berkeley L. S. Stanhope, Hon. Rev. W. S. Stanhope, Rev. H. W. Tweed; Capt. de Winton, Capt. Campbell; Messrs. H. G. Apperley, H. C. Beddoe, G. Cresswell, James Davies, Luther Davis, W. J. Grant, J. Lambe, C. J. Lilwall, C. E. Lilley, T. Llanwarne, B. St. J. Attwood Mathews, W. Pilley, A. J. Purchas, H. G. Sugden, Guy Trafford, H. C. Moore, Honorary Secretary, and James B. Pilley, Assistant Secretary.

The following is a list of the visitors:—Ladies—Lady Croft, and the Misses Croft, Mrs. Attwood Mathews and friend, Miss May Barker, Miss Beddoe, Mrs. Burrough, Mrs. Campbell, Miss Carless, Mrs. R. Clarke, Miss Davies, Miss Durrant, Miss Gee, Mrs. Glynn, Mrs. W. J. Grant, Miss Grasett, Mrs. Green, Miss Gwynne James, Mrs. Hopton, Miss Hopton, Miss Johnson, Miss Frederica Jones, Miss Lee, Mrs. Grey, Mrs. Lilwall, Mrs. Pilley, Miss Pilley, Miss Piper, Miss Prosser Powell, Mrs. Purchas, Miss Whinfield; and the following gentlemen:—Rev. E. R. Firmstone, Rev. H. B. Porter, Messrs. H. W. Apperley, Carless, Croft, Douglas Stretch-Dowse, and W. King, with many others whose names were not ascertained.

POSTSCRIPT.

It would have been considered nothing but natural had history revealed to us schemes whereby the murderers of Edward had attempted to throw off suspicion from themselves, but we are not prepared for such startling revelations to be reserved to so late a period of the nineteenth century. The following letter, signed G. G., appeared in *The Times* of November 4th, 1890, under the heading:

SOMETHING ABOUT EDWARD II., OF ENGLAND.

Count Nigra, not many years ago Italian Ambassador in London, sends me the following narrative, which he requests me to translate and have published in London.—

"From Acqui, in Piedmont, where I am taking the baths at the winter establishment, Le Nuove Terme, I went the other day to the Castle of Melazzo, where, according to local tradition, was for two years hidden Edward Plantagenet (Edward II.), King of England, after he was dethroned, and had succeeded in escaping from the hands of murderers bribed by the King's wife to do the deed. The fact is authenticated by an inscription, here subjoined, which was put up by the present owners of the castle, the brothers Arnoldi. Melazzo rises upon a hill at the meeting of the waters of the Erro and the Bormida, on the right bank of the latter stream, and overlooks both valleys. The view from the castle is stupendous. The distance from Acqui is three English miles, and there is a carriage way.

By what strange tide of events the ill-fated English King, upon his escape from England, and after a stay at Avignon, at the Court of Pope John XXII., came for a refuge to Melazzo, during the years 1332-33, if you think the subject worth the trouble, you may inquire in the proper quarter! and if you think it may induce any of the English tourists to undertake a pilgrimage to the most picturesque mountain districts of Upper Monferrat, you can also, if you think it matter of interest, publish this letter and inscription."

"NIGRA."

(The Inscription.)

"Edward II., Plantagenet, King of England, deposed from the throne by a vote of the Parliament in 1327, and imprisoned in Berkeley Castle, having providentially escaped from the daggers of two cutthroats, Sir Thomas Gorney and Sir Simon Esberford, Knights, bribed by the King's wife, the cruel Queen Isabel of France, and afterwards hospitably sheltered by Pope John XXII., at Avignon, after long and eventful wanderings, resided secretly in this Castle of Melazzo, then a dependence of the diocese of Milan, between the years of the Lord, 1330-33."

The inscription is in one of the halls of the Castle of Melazzo, near Acqui.

In reply to which the following letter appeared in the issue of November 10th.

"The information transmitted to England by Count Nigra, in *The Times* of the 4th inst., is certainly startling, but it is somewhat at variance with the unerring evidence of English documentary history, as I may, perhaps, be allowed to show.

In the Parliament held at Westminster in the fourth year of Edward III. (1330), proceedings were taken against Sir Thomas Berkeley touching the death of the late King. He admitted that he, being ill at the time, had placed the King in charge of Thomas de Gournay and William de Ocle. In the same Parliament judgment of death was passed on Roger Mortimer, Simon de Bereford, and others for treason; Gournay and Ocle were similarly condemned, but only these two men were expressly charged with the murder of Edward II. They both fled, and

Ocle got clear away. As to Gournay, he took refuge in Spain and was thrown into prison by the King of Castille at Burgos.

Edward III. at once took active steps to obtain possession of Gournay's person by writing letters to the King of Castille, issuing writs to persons in authority, and sending, on May 30th, 1331, Egidius de Ispannia, "dilectus valettus noster," to take Gournay captive and bring him to England. Impediments of all sorts were placed in Egidius's way, and it was not until February, 1332, when success seemed assured, that he found the prisoner had contrived to escape. Egidius returned home in June, and, Gournay being heard of at Naples in January of the following year, Edward, not to be deterred, despatched Sir William de Thweng thither, who obtained possession of the prisoner and conducted him as far as Bayonne, where Gournay fell ill and presently died. His body was brought by ship to England, ariving July, 1333. We know from the irrefragable testimony of contemporary documents that the search for and capture of Gournay were conducted with great persistence and vigour. They show how strong was the anxiety of Edward III. to bring his father's murderer to justice, and it is utterly impossible that there was any idea at that time that Edward II. was alive and in shelter in Italy.

Moreover, six years before the pursuit of the murderer was set on foot another and more significant scene had been enacted in Gloucestershire, between the dates October 22nd and December 20th, 1327. The accounts of the expenses for conveying the dead body of Edward II. from Berkeley to the Abbey of Gloucester still exist in full detail, and the Cathedral itself, with its Norman work overlaid, as it were, with a veil of perpendicular, is a witness of the *culte* of the murdered Monarch which, bringing such treasures and offerings to the Abbey, made the grave of a King the cradle of a new style.

The authors of the inscription at Melazzo have given us a chapter of history, new and curious indeed, but not, perhaps, of such a kind as to induce English students to make a pilgrimage so far as Melazzo to study it."

I have the honour to be, Sir, your obedient servant,

ALBERT HARTSHORNE.

Bradbourne-hall, Ashbourne, Nov. 6th.

And another letter from G.G. appeared on the same date.

"With respect to King Edward's escape from his would-be murderers' hand (as mentioned in *The Times* of November 4th) and surviving for years at Avignon, in France, and near Acqui, in Piedmont, there is a second inscription on the walls of Melazzo Castle (Acqui) stating that the document correcting the account of the King's death by the hands of assassins is by Manuel Fieschi, the Pontifical Notary at Avignon, a contemporary of Edward III., son and successor of Edward II., and was discovered by the French historian, Germain, in a mass of papers of the Bishopric of Maguelonne, compiled in 1368, and laid in the archives of the Departement de l'Hérault in 1879.

The names of the alleged murderers of the King are given in English histories as Sir Thomas Gornay and Sir John Maltravers. In the Melazzo inscription the latter is described as Sir Simon Esberford (Elberfeld?)"

Woolhope Naturalists' Field Club.

August 26th, 1890.

On Tuesday, August 26th, the Club visited the Breconshire Beacons. By a singular fatality circumstances have always combined to thwart the projects of the Club in their visits to these Beacons, the elements even lending themselves as it were to join in a conspiracy of disapproval. Profiting by the experience of former years, which has shown us the futility of relying upon Brecon for a supply of carriage conveyance equal to the large demand when so attractive a locality is opened for exploration, it was determined to try the route by Railway, and the experiment proved so favourable as to recommend itself for repetition upon any future occasion. Tickets were accordingly taken at Hereford by the Midland Railway through Hay (where a contingent of fifteen members and visitors, including ladies, from the Golden Valley district joined) so far as Talyllyn Junction, whence, by arrangements with the Brecon and Merthyr Railway authorities, a special train conveyed the party to Torpantau, where they found themselves landed on the platform at an elevation of 1,314 feet above the sea-level.

The scenery between Talyllyn Junction and Torpantau is very grand. Upon the left are seen: Llangorse Lake, the largest lake, except Bala, in the whole of Wales, being three miles in length, one and a half miles broad; the Mynydd Troed range of hills, and in the left back-ground the range of the Black Mountain, terminating in the conical peak of Crow's Foot, stretching far away in the distant horizon; the Allt standing proudly ahead. The river Usk is crossed, and near the junction of the river Cavanog the station of Talybont is reached after a run of three miles. From this point the scenery increases in grandeur, and can be viewed leisurely as the train is slowly creeping along, and up, the hill on the left as it makes the ascent for a distance of 7½ miles to Torpantau. Upon the right is the valley of the Usk, the river Collwn winding its way down the mountain; the valley Glyn Collwng, seven miles in length; innumerable hills, of varying magnitude; with the noble Tor in front, and the splendid heights of the Breconshire Beacons in the background, presenting a prospect gloriously grand.

From Torpantau the line continues to ascend as far as Dowlais Top, six miles further, on the road to Newport. The highest inhabited cottage in Wales—1,600 feet above the level of the sea—Twyn-y-waun, is close to the Railway line here, between Pant and Dowlais Top.

At Torpantau the road leading to the Beacons was entered without delay. After proceeding for a distance of a mile and a half a farmhouse on the left is

reached, soon after passing which a road is seen bearing to the left. This road conducts to the dam over the reservoir which, collecting the waterflow from the southern side of the three Beacons supplies the town of Dowlais. Avoiding this road, the members proceeded onwards through a pelting shower for more than a mile, the road gradually ascending, until they found themselves at a pass called Bwlch-y-ddwy-allt (the pass of the two cliffs). The clothing as well as the ardour of the botanists by this time had become considerably damped, insomuch that the majority, abandoning their botanical researches with one common consent prudently kept themselves in active exercise, and seeing the summits of the Beacons in front of them, made them the goal of their pursuit. Ascending gradually and obliquely along the southern flank of the rounded hill, which in the Ordnance Map is spelled Y-Fan-big, and pursuing the same course with the next succeeding heights, the elevation of 2,910 feet above the sea was eventually reached. The two contiguous highest Beacons are within rifle range of each other. Without the aid of levelling instruments it is impossible to determine which is the highest of the two. In *Transactions*, 1870, p. 94, we read that the most eastern is the highest, whilst in *Transactions*, 1882, p. 199, we are told that the most southerly is the highest. The same locality is referred to in each statement, which will be less misleading if we say that the one which lies most south-easterly is the highest. In the Ordnance Map the name Pen-y-fan is given, but to local authorities the name Cader Arthur or Arthur's Chair is more familiar. Owing to the uncertainty of the weather only a short time was spent on the summit, but fortunately the passing away of heavy clouds was temporarily succeeded by a ray of sunshine exposing a clear but limited proportion of the grand panorama exhibiting beauties and grandeur which proved a sufficient reward to the toilers who had made the ascent.

The descent was made by various routes. Some members descended into Brecon by the narrow path which skirts the intermediate Beacon upon its very steep and lofty northern slope overlooking the Cwm Serre valley so rich in rare botanical productions, thence over the shoulder of Bryn-leg into the road at Pont Cynedydd; some reached Brecon after a walk of about six miles by following the prolongation of the road from the narrow neck of Bwlch-y-ddwy-allt; others returned to Torpantau by the same route as was taken in the ascent, whilst one more adventurous, regardless of boggy ground and mountain torrents visibly increasing in volume, arrived home safely by the direct line in the valley by the stream Taf-fechan leading to the reservoir dam, a route not to be recommended after rains. The members who returned to Torpantau enjoy a grateful recollection of the thoughtfulness of the more wise ladies, who had prudently returned in the earlier part of the day and had prepared afternoon tea under the hospitable roof of the Station-master's gude wife. Here clothes were dried, and notes were compared, there being amongst the ladies some excellent botanists. The finds of the day included *Saxifraga hypnoides*, *oppositifolia*, and *sponhemica*; *Drosera rotundifolia* in blossom, some very fine specimens of *Narthecium ossifragum* (the bog asphodel), *Asplenium viride*, *Sedum Rhodiola*, *Silene maritima* (so far from the sea), *Caltha palustris*, *var. minor*, *Rubus ramosus*, *Galium boreale*,

Myosotis repens, *Ranunculus Lenormandi*, *Hieracium nitidum*, and last, but not least, a variety of this same genus whose name has not yet been determined, although it has been submitted to Rev. A. Ley, Rev. W. H. Purchas, and Mr. Hanbury.

The return train left Torpantau at 5.10 p.m. Shortly after leaving Torpantau the train enters a long tunnel, on the immediate emergence from which a grand prospect is revealed. The seven miles descent is rapidly made overlooking the valley of Glyn Collwng, seven miles in length. At the bottom of the incline the pretty little village of Aber with its picturesque bridge is reached, the Brecon Beacons on the left rear occupying the back ground in all their grandeur, the Black Forest range beyond stretching far away towards the horizon, and after passing the seventh milestone from Torpantau, the station is situated at the pretty village of Talybont.

There are many objects of antiquarian interest in this neighbourhood, which will at present only be casually referred to, as we are in hopes of the Club revisiting this locality before long. One of our members, Mr. Robert Clarke, promises us a list of the inscribed stones in this neighbourhood with drawings from rubbings taken by himself. Shortly after leaving Talybont upon the right-hand is Llansaintfraed Church, about six miles from Brecon; its interior contains some interesting old monumental slabs, and in the churchyard is a flat grave-stone to the memory of Henry Vaughan, obiit 1695, physician and poet, who wrote under the signature Siluria. About four miles and a half from Brecon is Scethrog; upon the left side of the road is a cylindrical stone, about three feet six inches high, commemorating the interment of a son of Victorinus, who is supposed to have been slain in battle between the Romans and Britons. The word VICTORINI is plain, the remainder of the inscription is illegible, but Mr. Robert Clarke by burrowing traced the inscription carefully downwards, and succeeded in obtaining a correct rubbing from the original, which he exhibited. This cylindrical stone is situated at the bottom of the little dingle on the east which is called Cwmgelleddion, or Cwmgelainion or Cwmgelanedd—the dell of the slaughter, or the heaps of carcases. At Scethrog also are the remains of an old castle consisting of a large square tower with entrenchments, now the site of a farmhouse. Approaching Brecon, at the third milestone, is Llanhamlach; in the Church is fixed a portion of an Anglo-Saxon cross with interlaced scroll work, and the following inscription:—IOHANNIS, MONIDIC, - SVNEXIT. HVNC. LAPIDEM. The word sunexit is peculiar! but so it is reported. Mr. Robert Clarke has taken rubbings of an interesting effigy of a female, with this inscription:—"Here lieth the body of IAN. VX. Humfry Standley, Earle of Darby. She married Phyllip sonne of Sir William sonne of Sir John Walby Knight and Marget VX. IOHN AP IOHN BARON OF Scethrog and Penkelly. This IAN was mother of Sir Elipot Walby." But we must leave the remainder for Mr. Clarke to present to the memoirs of the Club upon some future occasion, when they explore this ancient road leading from Y Gaer or Caer Bannau, the ancient Bannium, to Caerleon, the head quarters of the second Roman legion. Bannium is two miles and a half distant east from Brecon, on the north side of the Usk; traces of its

foundation walls and entrances still exist, and the shape of the camp is oblong. It is supposed to date from an early period of the Roman occupation under Ostorius Scapula, A.D. 54. It was destroyed by Bernard Newmarch about 1090, and its stones transferred for the building of Brecon.

At Talyllyn Junction the party which had been separated now re-united, when it was found that some had found time to visit the grand old Priory Church, and many had prudently refitted themselves with purchases of stockings and boots. On the journey homewards the business of the Club was transacted, which included the election of the following four members:—Count L. Lubienski, Rev. F. R. Burnside, Mr. Harold Easton, and Mr. James Douglas Stretch-Dowse. On the return journey the beautiful scenery was viewed under the more favourable aspects of a clear sky.

A list of the members and visitors attending is now given, so far as could be ascertained, the total number being between sixty and seventy.

Sir Herbert Croft, President; Rev. Sir George H. Cornewall, Captain Campbell, Major Doughty, Revs. H. A. Barker, J. O. Bevan, W. Bowell, W. Elliot, J. E. Grasett, E. J. Holloway, A. G. Jones, W. H. Lambert, H. B. D. Marshall, W. H. Purchas, T. Prosser Powell, and R. H. Warner; Drs. T. A. Chapman, J. H. Wood, and A. J. Crespi; Messrs. Robert Clarke, Luther Davis, W. J. Grant, E. H. Greenly, G. H. Hadfield, T. F. Inman, J. W. Lloyd, T. C. Paris, W. Pilley, H. Southall, Guy Trafford, H. C. Moore, Hon. Secretary, and James B. Pilley, Assistant Secretary; and the following visitors:—Ladies—Miss Davies, Miss Dawber, Miss Doughty, Miss Hayes, Miss A. Hayes, Miss Powell, Miss J. Powell, Mrs. Robinson, and Miss J. Robinson. Gentlemen—Lieut.-Col. Blathwayt, Captain Hayes, Revs. E. R. Firmstone, R. W. T. Hunt, E. B. Brackenbury, and A. G. Watson; Messrs. E. Bowell, Algernon Brackenbury, G. H. Busby, Hugh Croft, Basil Holloway, — Kelsall, F. Lindsay, John Lloyd, Walter Reeves (of the Royal Microscopical Society), J. Robinson, and Reginald Robinson.

NOTES ON A FEW OF THE MORE INTERESTING FLOWERING PLANTS INHABITING THE BRECON BEACONS.

By Rev. A. Ley.

Mr. W. Bowles Barrett, F.L.S., published in the *Journal of Botany* for 1885, a series of papers styled "A Contribution towards a Flora of Breconshire." These papers contain an accurate and exhaustive summary of the Flora of the county. They afford far the fullest list of the flowering plants of Breconshire known to exist, and but little has been added, and that little chiefly in the critical genera of *Rubus* and *Hieracium*, to the Flora of the county since the date of their publication.

It is because Mr. Barrett's papers may not be in the hands of all the members of the Club, that I have thought it might be worth while to bring together a few notes upon the more interesting of the flowering plants which inhabit the range of hills upon which we stand. The following notes are taken substantially from Mr. B. Barrett's papers, but they have had the advantage of Mr. W. P. J. Le Brocq's criticisms. He has kindly consented to look them over, and to give us the benefit of his more recent investigations in the botany of these hills. Mr. F. J. Hanbury has also kindly looked over some critical *Hieracia* which I recently sent him, and has allowed me to incorporate his decision with regard to them in this paper.

The range of hills upon which we stand is well known for the magnificent view which is gained of their highest points from the immediate neighbourhood of the town of Brecon. These highest points are the "Beacons" from which the range takes its name. The hills conspicuously and characteristically present this *double point* which gives them the names of Beacons, whether viewed from the hills of Radnor or Herefordshire on the N. and N.E., or from those of Glamorganshire on the south. They form the most elevated tract of country in South Wales, reaching (by the Ordnance Map) the elevation of 2,910 feet at their highest point in the Beacons, and 2,631 feet some twelve miles further west at the Breconshire Van. This elevated tract stretches across the county of Brecon in its southern part, from Monmouthshire on the east into Carmarthenshire on the west; the straight line from the Blorenge, rising immediately above Abergavenny on the east, to the hills of the Llwchwr valley in which the range sinks down on the west, measuring about forty-two miles. The ridge, or backbone, of the hills joining these two points lies nearly due east and west, bending out however in the central and highest part considerably to the north; and, moreover, rendered a singularly tortuous and undulating line, by the lateral valleys and glens which invade it both from the north and south. These glens on the north are all, so far as Brecon and Monmouthshire are concerned, feeders of the Usk, while on the south they form the heads of the Taf, Neath, Tawe, and other rivers. Measuring from north

to south, the breadth of the range, at its broadest, which is also its highest part, opposite the town of Brecon, is some ten or twelve miles. From this point the hills become narrower, each way both to the east and west, till they are found to be only a few miles in breadth at the extremities of the range.

The whole range of hills has been well named, when spoken of collectively, as "the Vans:" the Welsh term "Y Fan" (one of the many words meaning a "top" or a "ridge") being applied more frequently to the undulating "ridges" and "tops" which they present, than to those of any other group of mountains in the principality.

The geological formation of the hills is mainly the Old Red Sandstone with which we are so familiar in Herefordshire. This occupies the whole of the *centre* of the range; and in the Brecon Beacons this formation attains, I believe, its highest elevation, and its largest mountain mass in all the British Isles. The Red Sandstone is bounded on the south by the coal and iron district of Glamorganshire; and it is broken into at Pen-y-wyllt and the hills above Cwm Amman on the west, and again in the Monmouthshire part of the range upon the east, by tracts of limestone. This mountain limestone occurs in Breconshire (and therefore within the limits of this paper) only at Pen-y-wyllt, where it adds considerably to the number of interesting plants which have to be recorded.

No attempt has been made in the following lists to record the more common species. Those only are mentioned, which on account of their greater rarity, or for some other reason, may have more interest attached to them. The nomenclature of the 7th edition of the *London Catalogue of British Plants* has been used in order to maintain correspondence with Mr. Bowles Barrett's paper. New county records are marked with a *: introduced plants with a †.

Thalictrum minus, *L.* **var. montanum.** Very local. Confined, so far as is known, to one station. Craig-y-gledsiau, plentifully. Close to its southern limit in Wales, which is reached at Craig-y-llyn, Glamorganshire; or at Giltar head, Pembrokeshire?

Ranunculus Lenormandi, *F. Schultz.* A moorland plant, occupying the same position on the high lands which *R. hederaceus* does on the lowlands. Not abundant in these hills. Southern part of the range near Hirwain. Note: the Brecon Beacon and Black Mountain form of this plant is generally a small state, making a decided approach to *R. intermedius*, Hiern.

Caltha palustris, *L.* **var. minor.** Spring heads at high elevations on the hills; not common. At the southern limit of its range in Britain.

Trollius europæus, *L.* Globe Flower. Stream sides in the glens: locally abundant. Hepste glen. Pen-y-wyllt. Abundant in Cwm Serre.

Meconopsis cambrica, *Vig.* Welsh Poppy. Shady rocks and glens, rare. Ffrwd-grech and Rhyd-goch glens near Brecon.

***Hesperis matronalis**, *L.* Dame's Violet. Well naturalised on the Menascin brook near Brecon.

Arabis hirsuta, *Br.* On the limestone at and near Pen-y-wyllt. Walls in Brecon, abundantly.

*** Lepidium ruderale,** *L.* Very rare. Craig-y-rhiwarth, Pen-y-wyllt.

Helianthemum vulgare, *Gaert.* Rock-rose. On the limestone, rare. Craig-y-rhiwarth, Pen-y-wyllt. Dinas ridge, Pont-nedd-fechan.

Viola palustris, *L.* Marsh Violet. Rare on these hills. Marshy ground near Penpont on the Nedd; and at Pen-y-wyllt. Near Capel Coel-bren, and near Cray.

Drosera rotundifolia, *L.* Sundew. Rare on the Brecon Beacon range. Bog at Pen-y-wyllt. Abundant in Cwm Serre.

Silene maritima, *With.* Sea Campion. Confined to one station. Precipice under the summit of the Beacons. In this station it is extremely abundant, and bears larger flowers than at any sea-side station in which I have seen it. This is one of the class of plants which inhabit both the sea-shore and the cold damp precipices of the higher mountains, but are absent from the intermediate ground. At intermediate elevations the Sea Campion is very rare, though not entirely absent, occurring occasionally upon the gravel of rivers and lakes.

Alsine verna, *Bart.* In one station only. Precipice under the summit, in moderate abundance. Quite a mountain plant in its tastes; making itself more at home on the cold precipices of the higher mountains, than upon the limestone hills.

Sagina nodosa, *Meyer.* Boggy places and rill sides upon the hills; very rare. Mountain rivulets above Pentwyn; *var. glandulosa.*

[*Geranium sylvaticum, L,* is not known; but should surely be found in some of the numerous small glens of the hills. Found at Llanigon near Hay, and in the Black Mountain group].

Geranium lucidum, *L.* Shining Crane's-bill. On the limestone at Pen-y-wyllt. Usually confined to the lower, warmer parts.

Anthyllis vulneraria, *L.* Lady's Fingers. Very rare. On the limestone of Craig-y-rhiwarth, Pen-y-wyllt.

*** Trifolium striatum,** *L.* Canal bank near Brecon.

[*Ornithopus perpusillus, L.* Common Birds' Foot. Has not yet been observed in the county].

*** Vicia Orobus,** *D.C.* Rare in this range. Blaen-rhyd-nant, Cwm Cray.

Rubus saxatilis, *L.* At one station only. Limestone at Craig-y-rhiwarth, Pen-y-wyllt.

[*Rubus Chamæmorus, L.* Cloud berry, seems to be absent].

Geum rivale, *L.* Water Avens. Moist glens. Near most of the small waterfalls in Cwm Serre and Cwm Llwch. Frequent about Brecon.

*** Geum intermedium,** *Ehrh.* Rare. Fenni-fach.

***† Pyrus Aria.** *Hook.* Common White-beam. Plantation near Ffrwd-grech.

Pyrus rupicola, *Syme.* Mountain White-beam. Confined to the limestone near Pen-y-wyllt, Craig-y-rhiwarth, and at the Cave, Nant-y-gwared.

Sedum Rhodiola, *D.C.* Rose-root. Precipices at two stations. Precipice of the summit; Craig-y-gledsiau; both in fair abundance. Craig-y-llyn, Glamorgan; its southern-most station in Britain.

Sedum Telephium, *L.* Orpine. **Var. purpurascens.** Rare. Pen-y-wyllt. Pont Cynedydd in Cwm Serre.

[*Sedum anglicum, Huds.* Can hardly be absent?]

Sedum Forsterianum, *Sm.* **Var. virescens.** Rocks, rare. Precipice of the summit. Rock in Cwm Serre. Craig-y-llyn, Glamorgan.

Saxifraga oppositifolia, *L.* Damp cold precipices. One of the most interesting and beautiful plants of these hills, reaching here its southern limit in Britain. Its only other known Welsh localities lie in the Snowdon ranges, Carnarvon. Precipice under the summit: Craig-y-gledsiau; in some abundance at both stations. Y-fan-big.

Saxifraga sponhemica, *Gmel.* Mossy Saxifrage. Well marked and abundant in the rocky glens and on the damper cliffs. At several stations on the Beacons. Blaen-Taf-fawr. A form on Craig-y-gledsiau, and at other places, answering admirably to *S. affinis* of Don; E.B.S., plate 2903.

Saxifraga hypnoides, *L.* Mossy Saxifrage. Frequent in the mountain glens and on the precipices; but hardly so abundant in this range as the last. At many stations on the Beacons.

[*Saxifraga stellaris, L,* and *S. nivalis, L.* Absent].

Chrysosplenium alternifolium, *L.* Golden Saxifrage. Not rare. Frwd-grech waterfalls, and at other stations.

Carum verticillatum, *Koch.* Boggy mountain pastures, local. Near Coel-bren in abundance. Southern parts of the range, in the Hepste valley?

***† Lonicera xylosteum,** *L.* Fly Honeysuckle. Plantation near Frwd-grech.

Galium boreale, *L.* Rare and local. Rocks at the head of Cwm Cynwyn, Craig-y-gledsiau, near Capel Cellwen. Almost at the southern limit of its range in Britain, which is reached, as in the case of *Sedum Rhodiola* and other plants at Craig-y-llyn, Glamorgan, 15 miles further south.

Galium sylvestre, *Poll.* One station only. Limestone at Pen-y-wyllt.

Scabiosa columbaria, *L.* Abundant at several stations both on limestone and sandstone. Limestone at Craig-y-rhiwarth; sandstone of Craig-y-gledsiau, and of the summit precipice.

Carduus pratensis, *Huds.* Moist hill meadows. Near Capel Coelbren abundantly. One plant of a hybrid thistle (*pratensis-palustris*) growing along with it. Blaen-rhyd-nant, Cwm Cray.

Serratula tinctoria, *L.* Locally common. Cwm Serre; Cwm Tarell; Pen-y-wyllt.

Gnaphalium dioicum, *L.* Dry mountain banks, rare. Craig-y-rhiwarth: in Cwm Llwch, a single plant only found.

*† **Petasites albus**, *Gaert.*, and **P. fragrans**, *Presl.*, together with the Snowdrop, Monkshood, Lesser Periwinkle, and other plants, were introduced more than 30 years ago in a wooded glen on the Cynrig in Cantreff Rectory grounds, and are now thoroughly naturalised there.

*† **Inula Helenium**, *L.* Elecampane. A garden escape on waste ground in Cwm Tarell, near Brecon.

*† **Doronicum Pardalianches**, *L.* Leopard's-bane. Naturalised in fields near the shrubberies, Frwd-grech.

* **Hypochæris glabra**, *L.* A colonist, in cultivated fields, rare. Cornfield near the top of Llech-faen. Garden weed at Brecon.

Hieracium. In this extremely critical genus, the difficulties are at present greatly increased by the important work which is at the present time being done in it by Mr. F. J. Hanbury and others, by which the number of forms known to inhabit Britain is being rapidly added to. This, while increasing the difficulty of writing about them in a paper like the present, adds perhaps to the interest of any notes that can be given about them. Most or all of the following have been seen by Mr. Hanbury; and the names, resting on the authority of the first living student of these plants in Britain, may thus, when no ? has been appended to them, be considered of unexceptionable value.

* **Hieracium stenolepis**, *Lindeb. Journal of Bot.*, 1888, p. 205. Recorded by Mr. Barrett as *H. cæsium, Fr.* At one or two stations only, on the limestone at Pen-y-wyllt. First recorded as British from the Doward Hill, Herefordshire, and from Braemar. This plant occurs also on the limestone crag at Carreg Cennen, at the extreme west of the Beacon range, in Carmarthenshire; and should be looked for in the limestone portion of the range lying on its eastern side in Monmouthshire. It is necessary to add that Mr. Hanbury is not responsible for this name, as applied to the Pen-y-wyllt plant, which he was inclined to place to *H. sacrorum, L.* He has, however, only seen poorly dried specimens, not the living plant, which, from the highly developed glaucousness of its leaves, I should judge without much hesitation to belong to *H. stenolepis, Lindeb.*

* **Hieracium nitidum**, *Backh.* Abundant at several localities. Precipice of the summit: Craig-y-gledsiau. Head of the Hepste glen, on limestone rocks by the river side. Specimens have been sent by Mr. Hanbury from all these stations, and pronounced by him with little hesitation to bear the name of *H. nitidum, Backh.* This is a new record of great interest; *H. nitidum* having

been confined in its previously known stations to the Scottish Highlands, and being there a rare species. It occurs again at Craig-y-llyn, Glamorganshire, in abundance.

* **Hieracium caledonicum**, *Hanbury. Journal of Bot.*, 1889, p. 75, where a short description will be found. Craig-y-gledsiau, and in some smaller rocks at the head of Cwm Tarell. This, which is spoken of with some assurance by Mr. Hanbury, is again a record of great interest. The plant was found by him in 1888 on the north coast of Scotland, and since that date in Skye and East Ross. Its Breconshire record is therefore the earliest for England and Wales, and implies a very large extension of its range to the southward.

Hieracium murorum, *L., ex parte; variety.* Rocky mountain sides in Cwm Tarell, abundant at one spot; also on the central cliff of the Beacons. This variety of the common *H. murorum* is strikingly different from the type in appearance; but is said by Mr. Hanbury (and my own experience confirms this) to revert to the type under cultivation. It is abundant on the Tarens of the Black Mountain group, both in Monmouthshire and Herefordshire, and has not yet received a name.

? * **Hieracium Gibsoni**, *Back.* This name was suggested to me with doubt by Mr. Hanbury, for a plant growing on mountain sides near Capel Cellwen, and some of the Breconshire specimens bear a strong resemblance to Yorkshire and Denbighshire plants which are undoubted *H. Gibsoni.*

* **Hieracium orarium**, *Lindeb. Journal of Bot.*, 1888, p. 205. Again first recorded as British from the extreme northern coast of Britain, this form will probably be found widely scattered in it, when better known. Banks, mountain sides, and rocks. Cwm Serre, and the Menascin glen, near Brecon: probably common. The ciliate tips of the *young* ligules will separate it from the broad-leaved forms of *H. vulgatum, Fr.*, which it otherwise resembles. I believe that we have the same plant in abundance on the side of railway cuttings in the south of Herefordshire.

Hieracium lapponicum, *Fr. Journal of Bot.*, 1888, p. 73. Cwm Tarell, 1887, and subsequent years, on rocks by a stream. This is a plant of extreme interest; the Breconshire station being the only one hitherto known out of Lapland. Specimens from Breconshire were sent to Dr. Lindeberg in 1888, and identified by him, with an expression of certainty, with the Lapland plant. We greatly hope that further research will reveal it in other Breconshire or Welsh stations. I have myself, however, never met with anything resembling it in other parts of Wales.

* **Hieracium sp.** ? A small and well-marked plant, grows in abundance at the central precipice and the Beacons, and at Y-fan-big, which has not been at present identified with any British or foreign species. The opinion of Dr. Lindeberg upon this plant will be awaited for with much interest.

* **Hieracium Friesii**, *Hartm.* This is, in part at least, the *H. gothicum, Fr.*, of British authors. I use the newer name, not knowing to what extent they

cover the same ground. *Journal of Bot.*, 1888, p. 205. Stream sides and banks in mountain glens, at a level lower than the moorland: in many stations. In the Hepste and Nedd glens on the south of the range: on the Usk near Senne bridge on the north: and probably at many other stations. In the Hepste and Neath valley, Glamorganshire.

Var. basifolium. Falls of the Usk near Senne bridge.

Var.? A plant with long-petioled leaves occurs on the Hepste glen, which may turn out not to be assignable to *H. Friesii* at all.

[*Hieracium gothicum, Fr. Var. latifolium, Backh.* Mountain glens near waterfalls, at a higher level than *H. Friesii*, and more rare. In plenty in a glen near Llanwrtyd, Breconshire, and at several places near waterfalls in the Rhondda Valley, Glamorganshire. This rare plant has thus been found both *north* and *south* of the range which is the subject of this paper, and will be certain to be found on the Beacon range itself when better known and searched for. It is a very different looking plant from *H. Friesii*, and will probably be eventually severed from it.]

Hieracium tridentatum, *Fr.* Banks and rough pastures at a low elevation. Hedge bank between Cwm Serre and Brecon, fine and well-marked: probably elsewhere also.

[*Hieracium prenanthoides, Vill.* Rare in Wales: and confined in Breconshire, so far as is known, to Taren-r'-Esgob in the Black Mountain. It should occur on the Beacon range.]

[*Hieracium strictum, Fr.* River-side rocks at a moderate elevation. In plenty on the Yrfon, at and near Abergwessin, Breconshire, and on the Elan, Radnorshire. This should be looked for on the Usk and its tributaries.]

* **Hieracium sparsifolium,** *Lindeb. Journal of Bot.*, 1889, p. 73. This is one of the forms recently recognized as British, and it has already been recorded from several Welsh as well as Scottish stations. It is a striking plant, standing well out from any of the above forms. Mountain rocks at about 2,000 feet elevation; glens at a lower elevation. Blaen-Taf-fawr, Brecon Beacons, 1888. Craig-y-llyn, Glamorgan, 1890. Taren Olchon in the Hatterel range, Herefordshire.

* **Hieracium crocatum,** *Fr.* Stream sides at a moderate elevation. More rarely in the mountain rocks. Hepste glen on the south; Usk at Senne bridge, on the north of the range. Mountain rocks near Capel Cellwen. Craig-y-llyn, Glamorgan. A well-marked plant, generally easily recognizable.

* **Hieracium corymbosum,** *Fr.* River sides, rare? On the Usk at Senne bridge, 1890. Spoken of with slight expression of doubt by Mr. Hanbury. Apparently more rare, in S. Wales, than either *H. strictum* or *H. Friesii*, to both of which it bears considerable resemblance.

Hieracium umbellatum, *L.* Mountain pastures and banks; probably not rare. Menascin glen near Brecon, in abundance, 1890.

An apology is due for the inordinate length at which the genus *Hieracium* has been treated in this paper.

The Hawk-weeds, however, take the place in the mountains which the Brambles do upon the low-lands. They must be treated at much greater proportionate length than is assigned to other groups, or they must be omitted altogether. In electing the former course, we are induced to hope that others will be stirred up to the study of these plants. A great deal of real work remains to be done in this genus, in our mountain districts, and especially in Wales, as the above Notes amply testify,—work which cannot now be found among British Flowering plants, except in such critical genera.

[*Wahlenbergia hederacea, Reich.* Absent, so far as is known].

[*Vaccinium Oxycoccos, L.* Cranberry. Absent].

Vaccinium Vitis Idæa, *L.* Not common. Small and stunted on the exposed mountain, finer in the glens. Cwm Serre. Cwm Llwch.

Erica tetralix, *L.* Cross-leaved Heath. Fairly abundant on all the moorlands.

[*Erica cinerea, L.* Common Heath. Mr. Barrett's statement that this Heath is "very common" in Breconshire must, I think, be founded on some error. Neither of the Heaths is abundant on the Brecon Beacon range. Even the common Ling is not abundant. *Erica cinerea* I never met with on any of the higher hills or moorlands of Wales; and Mr. Le Brocq's experience on this point coincides with my own].

*† **Ligustrum vulgare,** *L.* Privet. Plantations near the road side at Frwd-grech.

Menyanthes trifoliata, *L.* Buck-bean. Scattered in bogs and pools. Mountain slopes, Cwm Cray. Capel Coel-bren. As abundant on the lowlands as on the higher ground.

* **Verbascum Thapsus,** *L.* Common Mullein. Rather rare in Breconshire and Radnorshire. At several stations near Brecon.

Veronica serpyllifolia, *L.*, **var.** * **humifusa.** Boggy spots on the higher moorlands, not rare. Cwm Cynwyn. Not mentioned by Mr. Barrett: first discovered as a native of South Wales by Mr. Le Brocq.

* **Veronica scutellata,** *L.*, with the **var. pubescens.** Boggy spots on the hills, not common. Llanfrynach and other stations (type and the variety); Cwm Tarell (the variety).

Pedicularis palustris, *L.* Bogs, local. Capel Coel-bren, and Pen-y-wyllt. In the lower part of Cwm Serre.

* **Lathræa squamaria,** *L.* Toothwort. Lower part of Glen Tarell; and at other stations near Brecon.

[*Scutellaria minor, L.* Lesser Skull-cap. Surprisingly rare in Breconshire. Recorded for the county in *Topographical Botany*, but never met with by Mr. Barrett, Mr. Le Brocq, nor by myself.]

* **Ballota nigra**, *L.* Black Horehound. This abundant weed of Herefordshire roadsides is very rare in Breconshire. At the junction of the Tarell with the Usk.

Myosotis repens, *Don.* Cold rills and spring heads on the hills, common. Cwm Tarell.

Pinguicula vulgaris, *L.* Butterwort. Common in wet places on the hills. Cwm Tarell, Cwm Serre.

Rumex Acetosella, *L.* Sheeps' Sorrel. This common little Sorrel, growing on dry pastures throughout the lowlands, flourishes on some of the highest exposed rocks of the Beacons, at nearly 3,000 feet elevation.

* **Polygonum Bistorta**, *L.* In several spots near Brecon. Llwch lane.

Empetrum nigrum, *L.* Crowberry. Scattered on the moorlands, not rare.

[*Myrica Gale*, *L.* Sweet Gale. Absent, so far as is known, from the whole county.]

Salix herbacea, *L.* Least Willow. This minute shrub fringes the precipitous rocks on the north of the Beacons; and occupies here its southernmost station in Britain. It was discovered here by the late Mr. Joseph Woods, the author of the well-known "Tourists' Flora."

Taxus baccata, *L.* Mr. Le Brocq has communicated to me the following interesting particulars respecting a specimen of the Yew growing in this neighbourhood. The tree is one of several old trees growing near the remains of a building in Cwm Serre near Pont Cynedydd. It is a male tree, but a large bough bears female blossoms and fruit. Mr. Le Brocq has been experimenting with the seeds produced by this tree, but has hitherto failed to make them grow. He treats the phenomenon as a curious instance of a "reversion from the normal dioicous to a diclinous state."

* **Orchis Morio**, *L.* Common Meadow Orchis. Abundant near Cefn Cantreff farm, on the old Dowlais road.

Gymnadenia Conopsea, *Br.* Sweet-scented Orchis. Mountain pastures, not common. Lower part of Cwm Serre, and near Pen-y-wyllt.

* **Gymnadenia albida**, *Rich.* In mountain meadows, very rare. Abundant at Blaen-rhyd-nant, Cwm Cray.

Habenaria bifolia, *Bab. Man.* Lesser Butterfly Orchis. Rare. Rough pastures near Ffrwd-grech.

* **Habenaria chlorantha**, *Bab.* Butterfly Orchis. As the last; not common. Cwm Serre; and at Blaen-rhyd-nant, Cwm Cray.

* **Epipactis palustris**, *Crantz.* Marsh Helleborine. Rare and local. Fine in Cwm Serre; and at one or two other stations not falling within the scope of this paper.

Paris quadrifolia, *L.* Herb Paris. Woods, rare and local. In abundance at Ystrad-felte, in the old course of the Melte brook. At several stations near Brecon outside the bounds of our paper.

* **Polygonatum multiflorum**, *All.* Solomon's Seal. Banks of the Usk near Senne bridge: stream side about two miles from Brecon; and on the Usk near Brecon. These two last mentioned stations do not properly fall within the range of this paper, but I am induced to mention them on account of the great interest attaching to this plant. This is, I believe, the first record of the Solomon's Seal in the principality. The discovery is due to the industry of Mr. Le Brocq, who has added so much to our knowledge of Breconshire plants.

Convallaria majalis, *L.* Lily of the Valley. Very rare. Limestone wood near Pen-y-wyllt.

* **Narthecium ossifragum**, *Huds.* Scottish Asphodel. Moorland bogs. Cwm Gwdy, Cwm Serre, and Cwm Cray; all on the northern slope of the hills.

Eriophorum vaginatum, *L.* Moorlands, especially on the higher hills.

Eriophorum angustifolium, *Roth.* Cwm Gwdy, and Cwm Serre. Both the common Cotton Grasses are tolerably abundant on the moorlands.

[*Eriophorum latifolium*, *Hoppe.* Not mentioned by Mr. Barrett, nor as yet found in the county.]

Carex dioica, *L.* Moorland at higher elevations; rare. Cwm Tarell.

Carex montana, *L.* Limestone woods, very rare. Craig-y-rhiwarth, Pen-y-wyllt.

Carex lævigata, *Sm.* Wet woods and glens, not common. Cwm Tarell.

Melica nutans, *L.* Limestone woods; at one station only, near Pen-y-wyllt.

Aira flexuosa, *L.*, **var. montana.** Rocks along the highest ridge of the precipice of the Beacons, along with *Salix herbacea*.

Poa nemoralis, *L.*, **var.** A noteworthy variety of this common wood grass occurs on the Beacon precipices at several spots, and merits further investigation. It appears not to have received any varietal name.

[*Festuca sylvatica*, *Vill.* This handsome grass is unrecorded, but must surely be found in some of the shady moist glens of the hills.]

Hymenophyllum Wilsoni, *Hook.* Filmy Fern. Sparingly in the glens and upon the precipices. Cwm Serre.

Asplenium viride, *Huds.* Green Spleenwort. Scattered in small quantities in the larger precipices. Precipice under the summit: Craig-y-gledsiau. Limestone near Pen-y-wyllt.

Cystopteris fragilis, *Bernh.*, with the **Var. dentata.** Brittle Fern. Not abundant on these hills. Cwm Serre, and at Ystrad-felte.

Polypodium Phegopteris, *L.* Beech Fern. In the glens, and among stones on mountain sides. Cwm Serre, Cwm Cynwyn, and Cwm Cray.

Polypodium Dryopteris, *L.* Oak Fern. As the last, both in the glens, and on stony exposed mountain sides, but not abundant. In the latter situation the fronds are often shrivelled by exposure, as on the shoulder of the Beacons, west of Cwm Serre.

* **Ophioglossum vulgatum**, *L.* Adder's Tongue. Not common. Rough pasture near Ffrwd-grech.

Equisetum maximum, *Lam.* In wet woods. Cwm Cynwyn, Ffrwd-grech.

Equisetum sylvaticum, *L.* Boggy woods and pastures, rare. Cwm Serre.

Looking back upon the plants here mentioned, it will be seen that a remarkable number of them find either in this range, or in that lying immediately to the south of it in Glamorgan, their most southern British stations. The reason of this is obvious, namely that these ranges are the southernmost ranges of high hills in Wales, and therefore in the British Isles.

List of mountain plants finding their southern limit, in the British Isles, in Brecon or Glamorgan.

Caltha minor	Brecon Beacons.
Trollius europæus, *L.*	Glamorgan.
Sedum Rhodiola, *D.C.*	Craig-y-llyn, Glamorgan.
Saxifraga oppositifolia, *L.*	Brecon Beacons.
Galium boreale, *L.*	Craig-y-llyn, Glamorgan.
Hieracium nitidum, *Backh.*	,, ,,
,, caledonicum, *Hanb.*	Craig-y-gledsiau, Brecon.
,, lapponicum, *Fr.*	Cwm Tarell, Brecon.
,, Friesii, *Hartm.* (=gothicum, *Fr.*)	Glyn Neath, Glamorgan.
,, gothicum latifolium, *Backh.* ...	Rhondda valley, Glamorgan.
,, prenanthoides, *Vill.*	Taren r'Esgob, Breconshire.
,, strictum, *Fr.*	On the Yrfon, Abergwessin, Breconshire.
,, sparsifolium, *Lindeb.*	Craig-y-llyn, Glamorgan.
,, crocatum, *Fr.*	,, ,,
,, ? corymbosum, *Fr.*	Senny bridge, Breconshire.
Veronica humifusa, *Dicks.*	Brecon Beacons.
Salix herbacea, *L.*	,, ,,
Aira montana	,, ,,

Of these, 8 stretch on into Glamorgan: 10 do not advance further than Brecon.

Two more find their southernmost *Welsh* station in these ranges, namely:

Thalictrum montanum	Crag-y-llyn, Glamorgan.
Alsine verna, *Bart.*	Brecon Beacons.

One has its sole Welsh station in Brecon—*Polygonatum multiflorum*, *All.*

One has its most southern home, so far as is known in the world, in the range on which we stand; viz.—

Hieracium lapponicum, *Fr.* This plant was not known except in Lapland before its detection in Brecon. This is undoubtedly the most remarkable *positive* fact which the botanical exploration of these hills has yet brought out.

Among its *negative* results the following seem the most remarkable. There is no Cloud-berry: no *Saxifraga stellaris*: no Common Heath: no True Cranberry: no Sweet Gale: no *Geranium sylvaticum*.

And now we have done. We have just touched the Lady Flora's skirts, but we have said more than enough to shew you how it is that we botanists find that damsel a very fascinating, but a rather exacting and an altogether insatiable mistress; who is likely, if you once begin courting her, to lead you a pretty rig, up and down the steepest hills, and to take up a great deal more of your time and your heart than you ever meant to give her.

Woolhope Naturalists' Field Club.

THE FUNGUS FORAY, 1890.

ANOTHER pleasant re-union of mycologists has taken place. The wholesome interchange of ideas and the discussions upon this extensive field of natural history have opened the minds of both the teachers and the students who assembled in Hereford on Monday, September 29th, for the annual Foray among the Funguses. The dry weather of the antecedent three weeks having been extended over this week, contributed to render the daily outings very enjoyable for pedestrian tourists, and to reveal to our visitors some of the charming scenery of our beautiful county, but it must be confessed that it was not favourable for the reproduction of species of fungi. Notwithstanding these circumstances, the practised eyes of the fungus hunter succeeded in finding more or less of interest every day, quite sufficient to afford employment for a working day of from eight to twelve hours, in the discussion upon, and in the determination of, some species whose evanescent characters rendered them the more difficult of diagnosis, owing to the dry atmosphere in which they had effected their growth. To some of our usual annual visitors we have to add three gentlemen, respectively from Norfolk, from Surrey, and from Devonshire, who, we hope, have been sufficiently struck with their first impressions of what the Woolhope Club can display, as to be induced to re-visit us in a more favourable season. At the same time we must say that we fail to observe any correspondingly increasing interest in the subject of mycology amongst our new and younger members at home, although their opportunities of study have been rendered more easy by the now nearly completed work of our leader—Dr. Cooke—namely, his "Illustrations of British Fungi," in eight volumes. This work came out in parts, which were presented to the Free Library by the late Dr. Bull, and since his death the series has been continued by the generosity of Mrs. Bull. It is to be found upon the shelves of our Reference Library.

As the list of the species found is appended to this notice, a general *resumé* of the work of the week and of the localities visited will now be given.

On Tuesday, September 30th, the party travelled by brake to the beautiful grounds of Whitfield, distant about seven miles, where, by the kind permission of Mrs. Greathed, the interior of the mansion and the gardens were inspected. Near the conservatory entrance to the kitchen garden the members were met by Mr. Robert Grindrod, the head gardener, who pointed out the finely-grown specimen of *Salisburia Adiantifolia*, of the Yew tribe *(Taxineæ)*, with leaves three inches across, resembling a gigantic leaf of the maidenhair fern, *Adiantum capillus veneris*, a tree which deservedly received a protracted attention. It must certainly

rank as one of the finest specimens in this kingdom; it is of healthy growth, it bears catkins every year, but the fruit is not known to come to maturity in this country. There is a fine specimen, forty feet high, growing in the Royal Gardens at Kew. In Japan it is called Ginkgo. The kernels of the fruit are eaten by the Japanese, and an oil is also extracted from them. This is the only deciduous tree of the Yew family. It is believed that this tree was planted by Lady Catherine Stanhope about the time that Whitfield came into her possession in 1775, thus making the tree 115 years old. On the lawns and in the grounds are many trees of beauty deserving of notice, such as three Cedars of Lebanon, three specimens of that beautiful tree the *Cedrus atlantica* from the Atlas mountains, some Wellingtonias, or, more properly, *Sequoia gigantea*; a conspicuous Silver Fir, *Abies pectinata*, the tallest tree in the grounds, over 100 feet high, standing solitary in the field; several very fine Scotch Firs, *Thuja* or *Cupressus macrocarpa*; a plantation of the *Sequoia sempervirens* or Red Cedar Wood from California, situated amongst which Mr. Grindrod drew the attention of the members to an interesting evergreen oak tree, not an Ilex, but a Quercus of the Sessiflora variety, which retains its fine light green leaves through the winter until the re-appearance of its vernal foliage. In the grounds is a fine old Ilex, which has lately suffered considerably from the snows and winds. At the further end of the Park, between the fishpond and the entrance into the garden at its lower or southern end, grows a *Pyrus Aria*, and in the garden are varieties of *Crataegus*, *Berberis*, a Red Cedar tree, which Mr. Grindrod thinks is a *Juniperus Virginiana*, although many visitors call it the Pencil Cedar, which is the Bermuda Cedar *(Juniperus bermudiana)*. It was particularly observed how plentiful of berries all the berry-bearing trees were, including the hollies in the hedges.

The fungus hunters, starting from the plantation of the Redwood trees, proceeded towards the Cockyard end of the wood bordered upon the right by a plantation of *Abies Douglasii*, and returning through the "Old Rookery," continued their walk along the "Woodwalk."

Some estimate may be formed of the quantity of funguses found to-day when it is stated that the following reply was given to the question as to whether we should pursue our explorations a little further, or desist from the search:—"We have enough, and more than enough." Amongst the many we must not omit to mention a beautiful specimen of the fully developed cups of the *Chlorosplenium æruginosum*, extending over a large surface of a bough of an oak, thoroughly saturating its entire substance with its deep verdigris-green mycelium. It is common enough to find wood stained with this fungus, which is made use of in the manufacture of Tunbridge ware, but it is rare to find so large a series of the fully developed cups of the fungus itself, which at the Exhibition in the Woolhope Club-room so delighted the heart of Mr. William Phillips, author of "The Manual of British Discomycetes," published in 1887, in the International Scientific Series. (See page 147 of this work for a description of this Helotium).

The party left Whitfield by the approach from Kingstone Grange, or the northern entrance, which was planted with an avenue of Scotch firs by the late Rev. Archer Clive in 1850, about which period the Redwoods and other trees in

the plantation were planted. In the evening the whole of the mycologists met at the house of Mrs. Bull, where Dr. Cooke read a paper on "Controverted Agarics," in which he took advantage of the opportunity of referring to some drawings represented in his "Illustrations of British Fungi," which had formed a subject for controversy.

On Wednesday, October 1st, the Fungus Foray was conducted over Haywood Forest, where the finds were not so rich as they often have been; and on Thursday, October 2nd, Dinedor hill and the grounds of Mrs. De la Barre Bodenham, at Rotherwas, were explored with no very satisfactory result. Mr. McCabe, the head gardener, met the members and pointed out the most rare and best grown trees. Approaching the lawns from the south side, where the mansion is situated, a tulip tree (*Liriodendron tulipifera*) of the Magnolia family stands out a prominent object in the landscape, its bright green foliage contrasting with the darker hues of neighbouring trees of *Abies* and *Picea* above which it towers; it is one of the loftiest tulip trees in the kingdom, being now 68 feet high. A rival recorded in *Woolhope Transactions* for 1878, page 110, growing in Croft Park, had a height of 50 feet, and the girth of 9ft. 9in. at the height of 5ft. from the ground. Another is recorded, at Longleat in Wiltshire, as being 100 feet high. Returning to Rotherwas lawn, a *Quercus coccinea* or Scarlet Oak, with very large handsome leaves, which assume a deep red colour in the autumn, growing near the tulip tree, attains a height of 66ft. A *Crataegus latifolia*, grafted upon the common thorn, is situated between these two trees; and in the cluster are to be found a *Cupressus horizontalis*, *Cupressus sempervirens*, probably the oldest in this county; *Abies orientalis* from the Levant; *Picea Canadensis* or Hemlock Spruce, with its finely divided leaves like the *Conium maculatum* or Common hemlock, hence its name. This tree is the hemlock referred to in Longfellow's description of the forest trees in America. An *Abies Douglasii*, one of the finest specimens in the county, planted only twenty years ago, is growing vigorously; so also a *Cryptomeria Japonica*, of which tree Mr. Southall informed us that he had read of an avenue in Japan extending a length of 50 miles. The *Cryptomeria Japonica*, or Japan Cedar, is said to have been introduced to this country in 1843 by Capt. Sir Everard Home. This tree is often misnamed, being mistaken for a *Wellingtonia* or *Sequoia*. Looking westward, a Lombardy poplar, 104 feet high, towers above all, and a magnificent, lofty, and most regularly grown weeping ash, *Fraxinus pendula*, gives a large area of shade. An avenue of stately Irish juniper trees, consisting of seventeen trees on each side, conducts to the hedge on the south bank of the Wye. In the gravel walk on the eastern side a salix, a variety of the goat willow, and a *Crataegus crista galli* were observed. Mr. MacCabe conducted the visitors to a fine oak on the river bank below the garden, the tree nearest to the garden, to one of whose enormous boughs were formerly attached the scales for weighing coals, &c., when landed from the barges, when, only thirty years ago, the Wye was a navigable river so far as Hereford. This oak tree has a girth of 18 feet at a height of 5 feet above the ground; the loftiest oak, a little lower down the river, is 70 feet high. At the root of the first mentioned oak tree was a large *Polyporus fomentarius*. Mr. MacCabe was instructed how, in Northern Europe, this is cut in slices, dried, beaten

until it is soft, and Amadou or German tinder is thus prepared. In this form it has been much used in Continental hospitals for stopping bleeding. In our own country Amadou is to this day employed in dentistry. Formerly it used to be gathered and sold for use as excellent tinder.

The soil of Rotherwas is favourable to the growth of trees. The stump of the famous old elm, *Ulmus campestris*, growing in the park near the pool, is still to be seen. Its magnitude and beauty secured for it a notice with a woodcut in *Loudon's Arboretum Britannicum*, page 1394, vol. 3, from which the following extract is given:—"At Rotherwas the old tree, represented in figure 1239, to a scale of one inch to fifty feet, from a drawing sent to us by Mr. Hay Brown, gardener, Stoke Edith, near Ledbury." Mr. MacCabe exhibited the woodcut kindly sent to him by Mr. Robinson, of *The Garden*: from the scale accompanying the woodcut, the tree is calculated to have been 125 feet high. The tree was blown down in the year 1865, and when measured in its dried condition had a girth of 29½ feet, at a height of five feet from the ground.—See *Woolhope Transactions* for 1868, page 86.

Before leaving Rotherwas, the Roman Catholic Chapel attached to the mansion was visited, and the old clock in the tower, supposed to be 300 years old, was inspected. Rotherwas has been in the possession of the Bodenham family for three centuries: the present red brick mansion was built in 1731.

The Annual Meeting of the Club was held in the Woolhope Club Room, when the officers for the ensuing year were elected, with the Rev. Sir George H. Cornewall as President. After this came the Annual Dinner at the Green Dragon Hotel, Sir Herbert Croft presiding. Dr. Cooke, in returning thanks for the welcome to all visitors, replied in his usual happy straightforward manner. After congratulating the Rev. A. Ley upon the results of his continued work upon the Flora, and the Mosses of the county, Dr. Cooke, in true Woolhopean sympathy, rejoiced at the opportunity afforded him for a short gossip in the retrospect of what had been going on in the Fungus world, for, said he, since ministers meet annually at the Lord Mayor's dinner to review the situation, may we not follow them at a humble distance? Continuing, he said:

"The past year is noteworthy for bringing two big books on Fungi fairly to a close—*Saccardo's Sylloge*, and *Cooke's Illustrations*. The former is designed to collect together and reprint the characters of all known species of Fungi. The total included is 31,927. The largest number before enumerated was 11,983 (in 1862), whilst about 15 years ago I roughly estimated 20,000 as the number. There are many deductions to be made of species recorded two or three times over under different names, and mere varieties called species, besides many undoubtedly not Fungi at all, to say nothing of incomplete forms still kept up with complete forms of the same species, making two or three species instead of one. All this would reduce the number by 1,000 or 2,000. Still it is safe to say about 30,000. This may be termed the census of Fungi 'up to date.'

"This is an age of "fads," and we have many "fads" in connection with Fungi. Out of respect to the opinions of some good friends not far from me, I do not intend to trespass on debateable ground. There is one singular phase I must

allude to. It is the *Sclerotium* fad. A well-intentioned but weak young faddist has ventured to disparage the work of our good friend Phillips, and, although he does not know one *Peziza* from another, he considers himself justified and capable of criticising severely one who really does know, and I may say did know more about them than he does when the faddist's greatest ambition was to get his toe in his mouth. In return he is now anxious to put his toe in every one else's mouth. There is a crotchet that every species of *Polyactis* has its *Sclerotium*, and every such *Sclerotium* its *Peziza*. Hence Mr. Phillips's book is charged with being worse than useless because it does not associate some *Pezizæ* with every *Polyactis*.

"There is another grave charge which we old men prefer against the boys—perhaps with more rattle than brains. They like to tie a kettle to every dog's tail because of the noise it makes. In former times, science, Biology especially, was supposed to deal only with dry facts, but now it includes dreams and nightmares.

"Take example:—A Polyactis is formed on a lily. It is assumed (but with no positive evidence) that through a *Sclerotium* it has a *Peziza* as its full development, therefore it is not called *Polyactis liliicolum*, and described as a mould. That is too common-place and vulgar. Oh, dear no! It is *Peziza Spooneyanum*, of which only the conidia are known. I can fancy the contempt with which some of our progenitors of 50 years ago would have treated such a degradation of science to the glorification of dreams.

"Take another case:—A dreamy Teuton professor cultivated a big *Sclerotium* in a damp blanket, and caused it to produce a large species of *Lentinus*, and he gave it a name—No. 1.

"Another of these *Sclerotia*, the same, was sent to an establishment in this country which shall be nameless; it was cultivated in a hot house and produced a *Lentinus*. It was submitted to me for a new name; I did not give it, but called it by the old name of *Lentinus cyathus*, *B.* and *Br.* This was name No. 2.

"In the meanwhile a fine flourishing specimen of a *Lentinus* found its way, with Sclerotium attached, to a Botanical department, and forthwith was called *Lentinus scleroticolum*. This is name No. 3.

"All are the same, and there are three names to my knowledge for the same thing—a sacrifice of science to a fad; to a *Sclerotium* fad. "Each cat will mew, each dog will have its day."

"One of the silly seasons has set in for Fungi. The systematists are gibbeted as fools. The physiologists are kings. By-and-bye the scales will reverse again.

"Turn now to the other work, to which modesty forbids that I should devote more than a very few words. Eight volumes containing 1,200 coloured plates of gill-bearing fungi have now been issued in this foggy island. For the first time any number approaching it has ever been done in any country in the civilized world. The whole number of described species, all the world over, is but 4,600, and more than a quarter of these have been found and figured in Britain. I have found that the following is the number of species of Agarics figured in the six celebrated works on this subject:—

Sowerby	...	...	...	165 Agaricini
Hussey	...	...	...	80
Bolton	...	...	...	108
Bulliard	...	...	...	287
Krombholz	...	...	...	230
Fries ...	...	...	...	209
and ...	...	...	...	272
				1,351

"Or an aggregate of only 151 more, in all the six largest works previously published, which cost four times as much as the eight volumes containing 1,200 coloured plates.

"Moreover, in very many cases the same species is figured over again in several of the works, so that in all they do not contain a total of more than half as many species as this number of individuals represents."

On the conclusion of Dr. Cooke's address, the appreciation of the services he has rendered to the subject of Mycology was sufficiently manifested by the enthusiasm with which the announcement was received that in all probability the eighth and last volume of the work above referred to—"Illustrations of British Fungi," by M. C. Cooke, M.A., LL.D., A.L.S., &c., would be completed by the end of the present year.

The Rev. Canon Du Port then read a short paper "On the unexpected appearance of two species of Fungus in a field which was under regular cultivation four years ago." This occurrence, and the extensive area covered by the copious growth, were so remarkable as to leave in the hands of Canon du Port investigation amongst the oldest parishioners, &c., as to any tradition of this locality having at any time been the site of an ancient forest.

An adjournment was next made to the Woolhope Club Room, where the following papers were read:—"The Florula of the Doward Hills—Mosses," by the Rev. Augustin Ley, being a continuation of this subject by Mr. Barton M. Watkins in the *Woolhope Transactions*, 1881, pages 53 to 85; "Remarks on Teratology, with Examples," by the Rev. J. E. Vize; and an elaborate and very carefully prepared paper on "Oyster Culture," by Dr. A. J. H. Crespi, in which he passed in review a still more elaborate work of 800 pages 8vo., termed "Oysters and all about them," by J. R. Philpotts, L.R.C.P., and S., Ed., published by John Richardson and Co., Leicester and London.

On the following day, Friday, October 3rd, the party travelled in brakes to Stoke Edith Park, where they were met by the Rev. W. H. Lambert, the rector. The Church was visited; the nave and chancel are of Grecian simple architecture, and were opened in 1741; the tower, of more early date, having more pretensions to architectural taste. The earliest monument is in the chancel, to the memory of Mr. Paul Foley, Speaker of the House of Commons, who died in 1699. Mr. Paul Foley commenced the present mansion, the north front of which, with its large flight of steps and decoration of Corinthian pillars, forms an imposing appearance. Can anyone give any information where the excellent brickwork of

the north front and other parts were manufactured, or how it came into the county? Such brickwork is very rarely seen. It is of very superior description, well burnt, closely textured, finely faced, well squared, and the building is completed with a minimum use of mortar; it is such brickwork as is sometimes seen in Holland. A somewhat similar brickwork adorns the front of the Mansion House, in Widemarsh street, Hereford.

Leaving the Church, the party went through the deer park, crossing the hill by one of the three Cockshoots, so called from its being the opening in the woods where in earlier years it was customary to spread nets to catch woodcock, and in later years where the sportsman takes up his post on the look-out for the woodcock going in the evening to their feeding grounds on the lower ground. The majority of those who were in search of funguses remained on the Stoke Edith side of the hill, the remainder descended upon the south side of the hill by a grassy drive through the park to Devereux Park, of which the ancient history is not known. All that we can learn is that one branch of Lord Hereford's family formerly possessed property in the adjoining parish; there is a wood called the Chapel Wood, but no vestiges of any worked masonry have been found; there are three very ancient looking pools. The park is also interesting botanically. The Rev. Augustin *Ley* has for several years been trying to ascertain if Caraway was ever cultivated there, for, if not, it must be pronounced to be a true native—see *Flora of Herefordshire*, pages 147 and 525. On the lower ground, and on the left of the drive, before reaching the pools, a gracefully grown Wych Elm tree is met which has a girth of 18 feet at a height of 5 feet from the ground. A circuitous route was taken round the three pools, returning by Cockshute Cottage No. 1, to the summit of Seager Hill above Putley, whence, from the elevated summit of 830·8 feet above sea-level (the Cockshoot, near Perton, being 630·5, and St. Ethelbert's Camp 738·6 feet high), the panorama excited the admiration of all. Shortly after four o'clock the party assembled, as appointed, at Lugwardine Court, the residence of Sir Herbert Croft, where he exhibited some productions from Australia, and read a few "Australian Notes," after which the party returned to Hereford, and thence dispersed to their homes with the pleasant reflections of another happy week.

The following mycologists attended this meeting:—Dr. Cooke, Rev. Canon Du Port, Mr. Acton, Mr. Bucknall, Mr. William Phillips, Mr. H. T. Wharton, of Madresfield, Acol-road, West Hampstead, and Rev. J. E. Vize; and new visitors—Major-General Bland (retired), R.E., of Wellesbourne, Bideford; Surgeon-General William Pearl, of Stuston Lodge, Scole, Norfolk; and Mr. E. Pearl, of Fairoak, Sylvan-road, Upper Norwood.

The following members attended either at one or other of the meetings, or the Annual Dinner:—The President, Sir Herbert Croft, Revs. W. Bowell, Charles Burrough, William Elliot, J. E. Grasett, E. J. Holloway, W. H. Lambert, Augustin Ley, H. B. D. Marshall, M. G. Watkins, H. T. Williamson; Major Doughty, Captain de Winton, Captain E. A. Swainson; Dr. T. A. Chapman, Dr. A. J. H. Crespi, Dr. J. H. Wood; Messrs. T. B. Acton, R. W. Bond, James Davies, Gilbert Davies, M. J. Ellwood, Charles Fortey, E. H. Greenly, W. H. Harrison, C. G. Martin, O. Shellard, H. Southall, M. Burton Watkins, H. Vevers, H. C. Moore, Honorary Secretary, and Mr. James B. Pilley, Assistant Secretary.

FLORA OF HEREFORDSHIRE.

FUNGI.

Additions in 1890.

Agaricus (Mycena) acicula. *Fries.* Downton.
" (Pholiota) præcox. *Fr.* Stoke Edith.
" (Hebeloma) nauseosus. *Cooke.* Dinmore.
" (Naucoria) sobrius. *Fr.* Stoke Edith.
" (Galera) mniophilus. *Fr.* Stoke Edith.
" (Hypholoma) cæsus. *Fr.* Stoke Edith.
" (Psilocybe) sarcocephalus. *Fr.* Downton.
" (Psathyra) semivestitus. *B. & Br.* Dinmore, Downton.
" (Panæolus) retirugis. *B.* Dinmore.
" (Psathyrella) trepidus. *Fr.* Stoke Edith.
Russula lutea. *Fr.* Downton.
Corticium sambuci. *Fr.* Dinmore.
" epiphyllum. *Pers.* Downton.
Puccinia glechomatis. *D. Cand.*
" scorodoniæ. *Link.* Downton.
Morchella Smithiana. *Cooke.* Bridstow.
" semilibera. *Fr.* Dadnor.
Lachnella nivea (*Hedw.*) Downton.
Diaporthe inquilina (*Wallr.*) on Umbellifers. Downton.
Empusa muscæ (*Cohn.*) on flies. Stoke Edith.

CONTROVERTED AGARICS.

By Dr. M. C. Cooke.

The practical completion of the *Illustrations of British Fungi* affords me an opportunity and an excuse, for a few brief observations on some of the species which are open to discussion. It seems to me not of so much consequence whether any distinct form of Agaric should be called a species, or only a variety, as it is to have a definite name by which such a form, or variety, or species, can be distinguished, and a true and faithful figure to which reference can be made. Notwithstanding this, it cannot be an advantage to science that species should be called by names which assume that the plants represented are the same as those which have been described by older authors under such designations. It may be that I have not always been wholly free from error myself, but wherever such is shown to be the case, I am ready to retract, since I know that to "err is human," and during the course of this paper I shall not hesitate to express my doubts frankly, and give the benefit of the doubt to those who may have disputed my views.

It is not my intention, nevertheless, to give way recklessly on points which have given me much cause for consideration, and on which the evidence, as yet adduced, is insufficient to raise a doubt in my own mind. Such, for instance, is the case with *Tricholoma russula* and *Hygrophorus erubescens*, as well as *Russula delica* and *Lactarius exsuccus*. In both these cases, although prepared to treat with respect views opposed to my own, I am not convinced.

There is, however, a rather important instance in which I am inclined to modify considerably. In the *Scottish Naturalist*, July, 1890, the Rev. Dr. Keith writes of *Agaricus stores*, Fr. as follows—

"This fungus has got itself established in our books as a species which has been found both in England and Scotland; but though I have frequently met with the plant which has been going by this name among British mycologists, I have never been able to satisfy myself as to its identity with Fries' species. *Ag. stores* is recorded and described in three of Fries' works,—his "Epicrisis" (1836-38), his Monographia (1857), and "Hymenomycetes Europæi" (1874). In each of these it is expressly mentioned that he had found it only twice, in 1815 and 1833, and on both occasions on the same trunk. As regards his acquaintance with the species, therefore, all three works are of equal value, for he had never met with it after describing it in the "Epicrisis." Indeed the description in the "Hymenomycetes" is a verbatim translation of that in the "Epicrisis," so that I am inclined to regard the description in the "Monographia" as his latest independent account of the species. Now in that description it is expressly declared to be a solitary growing species, a feature which is emphasized by being printed in italics, and which is said to remove it far from other species otherwise approaching it closely. On the other hand, the fungus which has been passing among us as *Ag. stores* Fr. is a remarkably cespitose one, diverging in this respect very strikingly from the habit of the true plant. Stevenson in his *British Fungi* gives Fries' description of the species with

his usual accuracy, and mentions two habitats, Ascot, and Perth fungus show. I know nothing of the Ascot specimens, but those which occurred at Perth were growing in large clusters, and it was there I got, from a distinguished English mycologist, the name of *Ag. stores* Fr. for a fungus which I had previously taken for *Ag. lacrymabundus* Fr.. Cooke cuts the knot of the difficulty by calling it *Ag. stores* Fr. var. *cæspitosus* C. But let any one compare the figure which he so designates with that which he gives of *Ag. lacrymabundus* Fr., and, excepting the slight difference of colour, he will find little to distinguish them. The conclusion I am inclined to come to is that my original idea was correct, and that the fungus which has been taken for *Ag. stores* Fr. is only a form, and scarcely entitled to be called a variety, of *Ag. lacrymabundus* Fr."

Before making any observations on the foregoing I must testify my profound respect for the opinions of Dr. Keith on matters relating to the *Hymenomycetes*, my ready acknowledgment of his great experience in field work, and a full recognition of his careful and acute powers of observation. No opinion which I have heard on this vexed question has come to me with an equal degree of force, and I must acknowledge myself, if not entirely, yet to a very large extent, ready to accept his interpretation.

The first record of this name amongst British Fungi was by Berkeley and Broome in the *Annals of Natural History*, No. 1418, with the remark, "This curious species occurred last year at the base of different trees at Ascot, and at Coed Coch; and it has also been found by Mr. W. G. Smith, and was exhibited at South Kensington, October, 1873. It is considered very rare by Fries; but it is probably one of those species which are abundant in some one year, and are not found again for a generation." W. G. Smith figured his specimens in the *Journal of Botany*, Vol. xiv., plate 176, fig 4. There remains no doubt that the species seen by Berkeley, and found by Smith, were the same as that figured in *Illustrations of British Fungi*, plate 543, and, again the same as that alluded to by Dr. Keith as exhibited at Perth. Of the identity of all these there need be no question. Berkeley and Smith had the same plant in view, for both have indicated it to me as *Ag. stores* Fr., and gave me the first impression of the species.

In 1884 Mr. C. B. Plowright gave expression to his views on this species, in Grevillea, vol. xiii., p. 48, where he described it under the name of *Ag. hypoxanthus*, adding "This agaric has been regarded as *Ag. stores*, but incorrectly so. It is always cespitose, and has hitherto occurred either on rotten beech wood, or under beech trees." I was still under the impression that it was a cespitose condition of *Ag. stores* when it was figured as *Ag. stores var. cæspitosus* in *Illustrations of Fungi*, plate 543, and I was much influenced by the opinion of the Rev. J. Berkeley in its favour.

Upon careful re-consideration of the subject, I have come to the conclusion that we really know nothing of *Ag. stores* beyond the description of Fries. There is no figure of it in existence, as far as we know, and we have nothing to guide us but a strict adherence to the description given by Fries. The plant under consideration does not conform in all particulars to the description. It cannot be

the typical form, and it seems to me that I am not justified in insisting upon the retention of a variety, the type of which is comparatively unknown. I think that the points of divergence insisted upon are, its cospitose habit, moist viscid pileus, and hollow stem, and I doubt if the edges of the gills are albo-serrulate. I cannot recognise the habit of *Inocybe* (*habitus potius Inocybes*), therefore my inference is that it is safer to revert (at least *pro tem*) to the name *Agaricus hypoxanthus*, Plow, and dissever it entirely from *Ag. storea*.

One other question has been raised, and it is that which I do not at present see my way to accept, that this is a form of *Agaricus lacrymabundus*, Fr. I have not recognised the "weeping gills," and for the time being will pass it by as an "open question."

I must be permitted to relieve my mind a little in reference to three or four closely similar forms to each other which have hitherto borne distinctive names, but which I am beginning to think do not deserve that honour. This group includes, as we know them, *Agaricus* (*Nolanea*) *pisciodorus* Cesati (illustrat. 378, fig. A), *Ag.* (*Nolanea*) *piceus* Kalch (illustrat. 379, fig. A), *Ag.* (*Naucoria*) *cucumis* Pers. (illustrat. 452), and *Ag.* (*Nolanea*) *nigripes* Trog (illustrat. 1,170).

It is noteworthy that all these four species are characterised as having a strong odour as of putrid fish or cucumber. Perhaps it may be assumed that the odour is the same, whatever it may be said to resemble. In the next place three are referred to *Nolanea*, and one to *Naucoria*. I am not disposed to place much reliance upon the presence of one in *Naucoria* as evidence. It is not easy to detect amber-coloured spores from salmon-coloured spores, and as all have apparently elliptical smooth spores of nearly the same size, at least in three out of four, the size and form of spores will not help us, and I doubt much whether the *Ag. cucumis*, with which we are acquainted, may not be as much *Nolanea* as *Naucoria*. At any rate I should be quite prepared for such a revelation. Then, again, all of them have black, or nearly black, stems, not a common event with slender-stemmed Agarics. Say what we will, there is a suspiciously close alliance between all the species, and if we take the trouble to compare the respective diagnoses of all the four, we shall be no nearer the discovery of good marks of specific difference than by a comparison of the figures. If we strike out from all simultaneously the features in which they coincide, there will be very little left.

A. nigripes Trog. Fr. Hym. Eur., No. 752.

Pileus submembranaceous, conic then campanulate, obtuse, without striæ, covered with paler flocci, brown, stem fistulose, twisted, smooth, black; gills nearly free, thin, ventricose, yellow flesh colour. Smell as of putrid fish. Stem often bent, tough, four to five inches long. Pileus 1½in. broad. In swamps.

A. pisciodorus Cesati. Fr. Hym. Eur., No. 753.

Pileus submembranaceous, conic then campanulate, then convex, obsolotely umbonate, velvety and soft, fulvous cinnamon; stem subfistulose, tough, delicately pruinate, chestnut turning blackish, paler at the apex, rather velvety: gills slightly adnexed, gilvous then flesh colour, at length fulvous. Odour similar to *A. nigripes* but colour different. On chips and rotten leaves.—Spores ovoid-oblong.

A. piceus, Kalch. Fr. Hym. Eur. 761.

Pileus submembranaceous, conic then campanulate, papillate, without striæ, smooth, pitch colour, umber when dry; stem fistulose, rather tough, short, even, delicately pruinose, of the same colour; gills emarginate, with a decurrent tooth, ventricose, rather distant, white then flesh coloured. Odour of cucumber, or fish. In grassy places in moist woods.—Sp. 10-12 x 4.

Ag. cucumis, Pers. Fr. Hym. Eur. 949. Sacc. 3410.

Pileus rather fleshy, broadly campanulate, smooth, fuscous bay when moist, paler about the margin; stem thin, firm, smooth, fuscous turning black, thickened at the apex, hollow, pruinose; gills slightly adnexed, ventricose, palid then saffron yellow. Odour of cucumber. Pileus 1in. broad, but occurs smaller. Amongst chips.—Sp. 9-10 x 5-6.

The following is the condensed form which the descriptions would take if reduced to one species:—

Agaricus (*Nolanea*) *nigripes* (Trog).

Pileus submembranaceous, conic then campanulate, obtuse, without striæ, floccose or velvety, brown; stem fistulose, straight or flexuous, becoming black, smooth, sometimes pruinose and paler at the apex. Gills adnexed nearly free, thin, ventricose, gilvous then flesh colour, smell of putrid fish or cucumber.

(*a*) *typica*. Stem flexuous, wholly black, pileus clad with paler flocci. In swamps.

(*b*) *pisciodorus*. Stem straight, pruinose, paler at the apex, rather velvety. Gills becoming fulvous.—Spores ovoid-oblong. Pileus fulvous-cinnamon. On chips.

(*c*) *cucumis*. Stem straight, pruinose, firm, thickened above. Pileus smooth, fuscous bay when moist, paler at the margin. Gills pallid then saffron yellow.—Spores 9-10 x 5-6. On chips.

(*d*) *piceus*. Stem short, straight, thicker than in the type, pruinose. Pileus papillate, pitchy brown when moist, umber when dry (paler at the margin). Gills emarginate with a decurrent tooth, white then flesh colour. Spores 10-12 x 4. In moist grassy places.

It must be observed that the only one of these forms which departs from the type, in any feature which would warrant specific distinction, is the last, which is the only truly aberrant form, in virtue of the robust stem, *papillate pileus*, and emarginate gills.

If I might venture an opinion, based on the belief that *Ag. cucumis* is not truly a good *Naucoria*, but rather a *Nolanea*, I should suggest that *Agaricus nigripes*, *pisciodorus*, and *cucumis*, are varieties of one species, call it by whatever name you please, and that *Ag. piceus* has distinctive features which might warrant its retention as a fairly good species. At any rate it is an open question, which merits investigation in the light of these suggestions.

Another question of doubt often presents itself to my mind in connection with *Ag. (Clitocybe) odorus*. Fries maintains the *Ag. viridis* of Withering and Bolton's figures (tab. 12) as a distinct species under the name of *Ag. viridis*, but as far as British Fungi are concerned I feel satisfied that we have only the one species,

which is known to us as *Agaricus odorus*, and, if there is another species, which Fries himself had never seen, it is neither that of Withering nor Bolton, and should have no place in the British list, except as synonymous with *Agaricus odorus*. As far as France is concerned, Dr. Quelet does not recognise two species, and I am strongly of opinion that at least the two references to Withering and Bolton, under *Ag. viridis*, should be transferred to *Agaricus odorus*, to which in my opinion they alone belong.

As this communication will be interpreted in some sense as a confession of sin, a little justification of that view may be found perhaps in the admission that I feel very suspicious of having fallen into error with regard to *Ag. (Collybia) tuberosus* and *Ag. cirrhatus*. It is at least probable that the colour of tuber is only a question of age, and that what I have figured as two species, are really but one, and that one *Agaricus tuberosus*, whilst *Ag. cirrhatus* has not been figured at all. It may be that the pale tuber is characteristic of *Ag. tuberosus*, and that the black tuber belongs to *Ag. racemosus*. Since the conviction of some error has evaded me I have had no opportunity of collecting and examining specimens so as to arrive at a definite conclusion; under any circumstances it seems that no tuber really belongs to *Ag. cirrhatus*, for some weight must be given to the remark made by Fries under the latter species, in his *Monographia*, "Tuber radicale in hâc specie nunquam adest."

Moreover, in this place I cannot resist the impression, although I have endeavoured to view their differences impartially, that *Ag. (Clitopilus) orcella*, and *Ag. (Clitopilus) prunulus* have no just claims to specific distinction, I am well aware that our friend Dr. Bull had a strong opinion in favour of their being good species, but perhaps he only intended to express his own facility in distinguishing one form from another, and this would apply as well to mere varieties, as to definite species. It is not my intention to pronounce any dictum on what should be the limits of species or varieties, nor do I think it of so much consequence, although in this case I may be permitted to reserve a doubt, which I do not think is merely an individual opinion. I sought the most characteristic specimens for illustration, and yet I cannot recognise a sound specific difference.

Perhaps it would be considered rather heretical in me to doubt in the same manner *Ag.* (*Lepiota*) *procerus* and *Ag.* (*Lepiota*) *rachodes*, but the larger the number of specimens I examine the more are my doubts strengthened as to their specific differences.

I may observe, in reference to the *Illustrations* that plate 49 is liable to be misleading. *Ag.* (*Tricholoma*) *murinaceus* is there figured with white gills, but they were cinereous in my original drawing, and have been left white in printing. This was overlooked at the time, but it should be corrected. Again, plate 167, which represents *Ag.* (*Tricholoma*) *virgatus*, has been printed with the pileus so dark that it is scarce recognizable.

I might allude to *Ag. (Tricholoma) argyraceus*. I certainly do not retain the opinion that it is a variety of the very common *Agaricus terreus*. Indeed, I cannot refer it either to *Ag. scalpturatus*, and in my present frame of mind I would rather recognize it as a species separate from either, with its two varieties,

Ag. chrysites and *Ag. virescens*, both of which are figured in the *Illustrations*. I still think that *Ag. orirubens* is only a form of *Ag. terreus*, and possibly *Ag. atro-squamosus*, but of the latter I am by no means certain.

More important, perhaps, is the conclusion I am to announce of a search after *Ag. gangrenosus* Fr., and although I still consider it in some sense an open question, I cannot divest myself of the suspicion that we, in this island at any rate, have only *Ag. semitalis* to which all specimens and drawings of the supposed *Ag. gangrenosus* should be referred. A glance at the description as well as the figures of *Ag. semitalis* strongly suggest *Tricholoma*, and not *Collybia*, with the gills sinuate or emarginate. Possibly, also, *Ag. (Tr.) immundus* is only a pale form of *Ag. semitalis*. All of them agree in turning black when bruised, or old, and all of them should of right be placed in the same section of *Tricholoma*. Whatever we may say, the subject is at least worthy of further investigation.

Beyond dispute, I should think, since Fries has published his figures of *Hygrophorus lactus* in his *Icones*, no one will contend that *Hygr. Houghtoni* can be maintained as distinct. I must profess also great scepticism with regard to *Bolbitius Boltoni*, and *Bolbitius vitellinus*, at least if the right species have been found and figured in the *Illustrations*.

Of course there are causes always at work in such cases which render some of the plates in the *Illustrations* far more satisfactory than others. In the first volume, for instance, before the lithographers became accustomed to that particular kind of work, there was a deficiency in the mechanical work of printing which subsequently disappeared. The eye does not become accustomed to the nice distinctions in the tone of colour without experience, and there were difficulties at first in getting softness, and preventing exaggeration of the bright tints. These difficulties disappeared entirely by the time we arrived at *Cortinarius*, which is about the best period artistically of the work. Be that as it may, some plates will always be open to dissatisfaction, whilst others must frankly be conceded to be the best illustrations of given species ever produced in any country. The reproductions were also made from the drawings of various people beside myself, so that in some instances there is a crudeness and stiffness in drawing—and in this respect there is some variety. Some artists never seem to acquire the power of giving character to their sketches. They may know well enough what they should be, but fail to express it. All these things taken into account, the failures are not numerous. All positive errors it has been my ambition to correct, as soon as possible, and I fancy but few are left.

It must be remembered, too, that the same species will be subject to variation, and though some of the figures are not truly typical, they, nevertheless, represent our insular forms. There is an example of this in *Ag.* (*Tricholoma*) *portentosus*; the plate 54 has been called in question by some continental mycologists, but early this present year, I found at Kew, the first time for many years, the exact form which was figured, and submitted it to one or two of my mycological friends with great satisfaction.

I have long felt that plate 27 was a poor representation of *Ag.* (*Lepiota*) *hispidus* Lasch, even if it deserved to be so called, but the true species was lately

found at Carlisle, and is now being printed for the supplement. It has been compared with a drawing made by the illustrious Fries, and no doubt can remain of its accuracy.

Some mycologists contend that *Ag.* (*Lepiota*) Friesii is only a variety of *Ag.* (*Lepiota*) *acute-squamosus*, but I think that a comparison of the two figures will suffice to carry conviction that they should be maintained as distinct. Again, the identity of *Ag.* (*Lepiota*) *meleagris* Sow, and *Ag.* (*Lepiota*) *Badhami* Berk, it would be folly to insist upon.

The species figured on plate 33 as *Ag.* (*Armillaria*) *aurantius* was soon found to be wrong, and it was called subsequently *Ag. robustus*, but my present opinion is in favour of *Ag. caligatus*, as figured by Barla, rather than *Ag. robustus*. In passing, it may be observed that the *pileus* in plate 76 (*Agaricus acerbus*) is much too dark, and rufous. It must not be forgotten that plate 60 is not *Ag. imbricatus*, which name is attached to it, but *Ag. vaccinus*.

A worthy friend, and fellow-member of this Club, is at issue with me respecting *Ag.* (*Clito*) *giganteus* and *Ag.* (*Clito*) *maximus*. I will not enter here upon the discussion, and only repeat my conviction that the two plates are accurate in their representation of the two species; therefore I have no doubt, in the course of time, my antagonist will succumb. If he is one of the first to raise doubts, and pertinacious in insisting upon them, he is also most magnanimous in renouncing them, as soon as he discovers that they cannot be maintained.

And here I may venture a doubt whether *Ag.* (*Clito*) *inversus*, *Ag.* (*Clito*) *flaccidus*, and *Ag.* (*Clito*) *lobatus* are not all forms of one species.

In the next place, if the figure of *Ag.* (*Clito*) *senilis*, from our late friend, M. J. Berkeley, whose memory we all revere (pl. 110), can be referred to that species at all, it must be a very remote form. It may be of interest to state that Berkeley has more than once expressed his conviction to me, that of all the subgenera of *Agaricus* he considered *Clitocybe* as the most puzzling and difficult. Again I must venture to dissent from the "Father of English Mycology" in that I have grave doubts whether his figures of *Ag.* (*Collybia*) *acervatus* (pl. 267) represent the true species.

As to *Ag.* (*Collybia*) *balaninus* B. and *Marasmius erythropus* Fr., I must continue to hold to the opinion that they are by no means identical if you obtain specimens which are authentic and compare them. The *Ag.* (*Mycena*) *excisus* figured on plate 148 is a fine species and an interesting one, but I could not insist upon its being referred to *Ag. excisus* of Lasch, perhaps it is a new and distinct species.

Ag. (*Pleurotus*) *pantoleucus* (pl. 179) must, I think, be wrong in colour, but it is a faithful copy.

All I can say of *Ag.* (*Pleurotus*) *ostreatus* is that I regard it as a most variable species, and I hardly dare venture to name all the so-called species which I should characterize as some of its varieties.

Passing now from the white-spored to the pink-spored species, my first doubt is of *Ag. gloiocephalus* and *Ag. speciosus*. Is there any sound specific difference? There seems to be a much more feasible distinction between the two

forms of *Ag. phlebophorus* on pl. 422, and I am inclined to give way to our Gallic neighbours who regard them as distinct species. I have already remarked elsewhere my conviction that *Ag.* (*Clitopilus*) *carneoalbus* of Withering is not the species of Fries and the continental mycologists (pl. 324).

Agaricus (*Pholiota*) *erebius* Fr. will, I presume, be accepted as including also *Ag.* (*Armillaria*) *denigratus* and *Ag. Levéilleanus* D. & M. Amongst other species of *Pholiota* I can only allude to *Ag. comosus*, *Ag. heteroclitus* and *Ag. destruens*, expressing my regret that I cannot find good specific differences between them. I shall purposely pass over *Hebeloma* and *Inocybe* without remark; to commence would be fatal, as the end would not be within an appreciable distance.

Leaving to private opinion, as an open question, the identity of *Ag.* (*Flammula*) *inopus* with some of the yellow species of *Hypholoma*, there is but little in *Flammula* which calls for remark. Indeed it is time that these observations came to a close. Something has already been said of *Hypholoma*, and more might be said, but for the present we will rest content with the end of the fourth volume of *Illustrations*, and venture no further. To the uninitiated such a paper as this will be sufficiently uninteresting and wearisome, even if not prolonged to an inordinate extent.

Having had the effrontery to issue some 1,200 plates of these gill-bearing fungi, which has now been the persistent work of some years, with only about 12, or not more than 24 more to come, I may be excused from a desire to hold conference with the Woolhope Club on some "controverted Agarics," and unbosom some of my doubts. Some of us old friends can hardly be expected to meet many times more, let us hope that we have each and all done something for the benefit of our successors, and that we shall leave the study of our favourite little corner in the science of botany better than we found it. Personally, I am thankful for all the encouragement and assistance which has been freely given to me by members of this Club in a long and anxious task. No one could have had more loyal and disinterested help. Had it not been for the Woolhope Club, and especially one of its most amiable and active members, whose loss we cannot cease to deplore, the "*Illustrations*" would never have been commenced, or brought so near to a successful close.

Upon the conclusion of the reading of this paper, the Rev. Canon Du Port said:– Gentlemen,—Dr. Cooke has just told us that it was at the suggestion of some members of the Woolhope Club, and especially of him, whose memory, not only in this house, but also wherever the name of Woolhope is named, is still fresh and will always be respected and loved, that he was induced to undertake the publication of his *Illustrations of British Fungi*. Not only every member of the Woolhope Club, but every mycologist also, is under the deepest obligation to Dr. Cooke for the production of this unprecedented work—the illustration not of a few pet species found by himself in all stages of growth, and hence easily determined, but the illustration of every species named in the author's handbook and "*quarumcunque aliarum*." The author has to-night

confessed that there are a few mistakes in the 1,200 plates already published; and I believe that there are a few more that he has not yet discovered. How could it be otherwise? But this does not in any way detract from the credit due to the author for boldness, accuracy, and industry. Did ever anybody see a first, or even a second or a third edition of a book on Phanerogamous Botany without a very large number of mistakes and misprints? How much more easily will errors creep in, with how much greater difficulty will they be discovered, in a work on Cryptograms. The proofs of Dr. Cooke's *Illustrations* could not be corrected by looking into a dictionary for the spelling of a word, or into a herbarium for a specimen of a plant; a delicate tint not rendered quite correctly here, the omission of a letter there, a name wholly misplaced, and the fact overlooked. How could all these be avoided? Besides all this liability to error due to the mere production of the work, there are errors that have crept into our nomenclature, and that are still probably in some cases being handed down by tradition, owing to the method in which names are sometimes assigned to specimens. Fungi are for the most part putrescent in a very rapid manner; they are seldom in a condition to be profitably studied some weeks after they have been gathered, at one's leisure, with description and plates at one's side. There were no figures in existence of a great many before Dr. Cooke's, but they had often to be named by some master in the hunting field itself, and often amidst such a list of freshly-gathered specimens that is not to be wondered at if names were sometimes wrongly given; there was no time to discuss the specimen, and an erroneous tradition might possibly be handed down. The king of mycologists, Elias Fries himself, once misled the whole Woolhope Club, by writing down, through a mere *lapsus calami*, the word *sapinus* for *triumphans*. As soon as I had mastered the A B C of the subject, I could not satisfy myself by resting so fully on tradition and I am afraid at one time I earned a bad reputation as an incorrigible sceptic. The rectification of some names such as that of *Agaricus Stoves*, to which Dr. Cooke has alluded this evening, was in some measure due to this sceptical spirit; so perhaps I the more readily render the expression of my unbounded admiration of Dr. Cooke's stupendous work and well-merited success, and foretell the higher honour still which all noble minds will offer to him because of his generous boldness in confessing thus publicly to the few errors to be found in his work.

TERATOLOGY.

By the Rev. J. E. Vize, M.A., F.R.M.S.

Teratology is the science of monstrosities—of abnormal growths, whether in animal or vegetable life. Looking at man as an animal, we at once detect instances of human teratology in the club foot, hump back, squinting eyes, and a variety of shapes which amount to distortions. We leave man and animals out of the question on the present occasion, and go to vegetable teratology. We shall find amongst plants an enormous amount of malformation, so much so that to anyone who has not had his eyes open to the fact there will be found examples beyond idea. Some of these examples will, we hope, prove interesting. At all events, the searching for them in our gardens, or rambles in the woods and wayssides, may beguile many a walk, and charm it with notions, which, to those who do not appreciate study by the roadside, must be somewhat heavy.

It may be said, why study them? They do not appear fascinating from their title. We can do without them. Just so. But there are minds in men which are not satisfied with letting everything alone in blissful ignorance. They find food for the mind in unusual spots of exploration. We say, if you want to be happy and useful never keep in one groove. Try something outside the beaten path of the mill horse.

It may be asked, how do these abnormal forms occur? What causes them? There may be several reasons given. Insects may damage a young plant to a slight extent, and so cause a deviation from the ordinary direct course. Or again, a luxuriant growth may produce a monstrous development. This we can readily see. Manure your soil too highly, and you at once bring forth an unnatural state of things, the seed feels it, the plant shows it still more. The reverse may occur. Through poverty of surroundings a vegetable may become so enfeebled that it is only a puny child of its parent. Indeed, a host of events may happen to prevent an average growth, and bring about an abnormal one.

Transportation of plants from one country to another must have the effect of making them prolific or depauperated. Flowers from Siberia would fare badly in the temperate zone, still worse in hot climates. Very warm regions, Central Africa to wit, could not send us vegetation which would thrive well here. No.

Again, the changes from moisture to dryness, and the opposite, must alter plants immensely. Go to Kew Gardens; and with all the advantages of artificial plants immensely. Go to Kew Gardens; and with all the advantages of artificial dampness, with all justifiable attempts to make plants feel that they are in a natural humidity and temperature, you cannot really succeed. The tree ferns of Kew cannot match the tree ferns of New Zealand. The fir trees are not the fir trees of foreign places, where they are indigenous. They are representations truly enough, but not up to the standard of excellency obtained abroad.

Man has a good deal for which to account, and also for which to take credit to himself, in his treatment of things. He can change them considerably for good or the reverse.

Whilst on this subject, let me say I could not help noticing to myself, whilst thinking about our subject of teratology, that it is a great wonder so many vegetables retain so similar an appearance as they do. In the great multitude of plants of the average type we get a likeness running through them all. Why are they not more unlike each other than they are? A little thing would do this. Take for example any plant you like. Let an atom of foreign matter have introduced itself in the natural course of things, or in an artificial way, what distortion it might produce. Let us suppose an atom of grit to have got into the beautiful spiral vessels, what room at once there would be for distortion. The place might become inflamed, and so produce a knot, or let some foreign substance have reached the head of the plant before any perceptible sensation was made. The result might be distortion, it might be hydra-headed, like the Cockscomb flower (*Celosia*), or twisted considerably from its normal shape.

Fasciation or clubbing occurs occasionally in plants. It is that state in which some parts blend together instead of keeping separate. The first instance I ever remember to have noticed was one in which the branches of a *Cotoneaster* had become so firmly united with the main trunk of the tree as to form one dense and compact, but flattened, mass.

The common Artichoke of our gardens (*Helianthus tuberosus*) is liable to this state of clubbing. One case happened in my garden at home. Instead of the round stem, which would probably be less than an inch in diameter, the union of stem and branches had become so firm that whilst you could easily see where the junctions had taken place, yet they were inseparable, and instead of retaining their round shape they had become flat and wide, somewhat resembling three of our fingers side by side. Their width was from 2½ to 3 inches. The union of stem and branches was more than a yard in height, the top being very much clubbed.

The gnarls and knots in wood as seen in walking-stalks of an eccentric kind are instances of teratology. It is extraordinary what varied shapes may be recognised by a practised eye, or by the ingenuity of anyone who has a gift for finding resemblances in this way. You may turn these knots into birds, beasts, fishes, reptiles, &c. There was a man, recently dead, who had a peculiar talent in this way. In walking along the road he would detect at a glance certain pieces of gnarled wood, and find a likeness in them to animals, and, by securing them, cut them into what they resembled. Of course, in most cases, they were caricatures, still they conveyed to the mind of a stranger what they were intended to be like. His rooms were, I am told, a museum of eccentricities. Elephants, snakes, lizards, toads, et hoc genus omne, were there. He was as rough in manners as need be, and as singular in speech as he was talented in his own peculiar way of cutting creatures from the pieces of wood he found. We generally believe that Nature in her work far surpasses art, and undoubtedly we are right. This man at all events on one occasion thought differently. Referring to one of his specimens which had been rough in the original piece of wood, he called it Nature, and then alluding to his workmanship, and calling it Art, he said, "That formerly was natur and art combined; natur fails, but art triumps." I should like to have seen

his museum, but fear it has no existence now.* It seems a pity that such original work, and work, too, so much out of the ordinary way, should live a man's life and cease to exist when he dies. Men with a special talent of this kind are not as a rule appreciated. Perhaps they are specimens of teratology themselves.

The Garden Scabious (*Scabiosa atro-purpurea*) supplied me with several specimens of unusual growth at the end of August and the beginning of the following month of this year. There were several plants growing in my garden, but one and one only of them had eccentric flower heads, all of which seemed to be more or less affected. The others were all right, and followed the normal form of blossom. The peculiarity in these malshaped flowers consisted in the fact that instead of the flower being regular, the head of the stem of it elongated itself, and so grew beyond the top of the blossom. Instances of the kind are no doubt very occasionally to be found.

It will be interesting to reserve some of the seeds of this plant, and sow them so as to ascertain whether their successor will tend to perpetuate the variety. Not that the process will continue long. It is not likely it will. The plant on which these abnormal flowers came was a very vigorous and healthy one. Perhaps three quarters of the Scabious adopted the general flower head, the other one-fourth of it was affected with heads, as shown in the specimens I here exhibit to you. In some cases the green forms seemed evidently to be flowers altered in growth; in others they were elongated into branches.

I found some clover with the heads of the same divided at the top. Many of the plants were affected similarly more or less, but not all of them. This variety of sport must be very common, I apprehend, because after discovering a few specimens on the railway bank at home one day I found numbers the following day on my vicarage lawn and in the churchyard. The thickened heads of clover form a great contrast to the conical shape of the ordinary plant, and so are easily detected.

I have a recollection as a schoolboy of seeing the Sunflower similarly affected as the clover just named. The seeds and seed cases of plants furnish some interesting diversions of form from the usual type. Acorns supply double fructification within one shell. Plums will do the same. Nuts, both hazel and filbert also. They give sometimes three formations. These eccentricities are not very difficult to meet with in the neighbourhood where I live because of the superstitious idea that it is unlucky to break them if they have more kernels than one. The notion seems very singular and must be deeply seated, because one would have thought a boy with a nut would not be in the least particular as to its shape. He would care more for the enjoyment of eating it than anything else. A curb can be put on a boy's appetite you see merely because of a fanciful idea which has no existence in reality.

In a cider country like Herefordshire there must occur to the minds of some of us instances in which monstrous forms of apples have been produced on the

*On the authority of a resident, this museum was at Stratford-on-Avon, its proprietor was Henry Jones, who called it his "Phusiglyptic" museum, and it has ceased to exist since the death, a few years ago, of its projector.—Ed.

trees. I rather thought some might have been figured in *The Pomona*, and fancied I recollected having seen some, but they are not there. Nor is there any reason that they should be. The object of the book is not to show defects, but standards of excellence.

Leaves may be liable to sports. The common Red Clover of our fields has supplied me with several specimens of unusual growth. We all know that Clover generally has three leaves on the one stalk; I have found many cases of four instead of three; also of five; these, however, are rarer, whilst rarest of all is the six-leaved form.

I have not yet discovered a Strawberry leaf of any very eccentric shape, but am convinced that a search over a wider range of plants than are at my command would give parallel instances to the above-named Clover.

In Mosses there is a tendency to sport in the production of fruit and fruit vessels. Hofmeister quotes some instances from Gumbel (Hofmeister, p. 181). He states that two capsules were found on one stalk of *Mnium serratum*; also two capsules upon one apophysis in *Bryum argenteum* and *Splachnum vasculosum*, and suggests "the possibility of a bifurcation of the growing upper end of the fruit rudiment." I would in all humility venture to think it was not the fruit rudiment, but a cause farther up towards the fructification itself, that created the fork in the stalk.

Then again, *Polytrichum juniperinum* has supplied two fruits and two fruit stalks underneath one common *Calyptra*, which seems to indicate the occurrence in one central cell of the mass having two central germinal vesicles without the one and same fruit vessel. *Hypnum lutescens* has supplied an amalgamation of two capsules, each having a peristome, or fringed mouthpiece.

With regard to ferns, the departures from the standard shape of them are indeed enormous. Let anyone have collected them with a view to varieties, and he will very soon find that he has more than he expected. Let him turn to Mr. Lowe's work on ferns, and see the hundreds of them classified there. Well for those who did their collecting years ago, before the ruthless murderers of ferns exterminated them! We want a Sherborne Society indeed. We want men's steps to be turned from uprooting our flowers, primroses to wit, as well as ferns, into useful citizenship. Many of these destroyers of plants who rove about the country to sell varieties are too lazy to do an honest day's work. Idleness suits them best. If people would not encourage these traffickers in vegetation by buying their plants, they would not get them for sale. The mischief is just as great with the purchaser as with the seller. How this is to be stopped is another thing. The fault continues, and is likely to do. Let us return to our subject. Mr. Lowe gives *Blechnum boreale*, *Polypodium vulgare*, *Aspidium filix mas*, *Lastrea filix fœmina* as having several hundreds of varieties between them.

Is not such a list enough to frighten all the botanical zeal out of anyone beginning to study ferns? I think so. Some one said not long ago "She was very glad to be old enough to have lived before competitive examinations were fashionable; she should have gone mad." The competition amongst botanists to make such hair-splitting for varieties that has gone on is maddening. A man

with an extremely crooked nose is a man for all that. If sub-division should ever be pursued "hot and strong" for the human being, that crooked-nosed man would be variety *curve-rostrum*. Oh, fancy to what indignities we poor creatures should have to submit. May the day of such degradation be far off.

In looking through my herbarium, there are certainly some very singular forms assumed by many of the species. I remember finding a very crested head of *Blechnum boreale* on the Sugar Loaf Mountain, Co. Wicklow. The same county at the Powerscourt Waterfall and the Dargle supplied some wonderful shapes of *Polypodium vulgare*. The rare *Lastrea rigida*, three plants of which I found at the Hampton Rocks, in Bath, had one frond very much forked towards the end of its pinnæ. I presume this arose from the luxuriant spot in which it lived. Up to that time it had never been recorded as living so far south, which may account for its freak.

Then, again, *Polypodium pheopteris* gives an instance of a splendid forked pinna on a very long frond.

Ophioglossum vulgare has a forked tongue. That some of these freaks of nature are tolerably permanent may, I suppose, be proved by the great number there are in cultivation. To visit London and see the quantities of tasselated *Pteris serrulata* in private houses on the balconies, as well as sold in the streets, would guarantee that the form is not likely to become extinct. It can be produced too easily for that. Ferns seem unusually capable of sporting themselves. Their gracefulness is not diminished at all by it.

I have ventured to speak a little against the ruthless destruction of plants. All men are not to be classed as wilful uprooters of plants. There is a beautiful walk in one of our most beautiful cities. It has a carriage drive for the centre, a gravel path on one side for foot-passengers on which to walk; the other side, instead of a pathway, has a quickly-running rivulet backed by a stone wall. On this wall I found a most extraordinary form of the common Hartstongue fern. Where the ligulate shape of the frond, generally speaking, would have ended on both sides at about equal distances from the mid-rib, a vein interfered. Beyond this vein on both sides a fresh lot of sori grew, not necessarily, although occasionally, continuous with the first sets. It is amongst the most extraordinary things I ever saw amongst ferns. There were only a few specimens. I took just enough for myself, and communicated the fact to a friend who had often botanised with me, and passed the very spot. "Ah," he said, "so you have found them. I took downright good care whenever you were walking with me at that place, to divert your attention from that side of the road, and bring you to the other." My friend, who by profession was a surgeon, certainly did not take unusual things for extermination's sake, in that instance. Nor, may I add, do I think any true botanists, as opposed to dealers for money, do so. They may take sufficient for their needs, and there their capture ends.

Now in collecting fungi, as contrasted with ferns, you cannot well exterminate them. Ferns you may, not fungi. Fungi are many of them utterly microscopical, whilst the larger sorts are so fleshy that they would soon deliquesce if you took them.

Let us turn our attention to teratology in fungi, for it would be unseemly for true Woolhopeans not to have their minds directed to that branch of botany if possible. Here I find that the ground has been so well trodden, that there remains but little for me to do. Amongst the larger kinds, in your *Transactions* for 1881-82, at page 103, our friend Mr. Phillips gives us a paper on "Monstrosities in Fungi," added to which is a plate figured by himself of some 28 eccentricities. By this means we get at one view some most extraordinary freaks of fungi. To look at them is enough. They seem to be capable of existing in any way except the normal one. They are kicking up behind and before. They seem to live quite composedly with their heels high in the air, or at any angle on which fortune has favoured their growth, and to start their life from the pileus of one of their own species. The most remarkable of all the plants figured seems to me to be No. 28, on the plate where we have the common mushroom (*Ag. campestris*) hoisted on the pileus of a plant in its usual position of growth, but the strangest thing of all is that this abnormal growth has two pilei, with one stem common to both, and this one stem has only one veil, or rather the remains of one veil, for both plants. One would think that sporting to this excess could scarcely be exceeded.

Whilst speaking of fungi, I am able to recall some decided cases of teratology amongst the microscopical forms. To classify the occurrence of 16 sporidia within the asceus of *Sphæria herbarium* (Pers.) would perhaps be admitted, as it generally has only eight, but *Sphæria herbarium* never confines itself to any undeviating course of conduct; it is apt to take freaks.

The singularly divided spores of *Puccinia conii* (Fckl.) as recorded by me in your *Transactions* for 1877, p. 58, added to those given by Mr. Plowright in his *British Uredineæ and Ustilagineæ*, in which the separation of *Puc. bullata*, as found by Professor Trail, is recorded, and of *Puc. Iychnidearum* by the Rev. Dr. Keith, as well as the specimen on *Lolium perenne* by Mr. Plowright, and *Puc. betonicæ* by Mr. Grove, all prove the sporting possibility of these minute forms.

Then again, I had a slide of *Triphragmium ulmariæ* containing uniseptate spores, also triseptate and quadriseptate spores. There is one curved spore which is a great contrast to all the others. They are straight, this one is extraordinarily bent.

These few instances are enough to show that the microscopical forms of minute fungi vary immensely, and they are enough to lead us to the conclusion, very fairly, I think, that the eccentricities of these small forms vie with the larger ones, and are just as liable to change shape, colour, &c. The little ones are just as peculiar as their bigger specimens.

Should any of you who are not Woolhopeans, or any who are not members of our Club, now or hereafter meet with monstrous or abnormal forms of growth in vegetable life, I do hope you will not think it will be otherwise than a pleasure to me to receive them at my home, Forden Vicarage, near Welshpool.

The eccentricities are not very difficult to meet with. They need searching if you would be really and truly successful, but are very often casually met with.

To attempt to give a list of them would be too great an undertaking. In broad terms, however, flowers, leaves, stalks, stone and fleshy fruits, seeds, may yield them, so would roots and rootlets, but they are underground.

To bring the subject of teratology to a close, let us inquire of what good is the study of it?

To the minds of many persons this pursuit takes us back to former ages. We can go to geology and no doubt, not only find there forms corresponding to our present abnormal shapes, but detect also a state of things to which our flowers, shrubs, and trees revert. Some of the instances which I have named to you are considered to be descendants of an earlier general state of things. The flowers of the Scabious, for instance, are said to be only reversions to things which occurred in former conditions.

In other words, there is an occasional reproduction of vegetable life of ancient ages in our own days, thus connecting together the distant periods. Many of these eccentric shapes now were therefore the rule ages since. Our ordinary forms have evolved from what are now somewhat extraordinary to us when we meet with them.

To inquire into these things, then, nay more, to investigate them, is of use to us. Evolution is a theory we must face more and more as we live. It is too prominent for us to put on one side. Nor need we do so—quite the contrary. The terrors of it are subsiding. It will find its place, not by being shunned and hooted at, but by quietly being faced by nature's facts and the truths of science. I, for one, do not dread it. Before many generations pass—not, I expect, in our own day—but by-and-bye, it will be a hand-maid where it was expected only a few years ago to have been a giant to crush out godliness itself.

Let us take another advantage to be gained by studying the freaks of nature. They show that in most unlikely spots we may come upon monstrosities. Go and search, as I have done, for a certain thing on which you expect to find an eccentric form. You may get your plant a thousand times repeated, repeated indeed until you well might give up in despair.

Go on; success may be yours. You may find what you want. Is there no room for patience and perseverance here? Yes, both will be rewarded. You will value your discovery all the more; the fact of your having found it will be more deeply pressed on you by far than if you gained your object, as it were, by magic. What botanist is there, or scientist of any sort, who cannot associate old and pleasing ideas with what he formerly took pains, toil, and trouble to procure? Let us add patience and perseverance then to the benefits of study. They are virtues, not for ourselves only, but for the good of our neighbours too.

THE UNEXPECTED APPEARANCE OF TWO SPECIES OF FUNGUS IN A FIELD QUITE RECENTLY UNDER CULTIVATION.

By the Rev. Canon Du Port.

The great dearth of fungi last year, when even the prolific slopes of Downton Castle scarcely produced more specimens than the very high road itself, will not be readily forgotten by the mycologists of Hereford. Norfolk was, if possible, more barren still, but on the 16th October a very heavy rainfall, in many places considerably exceeding an inch, softened the ground and probably stimulated the growth of those fungi whose mycelium had not withered. Two days after this rainfall, my neighbour, Mr. E. R. M. Pratt, of Ryston Hall, called to tell me of what he described as the most extraordinary show of mushrooms he had ever seen, and when I saw it I could only re-echo his words. What seemed to me more extraordinary still was that these fungi were growing among very young willows planted in a portion of a field which four years before was being cultivated under the regular rotation of agricultural crops. When the last crop of wheat off this field had been harvested, Mr. Pratt, having determined to turn the field into a nursery of timber for his estate, had it ploughed very deeply; then in the spring it was dug over again, and strips, about ten yards wide, were planted with cuttings of willows, young plants of oak, *Abies Douglasii*, black spruce, *Pinus Cembra*, and larch. On the occasion of my visit on October 18th, the strip planted with willows was so completely covered with a whitish fungus that one crushed three or four every time one set one's foot on the ground. These were of one and only one species, covered with gluten as copiously as *Cortinarius mucifluus*, the gills distilling moisture freely, the stem scaly from top to bottom, but more thickly so at the top; the colour and appearance of the pileus just that of *Agaricus Hebeloma crustuliniformis*, but the gills half an inch or more broad; and the smell very faint and rather sweet. On comparing my plant with Fries' description of *Ag. crustuliniformis*, I was much puzzled by his description of the gills as "*angustatæ 1 lin. latæ et lineares*" and of the smell as "*ingratus raphanoideus*," so I turned to *Ag. Hebeloma glutinosus*, and *Ag. Flammula lentus*, and *gummosus*. There were serious points of difference from all these, so I sent off a box to Dr. Cooke, and the next day, having to pass through Lynn, I took several to Mr. Plowright, in whose library after some search we found a figure of Persoon's (I think) representing *Ag. crustuliniformis* with gills quite as broad as those in my specimens. I was much confirmed in my first impressions as to *Ag. crustuliniformis*, and Mr. Plowright had no doubt about the determination. A few days after I gathered some fresh specimens, and sent one box to Mr. Phillips, one to Mr. Bucknall, and one to Monsieur Boudier at Montmorency. All of these pronounced in favour of *Ag. crustuliniformis*, and the latter added that he had recognised the peculiar smell of radish, and had also previously found specimens with very broad gills.

At this time there was not another kind of fungus to be seen in the whole field. Three days later the bed of *Abies Douglasii* was nearly as full of *Ag. Hebeloma mesophæus* as the willow bed had been of the other fungus, while a few of each kind were to be found among the oaks.

The question to which I would invite the attention of the distinguished mycologists here present is, whence came this sudden development of two distinct species in land which had very lately been under regular cultivation? I cannot learn from any of the labourers on the estate that they had ever seen "toadscaps," as we call them in Norfolk, growing near the willows, two miles off, from which the cuttings had been taken, though they had often seen some big ones growing out of the pollard tops of the willows. The most firmly convinced heterœcismist will hardly claim this appearance as an illustration of his theory. But again, I ask, whence came they? and further, whence came the *Ag. mesophæus* among the firs? and why was each species confined to the bed of its favourite host? A plantation of less than fifty years' growth is a place which most of us would carefully avoid if we were in search of fungi, and here was a field, barely emancipated from the plough, all of a sudden converted into a very garden of fungi.

With reference to the Rev. Canon Du Port's paper; some members suggested that it would be advisable to discover whether a wood had covered this site in olden times. The Rev. Canon has received the information from Mr. Pratt that the locality is "described in one of his old maps as cultivated land in 1635."

ON THE APPEARANCE OF A RED SCUM ON A SHEET OF WATER AT LLANDRINDOD.

THE Rev. W. H. Purchas, on a visit to Llandrindod in the month of August, had his attention attracted to a scarlet film on the surface of one of the pools of water there. He reports that his interest was first aroused by observing it from a distance, and on approaching the lake, he found that it extended for several yards from the bank, and for perhaps a distance of one hundred yards along the side of the lake. It reminded him of a highly amusing account of a "bloody pond" at Garendon, in Leicestershire, which is to be found in Potter's *History of Charnwood Forest* (London, 1842, Hamilton, Adams & Co.), being an extract from a work printed in London by J. H., 1645:—"The most strange and wonderful apparition of blood in a pool at Garraton,* in Leicestershire, which continued for the space of four days, the redness of the colour for the space of those four days increasing higher and higher, to the infinite amazement of many hundreds of beholders of all degrees and conditions, who have dipped their handkerchiefs in this bloody pool; the scarlet complexion of the linen will be a testimonial of this wonderful truth to many succeeding generations." The appari tion spread consternation far and wide amongst the people in those sad times of 1645.

Upon this subject Mr. Purchas sends us the following extract from a paper read by the late Mr. Edwin Brown, of Burton-on-Trent, to the Midland Scientific Association, December 17th, 1864. A few years ago, our esteemed member, the Rev. Andrew Bloxam, communicated to the *Leicester Journal* an interesting letter on the waters of a pond at Caldecote, near Nuneaton, where Captain Townshend now resides. He says, "On the way from the Rector's house, I observed a large pond in a field on the right, presenting a most extraordinary crimson appearance on the whole of its surface." He found the creature which produced this appearance to present in general a globular appearance, measuring about five-thousandths of an inch in diameter. It slowly revolved around its axis, and had the power of elongating itself like a pear, with a slight indication of a mouth at the broad end, and decreasing into a tail at the other. He named it, "*Volutor sanguineus*" from the peculiarities of its motion and of its colour but it is apparently an animalcule named by Ehrenberg and others, "*Astasia hæmatodes.*" Mr. Bloxam quotes an account published in 1645 o a bloody pond at Garendon, &c., &c. Mr. Lees once observed a similar phenomenon near Malvern. He was at first under the persuasion that "the village wheelwright had emptied his paint pot into the pond."—From the *Transactions* of the Midland Scientific Association, Winter Session of 1864—5.

Mr. Purchas took home some of this scarlet scum wrapped up in paper. Unfortunately it did not get into the hands of experts until this October, and

* Garendon.

in its dried condition it was impossible to determine positively its true character. There is reason to believe it may have been an encysted condition of *Euglena viridis*, which in its normal condition is green; from the transmutation of its elements it is converted into an oily material, from the metamorphism of the oil it becomes transformed into a brown colour, which, by greater oxidation, becomes more red. It represents when in its green state the active condition of the *Euglena*, and when red its quiescent stage. It belongs to the lower Infusoria, although some authors have called it an Alga. Had Mr. Purchas collected it in a bottle, and submitted it early to our experts, there is no doubt that its nature would have been determined.

Mr. Purchas remarks, with some surprise, that not one of the hundreds of visitors besides himself seems to have taken the least notice of the scarlet film, although they were constantly promenading on the rising ground near the lake from which the appearance had attracted his attention. This is nothing more than one of the many exemplifications of the truth of the story we read in "Eyes, and No Eyes."

For information on this subject, we advise our members to read an "Introduction to Fresh-water Algæ," by Dr. M. C. Cooke, published in the *International Scientific Series*. Read the chapter on "Notable Phenomena," and thence pass on to the larger work "British Fresh-water Algæ" (page 51).

OYSTER CULTURE.

By Dr. Alfred J. H. Crespi, Wimborne.

The oyster famine with which, according to many authorities of repute, we are threatened, from the recklessness with which the natural scalps have been dredged, gives oyster culture a special interest, and is a sufficient apology for a long article. It was with great pleasure that we learnt that an exhaustive treatise on oysters was coming out, and we could only envy the happy inspiration which had guided the industrious author in his fortunate choice—"Oysters, and All About Them." We positively envied him his comprehensive title. The battle was half won when that name was chosen—all that relates to oysters, their history, value as food, methods of cultivation, literature—and the subject is one of the vastest known to us—was in place, and we could not wonder that considerably over 1,000 closely printed pages were needed to cover, not the whole immense field, but a part of it, for the author had been compelled to hold over much matter, which will hereafter see the light, should another and greatly enlarged edition be called for. The author has devoted six years of untiring thought and labour to the *opus magnum* of an eventful and dignified life, and has had, in passing the sheets through the press, the valuable assistance of a most accomplished and highly-cultured clergyman, the Rev. R. A. Chudleigh, Rector of West Parley, Dorset, who has generously devoted many weary days and sleepless nights to the revision of a book which is a perfect treasury of interesting and curious information. The author, Dr. J. R. Philpots, was, some time ago, sheriff of the district in which he has so long resided; and it has recently occurred to him that his elaborate treatise might be so adapted and enlarged that it would do the county of Dorset, and more particularly his own town of Poole, lasting service in drawing attention to the value and importance of oyster cultivation and the facilities almost wholly neglected in the vast sheet known as Poole Harbour. In short, whenever the author can get useful and curious information he turns it to good account; and there is hardly a country in the world so remote and little known as to have escaped his keen observation. Dr. Philpots, however, has felt that to invest his book with general interest it would be necessary to adhere faithfully to his original design, and make the Natural History of the Oyster the main feature, so that readers at a distance would not have to complain that it devoted itself to matters of purely local interest.

A letter in a recent impression of the *Standard* on laying down oysters to fatten, asked why our extensive foreshores were not more used for the purpose? Probably few people know how to begin, or what to do. Hundreds of miles of foreshore might be used, and would, were the return as large as Dr. Philpots believes it would be, yield a profit exceeding in value the richest crop the adjoining land could bear. One of Dr. Philpots' objects is to throw light on this subject. Many people are anxiously seeking information; but they cannot find any authority competent to give it. Now any one, says our author, living on an

estuary or creek might have his oyster or mussel parc, as so many people have abroad. But it would be better to let the author explain his reasons for undertaking so costly a book on a subject of comparatively small interest to the majority of the middle class reading public. "My object," he remarks, "in preparing the present work has been to furnish the reader, as well as the general public with a clear description of the subject, and to make the medicinal properties and edible value of the common oyster clearer. Another reason for undertaking this work has been the want of a text-book for the student of zoology, which should at the same time be a book of reference to the general reader; and this I claim that mine is."

Dr. Philpots endeavours to avoid the too common fault of writing a book only of value to the specialist; for the more thoroughly it is that, the more effectually does it repel the ordinary reader, while he tries to keep clear of the equally common error of writing a book which, though popular enough, will have no value to the student of science. He quotes as a sort of text the following graceful passage from Herbert Spencer:—

"Think you that a drop of water, which to the vulgar eye is but a drop of water, loses anything in the eye of the physicist, who knows that its elements are held together by a force which, if suddenly liberated, would produce a flash of lightning? Think you that what is carelessly looked upon by the uninitiated as a mere snowflake does not suggest higher associations to one who has seen through a microscope the wondrously varied and elegant forms of snow crystals? Think you that the rounded rock, marked with parallel scratches, calls up as much poetry in an ignorant mind as in the mind of a geologist, who knows that on this rock a glacier slid a million years ago? The truth is that those who have never entered upon scientific pursuits are blind to most of the poetry by which they are surrounded. Whoever has not in youth collected plants and insects knows not half the halo of interest which lanes and hedgerows can assume. Whoever has not sought for fossils has little idea of the poetical associations that surround the places where embedded treasures were found. Whoever at the sea-side has not had a microscope and aquarium has yet to learn what the highest pleasures of the sea-side are."

Dr. Philpots tells us that another object is to treat the medicinal properties of this favourite bivalve fairly and thoroughly; and in this he succeeds in many passages.

The need of such a book is obvious, for with an ever increasing demand the supply of oysters is rapidly dwindling away. We can remember seeing them sold at one shilling a score; when, as a very precocious infant, we first began to take the deep interest in everything not pertaining to anything we ought to follow up, which stands in such singular contrast to the absence of interest in those matters to which our attention ought to be almost exclusively directed. At seven years of age we used to watch the busy fish shops on Saturday nights with absorbing interest, and then, about the year 1860, oysters fetched five shillings a barrel. In those days we not infrequently bought them and kept them in oatmeal and water to fatten; but even at that early age we had a significant instance of the

unaccountable antagonism between eminent authorities, for some salesmen warned us that the convex side of the bivalve must be underneath; others that the flat side must occupy the most dependent position; the penalty we were positively assured of infringing either rule would be the speedy death of the precious tenant. The round side is naturally underneath, as the flat valve is more easily raised by the occupant.

Our last inquiries as to the price of the "breedy creatures," as Christopher North not unfitly called them, were made over twenty years ago. We believe that they now fetch half-a-crown a dozen—an enormous increase in price over the days of our childhood—and a few weeks ago we actually saw them marked three shillings a dozen in a shop near Trafalgar-square. But prices have been going up for years, until the rich can alone command the attention of oyster dredgers; for others such things as Natives are as though they were not. And yet how cheap they once were—a single shilling would buy a larger number than any sane person would venture to eat at one sitting, unless he were a Vitellius or a Cæsar. London, Dublin, and Edinburgh were all happy in apparently inexhaustible supplies, offered at prices so moderate that they painfully disturb the equanimity of the present generation of oyster buyers. Fifty years ago 10d. would, in the Modern Athens, buy a hundred; and now, if the present rise in price continues, we may live to see them fetching 10d. apiece.

British oysters were first brought to the notice of Roman gourmets in the days of Julius Agricola, A.D. 72, when that great general, having introduced the civilization of Rome to the inhabitants of our islands, imported to Rome the oysters of Britain. The far-famed Rutupians were taken from the shores of Richborough in Kent and were much appreciated. Juvenal, lashing the gastronomic excesses so prevalent in his time, speaks of Our Natives in the following terms:—

"And in our days none understood so well
The science of good eating; he could tell,
At the first relish, if the oysters fed
On the Rutupian or the Lucrine bed;
And from a crab or lobster's colour name
The country, nay the district, whence it came."
(Sat. 4, 139.)

When Trajan was in Parthia, many days' journey from the sea, Athenæus tells us that Apicius Cœlius, who must not be confounded with a namesake of his, the writer of a book on cookery, sent the Emperor fresh oysters, which he had kept sweet by a clever contrivance—real oysters, not shams like the anchovies, which the cook of Nicomedes, King of the Bithynians, made in imitation of the real fish, and set before that King, when he expressed a wish for them, he, too, at the time, being far distant from the sea. Nor was it difficult to transport shell fish long distances inland, and as soon as preference was given to the British mollusc thousands of slaves were employed on the Atlantic shores, procuring the oysters, which in Rome are positively said to have fetched their weight in gold, although, unless the evidence was above doubt, one would not be obliged to accept the statement. The expense of keeping up a liberal supply in

the Imperial capital became at last so enormous that the censors were obliged to interfere, according to the customs of an age which tolerated sumptuary laws. This mode of transporting oysters long distances, says Mr. M. S. Lovell, in his valuable and interesting "Edible Mollusca," alluding to Apicius' "clever contrivance," may have been the one still practised in Italy, where, according to Poli, oysters are carried from Tarentum to Naples in bags tightly packed with snow; the latter by its coolness preserves them, and by preventing them from opening allows them to retain sufficient moisture to keep them alive for a long time. Our modern and better methods, however, relieve us of trouble and anxiety, and we transport the oyster, fresh or tinned, incredible distances, with only a tithe of the expense which the Romans had to face.

The Romans were, like ourselves, in the habit of sending presents of oysters to friends, who returned the compliment in the shape of a boar's head, fat ducks, or some other farm produce. Ausonius wrote a very amusing letter to his friend Theon, who had sent him only thirty oysters as a present:—

"Accepi, dilecte Theon, numerabile munus.
Verum quot fuerint, subjecta monosticha signant."

"The oysters were fine, but so few, very easily counted—they were just three times his ten fingers, or Gorgon's heads, if you multiply them by ten."

Around the Forum at Silchester the remains of many shops have been recently discovered, among them a taberna, for the cultivated Roman did not care only to drink the metheglin or native British beer, clearly a fishmonger's, in which are still to be seen numerous shells of that precious and luscious bivalve always so dear to the Italian epicure, a butcher's stall was close at hand; in the foundations of the last iron hooks and a steelyard were found.

To come, however, to more scientific matters. The oyster is a highly organised and specialized lamelli-branchiate mollusc, holding a far higher place in the animal world than many of its votaries suppose, who fancy, as it glides down their throats, that it is low down in the scale of creation; on the contrary, it is a wonderful little fellow, far more marvellous than the most perfect piece of machinery ever turned out of any human workshop.

Oysters grow fast: at six months they reach the size of a sixpence, at twelve they are an inch in diameter, at two years two inches across, while at three years they have a diameter of three inches. Probably they are in their prime at seven years, though their life extends to twenty. The shells, however, with advancing age, change their texture a good deal and become honeycombed with cavities of some size containing sea-water.

The fertility of oysters in parcs, or parks, as Huxley spells the word, is believed to be considerably diminished, although the oysters themselves are fatter and, therefore, superior, and in greater request at table.

Should only two or three ova in a million come to maturity, as the oyster deposits a million ova a year, the supply should increase rather than fall off.

Artificial culture is often advocated, and was, thirty years ago, coming into fashion in England and in France, but Huxley believes that only a very small and wholly inadequate return rewarded most of the persons who were

induced to take it up, while many lost enormously. Little is even yet known of the conditions favourable to rapid multiplication, but it is certain that the sheets of water selected for the purpose must be sheltered from storms, although they must also be freely open to natural currents, and the water must be neither too cold nor too hot. Some curious and most instructive instances of oysters appearing in vast numbers in waters not before favourable to them have been recorded, one in the Limfjord in Northern Kattegat is very remarkable, though readily accounted for by the fierce storm which broke through the dam separating the Limfjord from the North Sea.

The almost unaccountable falling off in the supply of late years has puzzled many observers. Competent authorities attach great importance to bad spatting seasons, and Mr. Nicholls, foreman of the Whitstable Oyster Company, in his evidence before the Fisheries' Commissioners in 1865, drew pointed attention to the small amount of spat in some years, stating that a good year only occurred once in six.

Much less is known of the conditions favouring reproduction than might at this time of day be expected. The enemies of the oyster are at least three, besides its greatest foe of all—man, and these are not over-dredging, but the depredations of starfish, whelk tingles and dog whelks, and too great heat or cold; for the young oyster, as well as its maturer kinsman, is very sensitive to any great rise; to both of which in shallow basins, in high latitudes, and in variable climates it is peculiarly subject. Hot spells and hard frosts have both been known to kill off immense numbers, and to reduce the yield for a long time. The abundance of their foes is shown by one instance:—14,000 dog whelks have been picked up in a single month in 100 acres of oyster park in the Bay of Arcachon.

Huxley, whose authority is above question, denies that over-dredging accounts for the diminished supply; he admits the increased demand, partly due to the larger area over which oysters can be distributed by the better methods and greater facilities of modern times; he also attaches much importance to bad spatting seasons, but he points out that it is not the object of oyster dredgers to denude the natural beds, and he questions if they could possibly remove a sufficient number to leave too few for effectual reproduction, but, however that be, it is obviously not to their interest to go on dredging till all are cleared off, and in practice dredging ceases to be commercially profitable long before the stock is dangerously exhausted. Nevertheless, practical men contend that over-dredging does in large measure account for the falling off; and their opinion is entitled to great respect.

A close time for oysters, often advocated as a sufficient remedy, has no analogy with that for salmon and game; it should never be forgotten that the latter are also protected by licences and duties, and that preserving by means of keepers is more or less extensively practised. Perhaps one of the best plans would be the removal of small oysters to protected waters. The depredations of reckless oyster dredgers are not easy to check, and would demand a vast and costly machinery, somewhat resembling that now required for the successful protection

of game; unfortunately, game preservation is not exactly profitable, and oyster preservation, if it is to mean anything, must be remunerative. How can that be accomplished?

The oyster is not a hermaphrodite in the ordinary acceptation of the term: it, however, alternates its sex, the same individual being for a time male, at another female; and in the course of the same season it may change four times. This is one of the most remarkable characteristics of this curious creature; much, however, remains to be made out concerning even this matter.

What we really need to make oysters abundant and cheap is more light on the conditions favourable to them, and some knowledge as to the best means of growing them artificially. Could we learn how to obtain and preserve the spat, and bring it to maturity in sheltered sheets of water, we might grow oysters in countless millions. Surely it cannot be beyond the reach of science thus to put them within our control as it were, so that we should be able to grow them in almost any number we desired, and at moderate cost: the latter is the most important consideration.

Why should not energetic and systematic efforts be made to turn to good account some of the vast sheets of water in the South of England? If the American scalps only cover 100 square miles, as we have read, and yet produce hundreds of millions a year, we could find many square miles of available foreshore, which would answer admirably the same purpose, and pay a high return. Dorset might send to market thousands of bushels every year; but before this could be carried out the oyster must be made private property, or our daring but lawless brood of southern fishermen would soon make sad havoc. We have ourselves known old Cornish women, who remembered and talked with cold-blooded exultation of the not very distant days when shipwrecked mariners were cut down with hatchets as they attempted to climb up the rocks of that iron-bound and inhospitable coast; and only give the Cornish and Devon fisherfolk the opportunity of robbing other people's parcs, which might cost £6,000 a piece to stock, and no scruples of conscience would deter them, though the fear of the law might be more effectual.

FLORULA OF THE DOWARD HILLS—MOSSES.

By the Rev. Augustin Ley, M.A.

In the year 1881 Mr. Burton M. Watkins published in the *Transactions* of this Club, a list of the phanerogamic plants found upon the Doward Hills. It was suggested, in the Preface to his paper, that the different groups of Cryptogamic plants, or some of them, inhabiting these hills, might at a future time be similarly catalogued. The following paper is simply an attempt to carry out this suggestion, so far as the True Mosses are concerned. We are thus, by the very scope of our paper, relieved from the necessity of any fresh description of the area, a part of whose vegetation we are attempting to deal with. It has been already accurately delineated and described in Mr. Watkins' paper: and to the limits there adopted we propose strictly to adhere.* Suffice it here to say that the Doward Hills consist of a tract, between one and two square miles in extent, of woody, rocky, and broken ground, much diversified both in geological strata and in aspect of surface, lying immediately to the south-west of the village of Whitchurch; bounded to the north by the line of the Ross and Monmouth turnpike road, and to the east, south and south-west by the tortuous course of the river Wye. We would refer those who wish for a fuller and more accurate description to Mr. Watkins' paper, to which the present stands in the relation of an Appendix. Rich as this small tract of land is in its phanerogamic vegetation, it is certainly equally rich in the small group of cryptogams with which we are now dealing. It is possible that other orders of the lower plants would prove in like manner to be remarkably developed on these hills, if sought with equal diligence.

In dealing with the Flowering orders and the Ferns, Mr. Watkins was, from obvious reasons, precluded from recording habitats; since the result of such records in so small an area as that now in view, would certainly have been to promote the pillage and possibly cause the destruction of the treasures, which it is one of the objects of the Woolhope Club to preserve. But the same considerations do not apply, or only with very limited force, to the group of plants here dealt with. These are the subjects, as yet, of such scant attention from the general public, and even among naturalists have so few students; they are, moreover, in themselves often so inconspicuous, and need such minute search, that there is at present no cause to fear their extermination through the inconsiderate love of an over-eager or over-numerous public. We have, therefore, in the following list, given in most cases such details of locality as may, we hope, assist lovers of nature to find the objects of their love: trusting thereby also to stir up the affections of a wider group of lovers for the things we ourselves love

* We wish, however, to say that the acreage of the Dowards was slightly over-estimated in Mr. Watkins' paper; 2,126 acres being more likely to represent the true area of the hills than 2,500, as there stated.

well. At the same time, the more restricted number of the objects of the present paper, as compared with those of the earlier, allows us to do this without overloading the pages of the Club *Transactions*, or trying unduly (we hope) our readers' patience.

The little group of True Mosses has not been studied so widely nor for so long a term of years, in the county, as the Flowering Plants; yet whereas a reference to Mr. Watkins' paper will show that somewhat over half of the Flowering Plants and Ferns then detected in the county had been found upon the Dowards, the proportion of the Mosses (reckoning on the same principles) is rather more than $\frac{3}{5}$ of those found in the county. It must be remembered, moreover, that while the Flowering Plants contain many species whose citizenship is uncertain, and which have to be classified as Colonists or Aliens, the whole of the Moss Flora is undoubtedly *Native*; such an occurrence as the introduction of an exotic species by human agency being, among Mosses, well-nigh unknown in botanical record. This adds considerably to our appreciation of the richness of these hills in cryptogamic vegetation. A still more remarkable result comes out when a comparison is made with the totals of British Mosses: 191 out of 568—or somewhat over one-third of the total Moss Vegetation of the British Isles being present on the Dowards. This third includes several rare species, and one not hitherto detected elsewhere in Britain. The present writer in the course of a winter day's ramble in the year 1884 saw upon the Greater Doward alone 120 species, or somewhat more than $\frac{1}{2}$ of the total number of species known to inhabit Britain.

We cannot conclude without a tribute of affectionate remembrance and acknowledgment to the fellow-worker who has made the Florula of these hills to so ample a degree his own; the memory of pleasant rambles in whose company lingers like a sweet perfume wherever we go upon them. Mr. B. M. Watkins was the doer of all the earlier cryptogamic work done on these hills; may he long be spared to enjoy with us its later fruit.

The sequence and nomenclature of species in the following list is taken from the *Flora of Herefordshire*. I am responsible for the records, unless otherwise stated. Most, if not all, of the more difficult species have been seen by Mr. H. Boswell, whose unwearied help and kindness it is desired here to acknowledge. The ! inserted after the name of a contributor indicates that a *dried* specimen of the plant from this station has been seen. Two !! indicate that a specimen has been seen in the *fresh* state. Three !!! indicate that the plant has been seen *growing*.

Pleuridium nitidum, Hedw. Frequent on the river-bank from the Upper Ferry to the Gas-works, Wyaston Leys.—*P. subulatum*, L. On the ground in the Lord's Wood.

Systegium crispum, Hedw. A single tuft, by a wood-path, Lord's Wood, near the Great Quarry, 1877. Not again found.

Gymnostomum calcareum, Nees. Shady calcareous and tufaceous rocks, at several stations on the east side of the hill. Fruit not found. The

locality given for *Gymnostomum tenuis* Schrad., on "tufaceous rock, Great Doward," in the *Herefordshire Flora*, p. 369, must be altered to the present species. *G. tenuis* is, so far as known, confined to *sandstone* in Herefordshire.

Weissia microstoma, Hedw. On the limestone, rare. Ditch-side at the bog, *B. M. Watkins* !!! In the Great Quarry.—*W. viridula*, Brid. Abundant on banks, both in exposed and wooded situations.—Var. *densifolia* Wils. On exposed limestone at Arthur's Cave.—*W. mucronata*, Bruch. Wooded bank; once only found. In the Lord's Wood, above the keeper's lodge.

Dicranoweissia cirrhata, Hedw. Surprisingly rare. On conglomerate in the Lord's Wood; once only found. Not seen on decaying posts or thatch.

Cynodontium Bruntoni, B. & S. Fine and plentiful on the conglomerate near the Old School. Abundant on the corresponding formation of Huntsham and Coppet Hills.

Dichodontium pellucidum, L. On the river-bank at several stations, but poor and barren.

Dicranella Schreberi, Hedw. Once only found. Lane-bank on the N.E. flank of the hill; barren.—*D. varia*, Hedw. On loose earth at the Mine Cave. Probably elsewhere.—[*D. rufescens*, Turn. will probably be found.]—*D. heteromalla*, Hedw. Frequent on the sandstone and conglomerate, where there is some shade.

Dicranum fuscescens, Turn. At one station on the exposed conglomerate near the Old School; very fine, but barren.—*D. scoparium*, Hedw. On tree-boles; and on the sandstone and conglomerate rocks; rarer on the limestone. *D. majus*, Turn. In the Lord's Wood, sandstone tract; also on lane-sides: the fruit not seen. Not on limestone?

Campylopus flexuosus, Brid. Sandstone tract in the Lord's Wood; in fruit.—Var. *paradoxus*. On the side of a wood-path in the sandstone tract, Lord's Wood.—*C. fragilis*, B. & S. On sandstone in the Lord's Wood; also on conglomerate rocks on the north face of the hill. Barren.—*C. torfaceus*, B. & S. On the ground in the sandstone tract, Lord's Wood; abundant, and fruiting freely. All the *Campylopi* are absent from the limestone.

Leucobryum glaucum, L. Conglomerate rocks near the Old School, and in the sandstone tract, Lord's Wood; fine, but barren.

Ceratodon purpureus, L. On old charcoal floors in the woods, and on conglomerate rocks; elsewhere rare.

Seligeria Doniana, Sm. Shady rocks, very rare. On shady lime-rocks at the Mine Cave, 1890, in minute quantity. First record for the county.—*S. pusilla*, Hedw. Shady limestone, very rare. On the east face of Little Doward. First record for the county.—[*S. recurvata*, Hedw. may occur on the conglomerate.]

Fissidens viridulus, Wils. In Arthur's Caves, fruiting freely in 1888. It will doubtless be also detected on lane-hedgebanks.—[*F. exilis*, Hedw. will probably be found.]—Var. *fontanus*.—*F. crassipes*, Bry. Brit. On stones in the Wye, at the New Weir, and above the Fish-house. Mill-sluice, Whitchurch.—*F. incurvus*, Schwg. Woods, on the ground; rare. In the Lord's Wood, near the Great Quarry.—*F. pusillus*, Wils. Shady limestone. In the Mine Caves, &c., 1890.—*F. byroides*, Hedw. Lane-hedgebanks, abundant.—*F. adiantoides*, Hedw. In the bog; fine, and fruiting freely. Not elsewhere.—*F. decipiens* De Not. Abundant on all the limestone rocks, both in shade and exposure; the fruit rather abundant.—*F. taxifolius*, L. Abundant, on all soils. A large form, equalling *F. decipiens* in size, occurs in the mud of the river-bank.

Phascum muticum, Schrad. The single specimen of this rare moss found on the Doward was communicated to us by Mr. B. M. Watkins!—[*P. serratum*, Schreb. will probably be found.]—*P. cuspidatum*, Schreb. Tillage fields, in winter; abundant.—[*P. curvicollum*, Hedw. and *P. rectum*, Sm. should be looked for.]

Pottia minutula, B. & S. Tillage field at the summit of the Great Doward, abundantly.—*P. truncata*, L. In tillage fields, and on the loamy river-bank, common.—[*P. intermedia*, Turn. and *P. Starkeana*, Hedw. will probably be found.]—*P. lanceolata*, Dicks. Not common on these hills. Tillage field, along with *P. minutula*.

Eucladium verticillatum, L. Limestone caves, at several spots, barren. Abundant and fruiting at the Dropping Well.

Leptotrichum flexicaule, Hampe. Abundant on the limestone *débris* and open limestone ground.—[*L. homomallum*, Hedw. should occur.]—Var. *densum*. Rare. One tuft, 1890, on bare limestone at the Seven Sisters Rocks. First record for the county.

Trichostomum rubellum, C. Müll. Very abundant, especially on the limestone.—*T. luridum*, Hornsch. In the Great Quarry, fruiting, 1877. Larger and barren by the river.—*T. crispulum*, Bruch. On the limestone of both hills, abundant throughout, and fruiting with some freedom.—*T. mutabile*, Bruch. On the limestone, with a similar distribution to the last, but less abundant, and less often in fruit.—*T. tophaceum*, Brid. Damp crevices in quarries, rare. In the Great Quarry, *Waterfall*! A large barren form also occurs in the river-mud.—*T. nitidum*, Lindb. Rare. On exposed limestone, both of the Great and Little Dowards.

Tortula ambigua, B. & S. On limestone banks and open ground.—*T. aloides*, Koch. As the last; common.—*T. unguiculata*, Hedw. Everywhere abundant.—*T. fallax*, Hedw. In the quarries, on limestone.—Var. *brevifolia*. Limestone, not common. Near the river, in the Lord's Wood.—*T. recurvifolia*, Schpr. In dry limestone quarries, rare. At one spot in the Great Quarry; first found in 1874. In a small quarry on the west side of the hill, 1890. Barren at both stations.—*T. cylindrica*, Tayl. Scattered, on the limestone; poor and

barren.—*T. vinealis*, Brid. Rare. Small quarry on the N.W. side of the hills, 1890.—*T. rigidula*, Dicks. Very abundant upon the limestone, especially in quarries: fruit not seen.—*T. spadicea*, Mitt. At one station, but very rare. At the Dropping Well, *Watkins* !!!—*T. Hornschuchiana*, Schultz. Wall-top at the Quarry, on the limestone; rare.—*T. revoluta*, Schw. Wall-top (limestone) above the Great Quarry; abundant, but barren.—*T. convoluta*, Hedw. Abundant on wall-tops.—Var. *sardoa*. Wall-top (limestone) near the Lower Ferry, 1890. First record in Herefordshire.—*T. sinuosa*, Lindb. Muddy stone by the river-bank. Rock (limestone) at the bog. Rare.—*T. tortuosa*, L. Very abundant on the limestone, both in shade and exposure: the fruit not rare in shade.—*T. subulata*, L. Scattered, both on the limestone and sandstone. The large river-side form occurs near the Fish-house.—*T. muralis*, L. Very common, both on walls and on the limestone rocks.—Var. *rupestris*. Abundant on the vertical faces of the limestone, in quarries.—*T. marginata*, B. & S. Tufaceous rocks at the Dropping Well, abundant at one station.—*T. Vahliana*, Schultz. Very rare. On an ant-hill near the summit of the Great Doward, 1890. First record for Herefordshire.—*T. latifolia*, B. & S. On dry limestone in the Great Quarry! Absent or rare on the river-side stumps.—*T. laevipila*, Brid. On elm stumps, common.—*T. intermedia*, Brid. Abundant on the exposed limestone. Fruiting on the Seven Sisters Rocks.—*T. ruralis*, L. On exposed limestone at three stations, but much less abundant than the last. On a roof at Whitchurch Mill.—*T. papillosa*, Wils. Rare. On an elm at the Dropping Well.

Cinclidotus fontinaloides, Beauv. In the river, near the keeper's lodge.

Grimmia apocarpa, L. Abundant everywhere, both on sandstone and limestone.—Var. *rivularis*. Stones by the Wye at New Weir.—[The variety *gracilis* should be found on shady limestone.]—*G. orbicularis*, B. & S. On exposed limestone, rare. Limestone at the Seven Sisters, 1877 and 1890. Quarry on the N.W. of the hill, 1889.—*G. pulvinata*, Dill. Everywhere abundant.—*G. trichophylla*, Grev. On the conglomerate, both of the Great and Little Dowards; fruiting at both stations.—*G. montana*, B. & S. Exposed limestone at the Seven Sisters Rocks. Conglomerate on the west face of Little Doward, 1890.

Racomitrium heterostichum, Hedw. Mixed with *Grimmia trichophylla* on the conglomerate at the Old School.—*R. alopecurum*, B. & S. Conglomerate rocks near the Old School, fine and fruiting, 1890.—*R. fasciculare*, Schrad. Rare. On shady conglomerate rocks near the Old School.

Ptychomitrium polyphyllum, Dicks. Upon limestone and sandstone walls; rare. Above the Great Quarry; and near the Old School.

[*Amphoridium Mougeotii* should be found on the conglomerate rocks.]

Zygodon viridissimus, Dicks. On elm and ash-boles near the Dropping Well. Fruiting on an elm in 1884.—Var. *rupestris*. On limestone, rare. In fruit near the Dropping Well.—*Z. Stirtoni*, Schimp. Shady limestone on the east face of Great Doward; rare, *Rev. C. H. Binstead* ! ! ! First record for the county.

Ulota crispa, Hedw. On a beech at the Mine Cave, 1887, and each year subsequently. The only station in the county.

Orthotrichum saxatile, Brid. At one station only. Limestone point at the bog.—*O. cupulatum*, Hoffm. Rare. On limestone points near the Great Quarry.—Var. *nudum*. Wall at the New Weir, near the river.—*O. stramineum*, Hornsch. Elm-bole at the Dropping Well, abundantly. Not noticed elsewhere.—*O. tenellum*, Bruch. Elm-boles, with the last, but less abundant.—*O. affine*, Schrad. On tree-boles; not abundant on the Dowards.—*O. diaphanum*, Schrad. On tree-boles; abundant.—*O. Lyellii*, H. & T. Tree-boles, not uncommon. The fruit has not been observed. *O. Sprucei*, Mont. Willow-boles below the New Weir, in fair plenty.—*O. rivulare*, Turn. River-side roots and stumps, above the Fish-house, abundantly.

Encalypta vulgaris, Hedw. On exposed limestone ledges, in the quarries; in the same situations, and often growing with the next species. Noticed at several stations.—*E. streptocarpa*, Hedw. On exposed limestone, especially in deserted quarries, abundantly. Fruiting abundantly in an old quarry on the N.W. side of the hill, 1884 and 1885.

Physcomitrium pyriforme, L. On the damp loam of the vertical river-bank, rare. Between the two Ferries.

Entosthodon ericetorum, Bals. Confined to the sandstone tract in the Lord's Wood. Bank in the sandstone tract, first discovered by Mr. Watkins!!! in 1873, and noticed at the same station in many subsequent years. Abundantly in a second station, in an old cartway, 1890. The above still continue the only stations known for this moss in Herefordshire.

Funaria fascicularis, Dicks. Cultivated ground. In tillage fields near Whitchurch.—*F. calcarea*, Wahl. Thin earth on exposed limestone, confined to a single station. Rocks at the S.E. point of the Little Doward, 1877, and again in 1890.—*F. hygrometrica*, L. Common. Abundant on disused charcoal floors in the woods.

[*Bartramia pomiformis*, L. will probably be found on the conglomerate of the northern exposure.]

Philonotis fontana, L. On the river-bank; rare, and in small barren bits. Great Doward and Little Doward.

Bryum pyriforme, L. Shady rocks, rare. In Arthur's Cave, 1873 and 1874, fruiting. Shady wall near the Lower Ferry, 1890, barren. Both these stations are on limestone.—*B. sutans*, Schreb. On conglomerate sand in the sandstone tract in the Lord's Wood, along with *Campylopus torfaceus*, B. & S. Not seen elsewhere.—*B. carneum*, L. Moist vertical loam of the river-bank, abundantly. Moist bank at the Mine Caves.—*B. albicans*, Wahl. With the last, on the river-bank; abundant, but always barren. A large form on the shady river-bank above the Fish-house.—[*B. pendulum*, Hornsch. should be looked for on the river-bank.]—*B. inclinatum*, Swartz. Wall-tops; rare? Wall-top at the Lower Ferry, 1890. Specimens from one or two other

localities on the Doward, gathered by Miss E. Armitage!—*B. Barnesi*, Wood. Muddy stones on the river-bank; very rare. Near the Upper Ferry.—[*B. intermedium*, W. & M. was reported by Mr. Watkins from a wall at Wyaston Leys, but proved to be a state of *B. capillare*, L.]—*B. bimum*, Schreb. At the bog, along with *B. pseudotriquetrum*. Steep river-bank above the Fish-house. Barren at both stations.—*B. torquescens*, B. & S. On horizontal ledges in disused lime-quarries, at several stations, but not abundant.—*B. atropurpureum*, W. & N. On the ground, especially at old charcoal floors in the woods. Great Doward and Little Doward.—*B. versicolor*, Braun. At a single station on the shady river-bank above the Fish-house; fruiting, 1887, barren, 1888.—*B. cæspiticium*, L. Wall-tops, abundant.—Var. *imbricatum*. In dry turf on the Little Doward, barren, 1873.—*B. argenteum*, L. Common. Abundant on the charcoal floors in the woods.—*B. capillare*, L. Wall-tops; rocks of sand and limestone; stumps, &c.; very common.—*B. Donianum*, Grev. Rare. In large barren tufts by the river-side, within the influence of the winter floods. Great Doward, above the Fish-house.—*B. provinciale*, Phil. Shady limestone ledges, confined to a very small area in the Lord's Wood. Fruiting in small quantity in several seasons.—*B. pallens*, Swartz. On the limestone, at several places in the Great Quarry, but always small and barren.—*B. turbinatum*, Hedw. Muddy stones by the river-bank; very rare. River-bank near the Dropping Well; small and barren.—*B. pseudotriquetrum*, Hedw. Abundant at the bog, and fruiting freely.—*B. roseum*, Schreb. Shady woods, very rare. At one station beneath the cliffs on the east side of Lord's Wood.

Mnium cuspidatum, Hedw. Shady river-bank in the Lord's Wood; abundant, and fruiting freely.—[*M. affine*, Bland, recorded in *Fl. Herefordshire*, p. 412, from the river-bank, will probably prove to be *M. cuspidatum*, Hedw.]—*M. undulatum*, Hedw. Abundant wherever any shade is found. Fruiting on a few occasions in the dense shade of the east flank of Lord's Wood.—*M. rostratum*, Schrad. Shady parts of Lord's Wood, on fallen limestone blocks, &c. Fruiting, along with the last, but shyly.—*M. hornum*, L. Very abundant in the woods, especially on the sandstone and conglomerate, and fruiting freely.—*M. serratum*, Schrad. On roots and stumps on the shady river-bank. Abundant above the Fish-house, and fruiting freely.—*M. stellare*, Hedw. Shady stones and lane-banks, on the sandstone; I believe also on the limestone.—*M. punctatum*, Hedw. On shady rocks in Lord's Wood; also abundantly on the shady river-bank; fruiting occasionally.

Tetraphis pellucida, L. Sandstone rocks in the Lord's Wood; the fruit not yet detected.

Atrichum undulatum, L. Abundant on the ground, especially in woods.—Var. *minus*. On the ground in the Lord's Wood, 1890. First record for Herefordshire.

Pogonatum aloides, Hedw. Bare vertical banks, both on sand and limestone, common. Abundant in old cart-tracks in the Lord's Wood.—[*P. nanum*, Neck, ought to be found on the sandstone or conglomerate, but has been repeatedly sought in vain.]

Polytrichum formosum, Hedw. Abundant throughout the woods, especially on the sandstone.—*P. juniperinum*, Hedw. Wooded bank, Little Doward. On conglomerate boulders in open situations on both hills.—*P. piliferum*, Schreb. Conglomerate rocks and turf wall-tops on the sandstone. Great Doward.

[*Diphyscium foliosum* should be looked for.]

Fontinalis antipyretica, L. In the river, near the keeper's lodge.

Hedwigia ciliata, Dicks. Conglomerate rocks, not common. Exposed conglomerate on the west face of the Little Doward.

[*Cryphæa heteromalla*, Hedw. should be seached for on elm-boles.]

Leucodon sciuroides, L. Tree-boles, abundant.

Neckera crispa, L. Abundant, and often very fine, on the shady limestone. Fruiting freely at the Great Quarry and elsewhere.—*N. complanata*, L. On tree-stumps and rocks. Not abundant, and the fruit not found.

Homalia trichomanoides, Schreb. Tree-boles by the river, at the New Weir, fruiting.

Leskea polycarpa, Ehrh. Stumps and roots within the influence of the river-mud, abundantly.

Anomodon viticulosus, L. On the shady limestone, in great abundance; the fruit also abundant.

Thuidium tamariscinum, Hedw. Abundant in the woods. Fruit not observed.

Pterogonium gracile, Dill. Exposed conglomerate rocks on the Little Doward; barren.

Climacium dendroides, L. One station only, in small quantity. Marsh below the Dropping Well.

Thamnium alopecurum, L. Shady rocks, especially on the limestone. The fruit occasional.

Isothecium myurum, Poll. Shady rocks and banks. In fruit?—Var. *robustum*. Shady limestone on the Little Doward.

Orthothecium intricatum, Hartm. Damp cavernous limestone, rare. At two stations at Arthur's Caves.

Homalothecium sericeum, L. Fine and abundant on the limestone; the fruit also abundant.

Camptothecium lutescens, Huds. Open grassy limestone banks, abundant. Several times found in fruit.

Scleropodium cæspitosum, Wils. Muddy river-side rocks, rare. Rocks at the Little Doward, sparingly.—[*S. illecebrum*, Schwg. should be searched for on marly banks, under trees. Looked for hitherto in vain.]

Brachythecium glareosum, B. & S. Open grassy banks, both on sand and limestone; the fruit not detected.—*B. velutinum*, L. On the elm-boles,

abundant.—*B. rutabulum*, L. Ubiquitous.—*B. rivulare*, B. & S. On the river bank above the Fish-house, abundantly.—*B. populeum*, Hedw. On stones in dense shady woods, not rare. In the Lord's Wood, near Arthur's Caves, &c.—*B. plumosum*, Swartz. Very rare. On a conglomerate rock near the Old School, fruiting, 1887, 1890.

Eurhynchium myosuroides, L. On the sandstone and conglomerate rocks; abundant and fruiting.—*E. circinatum*, Brid. Shady limestone, rare. East face of the Great Doward, in two spots. East face of the Little Doward, abundantly, 1890.—*E. striatulum*, Spruce. Shady limestone, locally abundant. On the east face of the Great Doward. Fruiting on the south face of the Great Doward, below the Seven Sisters.—*E. striatum*, Schreb. Hedge-banks, &c., on the sand and limestone, abundant.—*E. crassinervium*, Tayl. Abundant throughout the limestone; the fruit rather rare.—*E. piliferum*, Schreb. Wood-paths in the Lord's Wood; rare, and the fruit not found. —*E. Swartzii*, Turn. Sandstone and limestone banks; abundant, but always barren. —Var. *atrovirens*. Limestone, under dense shade, on the east face of the Great Doward.—*E. abbreviatum*, Sch., Syn. Lane hedge-banks, on the sandstone. Shady stone on limestone near the Mine Caves.—*E. prælongum*, Dill. Very common everywhere.—*E. pumilum*, Wils. Hedge-banks on the sandstone; rare. —*E. Teesdalei*, Sm. At one station. Mill-sluice, Whitchurch.

Rhynchostegium tenellum, Dicks. Very abundant on the shady limestone; the fruit abundant.—*R. depressum*, Bruch. Shady limestone, and at the base of limestone walls, at many spots on the Great Doward. Shady limestone on the east face of Little Doward.—*R. confertum*, Dicks. Scattered, on shady stones, common.—*R. murale*, Hedw. Stones and walls on the limestone, not abundant. On the east face of Great Doward.—[Var. *julaceum* should be found on stones in the river-mud.]—*R. ruscifolium*, Neck. In water, and under the drip of roofs, common. Whitchurch Mill. In the Wye.

Plagiothecium Borrerianum, Spruce. Shady sandstone near the Old School. Only known in one station.—*P. denticulatum*, L. Common, especially on the sandstone, and in lane-hedges.—Var. *aptychus*. On conglomerate below the Old School.—[*P. sylvaticum*, L. will probably be found, on search.—*P. undulatum*, L. seems to be absent, or very rare.]

Amblystegium serpens, L. Abundant everywhere. Forms growing upon shady limestone exhibit remarkable variation from the type, and merit further investigation.—*A. radicale*, B. Beauv. In the stream issuing from the bog; very rare.—*A. fluviatile*, Swartz. With the last; also very rare.—*A. riparium*, L. Stones by the Wye, at the New Weir; fruiting freely.

Hypnum Somerfelti, Myrin. Very abundant all over the limestone area, and fruiting abundantly.—*H. chrysophyllum*, Brid. Rare. Shady limestone on the south face of the hill, barren.—*H. stellatum*, Schreb. On the limestone, both in dry and damp situations; the fruit not abundant.—Var. *protensum*. Abundant at the bog: fruiting in 1888.—*H. filicinum*, L. Wet spots; also in dry shade on limestone; abundant, but the fruit rare.—*H. commutatum*,

Hedw. Abundant, and fruiting at the Dropping Well; not noted elsewhere.—*H. virescens*, Boulay. With the last, in the bog above the Dropping Well. Once found fruiting.—*H. rugosum*, Ehrh. Very rare. At one station near the Seven Sisters; poor, and apparently in decreasing quantity, 1872, and subsequent years.—*H. cupressiforme*, Dill. Very abundant in many types of situation.—Var. *filiforme*. Common on tree-boles.—Var. *lacunosum*. On the ground in the Lord's Wood.—Var. *resupinatum*. On tree-stumps and rocks.—*H. patientiæ*, Lindb. Abundant in several parts of the Lord's Wood, in wood-paths on clay soil. First noticed by Mr. Watkins.—*H. molluscum*, Hedw. Limestone, especially where exposed. Abundant, and fruiting freely.—*H. palustre*, L. At the Mill-sluice, Whitchurch; fine and fruiting. In small scraps on the river-side stones at several places.—*H. cuspidatum*, L. In damp or boggy grass, abundant. Fruiting in the large Quarry, *Miss E. Armitage!*—*H. Schreberi*, Ehrh. Open grassy banks and woods, on sandstone and conglomerate, common.—*H. purum*, L. Everywhere, in turf. Fruit (rare) in limestone banks on the west face of the hill.—*H. splendens*, Dill. Woods and open bushy hills. Not abundant, and the fruit not seen.—*H. squarrosum*, L. In turf, abundant in open or bushy situations; the fruit not observed.—[*H. loreum*, L. seems to be absent, or very rare.]—*H. triquetrum*, L. In woods, both on sandstone and limestone; also in open limestone ground, and grassy hills. The fruit not observed.

Sphagnum cuspidatum, Ehrh. Very rare. In a damp depression in Lord's Wood, on sandstone, 1890.

On analysing the above list, the following 25 species are either confined to, or show a marked preference for, limestone:—

Gymnostomum calcareum.	Anomodon viticulosus.
Weissia microstoma.	Camptothecium lutescens.
Seligeria pusilla.	Eurhynchium circinatum.
Fissidens decipiens.	E. striatulum.
Eucladium verticillatum.	E. crassinervium.
Leptotrichum flexicaule.	Rhynchostegium tenellum.
Trichostomum crispulum.	R. depressum.
T. mutabile.	R. murale.
Tortula recurvifolia.	Hypnum Somerfelti.
Tortula tortuosa.	Hypnum chrysophyllum.
Grimmia orbicularis.	H. rugosum.
Encalypta streptocarpa.	H. molluscum.
Neckera crispa.	

The following 10 are related in a similar manner to the sandstone and conglomerate:—

Cynodontium Bruntoni.	Leucobryum glaucum.
Dicranum fuscescens.	Grimmia trichophylla.
Campylopus flexuosus.	Hedwigia ciliata.
C. fragilis.	Pterogonium gracile.
C. torfaceus.	Plagiothecium Borrerianum.

The following 6 species are lovers of the river-mud :—

Pleuridium nitidum.	Bryum Barnesi.
Physcomitrium pyriforme.	B. turbinatum.
Bryum carneum.	Leskea polycarpa.

The following 15 are immersed in, or confined to, the immediate vicinity of water :—

Dichodontium pellucidum.	Eurhynchium Teesdalei.
Fissidens fontanus.	Rhynchostegium ruscifolium.
Tortula spadicea.	Amblystegium radicale.
Cinclidotus fontinaloides.	A. fluviatile.
Orthotrichum nudum.	Hypnum commutatum.
O. rivulare.	H. virescens.
Fontinalis antipyretica.	H. palustre.
Brachythecium rivulare.	

The following 14 species are *montane* in habit; that is, are rare in the lowlands, and become frequent in the highlands :—

Campylopus flexuosus.	Bryum nutans.
C. torfaceus.	B. pallens.
Leucobryum glaucum.	B. pseudotriquetrum.
Grimmia trichophylla.	Hedwigia ciliata.
G. montana.	Pterogonium gracile.
Ptycomitrium polyphyllum.	Orthothecium intricatum.
Entosthodon ericetorum.	Brachythecium plumosum.

The following 14 species are confined to the Doward Hills, so far as Herefordshire is concerned :—

Seligeria Doniana.	Bryum imbricatum.
Tortula Vahliana.	B. provinciale.
Grimmia orbicularis.	Isothecium robustum.
Zygodon rupestris.	Eurhynchium atrovirens.
Ulota crispa.	E. striatulum.
Entosthodon ericetorum.	Hypnum Somerfelti.
Bryum versicolor.	H. rugosum.

The following 11 are very rare in Herefordshire, and confined to one or two stations outside the Doward area :—

	Where else found.	*Station.*
Systegium crispum	Hereford	One.
Gymnostomum calcareum	Backbury Hill	One.
Weissia mucronata	Welsh Newton	One.
Cynodontium Bruntoni	Coppet Hill, &c.	Three.
Dicranum fuscescens	Huntsham Hill	One.
Phascum muticum	Titley	One.
Grimmia montana	Golden Valley ; Pont Esgob.	Two.
Zygodon Stirtoni	Huntsham ; Ludford	Two.
Funaria calcarea	Backbury Hill	One.
Bryum torquescens	Caplar ; Downton	Two.
B. turbinatum	Coppet Hill; Grwyne Valley	Two.

I have Mr. B. M. Watkins' hearty co-operation in taking the present opportunity to place on record several Flowering Plants and Ferns which have been detected upon the Doward Hills since 1881, and which are therefore additional to the species mentioned by him in his Florula. (The numbers appended indicate the position of the plant in relation to those in the original list).

36a. Barbarea intermedia, *Boreau.*
66a. Stellaria umbrosa, *Opitz.*
77a. Hypericum calycinum, *L.* Naturalised.
152a. Fragaria elatior, *Ehrh.* Naturalised.
159a. Rubus Maasii, *Focke.* R. macrophyllus, *W.* var. umbrosus, of L.C., Ed. vii.
160a. Rubus Drejeri. *G. Jensen.* R. Purchasii, Blox., Herefordshire Flora.
163a. Rubus thyrsiflorus, *W. and N.*, teste Prof. Babington R. Lœhri, *Wirtg.*, teste Dr. Focke.
182a. Pyrus latifolia, *Syme.*
189a. Epilobium Lamyi, *Wirtg.*
274a. Inula Helenium, *L.* Naturalised.
293a. Crepis biennis, *L.* Naturalised.
301a. Hieracium tridentatum, *Fr.*
384a. Myosotis sylvatica, *Hoffm.* Naturalised.
431a. Quercus intermedia, *Don.* Confirmed through the London Botanical Exchange Club.
442a. Salix hippophaæfolia, *Thuill.*
475a. Iris fœtidissima, *L.* Naturalised.
500a. Eriophorum augustifolium, *Roth.*
521 Var. Carex hirta, *L.*, var. hirtæformis.
563a. Festuca sylvatica, *Vill.*
587. Nephrodium Oreopteris, *Desv.*
585a. Cystopteris fragilis, *Bernh.*

REPORT ON THE COLLECTIONS OF THE LATE REV. J. F. CROUCH.

By Rev. A. Ley.

[Bequeathed to the Woolhope Naturalists' Field Club, and now placed in the Museum Room, Hereford. October 20th, 1890.]

I.—Lichens.

(a) Four quarto cloth bound volumes of Exsiccata, by W. A. Leighton; all mounted. In a good state, although slightly injured by insects.

(b) Three quarto cloth bound volumes of Exsiccata, by W. Mudd, all mounted. In the same state as the last.

(c) Six quarto cloth bound volumes of a General Collection of Lichens, many of them certified by W. A. Leighton; all mounted. In the same state as (a) and (b).

(d) Two quarto volumes of General Collection; in the same state as the above, but the present covers are *too small* for the collection, which is consequently suffering.

II.—Mosses and Hepaticæ.

(a) Seven fasciculi, numbered 1 to 7, of a General Collection, small quarto, tied in boards. All mounted and in excellent order. Mosses only.

(b) Two fasciculi, numbered 1 and 2, of Exsiccata by the late W. Wilson. The specimens are unmounted in thin paper envelopes, which are mounted on small quarto sheets, and tied in boards. All in excellent order and condition. Mosses only.

(c) One small folio volume of Sphagna Britannica Exsiccata, by R. Braithwaite, M.D., F.Z.S.; the whole mounted, and in excellent order. A presentation copy.

(d) Twenty-five brown paper volumes of a General Collection; small folio, mounted on thin paper, in very good order and condition. 24 vols. Mosses; 1 vol. Hepaticæ.

(e) One fasciculus, small quarto, tied in boards. Collection of Mosses of Herefordshire and the Woolhope Club District. All mounted and in very good order.

(f) One small quarto volume, in bound cloth covers, of a General Collection, chiefly from Herefordshire, mounted and in good order. Most of them are Mosses; a few Hepaticæ.

(g) General Collection of Mosses, in small folio paper books. The specimens are unmounted, in thin paper envelopes, which are mounted on the folio sheets. Twelve volumes, all in good order.

(h) Three volumes, forming a similar collection to (g), and in similar condition. 1 vol. Mosses, 2 vols. Hepaticæ.

(i) Twenty volumes, forming a collection similar in every way to (g) and (h), but in darker paper covers, and slightly smaller size. The specimens are in notepaper envelopes.

(j) Three fasciculi of Hepaticæ Britannicæ Exsiccatæ, by Messrs. Carrington and Pearson; small quarto. The specimens loose, in notepaper envelopes, mounted on larger sheets. The species numbered 1 to 215. All in excellent order.

(k) One volume, quarto, tied in boards, of a General Collection of Hepaticæ; the specimens partly mounted: partly loose in mounted envelopes. All in excellent condition and order.

(l) One folio book. A small collection of mounted mosses from Canterbury, New Zealand; in good order.

(m) A small collection of general foreign mosses; all named by H. Boswell. In good order.

(n) A small collection of mosses, unmounted, in thin paper envelopes; nearly all from Herefordshire. This collection is of some value, and ought to be placed in a box.

(o) A small general collection of mosses, mounted in newspaper in a box.

III.—Flowering Plants and Ferns.

(a) A Collection of Flowering Plants and Ferns in very large bound cases. The sheets are in imperfect order, some of them of considerable value, many worthless, and much of the collection injured by insects.

(b) A small collection on smaller quarto sheets, in brown paper wrappers, and contained in a single cover. This collection is of little consequence, and the sheets which are of value might well be combined with (a).

Woolhope Naturalists' Field Club.

APRIL 9TH, 1891.

THE Annual Meeting of the Club was held in the Woolhope Club Room, on Thursday, April 9th. The following members were present:—The President, Sir Herbert Croft, and Rev. Sir George H. Cornewall, President-elect for 1891; Mr. James Rankin, M.P.; Count Lubienski; the Revs. James Barker, J. O. Bevan, H. B. D. Marshall, M. G. Watkins, and H. T. Williamson; Messrs. F. Bainbridge, H. C. Beddoe, Cecil Butler, Joseph Carless (junr.), R. Clarke, James Davies, H. Easton, M. J. Ellwood, C. G. Martin, O. Shellard, H. Southall, Guy Trafford, H. Vevers, H. C. Moore (Honorary Secretary), and James B. Pilley (Assistant Secretary).

The accounts, duly audited, were passed. The Assistant Secretary is to be congratulated upon his success in recovering almost all the arrears due from subscribers, whilst the Treasurer retains a satisfactory balance in hand, which will enable the Editors to persevere in their efforts to print all the arrears of *Transactions*. In his report, Mr. Pilley informed us that the number of members on December 31st, 1890, was 185, a total which has only once been exceeded, namely, in 1884, when there were 191 members; the arrears due from subscribers then amounted to £41, in comparison with 10s. arrears due on December 31st, 1890. Three members have died during the past year, ten members have resigned, twenty-four new members have joined, thus making a net increase of eleven. At the Meeting two members were elected, as usual by ballot, and the names of three gentlemen were proposed to be balloted for at the next meeting.

The dates and places of the four Field Meetings of the year were appointed as follows:—May 28th, Thursday, Haugh Wood and the Woolhope district; June 30th, Tuesday, Aberedw Rocks; July 28th, Tuesday (Ladies' Day), Llanthony Abbey; August 25th, Tuesday, Moccas Park.

The Rev. M. G. Watkins, of Kentchurch, has sent us information of the following:—

ANTIQUARIAN DISCOVERIES AT ABBEY DORE.

"Some curious finds were recently discovered when cleaning out two watercourses in the north of Abbey Dore, in Herefordshire. The dormitories and domestic offices of the Cistercians who built it were on this side of the Church, and doubtless many more singular relics would be discovered were a thorough investigation made. Nine old keys—probably of stables, granaries, and the like

were picked up, ranging from about two to six inches in length, and some of them cut into very remarkable wards. One resembled an intricate modern latchkey, and may have belonged to a padlock. A keen-edged pointed dinner knife was also found, and three coins; one, a silver groat of Elizabeth; the second, a fine specimen of a copper sixpence of James II., dated, 1689; and the third a copper halfpenny (?) bearing the legend NVMMORVM FAMVLVS, probably of William and Mary, but in very bad preservation on one side, although the double rose was plainly visible on the other. A quantity of hewn stones and fragments, which had formed part of the conventual buildings, were also dug out. These relics are carefully preserved by the owner of the land, Captain T. Freke Lewis, of Abbeydore."

The following is a list of books received during the year 1890:—*Cotteswold Field Club Proceedings*, 1889-1890, Vol. x., Part 1; *Report of British Association for Advancement of Science* for 1889; *British Naturalists' Society Proceedings*, 1889-90, Vol. vi., Part 2; *Oldham Microscopical Society and Field Club Journal* for 1890; *Warwickshire Naturalists' and Archæologists' Field Club Proceedings* for 1889; *Holmesdale Natural History Club Proceedings* for 1888 and 1889; *Marlborough College Natural History Society Report; Geologists' Association Proceedings*, Vol. xi., No. 6, Vol. xi., No. 7, Vol. xi., No. 8; *United States Department of Agriculture—North American Fauna*, No. 3, also No. 4 of 1890; *Cardiff Naturalists' Society*, Vol. xxi., Part 2; *Essex Naturalist—Journal of Essex Field Club*, Vol. iii., Nos. 10 to 12; Vol. iv., Nos. 1 to 3, Nos. 4 to 6, Nos. 7 to 9, Nos. 10 to 12. *Bagnall's Flora of Warwickshire* was purchased; two small treatises on the Fungi of Finland, and two plates of illustrations of Swedish Fungi, were presented by Mr. William J. Humfrys.

Some more official business having been transacted the meeting concluded with

THE RETIRING ADDRESS OF THE PRESIDENT, SIR HERBERT CROFT, BART.

BY the rules of the Woolhope Club the retiring President is required to recount the doings of the Club in the past year, but unluckily I had to leave England on 7th April, 1890, for Australia, on important business, and so I was unable to attend the Joint Meeting of the Caradoc and Woolhope Field Clubs at Stokesay on Friday, May 30th, and for the same reason I was also absent from the second Field Meeting, of Tuesday, June 24th, when Kingsland, Eardisland, Burton Court, Stretford, and Monkland were visited, and I have ventured to insert in this address a short account of what I saw in Australia during those months, instead of a hearsay description of those meetings of the Woolhope Club. I am very grateful to Mr. Henry Southall, the President for 1889 and Vice-President for 1890, for having acted as President at those two meetings, and I also have to thank the members of the Club for the great compliment of my election, when away. But I am glad to say that as my plan of campaign was carried out without let or hindrance, I did arrive in England again on the 27th July, and so had the great pleasure of acting as President on the Ladies' Day and at the succeeding meetings of the Woolhope Club, all of which were very successful.

I landed at Port Adelaide on the 14th of last May, which month there corresponds to our November. The weather was luckily fine, and we went by rail to Adelaide, passing through suburbs in which the houses were of slight build, as if they had been hastily run up, and for a temporary sojourn. I spent the afternoon in the Botanical Garden, which is kept in beautiful order, and I saw there a great variety of plants, and also a good many parrots and other birds. The tropical plants in the palm house were novelties to me, and I also saw in another house the Victoria Regia lily, and the gardener boasted that it had had more than a dozen blossoms in the past summer. After a long voyage this garden was a great treat to me, but unluckily I had to leave Adelaide the same night for Melbourne and Sydney. Altogether I travelled by rail in Pulman cars in four colonies, South Australia, Victoria, New South Wales, and Queensland, and in each there is a different gauge. Next morning I awoke early, and was surprised to see for miles dead trees innumerable! My pleasant companion in the Pulman car informed me that these trees had been ring-barked to kill them, and when I got to the New England stations I found that ring-barking was the rule, and it is done by removing a ring of bark from the tree not far from the root. On the stations on which I stayed, the trees so killed were for the most part white gums, which are of no use whatever, and indeed it is difficult even to burn them, and so they are left to stand or fall after death, as may chance. As soon as the tree is dead the grass beneath it improves wonderfully, and becomes a good bite for sheep or cattle. One of my friends can remember ring-barking of trees forty years ago, but it has been in general use for certainly nearly twenty years, and I must say I was much struck by the excellence of the pasture on the stations I visited. Where

trees have been ring-barked the paddock is enclosed by a substantial fence, partly of wood and chiefly of wire, and in these paddocks the sheep stand the wet well, and did so in 1890. Formerly three acres were required for a sheep; now on good land each acre will carry a sheep, and in 1890 more than that on an average. The paddocks of course vary in size, but the system is an economical one, for shepherds are no longer required, as one boundary rider can look after 10,000 sheep in paddocks. On my way to Melbourne I saw for miles land without rivers, creeks, brooks, or even ditches, but generally in Australia there is not this dearth of water, and underground rivers have been recently discovered, but the droughts are very serious. So it was in 1888, when an enormous number of sheep died of indigestion, because the grass had been frost-bitten in March, and afterwards became so dried up that it contained no nourishment and was like wood shaving. Some men set a light to the grass on a station, and it was burnt, and thereby the sheep were saved, because new grass sprung up at the roots of the burnt grass; so that unintentionally the burners did that squatter a kindness. But last winter, i.e., April to Michaelmas, 1890, there was no lack of water. In New South Wales the rainfall from 1st of May, 1889, to 31st May, 1890, was stated in the papers to have amounted to 102½ inches. And all June was wet and also July, and yet the sheep in the paddocks did well—but towards the end of 1890 there was a good deal of foot-rot among the sheep owing to the great amount of rain. The floods in May and June, 1890, at Bourke and on the Darling river, were terrible, and the losses enormous. That flood was forty miles in width and lasted three months. It reached Wilcannia six weeks after Bourke. 300,000 sheep are reported to have perished. My companion had 150,000 sheep there, and by the good management of his agent in moving his flocks to the higher ground, he had only lost 2,500. My friend was also interested in the Broken Hill Silver Mine, the west of New South Wales, and reported wonderfully well of it, and stated that it had paid £80,000 a month in dividends, and the dividend for the month of April, 1891, amounts to £96,000! at the rate of 2s. per share. I afterwards saw the Government report of this mine for the past five years, and it bore out this extraordinary profit. I obtained in New England a sample of silver ore. I afterwards travelled with a mining engineer, and I learnt from him that there is a wonderful silver mine in Tasmania, and also tin mines. He had also seen most of the mineral districts in Australia, and in his opinion there is an immense deal of undeveloped mineral wealth there, and especially in Queensland. The great gold mine of Mount Morgan is in that colony, and only twenty-eight miles west of Rockhampton. Some say that it is played out, but my informant predicted for it, with good management, a great future. While I was in Queensland I saw some shallow pits, which had been dug out by tin miners and abandoned. There is a great deal of tin there, on the border of New South Wales, no doubt, although the boom is for the present over, and the Chinese are the only miners now there. However, for the month (May) before my visit the Chinese had got over eight tons of tin, and it was valued to me at about £450, but I was informed that a royalty of over £200 had to be paid thereon. While I was in New England a gold nugget was found at Herbert Park, which was probably worth over £50. I visited also the

rising port of Newcastle, and spent the day at the country house of a relative, which stands in a wood on an eminence and has fine views of Newcastle Harbour, and also of the open sea. Close by he has a coal mine, and I saw large quantities of excellent coal coming up in lifts direct from the pit. He has there erected a beautiful church, which is frequented by the miners and their families. From Newcastle there is a large export trade of coal, and a good deal goes to San Francisco. I also visited another fine chateau on the coast and south of Sydney. On the hill behind it there was also a coal mine, with a mineral line from it to the main line to Illawarra. This coal district is a great rival to the Newcastle field, but I believe the latter has the largest export trade at any rate. On the Illawarra line I saw most beautiful specimens of the gigantic tree fern, from the train, and on many gum trees the stag's head fern was growing. The railway went alongside the sea for miles, on the cliff, and it reminded me a good deal of the Riviera line, and was, I think, equally beautiful, but there even, and also in other parts of Australia, I missed the luxuriant foliage of Herefordshire. At Sydney I was most kindly entertained at the large house of the same relative in Boodi Bay, from the grounds of which I saw the far-famed Sydney Harbour and also the sea. After a short stay I left for New England, in the north of New South Wales, with my son, by the night mail, in a Pulman car, and about noon next day we arrived at our destination and were met by another relative and driven to Station A, where I was cordially welcomed. I stayed altogether at three stations up country, and also visited a fourth, and they all had plenty of water in the small rivers, called creeks. They were all much alike, one storeyed convenient wooden country houses with a broad verandah, which at Station A rather darkened the rooms ; at any rate it did so in winter (May) when I was there. Not far from the station house are cottages for the men, and some are used as spare rooms for guests. There is also a large wool-shed and stables and other buildings. All the stations I visited had excellent kitchen gardens and also flower gardens. The kitchen gardens at A and B had been recently flooded, but in winter the flood does rather good than harm. At some stations people don't trouble to dig a kitchen garden. I met a youth whose ill-fate it had been to be on a station without either kitchen garden or dairy, and the life there was very rough, and the food only damper and beef or mutton. I think this must be exceptional, for wherever I went I found excellent milk and vegetables, and on one station there was a cream separator, as they had 400 cows and milked a good many of them. I was delighted with the independence of bush life, which I found most comfortable, and luckily it was a very mild winter, though rather showery. At Station B, where I also stayed some time with kind relatives, the thermometer on June 4th was not below 43°, and two years before it went down to 20°. Cold weather is not unusual on the New England plateau, which extends from Macdonald river to the borders of Queensland, and at the highest point is 4,471 feet above the sea. The hours for meals were as follows—breakfast at eight, dinner at one, and supper at six. I never had such a good appetite in my life, and gradually got into the way of drinking tea at all meals, and excellent tea it was. Wine, beer, and spirits were always to be had, but somehow I got to prefer

tea, and certainly there is far more of beer and wine consumed in an English country house than in an Australian one. At a Club in Sydney I saw gentlemen at 6 p.m. taking dinner and high tea in about equal numbers. I was awakened the next morning after my arrival in the bush by the melodious piping of the Australian Magpie, which resembles the sound of a well-played flute. The bird is also known as the Piping Crow, and resembles a Crow in many respects, is carnivorous, and feeds entirely on insects, such as locusts, grasshoppers, centipedes, slugs, and worms. As a rule they do not eat fruit, but in winter some say they will do so. Hearing that they were easily tamed, I procured two, and actually succeeded with some trouble and expense in bringing them home with me across America. They were hatched in 1889, and had been partly tamed before I bought them. Their native names are Goorebat, Curluck, and Koorakoola. I had hoped to keep them in the kitchen garden as sentinels against slugs, etc., but unluckily one died of a chill last November, and his mate only outlived him a fortnight. I also saw the female Butcher bird, and many Soldier birds, which flock together and, uttering shrill cries, will attack even Hawks. I was close to one, and thought it rather like a Cuckoo, though it had yellow legs. At one station, in the morning, I heard the laugh of the Laughing Jackass, and also had a good look at one which was perched in the top of a dead tree. The Laughing Jackass, or Giant Kingfisher, I saw was a large gray bird, with a good deal of black on its wings and head. They are protected by law, because they kill snakes, and any one killing one is liable to a large fine.

As we were driving in the dusk in Queensland from the railway station we saw an Opossum, which ran up a tree. They sleep all day in the hollow limbs or forks of trees, and at night run about seeking the greenest leaves of the gum. One was shot while I was on the station, and in its pouch was found the young Opossum alive, which I have brought home with me, and have much pleasure in offering to the Woolhope Club Museum. I did not see a Kangaroo, but on the Sunday I was in Queensland some ladies of Station B met one in their afternoon walk. I saw two skins of a large and rare variety, the Red Kangaroo, and obtained another skin in Sydney. I have also a rug made of the skins of the harmless tree bears, which are common enough, and were shot by my son on Station B. He also sent me some Opossum skins, which are made into handsome gloves, which I found of great use during the cold night on which we arrived at Albany, but afterwards hardly ever required them. The prettiest birds I saw were the small Blue Mountain Parrots, of which I found a good many on the borders of Queensland on Station C. I admired their red breasts very much. In winter Parrots get together in flocks, which may account for my having seen so few at Stations A and B.

The Peppermint Tree furnished me with a sample of manna, which I found on a leaf, but in spring it is found on the ground in large quantities. We have a prize medal for a bottle of this manna which a lady exhibited at the London Exhibition of 1862. It is in a house in Kew Gardens, and is considered an excellent medicine. In consequence of the triumph of this lady an eminent surgeon sent over for a cask from Station A ; it was duly sent, but on arrival the

contents were found to have evaporated. Manna is a kind of sap, and the piece I saw resembled cuckoo-spittle.

I wish to say something about the sheep farming of Australia. In 1793 John McArthur began it by importing three Merino rams and five ewes from the Cape of Good Hope to Australia. In 1883 Australian sheep numbered 77 millions. In 1890 in New South Wales alone there were 51½ millions. One day I was driven in a buggy along a beautiful plain at Station A to inspect sundry sheep which were collected in flocks of about 1,500. Some were lambs and all were healthy. These sheep are of the pure Merino breed. They surprised me by their size, and reminded me of the Dorset breed, which I have kept myself, especially the rams with their horns. In 1862 the wool from this flock took a prize at the London Exhibition, and several of the sheep recently won prizes at the local show, showing that the quality of the wool has not deteriorated. Since I left fresh Merino rams have been purchased for this station, 150 guineas being paid for one ram. This is an excellent station, being on basalt, which is considered the best soil for sheep. At station B I saw eighteen of the Wolseley shearing machines in the shed. They resemble a horse clipping machine, and were worked by an engine by means of straps and wheels. The following account of competing wool machines is taken from the *Sydney Mail* of 12th July, 1890:—

"THE COMPETING MACHINES.

"The Wolseley machine was the first shearing machine practically worked in Australia, and is a purely Australian invention. It may be driven by steam or horse power, and the motion is applied through a shaft on which is a bevel wheel, which imparts motion to the small bevel pinion, the spindle of which gives motion to the core of the flexible shaft, which being connected with the shearers gives the rotary motion to the shaft, causing the cutter to reciprocate over the comb. The shearer weighs 2 or 3lbs. A forked piece reciprocates over a comb with about 11 teeth at the rate of 4,000 times per minute. The means of conveying pressure on to the fork, and thus on to the cutter, is a novel construction. It is a pin in the shape of a mushroom, and is a portion of a circle, the pin being the exact centre of the circle. Its head rests on the screw piece which is near the tension nut. The point of contact is perfectly plain, and thus as it reciprocates backwards and forwards over the comb the pressure at every point of the cutter is exactly the same. The Wolseley is used in several of the shearing sheds of Australia.

"At the conclusion of the four hours the records of the sheep shorn were as follows:—Bariquand machine, 26 sheep; Wolseley machine, 54 sheep; Australian machine, 43 sheep.

"On Tuesday, Mr. W. H. Warren (professor of engineering), and Mr. D. H. Neale (engineer on the Government railways), who acted as judges at the recent sheep-shearing contest at Moore Park, handed in their report to the Council of the Agricultural Society. They express the opinion that the Suckling and Wolseley shearing machines 'are much superior to the others competing, and each possesses exceptional merits. As far as the trials show, Suckling's compressed air system is slightly the better. These trials, however, did not give sufficient

data as to the relative amount of power required. It is therefore recommended that further trials be made to determine this point, failing which they would suggest to the council the advisability of dividing the prizes.' Mr. W. H. Suttor and Mr. John Smith, who watched the shearing, agreed with the suggestion made by the judges of the mechanical working of the machines. They observe:—'We are much struck by the excellent work done by these machines. If the Wolseley shearers had shown more care and less haste the work done would have been more equal in character.'" In 1890 one man with the Wolseley shore 164 sheep in a day, and altogether 7,000 during the shearing. My host thought highly of this machine, and maintained that by its use ½lb. weight extra wool is obtained from each sheep. This a shearer doubted, and so he was allowed to shear a sheep in the ordinary manner with shears, and very closely clipped it, but, nevertheless, ½lb., less 1oz., was obtained afterwards by the machine off that sheep's back. The sheep are in pens inside the shed, and these have exits into pens outside the shed. While I was there they were erecting outside and by the side of the shed a covered receptacle for sheep on posts of that valuable gum wood called stringy-bark; this will be of great value, for it will contain 600 sheep under cover and prevent the total stoppage of the shearing at times owing to the sheep having been wetted by the rain. Some say that after having been shorn by the Wolseley very closely the sheep cannot have as much wool in the following year, but a Scotch gentleman assured me that in May the wool of his sheep was just as long as it had been in the same month of the previous year when they had not been shorn by the machine.

At one station I saw a sheep which had been killed by a dingo, or native dog, in colour a fox, in size a wolf. These brutes are very mischievous, and a good reward is paid by Government for their destruction, and those who destroy the marsupials are also rewarded, and I regret to hear that these graceful creatures not only eat the grass but also its roots. I heard of the following high prices at a New South Wales station, also on basalt, which was sold in June while I was there. Bullocks fetched £4 a-piece, and sheep 8s. a head, but they were exceptionally good animals, and had a run under their feet which also fetched a good price. Freehold land was sold for 37s. 6d. an acre, and conditionally purchased land for 25s. an acre, on which 1s. an acre a year is for ten years payable to Government. The roads were very bad in New South Wales with few exceptions, but in Queensland they were better reported of. The fences must be substantial, for I saw two Devon bulls which were spoiling for a fight and prevented by an intervening fence, and curiously enough they took no notice of us who were spectators. My friend believes in Devons, and assures me that there is hardly any demand for pedigree cattle in New England, although they were in demand ten years ago. I heard of some excellent Hereford cattle near Tamworth, and strongly recommended a trial of that breed to him. A capital pair of white cobs took me in a buggy over the plain. I like the horses. I have models of the horses and cattle made by the shepherd's daughter. I shall never cease to be grateful for the kindness of my Australian friends, and I can only hope that this plain unvarnished sketch of Australian bush life may not be without

interest to my hearers. I have revised it since I read it at my own house after the Fungus Foray at Devereux Park.

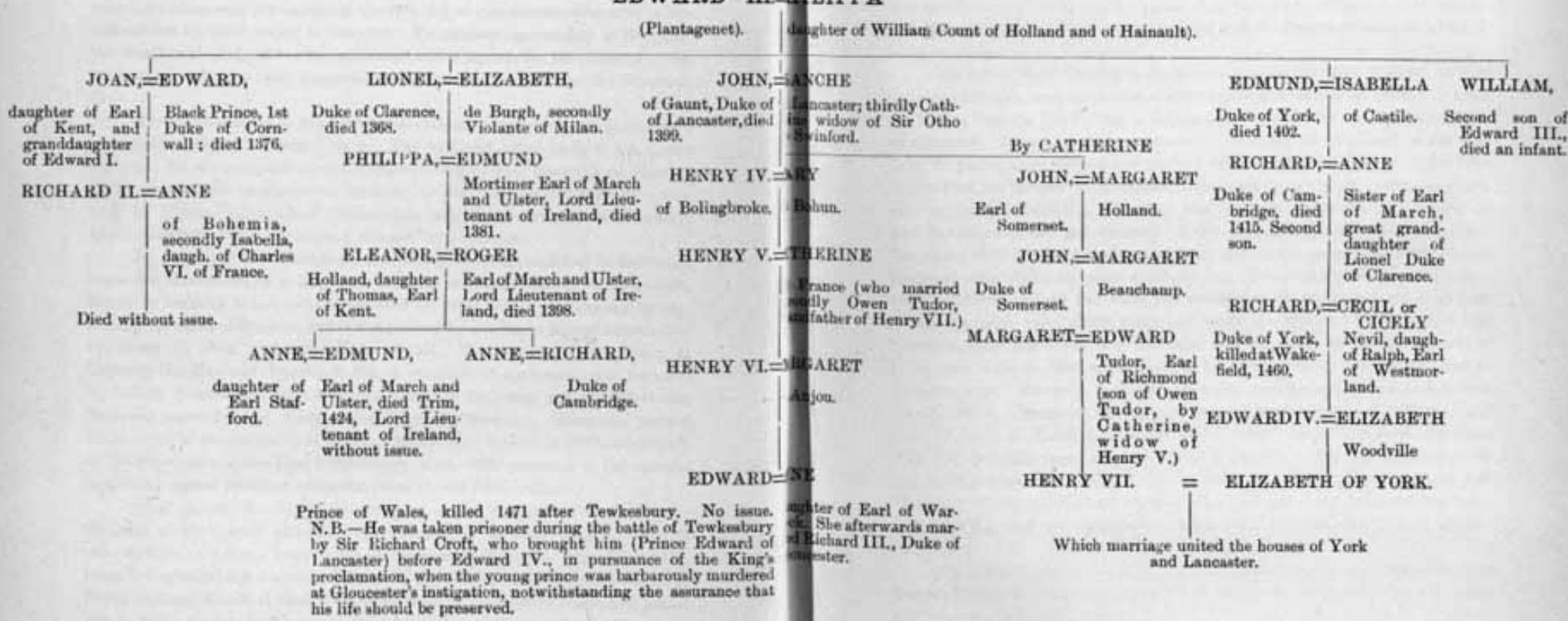
The Ladies' Day at Berkeley Castle will long live in the memory of the visitors, and the central committee of the Woolhope Club, on December 15th, 1890, passed a grateful vote of thanks to Lord and Lady Fitzhardinge for their kind permission to allow the Club to pay a special visit there on the 29th July, 1890, which vote of thanks has been since then cordially acknowledged by Lord Fitzhardinge.

The route through the Forest of Dean and over the Severn Bridge was a most interesting one, but unluckily the rain fell so persistently that most of the scenery was invisible owing to the mist. Fortunately, on arriving at Berkeley, the weather cleared, and a fine afternoon added greatly to the pleasure of the visit, which had often been suggested but never before achieved by the Woolhope Club.

Berkeley Castle is in wonderful preservation, considering its age, and is a remarkable relic of the feudal times. The hall and other parts of the Castle reminded me of some parts of the colleges at Oxford and especially of Merton, which is not quite so ancient as Berkeley, as the latter is stated to have been built by Henry II. for Albert Fitzhardinge out of the ruins of the Nunnery, which was destroyed in the reign of Edward the Confessor.

In *Domesday Book* Berkeley was a Royal Demesne, and was in the tenure (says the Handbook) of a Roger de Berkeley at a large annual fee farm rent. Roger de Berkeley is said to have forfeited the great manor of Berkeley by supporting the cause of Stephen, and it was granted by charter to Robert Fitzharding by Henry II. when he became King in 1154. But Henry II. gave Roger de Berkeley the Manor of Dursley in fee, on condition of his surrendering Berkeley to Robert Fitzharding, who took the name of Berkeley, and his eldest son Maurice, married Alice, daughter of Roger de Berkeley, whose son wedded Helena, one of the daughters of Robert Fitzharding. According to the Handbook of Berkeley, the present Lord Fitzhardinge is the 26th possessor of the ancient castle and estates in direct succession from Robert Fitzhardinge.

After visiting the Castle, the members of the Woolhope Club, under the guidance of the Rector and his Curate, inspected Berkeley Church, which is considered to be in many respects one of the finest in England. Here Henry IV. (then Bolingbroke) met his uncle, Edmund Duke of York, and the result was (says Burke in *Royal Families*) that York came over to his nephew's side, and joined him in laying siege to the Castle of Bristol, which was given up by the Governor, Sir Peter Courteney, not to Henry, but to the command of the Regent (York). York had been appointed Regent by his nephew, Richard II., during his ill-timed absence from England for the purpose of chastising the Irish, who had slain his cousin and heir, the Earl of March. How little did Henry or York foresee the wars of the Roses, or that the grandson Henry VI. of the first-named would be in his turn dethroned by the great grandson of York, namely, Edward IV.! When they met in Berkeley Church they agreed to pass over the descendants of Lionel Duke of Clarence, the elder brother of John of Gaunt; and yet Clarence's heiress


EDWARD III.=PHILIPPA
(Plantagenet). daughter of William Count of Holland and of Hainault).
JOAN,=EDWARD,
daughter of Earl of Kent, and granddaughter of Edward I.
Black Prince, 1st Duke of Cornwall; died 1376.
RICHARD II.=ANNE
of Bohemia, secondly Isabella, daugh. of Charles VI. of France.
Died without issue.
LIONEL,=ELIZABETH,
Duke of Clarence, died 1368.
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Mortimer Earl of March and Ulster, Lord Lieutenant of Ireland, died 1381.
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Earl of March and Ulster, died Trim, 1424, Lord Lieutenant of Ireland, without issue.
ANNE,=RICHARD,
Duke of Cambridge.
JOHN,=ANCHE
of Gaunt, Duke of of Lancaster, died 1399.
Lancaster; thirdly Catherine widow of Sir Otho Swinford.
By CATHERINE
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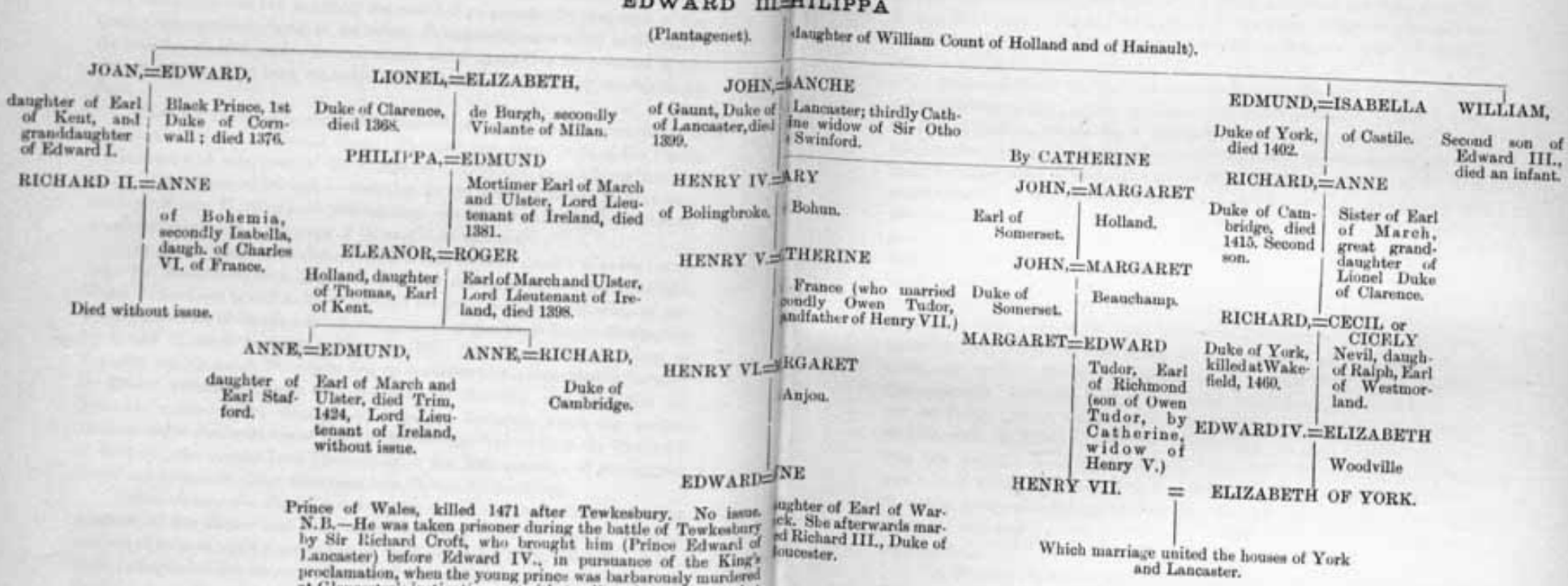
of Bolingbroke.
Bohun.
HENRY V.=THERINE
France (who married secondly Owen Tudor, grandfather of Henry VII.)
HENRY VI.=RGARET
Anjou.
EDWARD=NE
Prince of Wales, killed 1471 after Tewkesbury. No issue.
N.B.—He was taken prisoner during the battle of Tewkesbury by Sir Richard Croft, who brought him (Prince Edward of Lancaster) before Edward IV., in pursuance of the King's proclamation, when the young prince was barbarously murdered at Gloucester's instigation, notwithstanding the assurance that his life should be preserved.
ghter of Earl of Warwick. She afterwards married Richard III., Duke of Gloucester.
JOHN,=MARGARET
Earl of Somerset.
Holland.
JOHN,=MARGARET
Duke of Somerset.
Beauchamp.
MARGARET=EDWARD
Tudor, Earl of Richmond (son of Owen Tudor, by Catherine, widow of Henry V.)
HENRY VII. =
EDMUND,=ISABELLA
Duke of York, died 1402.
of Castile.
WILLIAM,
Second son of Edward III., died an infant.
RICHARD,=ANNE
Duke of Cambridge, died 1415. Second son.
Sister of Earl of March, great granddaughter of Lionel Duke of Clarence.
RICHARD,=CECIL or CICELY
Duke of York, killed at Wakefield, 1460.
Nevil, daughter of Ralph, Earl of Westmorland.
EDWARD IV.=ELIZABETH
Woodville
ELIZABETH OF YORK.
Which marriage united the houses of York and Lancaster.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Duke of Somerset.
Beauchamp.
MARGARET=EDWARD
Tudor, Earl of Richmond (son of Owen Tudor, by Catherine, widow of Henry V.)
HENRY VII. =
EDMUND,=ISABELLA
Duke of York, died 1402.
of Castile.
RICHARD,=ANNE
Duke of Cambridge, died 1415. Second son.
Sister of Earl of March, great granddaughter of Lionel Duke of Clarence.
RICHARD,=CECIL or CICELY
Duke of York, killed at Wakefield, 1460.
Nevil, daughof Ralph, Earl of Westmorland.
EDWARD IV.=ELIZABETH
Woodville
ELIZABETH OF YORK.
WILLIAM,
Second son of Edward III., died an infant.
Which marriage united the houses of York and Lancaster.

and grand-daughter Anne Mortimer, married Richard, Duke of Cambridge, and by that alliance their grandson (Edward IV.) acquired a better title to the throne than Henry VI. ever possessed. As it is not generally known I have ventured to compile a short pedigree of the descendants of Edward III., in which the Herefordshire family of Mortimer is conspicuous.

The visitors were then kindly welcomed to the Rector's garden, where Sir George Cornewall read an interesting paper on the names of plants. I may here venture to congratulate the Society on having secured Sir George Cornewall as President for 1891, for few members of the Society have ever done more for it than Sir George, who was for years their Secretary. Then we returned to Hereford, and can recollect a very pleasant visit to Berkeley Castle, of which I failed to see the like in my travels.

The fourth Field Meeting took place on Tuesday, the 26th August. A fine morning induced a large number of members to attend at Barton Station to visit the Brecon Beacons, but the day in Breconshire was not a favourable one for such an excursion. By special train we reached Torpantau by noon, and on our way there we passed some remarkably verdant hills, which reminded me of the hills surrounding the harbour of Auckland, New Zealand, and their emerald hues are also particularly beautiful. No time was lost, for Pen-y-fan, the highest of Red Sandstone peaks and monarch of the Brecon Beacons is 2,910 feet; but Torpantau itself is 1,314 feet above sea-level, so that the ascent from that point is short and certainly by no means a difficult one. Twas a misty rainy sort of a day, but it improved, and we had some fine views from the summit over a large map of country, with many fields white and ready for harvest. Then came a bad hailstorm, after which the rain descended and somewhat spoiled the pleasure of a ten mile walk to Brecon, descending by Cwm Serre to the Brecon road at Pontcyneddyd. However, it turned out a fine evening, and we had time to visit the old Priory Church at Brecon and to refresh ourselves at the Castle; and then by train to Talyllyn Junction again, where we were rejoined by those who had returned from the Beacons to Torpantau. For the botanists there was a large field, and plenty of time to work in. The Stationmaster's wife at Torpantau kindly provided tea for those who returned there. Altogether a fairly successful day, and the arrangements were excellently planned and punctually carried out.

On Monday, September 29th, the Mycologists arrived at Hereford for the Fungus Forays, and the first Fungus Foray took place on the following day, when the lawns and grounds of Whitfield were visited by kind permission of Mr. Clive and Mrs. Greathed. On Wednesday, October 1st, the venue was Haywood Forest for Belmont and the vicinity of Hereford; and on Thursday, 2nd, Madame de la Barre Bodenham kindly allowed an invasion of the lawns and grounds of Rotherwas. On the same day at the Annual Meeting the Rev. Sir George Cornewall was elected President for 1891, and Sir Herbert Croft, Vice-President. The Dinner took place at the Green Dragon Hotel, and was largely attended, after which there was a Conversazione at the Free Library. On Friday, October 3rd, Lady Emily Foley allowed a visit to Devereux Park, and the muster was a

large one. A short visit to Stoke Edith Church, and then across the park, under the guidance of the Rector, the Rev. W. H. Lambert, brought us to the melancholy lake at Devereux Park. This park is very near to the parish of Putley, and Putley belonged in the 11th century to Devereux, and in 1316 to Comyn, who sold his lands, and Judge Cooke informs me that the tradition is that the place known as Devereux Park belonged to the Putley branch of that ancient family, and was enclosed in Stoke Edith Park in 1685 by a grant of King James II., which is preserved at Stoke Edith House. It was a most enjoyable saunter along the turf drives, from which we had extensive views of the Malverns and the Frome Valley, and I was glad to hear from the leading Mycologists that they had obtained some desirable specimens of fungi, notwithstanding their scarcity owing to the extreme dryness of the autumn. To Lady Emily Foley the Club is again indebted for a very pleasant visit to her demesne, and on the way back to Hereford it gave us very great pleasure to welcome the Mycologists and visitors at my own home, where the chatelaine was able to show a thriving Macartney rose on a southern wall. Conscious I am of many shortcomings in the discharge of my duty as President, yet I shall always remember my year of office with pleasure, and feel grateful to the members of the Woolhope Club for their kind indulgence to me and for their hearty support.

A vote of thanks to Sir Herbert Croft for his services as President, proposed by Rev. Sir George Cornewall, was seconded by Mr. Rankin, M.P., and carried with applause.

Woolhope Naturalists' Field Club.

MAY 28TH, 1891.

ON Thursday, May 28th, the Club visited the Woolhope Valley, the district from which, in 1851, they assumed their name.

There was a good attendance of members and their friends, including the President, Sir George H. Cornewall; Vice-Presidents, Sir Herbert Croft and Dr. T. A. Chapman; the Rev. J. D. La Touche, the President of the Caradoc Club, with his son, Mr. Norman La Touche, of the Public Works Department, India, and friend, Mr. F. E. Staughton; Members: Captain de Winton, Revs. J. O. Bevan, J. Dunn, W. H. Lambert and H. North; Messrs. W. H. Banks, Samuel Carrington, H. Easton, W. C. Grant, C. G. Martin, H. Southall, James B. Pilley, the Assistant Secretary, and H. C. Moore, Hon. Secretary; with the following visitors: Rev. E. R. Firmstone, Dr. G. Bainbridge, Dr. E. J. Roberts, Messrs. Hugh Croft, J. T. Hereford, P. B. Marshall, C. Whatmore, and Mr. Henry T. Timmins, who is preparing pen and ink sketches for his forthcoming work, *Nooks and Corners of Herefordshire*.

Leaving Hereford in conveyances, the members alighted at the Moon Inn, Mordiford, 153 feet above the sea level, and commenced their walk along the road leading to Woolhope, by way of Haugh Wood and Broadmoor Common. Observing, *en passant*, the sections of Ludlow drifts on the left hand, a halt was made at the transition, so plainly marked on the right hand across the Pentaloe brook, between the Ludlow Rocks and the Old Red Sandstone, with an intermediate detritus of drift, and, proceeding a few hundred yards up the hill, the members divided into two parties, the Botanical section following Mr. C. G. Martin up the hill, whilst the Geological section, under the Rev. J. D. La Touche, branched off to the right for the examination of the quarry of Woolhope Limestone, situated between Scutterdine and Lower Littlehope, which said limestone forms a wall all round the upheaval of the lower geological stratum of Llandovery Sandstone, of which the central dome of Haugh Wood, an extensive wood of 876 acres, is constituted. The two parties reunited at the summit of Haugh Wood, 604·9 feet above the sea level. After enjoying the glorious panorama of the Welsh and Herefordshire hills, with the City of Hereford in the valley, the members, retracing their steps so far as the footpath on the right hand leading to Haugh Wood Pound, struck through the wood, picking specimens of the Aquilegia, which here has become naturalized, and passing occasionally small outcrops of the rock which forms the hill, whose characteristic fossils on examination proved it to be the Llandovery Sandstone. Pentaloe brook was reached again opposite the keeper's cottage, at Mangerdine. Pentaloe brook follows the course of a geological "fault"—the two extremities of the wall of Woolhope Limestone round

Haugh Wood may be observed, whilst on the opposite side of the brook the Wenlock shales and strata appear. Crossing the brook the members found themselves in Bear Wood. Whence this name? We have the Serpent's-lane leading from the Littlehope quarries into the Fownhope road, where the Green Dragon, of old tradition, would descend to quench its thirst in the river Wye! Have our botanists given the name to this wood from the too unpleasant frequency of the *Allium ursinum*, with its attractive efflorescence and repulsive odour of garlic, and of the bear's foot (*Helleborus fœtidus*) with its showy green foliage, conspicuous at a considerable distance? Emerging from Bear Wood, the party, by permission of Mr. Morgan, proceeding through his farm yard at Warslaw, with but little time for the examination of the sections of Wenlock formation in the lane, through Timbridge wood leading to the main road from Old Sufton to Checkley Common, which was crossed, ascended Backbury hill, halting to observe the formation of the valley on the north side, between the spur of Hen Hope on the right or east side, and the spur of Fen Hope on the left or western side. Opinions vary as to whether this strange amphitheatre-like valley was formed by land-ice, or by ordinary denudation, since ordinary rainfall would have produced ravines rather than so extensive a scooping out between these two spurs. Upon this point the Rev. J. D. La Touche remarks:—"The similarity of this amphitheatre-like valley to the *cirques* of the Alps has led some geologists to refer its origin to glacial action, this having been generally supposed to be the cause of these latter formations. But, as Professor Bonney has shown (*Quart. Jour. Geol. Soc.*, Aug. 1871), it is most improbable that this theory is correct, and it is much more likely that they are due to the ordinary action of water. In this case the ridges of hard rock at the lower part of the gorge, broken through by fault, would present an obstruction, and the softer slats above would be removed by denudation, carried on for a sufficient length of time."

At two o'clock, according to the programme of the day, the members had assembled at St. Ethelbert's Camp, on the top of Adams' Rocks, from which summit of 738·6 feet above the sea the physical geology of the Woolhope valley can be studied. Upon the present occasion the explanatory diagrams which Mr. Moore had distributed amongst the members for their study, enabled them all to grasp this very instructive epitome of the Upper Silurian system of geology—of which Sir R. Murchison (*Siluria*, page 118, 1854) has written—it is the "finest known example within the British Isles of a valley of clean denudation, as well as of elevation." It is also referred to in Humboldt's *Cosmos* (Vol. v., page 231, Bohn's edition). Mr. Moore also exhibited a plan, upon a large scale, of the camp, showing its double entrenchments upon the exposed sides.

As regards the Botany of this district, from the lane leading from the "Moon" Inn at Mordiford to the Scutterdine and Littlehope quarries, a specimen of *Helleborus fœtidus*, conspicuous by its showy green foliage, was pointed out growing on a hedge bank in a field on the left at some distance from the lane. *Chrysosplenium oppositifolium* or Golden Saxifrage grows in wet places between the "Moon" Inn, and the lower part of the road leading to Haugh Wood. On the hill *Ophioglossum vulgatum* is found in a meadow on the right. *Pyrus aria*

scarcely budding into leaf, *Pyrus torminalis*, *Viburnum opulus* and *lantana* were all met with on the road in very close proximity, and not far off *Rhamnus frangula*. *Cephalanthera ensifolia* has been found in the wood, and more common are *Habenaria viridis* and *Epipactis palustris*. The lower parts of the hill near the Pentaloe brook are carpeted with *Scilla nutans* and *Allium ursinum*. *Aquilegia*, although probably originally an escape from the cottage gardens, has become naturalized in many parts of Haugh Wood. That troublesome weed, as Bentham says, but much cultivated for its medicinal purposes, *Ægopodium podagraria* clings to the neighbourhood of cottages. On Backbury Hill may be found *Geranium lucidum*, *Draba verna*, *Myosotis collina*, *Saxifraga granulata*, and *tridactylites*; in the ditches surrounding St. Ethelbert's Camp are *Paris quadrifolia*, *Listera ovata*, *Daphne laureola*, and *Lathræa squamaria* (Toothwort) growing as a parasite on the roots of the hazel tree. *Cotyledon umbilicus* grows on the rocks just below the summit of Adam's Rocks. *Carum Carui* appears indigenous in the Woolhope valley, growing in meadows near Winslow Mill situated eastward of Woolhope village.

Whilst refreshments were being taken on the summit of St. Ethelbert's Camp, the members were, by aid of Mr. Moore's diagrams, gradually familiarising themselves with the physical geology of their surroundings.

The following paper was then read on

THE GEOLOGY OF THE WOOLHOPE DISTRICT.

By the Rev. J. D. La Touche.

It is not unusual to meet with people, who, though well educated and thoughtful in most subjects, yet listen with a kind of amiable incredulity to the statements of geologists when they speak of the forces to which the earth's crust has been subjected in past time. Could such persons visit the district in which we now are assembled, and study, even cursorily, the arrangement of the rocks that circle round this beautiful valley, and observe their inclination as they pass from north to south, or from east to west, they could hardly fail to meet with facts amply sufficient to convince them that not only a definite order is observable in the succession of these strata, but that, subsequent to their deposition, a mighty upheaval has altered their originally horizontal condition, and in doing so, has fractured and disconnected portions of them where they were once continuous. And if, travelling to the north-west into Shropshire, and to the south-west into Wales, he should meet with strata nearly identical with these as well in lithological character as in the fossil remains with which they are charged, and should find the very same sequence and succession of extinct forms wherever he goes, he must assuredly admit that so far, at least, the facts alleged are not visionary, but rest on as solid a foundation as any that are the result of observation in other sciences. Within the compass of this little valley, some five miles in its greatest length, we have an epitome of the whole of the Upper Silurian system, and, indeed, one of the most important clues to decipher it, by which what were at one time regarded as a heterogeneous mass of shales, sandstones, and limestones, grouped under the common name of grauwacké, have by the labours of Murchison and others been explained and reduced to order. The dome-like hill of the Haugh Wood, which occupies the centre of this valley, consists of rocks that underlie the Upper Silurian. Here may be seen an exposure of the Llandovery or May hill Sandstone which marks the boundary between the Silurian and (as it is now called) the Ordovician series. Above this, and dipping away on all sides, comes a somewhat local stratum called the Woolhope limestone in which have been found some fine fossil forms, including *Homalonotus delphinocephalus* and *Bumastus Barriensis*, as well as others common to the Wenlock series. Then in succession may be traced the Wenlock shale, surmounted by its characteristic limestone, which forms so important a feature in its development in Shropshire and elsewhere, and lastly, the lower and upper members of the Ludlow rocks separated by the Aymestrey limestone. On all sides these successive beds are seen to dip away from the central dome and to sink beneath the vast tract of Old Red Sandstone which surrounds them and occupies so large a part of Herefordshire. Nor are those most interesting beds here absent which indicate a transition from the more primitive forms of the Silurian age to the higher types that became more prevalent, if they did not originate, in succeeding Devonian times. Mr. Brodie, in the *Woolhope Transactions* of 1870, p. 273, has given an important paper on these beds

at Perton, near Stoke Edith Park, and an account of his discovery of some splendid specimens of a Eurypterus, which has been named after him. Shales of a similar character, and occupying the same relative position, have been found wherever the junction between the Silurian and Old Red series has been exposed to view.

The question here presents itself, under what conditions this very interesting and instructive district has assumed its present conformation. It is perfectly obvious that a force from beneath has upheaved the strata from their originally horizontal position, and that subsequently the great dome thus produced has been removed by denudation. But was this upheaval a gradual or sudden one, and were the denuding forces of a violent nature or the gradual effects of the atmosphere, such as we this day witness on all hands? And lastly, what has become of the material of which the dome was formed?

The answer to this last question is found in the considerable deposits of drift, referred to by Sir R. Murchison, and described in much detail by Mr. Merewether in an excellent paper read before this club in the year 1870, who thus summarises the information that his long residence in the neighbourhood and careful observation had enabled him to collect. These drifts "are found," he says, "at Mordiford, by the side of the road leading to Woolhope, through Haugh Wood, then the high and long bank of drift opposite the bridge leading to Holme Lacy; the drift at the turn of the road, about 300 yards further on; the great mass of drift on the right hand side where the river approaches close to the road, in the village of Fownhope, between a bridge over a small stream of water and a draper's shop, nearly opposite the Green Man Inn." And he mentions finding among the gravels a considerable number of specimens of the fossils peculiar to the rocks of the Woolhope valley, so that there can be no doubt as to their origin. But much difference of opinion has been expressed as to the mode in which these accumulations have taken place. The opinions of earlier geologists were in favour of some sudden and violent upheaval and the action of enormous volumes of water rushing over the torn and dislocated masses of shattered rock. In 1866 Mr. Symonds speaks of earthquake motion as having been the operative cause of the disturbance (though I have every reason to believe that in later years he would have expressed a very different view). In Sir Roderick Murchison's description of the district we continually meet with such expressions as "violent extrusion," "great convulsions near Dormington," and he writes as follows:—"What agency, I ask, except that of very powerful currents of water, could have removed every fragment of *débris* that must have resulted, whether at one or several periods of elevation, from the destruction of all the once superposed arches of rock, and have scooped out all the detritus arising from such destruction, from the circling depressions, the central dome, flanking ridges, and former cover of those Silurian strata? And if that water had not been impelled with great force, caused by the sudden uprises of these rocks from beneath the Old Red Sandstone, what other agency will account for so complete a denudation, the broken materials having only found issue by one lateral gorge, which was, we see, opened out by a great transverse fraction of the encircling ridges?" (p. 492, *Siluria*). We have here an eloquent and picturesque description from the pen of a firm believer in

what is called the convulsionist theory of geology. And, indeed, if but the limited space of a few thousand years be all that we are justified in allowing ourselves to account for what has here evidently happened, a *deus ex machinâ* in the form of some such mighty convulsion as Sir Roderick has pictured, is manifestly demanded. But as experience and observation have extended recourse to sensational hypotheses involving such violent action has been seen to be unnecessary and unfounded; and I believe that all competent geologists of the present day maintain that only on the clearest evidence ought they to be admitted. It is seen that, allowing sufficient time, the forces called into play by frost and rain, breaking up the rocks, first into larger and by degrees into smaller masses, are amply sufficient to effect all the phenomena which we here behold. If *e.g.* you visit the huge quartzose masses of rock that rear their giant forms above the moorland that covers the ridge of what are called the Stiperstones in Shropshire, you will not fail to wonder at the large blocks of stone which strew the ground in long lines down the slopes of the ridge. Starting from the foot of each large mass these stretch away in gradually diminishing size, and tell, as plainly as rocks can speak, of a history of extremely slow movement, resulting from the descent down the hill of the soil on which they lie, and that as they proceeded on their way they have been broken up by atmospheric agency into ever smaller portions, until, at last, they are reduced to the condition of sand and clay. And that this motion of the soil is no myth you will be convinced, if you observe the way in which the edges of strata which dip inwards towards the centre of a hill are bent by the continued friction of the surface earth upon them as it slowly moves downward. Given many millions of years for the continuous action of the forces now in operation, what may not be effected? Some observations made several years ago, which at the time attracted the attention of some of the members of the Woolhope Club, upon the quantity of sediment annually carried down by the waters of the Onny, showed that the denudation of its basin would probably amount to about a foot of the ground's surface in 400 years. I should hardly venture to quote this result as sufficiently trustworthy, since the observations were not continued long enough to make them quite satisfactory, but that I have lately had the pleasure of seeing the estimate confirmed by a passage in Mr. Wallace's splendid work on "Island Life," in which he gives the average arrived at by a very large number of observations of the same kind made in other parts of the world. Now, the area of the basin from which the waters of the Onny are supplied measures about 84 square miles, and taking the average height of the surrounding hills, at the very moderate estimate of 400 feet, I find that a valley of such dimensions would, at the above rate, be worn down in about two million years, though this is probably far below the mark, since denudation would be much slower when the land was first emerging from the ocean than afterwards. Various estimates have been made, founded on data, that I cannot now discuss, as to the time that has elapsed since the commencement of the deposition of the sedimentary rocks. Of these the most probable, as well as the most moderate, appears to be that of Mr. Wallace in the book I have alluded to, and this amounts to no less than 28 million of years. Now, such being the vast spaces of time involved in geologic change, it can hardly be thought excessive

to assign two millions, which, although a small portion of the whole, is inconceivably great, as the period required to move the mass of solid material that once extended over the place where we now stand, assuming that a valley of 84 square miles by 400 feet deep may have been excavated during that interval.

And what, on the other hand, are the evidences of any exceptionally violent action? The small mass of intrusive diorite at Bartestree suggests a certain amount of volcanic disturbance in the neighbourhood; but its effect must have been quite insignificant. Then there are the beds of drift and gravel. Did they indeed contain a large number of angular fragments torn from the living rock, and great irregular masses such as we know to be among the ejectamenta of volcanoes in the present day, and swept into their present position by waters of a mighty deluge, something might be said in favour of such a hypothesis. But if, on the contrary, they are largely made up of rounded and smooth and water-worn stones the evidence would point the other way. Such rounded pebbles and gravel can only have been formed by attrition, and tell quite clearly of the lapse of a lengthened period of time for their production.

That from time to time storms of great violence have visited this district, as elsewhere is of course true. An account of one such storm was given in the *Hereford Journal* of May 29th, 1811.* Floods like these have no doubt swept before them large quantities of detritus such as are found in the beds of drift; the valley has moreover been probably elevated above the waters of the ocean, and again plunged beneath them more than once; and, as Mr. Merewether suggests, the tract between this and Dinmore and Holme Lacy may have been a vast lake, and doubtless all these changes have left their marks on the geologic features of the district; but I cannot concur with him or others in supposing that they afford any proof that Woolhope has been the scene of any exceptional convulsion.

I hope I may be excused for dwelling so long on this point. I have done so since, in the many interesting papers which I have consulted in your *Transactions*, I do not find that it has been discussed from this point of view. In conclusion, it may be of interest to notice that in comparison with the thickness of the different members of the Silurian strata to the west, their representatives here show a marked diminution or thinning out. I have been unable in the various papers recorded in the Club's *Transactions* to find any clear statement upon the actual thickness of the various strata at Woolhope, a want which I venture to suggest it might be desirable for some member to supply. In a paper, indeed, by the Rev. Robt. Dixon, read in 1867, he gives certain measurements, but they appear to have been deduced from the section of the survey and not from original observation. In this statement the thickness of the Wenlock series is estimated at about 1,400 feet, while I find in Woodward's geology that the same beds measure at Malvern, not very far distant, only 790 feet. There is, I imagine, some inaccuracy here which would be well worth clearing up. In Shropshire, these Wenlock strata are some 2,400 feet thick, and it is probable that a regular thinning out in their dimensions, as in those of the higher strata, will be found to have occurred as we trace them to the east. The relative thickness of beds in different

* *Transactions*, 1867, p. 167.

localities is one of the most interesting and important questions that can engage the attention of a geologist, since much light is thrown by its determination on the configuration of the land in distant epochs, and on the primæval history of the earth.

Upon the conclusion of Mr. La Touche's paper, the President, on behalf of the Club, suitably thanked him. Then some business of the Club was transacted, including the election of the Rev. J. O. Bevan, of Vowchurch, as delegate to the British Association for the advancement of Science at their meeting to be held this year at Cardiff.

The following gentlemen were elected members of the Club:—Mr. C. G. Blathwayt, of Walney House; Rev. C. S. Hagreen, Vicar of Marden; and Rev. Plaskitt C. Lewis, of Oldcastle.

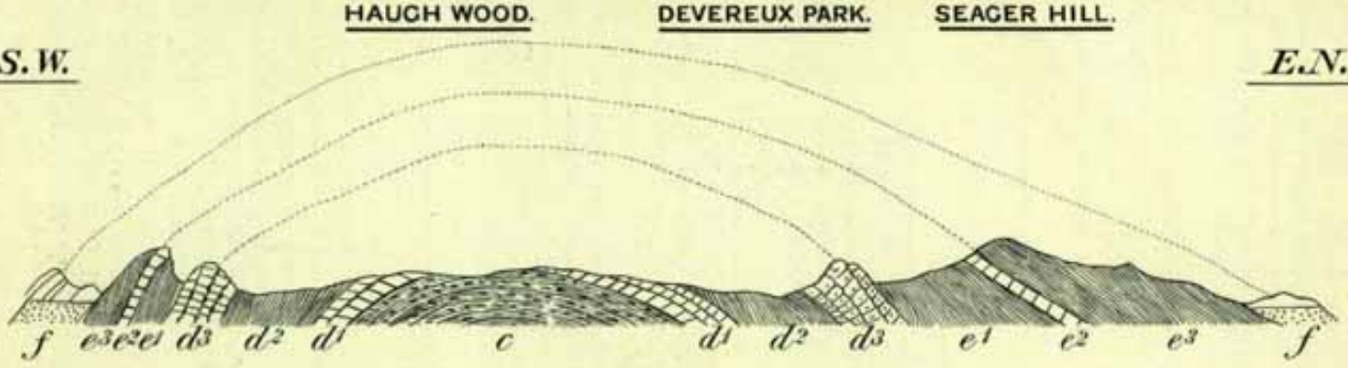
The following few remarks, entrusted to the charge of the Honorary Secretary, were prepared by Mr. George H. Piper, F.G.S.:—

The chief object of the excursion to-day is to familiarize ourselves with the geological structure of the Woolhope Valley, and while using the science of Palæontology in detecting the rock formations which come under our notice, we must not lose sight of the fact that our present pursuit is physical geology.

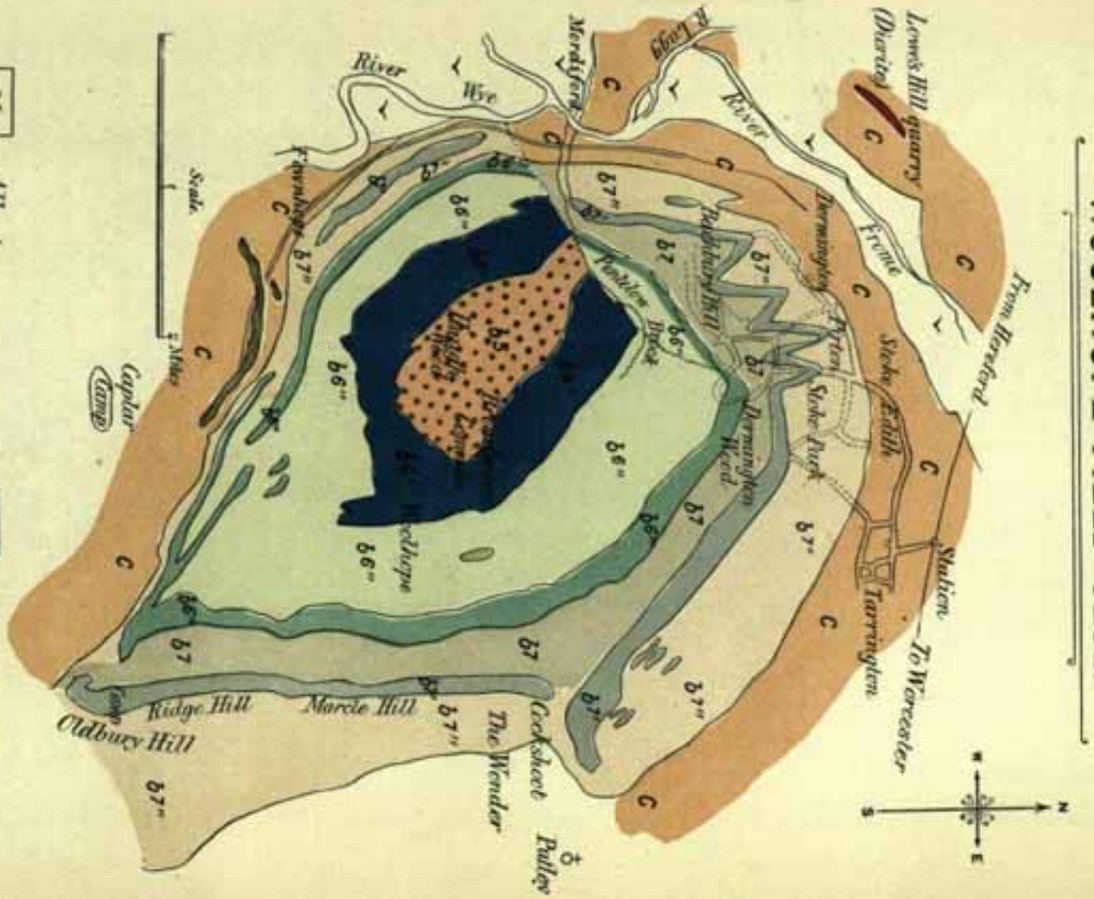
When we call to mind that amongst other eminent geologists Sir Roderick Murchison and the Rev. William S. Symonds have made this valley the object of their research, and have written fully upon it, I must ask you to acquit me of plagiarism when you find that in the following short remarks I have made free use of their valuable books on the subject. Murchison describes Woolhope as being the most symmetrical valley of elevation in the British Isles. There the limestone, as seen in the diagram (of which I have made copies for your use), forms the exterior coat of a central dome marked C, in which the summit of the Upper Llandovery (or May Hill Sandstone) is barely visible. Sections of this formation may be seen near to the village of Woolhope. From this rock the Woolhope limestone, D. 1, dips away on all sides to pass under the Wenlock shale, D. 2. Quite near to the Church there is a large open quarry of Woolhope limestone. The Wenlock limestone, D. 3, plunges under the Ludlow rocks, E. 1, 2, and 3, and Old Red Sandstone, F, as displayed in the diagram. In short, you have before you on either side of the central dome of Haugh Wood a full exposition of all the Upper Silurian rocks, from their base to their summit.

The phenomena of this most remarkable elliptical mass, insulated and raised up through a great area of overlapping Old Red Sandstone, were first described in the "Silurian System." The term "Valley of Elevation" does not convey an adequate idea of this wonderful geological scene, for within the encircling ridge of Middle Ludlow rocks (or Aymestrey limestone), E. 2, there is one parallel surrounding valley in the Lower Ludlow Shale, E. 1, and another in the Wenlock Shale D. 2, or between the ridge of Wenlock Limestone D. 3, and the Woolhope Limestone D. 1. Thus, by the elevation of the various strata around a common centre, and by the subsequent excavation of their softer members, the hill or dome

SECTION ACROSS THE ELEVATED VALLEY OF WOOLHOPE.



c	*Upper Llandovery Rock*
d1	*Woolhope or Lower Wenlock Limestone and Shale.*
d2	*Wenlock Shale.*
d3	*Wenlock Limestone.*
e1	*Lower Ludlow.*
e2	*Middle Ludlow or Aymestry Limestone.*
e3	*Upper Ludlow.*
f	*Old Red Sandstone. (base of)*



of Haugh Wood has been left by natural causes, as if it were a huge artificial entrenched camp, with two encircling mounds and two circumfluent valleys.

Mr. Symonds says that the term "Valley of Elevation" does not convey an adequate idea of the wonderful geological history portrayed in the valley of Woolhope. The central dome of Haugh Wood is occupied by the May Hill rocks with Pentameri and encrinital stems, the central nucleus being no doubt composed of some far older formation, probably Cambrian or Syenitic rocks. Around the May Hill beds the Woolhope limestone circles dip away on all sides under the Wenlock shale and limestone, and these again under the Ludlow rocks and the Old Red Sandstone.

The Woolhope district in its extension from Marcle to Mordiford may be denominated as an elongated pear-shaped mass of Upper Silurian deposits, which were elevated through the overlying Old Red Sandstone, and were then denuded down to the May Hill beds at the domed Haugh Wood.

The district offers a peculiarly instructive history to the physical geologist, for when, after studying the rocks around and across this area, he beholds the shales hollowed into valleys, and the tilted limestones standing out like the walls of an encampment, he cannot doubt that the stratified masses now occupying hills far asunder, were once parts and portions of strata which were formerly conterminous and joined together, all of which must have swept nearly horizontally over the rocks which now form the dome of Haugh Wood. It is evident that earthquake agency upheaved the Silurian rocks through the overlying Old Red deposits, but *that* great power, denudation, has also wrought with tremendous force, for scarcely a fragment is left of the rock masses that once formed the roof, or overlying crusts of the elevated strata, which must have been denuded and carried off as the elevatory movement was gradually progressing.

Some geologists have believed that the gradual action of the sea has produced the wonderful results of erosion which present themselves on the surfaces of rocks of all ages. But if we look to the agency of present seas we know that the deep ocean never erodes, and that, on the contrary, perfect tranquillity reigns at its base. If, then, denudation in our time is produced only by breakers or by waves acting on coast-lines which have, we know, a wasting and denuding power over limited regions, how account for the perfectly clean sweep which has been made of wider tracts? With the exception of ordinary submarine currents to which many continents must have been subjected, what more natural method of explaining these facts than by referring them to the translation by vast bodies of water suddenly put in action by those upheavals of parts of the earth of which we have clear evidence? Judging from the fact that marine gravel and shells do often lie in terraces at different altitudes on the sides of our mountains, must it not be admitted that each of the upward sudden movements leaving such a terrace must have given rise to waves of such magnitude and force as would sweep over and scour the low tracts, destroying land animals in their course, and mixing them up with those of aquatic creation? How explain the mixture of bones of all sorts of animals except by some such catastrophe! Murchison says emphatically, "Let not beginners in geology be led away by those who, deriding convulsionists

and catastrophists, repudiate data, which many men who have passed their lives in the study of the dismemberments of the rocks think are inexplicable, without appealing to much more powerful causes than any of which history records an example. What agency except that of very powerful currents of water could have removed every fragment of the débris of the Silurian Valley of Elevation of Woolhope, and scooped out all the detritus arising from its destruction, from the circling depressions, the central dome, flanking ridges, and former cover of those Silurian strata? And if the water had not been impelled with great force, caused by the sudden uprising of these rocks from beneath the Old Red Sandstone, what other agency will account for so complete a denudation, the broken materials having only found issue by one lateral gorge, which was, we see, opened out by a great transverse fracture of the encircling ridges?"

Leaving St. Ethelbert's Camp, the members descended, some by the way of the landslip from Tower Hill of three acres of land with forty oak trees, which occurred in the year 1844, the remainder through Perton lane, where the geologists obtained, either in the hard nodules of the Middle Ludlow or Aymestrey formation in the exposure in the cutting, or in the grand exposure of the same formation some sixty or seventy feet high, in the quarry upon the left hand, specimens of the following fossils:—*Atrypa*, *Bellerophon*, *Orthoceras*, *Rhynconella*, *Strophomena*, etc. The conveyances were rejoined near Perton farm, and the journey homewards resumed, until a halt was called at Mr. Forman's farm at Bartestree, whence a walk across the field brought the party to the Looseshill Quarry close behind the Bartestree Convent, the property of Mr. William Henry Barneby.

When the members had examined the metamorphosis of the Old Red Sandstone by the eruption of Greenstone or Diorite, the Rev. J. D. La Touche gave the following description of igneous rocks:—"Much attention has of late years been given both to the materials of which igneous rocks, such as those before us, are composed, as well as the conditions under which they have assumed their present form. Studied in the light which existing volcanoes throw upon the subject, we find that they may be classed under three divisions. First, the ashes and scoriæ which are blown from the crater, and which are afterwards consolidated into beds, either under water or on land; secondly, molten matter, intrusive in the cracks and faults of pre-existing sedimentary, and sometimes volcanic, rocks; and thirdly, great sheets of lava spread over the surface. We have an example here of the second of these three classes. This mass of Diorite, as it is called, was once in a molten state, and has clearly left the traces of its intense heat on the Old Red Sandstone wherever the point of contact may be observed, baking it and altering its character. Not only so, but its very composition tells the same tale, since, as Professor Judd and others have pointed out, the central portions of the mass are more coarsely crystalline than the parts which are in contact with the sandstone. This may be easily understood if you consider what takes place were you to dissolve a quantity of carbonate of potash or other crystallisable material in water. If the solution be allowed to cool and evaporate very slowly, large crystals will be formed, whereas if the cooling takes place very rapidly they will

be much finer. It probably took a very long time for the central part of this Diorite to become solid, hence we should expect to find its texture there to be more coarsely crystalline, while what is in contact with the original rock would have a homogeneous and even a glassy appearance. The same remark applies to other igneous rocks as well, and has led to their classification. Some at great depths in the bowels of the earth have taken enormous periods of time to cool and become solid. In these are found crystals, sometimes of very considerable size. They are termed granites, syenites, gabbros, classed according to the percentage of silica that they contain; others, poured out over the surface, have assumed an altogether different aspect from the fact that they have cooled more rapidly; they are termed rhyolites, andesites, basalts. Now it must be remembered, that, though so unlike in appearance, the ultimate materials of which these rocks are formed respectively may be identical; and thus an important clue is afforded to determine their history and the conditions which attended their deposition.

It is well to bear clearly in mind the sequence of events which preceded the occurrence of this igneous outburst. The series of Palæozoic strata, up at least to the Old Red, had already been deposited: each of its members had been consolidated into hard rock, when, owing to some disturbance of the earth's crust consequent on its contraction and the folding of its surface, a portion of the great molten mass which forms the centre of the globe was forced up into the fissure that was created. It is a striking fact that we are literally walking each day of our lives on what might, at any moment, be a volcano. If we were to make a hole in the earth beneath our feet, we should find that at the depth of ten miles the heat would be sufficient to melt iron, and at twenty miles, all known substances. Not that they are actually in a liquid condition, since the enormous superincumbent pressure is sufficient to prevent this. But the fact that, according to Professor Prestwich, an increase in temperature of one degree Fahrenheit is found to occur for every 45 to 50 feet sunk in deep mines, proves that a heat such as I have stated would be the result. This great central heated mass, then, being only kept in a solid and quiescent state by the enormous pressure of the crust above it, it may easily be supposed that a certain diminution of that pressure is only required to set free some of the force stored up. A slight movement in the surface rocks caused by the contraction that is always going on, and the infiltration of water through the cracks caused thereby, would supply all the conditions necessary for an outburst of lava; either violently, through the crater if a volcano, or, more quietly, by welling up through fissures, as it has done in this instance.

There is good reason to believe that there were certain epochs of exceptional igneous activity such as I have spoken of in past time. What are now called Archæan rocks are believed by some competent authorities to represent matter in a plastic condition previous to the deposition of any sedimentary rocks. Of this state of things we have but very imperfect knowledge; but since the formation of sedimentary strata there is positive evidence to show that during the Ordovician, or, as Sir R. Murchison called it, the Lower Silurian Epoch, again in the Carboniferous, again in the Permian, and lastly in the Tertiary, there have been powerful volcanic disturbances, with intervals of repose between them. It must have

been, of course, to one of the last two of these that this mass of Diorite is due, probably to that in which the basalt of the Clee Hills in Shropshire was poured forth, and which took place after the coal measures had been formed.

I shall not attempt to enter upon the complicated subject of the composition of igneous rocks further than to say that Diorite belongs to what is called the sub-acid group; that is, to rocks that contain less silica than the granites and rhyolites. The determination of this fact depends on chemical analysis, but may also be made by the examination of thin sections under the microscope in polarized light, such as you have this day had an opportunity of seeing."

A small instrument, ingeniously devised for field use by Mr. La Touche, composed of a pair of Nichol prisms, had been previously handed round to illustrate the remarkable change of colour and the development of texture seen in various minerals when viewed in polarized light, nor can it be too widely known amongst the members of the Club, that Mr. La Touche has a friend, Mr. Parry, of Lydbury North, Salop, who is capable of making the delicate sections of mineral as required for this instrument.

Thanks having been accorded to Mr. La Touche for this unexpected impromptu explanation, time was called for resuming seats in the carriages, which were pulled up again at Lugwardine Court, for tea and other refreshments, by the invitation of Sir Herbert Croft, Vice-President, after which the members, grateful for their repast crowning the pleasures of the healthy outing, returned to resume their duties at their respective homes.

Woolhope Naturalists' Field Club.

JUNE 30TH, 1891.

THE second Field Meeting of the Club this year took place on Tuesday, June 30th, at Aberedw, in Radnorshire. The meeting was well attended; twenty-nine members took their seats at the Barton Station, Midland Railway, Hereford. The party, gathering contingents at the intermediate Railway Stations, mustered forty-eight upon arrival at the rendezvous, Aberedw, and was thus constituted: The President, Rev. Sir George H. Cornewall; Vice-Presidents, Sir Herbert Croft, and Rev. Augustin Ley; Rev. J. D. La Touche, President of the Caradoc Club; Members, Revs. G. E. Ashley, H. A. Barker, W. D. V. Duncombe, W. Elliot, C. S. Hagreen, E. J. Holloway, Plaskitt C. Lewis, H. B. D. Marshall, T. P. Powell, M. G. Watkins, and H. T. Williamson. Captain C. O. Dansey Oldham, Captain E. A. Swainson, Messrs. C. G. Blathwayt, Cecil Butler, J. Carless, jun., R. Clarke, P. C. Cleasby, G. Cresswell, James Davies, E. H. Greenly, T. C. Paris, G. H. Phillott, W. Pilley, E. L. G. Robinson, H. C. Moore (Honorary Secretary), and James B. Pilley (Assistant Secretary); with the following visitors: Sir Richard Harington, Revs. A. G. Adamson (Rector of Aberedw), W. E. T. Morgan, Walwyn Trumper, T. Williams (Llowes), W. Gordon Williams (Gwenddwr, Breconshire), Surgeon-General Perry, Messrs. William Boycott, J. Cockcroft, W. Cornewall, L. W. Humphrys, Thomas La Touche (of the Indian Geological Survey), Norman La Touche (of the Public Works Department, India), H. T. Timmins (of Edgbaston), and a few others whose names were not obtained.

Upon arrival at the Three Cocks Junction, the interval of one hour was profitably occupied in transacting some business of the Club, Mr. Charles P. Bird, of Drybridge, Hereford, was re-elected a member upon his return from India, and the names of the following gentlemen were proposed to be balloted for at the next meeting—Mr. Digby S. W. Nicholl, F.L.S., F.Z.S., M.B.O.U., &c., of the Ham, Cowbridge, author of *The Birds of Glamorganshire*, and Mr. Warre Prescott, of King's Pyon House.

Seats in the special carriages having been taken, the members proceeded on their journey from the Three Cocks Junction by the Cambrian Railway. After a few minutes run a hasty glance of a horse-shoe bend of the river Wye was obtained upon both sides of the iron lattice bridge which carries the railway over the river. Upon the left side a series of natural terraces present the appearance of an artificial breakwater. Upon the right is the beautifully situated rectory of Boughrood, with the modern house, Boughrood Castle, above. The ancient building is said to have been held in 1140 by Einion Clydd—(*Mediæval Military Architecture*, page 107).

After leaving Boughrood Station the line of railway runs by the river bank, and continues on a course of 27 miles nearly parallel with the Upper Wye past Builth to Rhayader, through a valley of charming scenery, the river forming here the boundary between the counties, Radnorshire on the right, and Breconshire on the left or western, side of the railway line journeying towards Builth. About half way between Boughrood and the next station, Erwood, the tributary of the Bachhowey is crossed, where on July 18th, 1867, a red-letter day in the annals of the Woolhope Club, the railway authorities stopped the train, and erected a platform for the members to alight and spend the day at the beautiful waterfalls of Craig-y-pwll-ddu, where are observed remarkable contortions of Ludlow rocks. (See *Transactions*, 1867, page 40, et seq.) Upon this historic ground we must dwell for a few moments to remind ourselves that Sir Roderick Murchison has pointed out that the stream here separates the Upper and Lower Ludlow rocks. Upon the south, Trewern Hill, a continuation of the Begwn range, is of the Ludlow formation, whilst still more southerly the Old Red Sandstone rocks appear. In the Ordnance Geological Survey the line of demarcation between the Old Red Sandstone and the Ludlow is a well defined line, about a mile north of Erwood. The bold hill of Garth, 1,065 feet high, is just on the Old Red Sandstone, Llandeilo-graban and Llandewi-fach are both of the Lower Ludlow formation. At Boughrood is a narrow outlier of Lower Ludlow along the river Wye, about a mile in length, another of similar size on the right side or east of the Wye, a mile further north, against the stream of the river upwards,* whilst a much larger outlier of the same Lower Ludlow crosses the Wye just before reaching Erwood. These Ludlow rocks extend from Erwood to Corn-y-fan, about six miles north-west of Brecon. In *Records of the Rocks* the Rev. W. Symonds recommends the geologist after examining the Upper Silurian section on the banks of the Wye near Trewern, to follow up the rocks in ascending order by Cusop to the Brownstones on the summit of the Black Mountains, and on page 239 he exhibits an instructive section of this walk. From this range of hills demonstrating the passage downwards from Old Red Sandstone to the older rocks beneath them Sir Roderick Murchison obtained the key to the whole Silurian system. Our geologists would have preferred to tarry awhile, but the train hurried them along their course almost parallel with the rocky-bedded Wye until other historic ground was reached at the station of Erwood. At this place the river was forded by the English troops in the pursuit of Prince Llewellyn. The name of the ford is Cafan Twm Bach, or little Tom's boat, where now a very comfortable-looking hostelry occupies the Radnorshire bank within three minutes' walk of the railway station at Erwood. A repetition of the oft-told history of Llewellyn's betrayal by the blacksmith who reversed his horses' shoes is unnecessary—suffice it to say, in the words of the learned Selden, that on December 22nd, 1282, in the 48th year of his age, perished "as great and

* The right side here mentioned is properly the true left bank of the river, it being necessary always to bear in mind that the banks of a river are always designated right and left banks as you travel with the stream down the river from its source to its mouth, not against the stream from its mouth to its source. In this paragraph of the text, the terms right and left have been used according as objects were situated right or left of the traveller from Three Cocks towards Builth.

worthy a prince as ever the third part of this island was ruled by," and that one of the most carefully-recorded accounts of the circumstances is to be found in *Transactions* of the Woolhope Club for 1866, page 230. Leaving Erwood station, the Old Red Sandstone is shortly lost sight of; the hill upon the right hand of the railway exhibits the appearance of ruins of an ancient fortification with a series of rocky walls of circumvallation rising above each other successively. These rocks of Upper Ludlow tilestones, with a horizontal stratification, have in some instances assumed grotesque shapes owing to disintegration and weathering of the soft parts. Near Aberedw, just above Mr. T. B. Mynors's residence "Pont Shony," (Johnny's bridge), of which Mr. T. M. Baskerville of Clyro Court is the proprietor, are representations which carry the mind to the monster Sphinx and other gigantic relics of Egyptian antiquity.

At Aberedw railway station the members were met by the Rector of the parish, Rev. A. G. Adamson. The first object of search was for a rounded boulder, a granite-like rock which Mr. Moore had observed on his visit here about a month ago and which appeared to have fallen from the drift exposed here. Mr. Moore had chipped off a fragment and sent it to the Rev. J. D. La Touche for examination, who reported of it as follows: "The chip of the boulder turned out to be very interesting. I have made a good section of it which has revealed some fine structures. It appears to be a volcanic tuff, with large crystals of plagioclase felspar, and cavities filled with zeolites which make a splendid display of colour in polarized light." The search for the boulder, however, proved fruitless; it had been removed and probably broken up for road-mending. Portions of igneous rocks were discovered in the drift.

Mr. Adamson conducted the members to the contiguous ruins of one of Prince Llewellyn's castles, which in Vol. 1, page 109, of Clark's *Mediæval Military Architecture* is said to have been built by Ralph de Baskerville, one of the Norman invaders. Alas! that the march of civilisation should find it incumbent to deliberately demolish so interesting a relic of history. Upon forming the railway line, the contractors, not successful in their first attempts to remove from off the face of the earth the two circular towers on the south side of this stronghold, accomplished this ruthless vandalism by increasing the number and quantity of their charges from one barrel of gunpowder to three barrels. The parish clerk, David Williams, now aged 79, was a witness of their proceedings. He recalls to mind that the wall interiorly had many curious recesses like large cupboards. Surely in the present days of reformed churchwardens and scarcity of Goths, the embankment would have been faced with a wall of masonry where stone was abundant, and the whole would have been preserved, or the line would have been diverted a few yards, and thus the feelings of posterity would have been spared so deep a wound. The fragments that remain of this stronghold show that it was a square work of about forty yards each side, with a round tower at each angle, and surrounded by a deep dry ditch, enclosing an area of about one-third of an acre. Three hundred yards south-easterly upon the north bank of the river Edw is a conical mound, the upper surface of which has been artificially elevated perhaps fifteen feet by the excavations from its surrounding ditch. Exposures upon its declivity show that its base of the

uppermost tilestones of the Upper Ludlow series was originally a natural knoll. The Rev. Jonathan Williams, in his History of Radnorshire, page 285, considers that this was the residential palace of the British reguli or chieftains of this district long prior to the Norman invasion. Such it may have been, but only on the supposition that the reguli of those days were contented with a cave or a stockaded enclosure of a few feet only in area for a palatial residence. The elevated mound forms a commanding site for a place of observation, and no doubt has often been used for this object. To-day the view along the valley of the Upper Wye, the precipitous banks of the river Edw, the deep dingle, along whose base flows this garrulous river, with the finely wooded opposite side, the posterity of the primeval forest, formed objects of most pleasing beauty.

The parish Church is situated a distance of four hundred yards from this knoll. It is of the usual type so prevalent in Wales, consisting of a nave and chancel of the same width, a tower at the west end and a porch (in this instance of unusually large dimensions) upon the north side—measuring externally 18ft. by 16ft., and being proportionately high. The porch entrance is framed in heavy oak-timbered work, with open quatrefoil and trefoils above, and internally there is a double row of seats on each side, the lower in oak beams, the upper in stone. It would be interesting to know whether local traditions throw any light upon any use that may have been made in earlier days of so large a porch. Mr. Clarke informed us that it reminded him of what he had read in "The Crosses of the Vale of Clwydd," namely, that in the 13th century the Bishop petitioned to have the practice discontinued in that valley of using the Church porches on market days for the sale of commodities. Upon a large hard stone lying before the threshold of the porch* appears the following inscription well engraved, and in excellent state of preservation—I. H. 1604. Engravings upon several stones in the walls of the Church on both north and south sides were remarkable for the fineness of their execution and for their well-preserved condition. A mural tablet of a softer structure, recording the demise of a Freemason, had been removed into the vestry. The quaint inscription upon it is given in full below, in the Rev. A. G. Adamson's description of the Church.†

Two venerable yew trees in the churchyard are undoubtedly the most ancient living remnants of antiquity here. Their riven hollow trunks, with gnarled excrescences, boughs, and branches, rendered the work of their measurement, at a height of 5ft. from the ground, in accordance with the rule of our Club, a matter of such difficulty, that their girth was taken at 3ft. from the ground, and was found to be respectively 23ft. 2in. and 18ft. 6in. From *Transactions* 1871, page 3, the inference would be drawn that there were four yew trees in the churchyard; but the parish clerk, David Williams, who has lived at Aberedw all his lifetime, bears evidence that within the memory of his nine and seventy years there have never been more than these two yew trees. The clerk's father, a carpenter, died in this parish at the ripe age of 91.

*Recently removed to the wall within the Porch, for its better safety and preservation.—(A.G.A).

†This tablet is now fixed within the Porch.—(A.G.A.)

The rector, the Rev. A. G. Adamson, conducted the members of the Club over his Church, and began his explanation of its interesting details by informing them that it was dedicated to St. Cewydd, who, according to Canon W. L. Bevan (*Diocesan Histories, St. David's*, p. 5), was a northern chieftain from Strathclyde, who came to Wales in about the 5th century. Three Churches, viz., Aberedw, and Disserth in Radnorshire, and Llangewydd in Glamorganshire, are dedicated to him. A road in Aberedw is still called "Cil-gewydd." S. Cewydd is the Welsh S. Swithin—the dates of their Feasts correspond. S. Swithin's Day is July 15th. Aberedw people say that "Aberedw Feast is on the second Sunday in July." One woman told the Rector "it is the Sunday after Becket's Feast." Becket's Feast was on July 7th.

In the churchyard is the tomb of John Davies. He was a brother of the antiquary, the Rev. Edward Davies, author of *Celtic Researches* and *Mythology and Rites of the British Druids*. His life appears in Leslie Stephen's *Dictionary of National Biography*. He died in 1831.

Exterior of Church.—South side, five windows, the two in the chancel are Jacobean, the two next in the nave are churchwardens' windows of wood, the south-west window is of the 14th century; this last and the two chancel windows are of Red Sandstone. The chancel door, though now walled up, is clearly visible. The original use of it by the Priest obtained until thirty years ago, when the men of the congregation alone entered by it. There are two mural tablets on the south-east wall with the following inscriptions:—

I.—Just opposite under C. D.: ther lyeth ye body of Catherine seed daughter to James Davies Cur: of this pish by Mary his wife who dyed ye 18th of 9br, 1709, aged 11 weeks.

How fading are ye joys we dote upon
Like apparitions seen and gone
But those wh soonest take their flight
Are ye most exquisite and strong
Like Angels' visits short and bright
Mortality's too weak to bear them long.
It is hard ye hour to pass.

II.—Underneath lie the remains of Daniel James, the son of James James, of Pen-y-blaen in this Parish, Gent., who departed this life Nov. 5, 1786, aged 24 years. After many years' heavy affliction which he bore with Christian patience; he gave up his soul to the hands of a precious Saviour, hoping for the Resurrection of the just.

A friendly youth rests here below
A prisoner to a conquer'd foe:
But Jesus his discharge will sound,
Soon by an Angel, from the ground.

This Daniel James was a younger brother of James James, one of the first ministers of the Calvinistic Methodists in 1811, whose life has been written in *Geiriadur Bywgraffyddol* (Noted Men of Wales).

East wall: No east window, nor any trace of there ever having been one.

North side: Two windows, in chancel, Jacobean; in the nave one of 14th century, both of Red Sandstone.

On the chancel wall, three tablets recording, in finely chiselled engraving upon very hard stone, that people were buried "under the green stone," dates 1703, 1707, 1716. The meaning of the "green stone" still remains an unsolved mystery.

In the angle between the porch and the tower is a large mound with a semi-circular wall in front. It appears* to have been a vast grave from the fact that, when a hole was dug three years ago for a scaffold pole, bones were at once disclosed.

Within the memory of people now living the Stocks stood at the churchyard gate. Ball-playing used to be common in the churchyard, Fives against the wall of the Tower, and a kind of Tennis along the roof on the south side. A small window in the Tower was filled up to prevent the fives-ball going in, and a hollow in the ground, filled up only two years ago, was made by the feet of the fives-players.

Interior.—The font is new: the old one, circular, was removed about thirty years ago to Alltmawr Church, in Breconshire, on the opposite side of the Wye. The chancel-screeen is pre-Reformation from the floor to the lower beam of the loft: the loft, however, has disappeared, if it ever existed. From the floor of the loft to a beam near the roof perpendicular railings were inserted, perhaps in the Jacobean period. Mr. Robert Clarke considered that the lower and upper parts were alterations of the 18th century, but the framing and middle portion is of the original perpendicular work, with the archway, and cusped tracery heads, seven in each side now remaining.

The screen appears to have been turned round, as its carved side faces the east. At the entrance of the chancel was formerly the inscription "Marry here," the work of some rubrical mind. The rector has restored the ancient custom. The roofs of chancel and nave are barrel-shaped, that of the chancel, ribbed in oak, and plastered between.

Tablets in chancel.—North side, Baskerville, a very old family in Aberedw, now represented by W. B. Mynors, Esq., Bosbury House, Ledbury; of Jones, Rhysgog, now a farm house with some internal remains of past greatness.

South side, James James, the father of the Calvinistic preacher before referred to. He owned, and lived at Pen-y-Blaen, in the upper part of the parish.

Vestry.—Really a part of the Church, partitioned off, probably in the early part of this century, for a parish school. In the vestry† is kept a mural tablet, removed, for the sake of preservation, from the exterior east wall; the inscription runs:—Here lieth the body of Jeremiah Cartwright, son of William Cartwright, of Choulton in ye parish of Lidbury and County of Sallop, Freemason. He left issue Jeremiah, William, John, Humphrey, Sarah, Elizabeth, and Anna. He died 8br. 4, 1722, aged 73.

*The mound has since been removed, and the conjecture proved correct.—(A.G.A.)

†Now fixed inside the Porch.—(A.G.A.)

Now Cartwright he with all his skill
Can use no Pencill, Toole, nor quill;
As he on others oft did write
Now others do on him Indite;
But though he lie awhile in dust
We have assured hope, and trust
That man's Great Builder will him raise
And build him up unto His praise,
At the last Resurrection,
In Christ, the living corner stone.

Church plate.—Nothing ancient but a large silver chalice, nine and three-quarter inches high, inscribed: Aber-edw 1700. Respecting this chalice, the following information has been received from the Goldsmiths' Hall:—"The silver chalice was made in the year 1706 by one Benjamin Pyne whose shop was in St. Martins-le-Grand. His mark, as registered with us, was a crown over a star with the letters P.Y. under. The plate must have been a piece of what is called Britannia plate (Britannia with shield and trident and a lion's head erased). This plate was only marked as the sole standard between the years 1697—1720. It is 8 dwts. better than present standard, or very nearly pure silver. The last mark, which you say looks like the Hebrew letter Coph, is really the 'year letter' L in old English Courthand."

Books, registers, various papers; a black letter Bible, authorised version. The title page of the Old Testament is missing, that of the New Testament bears the date 1639. On the margin of the first chapter of Genesis appear in manuscript the following directions to the binder. "June 22th, 1662, to bind buffe, et., and p'rfct this Aberedows Church Bible in 8 weeks tyme, and to rec. for doing it £1 2s. 0d." Apparently this binding still contains the book. Over the £1 is written "George," and on the opposite page "Thomas George," in the same handwriting, probably that of the Rector or Churchwarden who gave the directions for binding.

The registers are modern. Baptisms and burials from 1740. Marriages from 1754. In the former are recorded the census of 1811 and 1821. In the former year the population was 395, in the latter year 311. In 1891 it was 193. In this register also occur the lines:—

"Immodest words admit of no defence,
For want of decency is want of sense."

In the marriage register the woman signs herself first by her maiden name, and then adds "alias so and so," giving the married name. One hundred years ago the spelling seems to have been phonetic. "Dotter" for "Daughter"; "bired" for "buried"; "Vawn" for "Vaughan" occur.

The overseers' accounts from 1823 are preserved. Much ale seems to have been drunk at vestries. Such entries as "Ale at a vestry, £1 6s. 6d." are common.

Loose papers preserved in the Church coffer.—Wills from 1803-1827; leases from 1795-1810; marriage settlements, one 1770; indentures of apprenticeship, one 1777. From these a number of curious and interesting particulars may be gleaned.

So soon as Mr. Adamson had completed the above detailed description of his Church, he conducted the members higher up the Edw stream, to Mr. W. B. Mynors' fishing cottage upon its banks. Here took place an important part of the day's programme, to wit, luncheon, Mr. Mynors having very kindly placed his cottage at the disposal of the members for the day. Afterwards followed a very interesting paper read upon the lawn, upon the banks of the pure mountain stream, here skirting the base of the steep rocks surmounted by the Church, with the graceful woods on the opposite side of the dingle in the background. This paper, by the Rev. Augustin Ley, was called "Notes on the Botany of Aberedw," and was really a good contribution towards the flora of the district, rendered to-day more valuable by the addition of 98 new species. At the close of the day Mr. Ley gave the following summary: of flowering plants 340, of ferns &c., 18, of mosses 120, or a total of 478 species.

Continuing under the guidance of Mr. Adamson, passing the spout or well "Danderw," locally pronounced Dandrew, and signifying "under the oaks," the river Edw was crossed by a plank, and the wooded steeps of the opposite hill were scaled, from which a walk over two or three fields brought the members to Prince Llewellyn's cave, a natural excavation in the rock, about seven feet square and as many in height. The Rev. Jonathan Williams, in his history of Radnorshire, says (page 285):—"Artificial excavations of this description are frequently to be met with in several parts of Wales, and undoubtedly were used as places of refuge and secure retreat in periods of trouble and danger. Perhaps also the disciples of Druidism resorted thither, in order to contemplate with greater freedom and abstraction, and treasure up in their memories the mysterious arcana of their order." If Aberedw was, as it is said to have been, Prince Llewellyn's favourite hunting seat, it is very possible and probable that this cave was known to him; and if he ever made it a temporary residence, he would at least be spared the luxury of a four-poster during his tenancy, or the necessity of providing a caretaker during his absence. History does not, so far as we have read, record the fact of Prince Llewellyn at this critical period in his struggles abandoning his own followers to secrete himself in a cave. On the contrary, he maintained his activity until his disastrous death by the hands of Adam de Francton. In 1282 the forces of Edward I. entered North Wales at several points; Llewellyn Ab Gruffudd, leaving a strong force behind him in Cardiganshire, which county he had subdued, advanced towards his castle at Aberedw; learning that a large force under Sir Edmund Mortimer and John Gifford, reinforced by the men of Herefordshire, was occupying the Breconshire side of the river Wye at Cafan Twm Bach—or Little Tom's boat *—at Erwood, he (Llewellyn) posted an advanced detachment near a

* Cafan Twm Bach.—With reference to the proper meaning of the ferry called "Cafan Twm Bach," the Rev. W. Gordon Williams, Vicar of Gwenddwr, has sent the following interpretation:—"It signifies 'Little Tom's Boat,' but I have never been able to discover who 'Twm Bach,' or 'Little Tom,' was; he may have been contemporary with another Tom who had charge of the ferry boat at Boughrood. The word 'Cafan' is still used on the Wye-side upper waters for a boat, although the usual Welsh term for boat is 'bâd' or 'cwch.' 'Cafan' really means hollowed or dug out. Compare Latin 'cavus' and its many derivatives, *concave, excavate*, and possibly the very word we use when we speak of Llewellyn's *cave* at Aberedw. I think that originally the cafan was a hollowed or burnt out trunk of a tree formed into a boat. The bâd or cwch would more or less be composed of planks and cross beams. *Chambers's Etymological Dictionary* connects boat with bâd. Cafan, besides meaning an old tree trunk boat, is used for a pig-trough, cafan moch, and eaves-trough, cafan tô, literally roof-trough."

bridge across the Irfon, in a dingle now called Cwm Llewellyn, on the Breconshire side of the Wye, about three miles westward of Builth. The crafty reversal of the horse's shoes by the traitorous blacksmith Madoc-goch-min-mawr, occurred during this period. The fidelity of the garrison of Builth was suspected, and as events proved, very justly so. The garrison, probably overawed by the proximity of the stronger party under Mortimer and Gifford, whose intentions were to surprise Llewellyn at Aberedw by crossing the river Wye at Cafan Twm Bach, refused assistance, whereupon Llewellyn rode towards his retainers at Cwm Llewellyn dingle, where, after a confused onslaught, his dead body was found, which, after decapitation, was buried at Cefn-y-bedd-Llewellyn, "the ridge of Llewellyn's grave," in Breconshire, at the intersection of two roads three miles westward of Builth. The Rev. Thomas Thomas, in his very valuable *Memoirs of Owen Glendower*, says, p. 14, that Helias Walwyn, a native of these parts, pointed out to the English a ford below the bridge. The Welsh, attacked both in front and rear, gave way, the remainder of the English passed over the bridge, and when this information reached Llewellyn, he calmly replied, "he would not stir from thence though the whole power of England was on the other side of the river." In the same work on page 15 he records the tradition that the eventful journey with the reversed horse's shoes occurred in the attempt to proceed from Aberedw Castle to confer with the lords of Llandovery, and that being betrayed by the blacksmith, he was pursued and killed in a field about two miles above Buallt, or Builth, and six from his own castle. The account, recorded somewhat fully in *Transactions* 1866, page 230, states that Llewellyn destroyed the bridge at Builth. Roscoe, in his *South Wales*, p. 83, admitting the discrepancy of historians, gives a version of the story which, he says, is supported by the authority of an ancient manuscript document. Rather than make confusion worse confounded by adding another version of our own interpretation of the various conflicting statements, we should feel a deep debt of gratitude to anyone who would inform us to what ancient manuscript Roscoe refers, or, better still, amongst what archives it is deposited, and we would, if we could obtain access to it, promise to publish that authority for the benefit of readers of history which Roscoe has omitted.

Before leaving this historic neighbourhood, it must be noticed that Wordsworth writes concerning his principal character in *Peter Bell*, that "the countenance, gait, and figure of Peter were taken from a wild rover with whom I walked from Builth, on the river Wye downwards, as far as the town of Hay. He told me strange stories."—See the introduction to *Peter Bell* in the posthumous edition, 1857, of Knight's *Life of Wordsworth*.

From Llewellyn's Cave the members, separating into parties, radiated in different directions. The majority preferred the invigorating walk over the open country of Llandeilo Hill, diverging either to Llandeilo-graban Church, thence to the summit of Garth Hill, 1,065 feet high; others walked to the pool called Bwch-llyn; some found the Aberedw Rocks and the river scenery the most attractive ground. Wherever they may have gone, it was observed that a sort of centripetal attraction brought the whole party assembled together shortly before six o'clock at a comfortable hostelry called the Boat Inn, prettily situated on the

Wye, opposite Cafan-Twm-Bach, only three minutes walking distance from Erwood railway station.

Concerning Llandeilo-graban Church, with the remark that the churchyard with its two venerable yew trees deserved a more extended examination of some of its quaint monumental records, we give the following details furnished by Mr. Robert Clarke :—This is another building of the usual Welsh type, consisting of a nave, a chancel, divided from it by a tall pointed arch, a tower at the west end, and a porch on the south side. On the west side of the porch is a singular walled-up recess, and in an angle a holy water stoup remains in the wall. The interior is in a sad condition requiring repairs. The roof is ribbed in oak, with carved bosses in the nave, on some of which the colouring remains very well preserved, at the intersections, and plastered between. The font, an octagonal bowl upon a square shaft, is ancient. The screen, described in Rev. Jonathan Williams's *History of Radnorshire*, has entirely disappeared, only a couple of perpendicular pinnacles remaining, in an inverted position in the pulpit. The descent from Llandeilo-graban Church to Erwood Station, distant one mile, is along the western side of the gorge occupied by the brook called Nant Henllan. But if Garth Hill is to be visited the brook must be crossed by the bridge, near which, upon the left, is an old quarry. This quarry, representing a vertical exposure of twelve to fifteen feet, escaped the observation of the geologists. Its horizontal beds, furnishing blocks ten to twelve inches high, were composed of a better description of stone than the laminated upper tile stones of the Ludlow series so frequently met with in this locality, being such stone as would apparently be readily dressed for angles and quoins, or, as Mr. Robert Clarke expresses it, may be termed in building work a good block stone.

Garth Hill, 1,065 feet high, one mile eastward of Erwood Station as the crow flies, the walking distance being much increased by the declivities of the intervening ground, must not be confounded with Garth Hill, about 800 feet high, in Breconshire, one mile south-east of Builth Wells. Those who ascended this conical hill were amply rewarded by the magnificent panorama thence displayed, exhibiting one of the most extensive views of the river Wye that can be found anywhere. On the summit is a small circular ancient encampment, with its entrance upon the east side, contiguous to which upon its south side is another singly entrenched earthwork nearly square in plan. The two carneddau, or cairns, mentioned in the Rev. Jonathan Williams's *History of Radnorshire*, remain in situ, and are now overgrown with grassy turf.

Craig y-pwll-ddu, the rock of the black pool, is distant, as the crow flies, nearly one mile eastward of Garth Hill. This remoteness, however, is very much extended by the sinuosities of the approaches, and the broken character of the ground. Those who have visited these savage looking rocks inform us that the access to this very romantic waterfall of the river Bachhowey, and the descent to the pool, are more easily and safely made from Boughrood, by the southern side of the river. The river has worn a steep, narrow, and gloomy chasm in the rocks ; the remarkable contortions of the Ludlow rocks here, caused by lateral pressure when neighbouring elevations were upheaved by volcanic agency, have not been visited

by the Club since July 18th, 1867, but if the geologists could persuade some of our amateur photographers to accompany them, the Club would easily be persuaded to have a Field-day in so lovely a spot.

Bwch-llyn pool, of which a legend is narrated in Mr. Edmund Cheese's interesting paper on Rhosgoch, in Woolhope *Transactions*, 1870, page 184, is 1,900 feet in its greatest length, by 900 feet in its greatest width. Those who failed to visit this pool lost the beautiful picture there displayed of acres of yellow lilies in flower. One gentleman narrated that the shore of this pool was the only place where he had ever seen an unfledged snipe ; the strange form and ungainly appearance it presented, with its long legs and prominent long beak, made such an impression upon him as to excite his sense of the ludicrous whenever its recollection occurs to his mind. This pool, under the spelling of Boughlinne, is mentioned by Leland in *Itinerary*, Vol. 5, page 72, he says there is "a Llyinne, in Low Elvel, within a mile of Payne's Castel, by the Church Llanpeder. The Lline is called Boughlline, and is of no great quantity, but is plentiful of pike, and perche, and eles." In fact, Leland seems, in this *Itinerary*, 1533 to 1540, to have followed the footsteps of Giraldus Cambrensis, who started from Radnor in 1188.

The ninety-eight species of plants met with to-day will be found recorded in Mr. Augustin Ley's "Notes on the Botany of Aberedw and the District." Of geological fossils there were but few found by the Rev. J. D. La Touche, and his son, Mr. Thomas La Touche, of the Indian Geological Survey. Amongst the finds may be named *Orthonota amygdalina*, *Rhynconella nucula*, *Orthis elegantula*, and *Chonetes striatella* of the Ludlow rocks. For further records of the fossils of this locality see *Transactions*, 1865, page 134 ; and for further information about the locality reference should be made to *Transactions*, 1866, p. 230 ; 1871, page 4 ; 1874, page 8 ; 1879, page 181, and to *Records of the Rocks*, page 238.

FIRST CONTRIBUTION TOWARDS A FLORA OF ABEREDW, RADNORSHIRE.

By the Rev. Augustin Ley, M.A.

The following notes relate chiefly to the lower part of the valley of the Edw, together with the hills which bound it on both sides. A few particulars are also added when anything which was thought of interest is known with regard to the plants of other stations in the immediate neighbourhood; always, however, confining the remarks made to the country lying on the left, or Radnorshire bank of the Wye, and never in any case trespassing on the Breconshire flora.

The notes represent chiefly the fruit of a four days' visit (from the 10th to the 14th May) in the spring of 1886, at which period, however, many of the plants were too little advanced to be studied with advantage; two short visits in June and August, 1890; and two or three flying visits lying between 1886 and 1890. One or two records of earlier years are introduced. On none of these occasions, except that in 1886, was more than an hour or two spent in the neighbourhood. These visits included one long walk from Aberedw as far up the stream as Cregrina and Glascwm Hill, two or three visits to Llanbwchllyn pool and hills lying between it and Aberedw, with several walks along the interesting banks of the Wye near Erwood station, and between this point and Aberedw. The fragmentary character of the opportunities thus utilised must be my apology for the fragmentary information which I have placed together in these notes. They must strictly be regarded as a *contribution* towards a Flora of the district, and by no means can they claim to be anything more. It is hoped that others, with larger opportunities, may undertake similar work for some of the many river basins of Brecon and Radnor shires, especially those which belong to the system of the Wye, in which the Woolhope Club can claim an especial interest. All such local work would, moreover, contribute towards a Flora of Radnorshire, which is at present a desideratum.

The Edw is one of the smaller affluents of the Wye, draining that part of the centre of Radnorshire which lies between Radnor Forest on the east and the larger Ithon Valley on the west. Its upper part is rather flat, but for the lower six miles of its course the valley becomes narrow and deeper. This narrow part begins shortly above Cregrina Church and hamlet, and continues down to its junction with the Wye at Aberedw. The valley and hills which bound it in this lower part support what must be termed on the whole a decidedly *poor* vegetation, both phanerogamic and cryptogamic. The sides of the hills bounding the river valley are steep, and the valley is very narrow—averaging not more than three-quarters of a mile across from brow to brow of the hills. These steep hillsides are mostly cultivated and enclosed, but with small woods on the steeper portions, and occasionally open ground descending to the river bank. Immediately before its junction with the Wye the valley becomes still narrower, and the

hills higher, forming a small wooded, rocky, and tortuous gorge, through which the streamlet winds, to lose itself in the larger Wye. This gorge affords by far the most interesting ground for the naturalist in the neighbourhood, and has become a favourite resort for pic-nicers since the railway has been made, and a railway station established at Aberedw. On the north side lies the little village, with its interesting old Church, and too faint and obliterated remains of the old castle. The gorge on this side rises with a nearly bare perpendicular rock of about 150 feet. On the south side the gorge forms a curve of steep, rocky hill rising to 250 or 300 feet. The bosom of this curve is filled with old wood, which seems clearly a remnant of the aboriginal forest of the country. The hill rising to the south behind this gorge is singularly broken and rocky, the individual rocks and their ranges forming curious castle-like tiers and towers, bare or crowned with stunted bushes.

The hills do not generally rise much above 1,000 feet, Llandeilo and Glascwm hills being the highest in the neighbourhood. The latter will probably be nearly 2,000 feet; and from its summit a very extensive view is gained, comprising what we may—with the help of a little imagination—call the whole of the Wye Valley: Plynlimmon being distinctly traceable in the N.N.W., and the Forest of Dean group of hills in the distant S.E. I do not know another point from which so wide a panorama of the Wye is gained. The tops of the hills are flattish, and support a very poor vegetation; they are mostly formed of dry short turf. Ling appears in beds at a very few spots (Llandeilo and Glascwm hills). There is no bog or peat, except to a small extent at the Mawn pools, Glascwm. The pieces of water, if one may dignify them with such a name, are mere small pools, with no interest, and supporting no vegetation except of the lowest orders. The small cwms or dingles in the hill sides are generally poor and not deep, though tolerably rocky. The portion of Llandeilo hill rising immediately above the Wye is the most rocky and interesting of the group, and here several of the less common Grimmias should be discovered.

One exception must be made, when speaking of the poorness of the pieces of water, in Llanbwchllyn Pool: an imposing lakelet lying in lower ground, immediately to the S.E. of Llandeilo hill, ⅔ of a mile long by more than ¼ broad. This pleasing pool has flat marshy banks, which support a large Grass and Sedge vegetation. It lies in a wild sequestered spot, with no houses or cultivation beyond a single small farm near. It is well worth a naturalist's visit, be he ornithologist, entomologist, or botanist.

The banks of the Wye hardly come within the scope of this paper. We mention them, however, because mention will be made in the following notes of a few plants which inhabit them. This district of the Wye, from the Three Cocks to Builth, is of exceptional interest, and deserves a separate paper, which should take in the Breconshire as well as the Radnorshire banks.

The large handsome lake-side Meadow Rue occurs on the banks of the Wye near Erwood. The pretty Water Crowfoot, which forms so bright an ornament of the Wye in Herefordshire, is absent in this district. The large Spearwort, the largest of the British species, is to be found at Llanbwchllyn Pool; here also, and

in the wooded glen, the beautiful Globe flower is to be found in plenty. One of the rare plants of the district, the yellow Welsh Poppy, is a native plant in the wooded glen—the only known locality in Radnorshire. At Llanbwchllyn both the White and Yellow Water Lilies are found in abundance.

One of the plants we miss at Aberedw is the Sweet Violet. Its rare congener, the Marsh Violet, will be found at Llanbwchllyn, and the pretty Wild Pansy (which is scarcely found in Herefordshire) is scattered in small quantities about the hill pastures. The handsome Mountain Pansy is not, that we know of, to be seen on these hills; and they are far too dry to allow of the different species of Sundew to flourish. In a meadow adjoining Aberedw Church the beautiful Meadow Cranesbill was in full flower at the time of our visit, while the red-stemmed Shining Cranesbill and the delicate Dove's-Neck were peeping out of the rocks and hedges.

One or two less common leguminous plants are to be found; on the railway the beautiful Haresfoot Trefoil flourishes, and on a bank near the Castle the shrubby Mountain Vetch was discovered by one of our party.

All the British species of wild Cherry are to be found quite near. The small Shrubby Cherry, with its really nice fruit, clothes the banks below the churchyard, while the Bird Cherry is common in the hedgerows. The curious Marsh Cinquefoil grows at Llanbwchllyn, but the great rarity of the whole flora is the large White Rock Cinquefoil, which has been recently discovered in this district, the second locality in the British Isles.

The rocks and woods are full of the deep pink and Hoary-leaved Rose, which was in its best flower on our visit; while the woods and rocks suppport bushes of the Mountain White Beam.

In the deep shade of the glen are to be found many varieties of the Enchanter's Night Shade: among which the common lowland form is not so conspicuous as the Alpine one, which is, usually speaking, a much rarer plant.

The Saxifrage group is more largely represented at Aberedw than at any other spot which I know in Radnorshire. In spring the rocks are gay with the White Meadow Saxifrage; and later on in June different forms of the Mossy Saxifrage are plentiful. In July and August their place is taken by the curious Orpine or Livelong, with its purple blossoms, which clothes every rock.

Another plant of this order is the English Stonecrop, whose delicate white blossom contrasts well with the bright yellow of its near relative the Biting Stonecrop. The English Stonecrop is not found in Herefordshire, and is confined to the sea-coast and mountain regions. Another congener of these curious plants, the Navelwort, is abundant at Aberedw; while the woods support both the species of Golden Saxifrage—the larger, rarer, species growing freely at one spot.

In the wooded gorge, the Woodruff is plentiful; and at one spot—its only known habitat in Radnorshire—the Small Teasle or Shepherd's Needle rears its elegant white head of flower.

In the Daisy and Hawkweed tribe, the only rarities which Aberedw boasts of are several species of the latter, which at present are only known from this spot in the principality. They are all commonly classed as "Dandelions;" but

when studied closely will reveal many differences such as botanical enthusiasts delight in. In the village the True Wormwood is seen in the waste places—a plant which, almost invariably, accompanies a Radnorshire village. It is not found in this way in Herefordshire.

Several spots in the neighbourhood support the very elegant little Ivy-leaved Bell-flower—but it has not been detected at Aberedw itself. The hills support a good deal of the Ling; while the true Heaths are much more rare; the Cross-leaved species, however, being to-day brought us from Llandeilo hill.

The large yellow Mullein which is abundant in Herefordshire is quite a scarce plant in Wales; but it flourishes in good quantity among the dry exposed rocks near Pont-Shony. The curious Toothwort is found abundantly in several spots in early spring.

The wild Thyme is abundant on the hills, and the Marjoram nestles in the bank below the churchyard. On the rocky débris near Pont-Shony, the curious Hound's Tongue is abundant, and in late summer its seeds cling so closely to the dress of the passer-by that it is difficult to detach them.

The elegant Butterwort will be sought for in vain, we fear, on these hills: while another mountain friend, the sweet Dutch Myrtle, which greets one's senses in the more northern and western districts of Wales, seems absent from Radnor and Breconshire. Every observer of plants knows how beautiful our Herefordshire woods are, after a recent fallage, with the large Wood Spurge. This plant will be sought for in vain in Radnorshire.

The tree forming the aboriginal woodland here is nearly all the Oak, which in our own county also seems to be one of the oldest Natives of the woods. But at Aberedw our Herefordshire Elms will be vainly sought: they are neither native, nor apparently have they been planted. Birch and a few Willows flourish, but not plentifully; while nearly every small mountain farm is surrounded by its protecting Sycamores. The Ash is abundant, and attains a large size. The Yew is represented by many large trees in Aberedw, Rhulen, and Cregrina, churchyards.

On the river rocks of the Wyeside the Chives—a rare plant—flourishes for a mile or more of distance. I am informed that it is found in similar stations on the Continent; and this makes it extremely probable that this curious leek is native on the Wye.

Few or no Orchises of interest occur in the district, and I looked in vain for a single Bluebell; but I have had specimens sent me of Snowdrops and the Lent lily from this part of Radnorshire, and a single meadow at Boughrood supports large quantities of the Autumn Crocus, which is very visible to passengers sitting in the carriages of the Mid-Wales (now Cambrian) railway.

We failed to find anything of interest in the Grasses or Sedges; but our search was rewarded with the discovery of eighteen species of Ferns. One of them is rather rare, but we must refrain from giving localities where so many are bent on a work of ruthless plucking up.

To sum up, the result of our botanical labours represents 340 Flowering Plants, 18 Ferns, and 120 species of Mosses, giving a very presentable total of 478 recorded species for Aberedw and its neighbourhood.

NOTES ON THE FLORA OF ABEREDW.

By the Rev. Augustin Ley, M.A.

The following Notes adopt the Order and Nomenclature of *Lond. Cat.*, Ed. vii. Plants which were thought at time of observation (1886—1890) to have been hitherto unrecorded for Radnorshire have an * attached: Introduced species a †. It is believed that no Mosses have been previously formally recorded for Radnorshire.

CATALOGUE.

No **Clematis** seen.

Thalictrum flexuosum, Bern. On the rocky banks of the Wye. *T. minus*, L. and *flavum*, L. Unobserved.

Anemone nemorosa, L. Plentiful in all the hill-side woods: still in full flower, May 10th—14th, 1886.

None of the forms of **Ranunculus aquatilis**, L. were seen, except *peltatus*, Fr., one small specimen on Llandeilo hill. *Flammula*, L. Apparently not abundant. *Lingua*, L. Sparingly at Llanbwchllyn. **Auricomus*, L. Sparingly, in woods and hedge-banks. *Acris*, L., and *repens*, L., both at Aberedw village. *Ficaria*, L. Everywhere.

Caltha palustris, L. Plentiful and very fine.

Trollius europæus, L. At Llanbwchllyn, but not fine; also in the wooded glen.

Aquilegia was not seen.

Nymphæa alba, L., and **Nuphar lutea**, Sm. Both plentiful in Llanbwchllyn pool.

Papaver * dubium, L., is pretty plentiful on the railway bank, and in a cultivated field. No other of the genus seen.

***Meconopsis cambrica**, Vig., is plentiful and clearly native in the wooded gorge.

Fumaria confusa, Jord. Very large and fine flowered, in tillage. *Officinalis*, L. On the railway, &c.

Chelidonium. Seen in a hedge at the village.

Sinapis arvensis, L. On the railway bank, &c.; no other species seen.

Brassica Rapa, L. Var. *sylvestris*. Aberedw, 1884. Var. *Briggsii*, 1886, 1891.

Sisymbrium officinale, Scop., and *Alliaria*, Scop. Common weeds.

Cardamine pratensis, L. Very common. *Hirsuta*, L. Common. **Sylvatica*, Link. In several places. *Impatiens*, L. In several spots in the wooded gorge.

Arabis thaliana, L. Common. *Hirsuta*, L. Not seen.

Barbarea *† intermedia, Bor. In two spots, in a clover field and on the railway bank. *Vulgaris*, Brown. Noticed on the Edw at the village.

Nasturtium officinale, Brown. Noted at one spot. No other of the genus seen.

Draba verna, L. Very plentiful on wall tops.

Capsella Bursa pastoris, Mœnch. A common weed.

Lepidium Smithii, Hook. In a tillage field. *Campestris*, Brown. Not seen.

Helianthemum vulgare, Gaert. Apparently absent.

Viola odorata, L. Also apparently absent. *Palustris*, L. Plentiful at Llanbwchllyn. *Sylvatica*, Fr. Var. *Riviniana*. Present. *Reichenbachiana*. Unseen. **Tricolor*, L. At two spots, in a tillage field, and in pasture. Var. *arvensis*. Was not noted. *Hirta*, L., *canina*, Auct., and *lutea*, Huds., were not seen.

No *Drosera* seen. *Polygala vulgaris*, L. Noticed in several places.

Silene inflata, Sm. Noted at several spots.

Lychnis *vespertina, Sibth. Near the railway. *Diurna*, Sibth. Seen at more than one place.

Mœnchia erecta, Sm. Very fine and plentiful on a wall at Aberedw village; also on Llandeilo hill.

Cerastium glomeratum, Thuil. Very plentiful. **Triviale*, Link. Seen. No other seen.

Stellaria Holostea, L. Plentiful. *Media*, With, and *uliginosa*, Murr. Seen. *Nemorum*, L. Not discovered. *Graminea*, L. In meadows near the Castle.

Arenaria trinervis, L. Seen.

Sagina *ciliata, Fr. At two spots on the dry exposed ground, near the top of the small gorge. *Apetala*, L. Near Pontsioni. *Procumbens*, L. General.

Spergula arvensis, L. Abundant in a tillage field.

Scleranthus annus, L. Abundant with the last.

Hypericum perforatum, L. Noticed sparingly. *Dubium*, Leers, var. *maculatum*. Abundant. **Humifusum*, L. On dry banks in small quantity. No other *Hypericum* seen.

Malva moschata, L., and *sylvestris*, L. Noticed on a roadside. *Rotundifolia*, L. Not seen.

Tilia parvifolia, Ehrh. A single bush in the wood near the cave.

Linum catharticum, L. Plentiful. *Angustifolium*, Huds. Unseen.

Geranium *pratense, L. Noticed at two spots. *Molle*, L., *dissectum*, L., and *Robertianum*, L. Seen. * *Lucidum*. In great plenty on rocks and walls about Aberedw. *Columbinum*, L., Aberedw, 1884. No other *Geranium* was noticed, nor any *Erodium*.

Oxalis acetosella, L. Plentiful throughout.

Ilex Aquifolium, L. Common.

Euonymus and **Rhamnus**. Unnoticed.

***Acer Pseudo-platanus**, L. Fine, and clearly planted, round the hill farms for the sake of shelter. *Campestre*, L. At one place among the rocks.

Ulex europæus, L., and *Gallii*, Planch. Both present, but not in abundance.

Genista. Unnoticed.

Sarothamnus scoparius, Koch. Fine and plentiful.

Ononis * arvensis, Auct. Fine, at one spot.

Medicago lupulina, L, was noticed both on the railway bank, and as a cultivated plant. No other *Medicago* or *Melilotus* noticed.

Trifolium pratense, L. Abundant. *Arvense*, L. In the dry rocky gorge, and near the railway station. *Repens*, L. In several spots. *Procumbens*, L. On the churchyard wall and at other places. *Minus*, Relham. At the same spot.

Lotus corniculatus, L. Abundant. *Major*, Scop. Not seen.

Vicia hirsuta, Koch, and *tetrasperma*, Mœnch. Noticed on the railway banks. †* *Sativa*, L., seen, and **angustifolia*, Roth. *Orobus*, D. C. Discovered near the Castle. *Cracca*, L., and *sepium*, L. Both seen.

No species of **Lathyrus** seen, except *pratensis*, L., which was abundant.

Orobus tuberosus, L., with well-marked var. *tenuifolius* was fine and plentiful.

At least *three* forms of **Prunus** were noticed, including certainly *spinosa*, L., and **domestica*, L., with an intermediate which might be *insititia*, L., but more resembled the *fruticans* of the Plymouth Flora. All three (May, 1886) were blossoming along with the leaves. A single small tree of *P. Avium*, L., is noticeable near Erwood Station, in a situation suggesting that it has been planted; it appears to be absent from the woods. *P. Cerasus*, L. Plentiful along the rocky bank of the gorge under the churchyard. *Padus*, L. Plentiful in hedges between Aberedw and Builth, but not noticed elsewhere. Thus all the British *Pruni* were seen.

Spiræa Ulmaria, L. Seen in several spots.

Agrimonia Eupatoria, L. Common.

Sanguisorba officinalis, L. Noticed at more than one station.

Alchemilla vulgaris, L. Fine; with the leaves large and nearly smooth, as is usual in mountain situations. *Arvensis*, Scop. Noticed in several places.

Potentilla Fragariastrum, Ehrh. Plentiful. *Tormentilla*, Schenk. Present. *Procumbens*, Sibth, and *reptans*, L., remained unnoticed. *Anserina*, L. Seen. The great rarity *P. rupestris*, L., was discovered at its second British station, the particulars of which it is thought unadvisable to publish.

Comarum palustre. L. Occurs at Llanbwchllyn pool.

Fragaria vesca, L. Common throughout the district.

On the two genera of *Rubus* and *Rosa* the following information was gleaned.

Rubus Idæus, L. In the woods in several places.

RUBUS FRUTICOSUS, L. :—

All the *Suberecti* were conspicuous for their absence, although all the three recognised forms occur in Radnorshire. *Lindleianus*, Lees. Very fine and plentiful everywhere. * *Rimosus*, Blox. (or a form very near it). Fine and plentiful, as throughout Central Wales. *Discolor*, W. & N. Poor and scarce, but noticed at several places. * *Leucostachys*, Sm. Pretty common. *Kohleri*, Weihe. Fine and plentiful in the var. * *pallidus*, Bab. *Diversifolius*, Lindl. Poor, in hedges near the village. An unnamed form falling under the *glandulosus* section, in a hedge near the village. *Corylifolius*, Sm., and *cæsius*, L. Both so poor as to be quite doubtful. * *Tuberculatus*, Bab. Fine, in hedges. This constitutes a very poor Bramble Flora; most of the common lowland forms being conspicuous for their absence, or if present for their poor development; while the more highland forms are not present to replace them.

ROSA :—

Spinosissima, L., *involuta*, Sm., *hibernica*, Sm., and even *mollissima*, Willd. Absent or unnoticed.

***Tomentosa**, Sm. Abundant and well developed, with at least three forms, of which one is probably *subglobosa*. *Scabriuscula*, Sm., *rubiginosa*, L., and *micrantha*, Sm., unseen. Of **Canina**, L., the following forms were noticed :—

Lutetiana and *dumalis*. Abundant. *Urbica* and *obtusifolia*. Seen. *Reuteri* or *subcristata* also seen. *Implexa*. In several places. A form answering to the *platyphylla*, Rau., in the *urbica* series.

* **Arvensis**, Huds. Seen, but not abundant.

Geum urbanum, L. Noticed. *Rivale*, L. Seemed to be absent.

Cratægus Oxyacantha, L. (the form *monogyna*). In the hedges.

Pyrus * torminalis, Ehrh. A small bush at one station in the rocks. * *Rupicola*, Syme. Both in the wooded gorge and among the hillside rocks.

Aucuparia, Gaert. Doubtless present, but unnoticed. *Malus*, L., var. *acerba*. Noticed in the dry gorge, apparently native.

Epilobium montanum, L., and ***obscurum**, Schrd. Common. No other of the genus seen.

Circæa *lutetiana, L. Noticed, but less abundant than ***alpina**, L. This, with one or more of the * intermediates, fills the shady part of the gorge.

One of the **Myriophyllums** noticed in a small road side pool.

Callitriche and **Bryonia** unnoticed.

Ribes †Grossularia, L. and **†rubrum**, L. Both seen. *Alpinum*, L. Absent or unnoticed. *Grossularia*, var. ***Uva-crispa**. In the dry gorge.

Sedum Telephium, L. Very abundant and clearly native, in both its forms ***purpurascens** and ***Fabaria**, the latter well marked. *Anglicum*, Huds. In the gorge and on the rocky hill above it. *Acre*, L. Noticed. *Rupestre*, Huds. and *Forsterianum*, Sm. Unnoticed.

Cotyledon Umbellicus, L. Fine and plentiful.

Saxifraga *granulata, L. Extremely abundant; occupying rocks, and rocky banks and woods; not, as usual, alluvial soil. ***Sponhemica**, Gmel. and *hypnoides*, L. The former on the railway bank under the castle, and in the wooded gorge; the latter in the gorge under the churchyard and many other spots. *Tridactylites*, L. Unnoticed.

Chrysosplenium oppositifolium, L. Fairly abundant. ***Alternifolium**, L. Very fine at one spot in the rocky gorge.

Few of the *Umbellifera* seen.

Hydrocotyle. Not seen. *Sanicula europæa*, L. In the wooded gorge. *Helioscadium inundatum*, Koch. On Llandeilo hill, at a single spot. *Bunium flexuosum*, With. Common. *Pimpinella Saxifraga*, L. Seen. *Œnanthe crocata*, L. Common on the Edw; another of the species (probably *fistulosa*, L.) noticed at Llanbwchllyn. *Silaus *pratensis*, Bess. Noticed between Aberedw and Builth. *Heraclium sphondylium*, L. Common. *Daucus Carota*, L. Seen in more than one spot. *Torilis infesta*, Spreng. In a tillage field. *Anthriscus*. Near the village. *Conium *maculatum*, L. Abundant about Aberedw village. *Chærophyllum sylvestre*, L. and *temulum*, L. Abundant.

Lonicera Periclymenum, L. On rocks in the dry gorge.

Adoxa *Moschatellina, L. Woods and hedge banks in many spots.

Hedera Helix, L. Common, and *Sambucus nigra*, L. *Cornus sanguinea*, L. Near Pontsioni.

Galium cruciatum, With. Seen. *Verum*, L. and *saxatile*, L. In several places. *Palustre* L., var. *elongatum*. In the stream in the village. *Aparine*, L. Abundant.

Asperula *odorata, L. In many places in the wooded gorge.

Valeriana *dioica, L. Seen at Llanbwchllyn. *Officinalis*, L. In fair plenty (the *segregate sambucifolia*).

Valerianella *dentata, Koch. One small piece seen in a tillage field.

Dipsacus *pilosus, L. At one spot in the wooded gorge. *Sylvestris*, L. Unnoticed.

Scabiosa arvensis, L. Seen. *Succisa*, L. Near the cave.

Carduus crispus, L. Noticed in several spots. *Lanceolatus*, L. and *palustris*, L. Abundant. *Acaulis*, L. Unnoticed. *Carlina*. Not seen.

Arctium sp., probably *minus*, Sch. At several places.

Centaurea nigra, L. Common; no other species seen.

Chrysanthemum *segetum, L. In tillage, very fine. *Leucanthemum*, L. Fine, on the railway banks, &c.

Matricaria Parthenium, L. Noticed near the village. *Inodora*, L. Abundant.

Anthemis. Unnoticed. *Achillea Mille folium*, L. Abundant.

***Artemisia Absinthium**, L. Plentiful in waste ground at the village. This plant is usually to be seen about a Radnorshire village. *Vulgaris*, L. Unnoticed.

Filago and **Gnaphalium**. Unnoticed.

Senecio Jacobæa, L. Abundant on the rabbit farm near Erwood Station. Common. *Vulgaris*, L. Common. *Aquaticus*, Huds. On the Edw. The other species unnoticed.

Inula. Unnoticed. *Bellis perennis*, L. Common.

Solidago Virga aurea, L. A form approaching the var. *angustifolia*. By the Wye, near Erwood Station.

Tussilago Farfara, L. Common.

Petasites vulgaris, Desf. Observed on the Edw. *Eupatorium*. Not seen. *Lapsana communis*, L. Abundant.

Leontodon *hispidus, L. Common.

Hypochæris radicata, L. Seen.

Picris hieracioides, L. Recorded for Aberedw. See Record Club Rep. 1881-2, p. 191. *Tragopogon *pratensis*, L., var. *minor*. Fine, on the railway bank.

Taraxacum officinale, Wigg. Seen. Also the vars. *erythrospermum* and *lævigatum*. On the dry ground above the Edw, and probably at other places.

Lactuca muralis, Fresen. In the wooded gorge.

Sonchus asper, Hoffm. Seen. *Oleraceus*, L. Unseen. *Arvensis*. In tillage.

Crepis virens, L. Seen. No other species seen.

Hieracium Pilosella, L. On the railway bank. * *Lasiophyllum*, Koch. At several stations in the gorge. **Murorum*, L. Common on the railway bank and in the rocky woods. * *Vulgatum*, Fr. Common. * *Orarium*, Lindeb. At several spots. *Boreale*, Fr. Common. * *Auratum*, Fr. (?) Abundant on the railway bank. Of these Hawkweeds, two possess great interest. The *lasiophyllum*, Koch, has been submitted to Prof. Lindeberg, who has identified it with the typical plant of the Continent. The other, *auratum*, Fr., has not yet been submitted to the *savants*; but if correctly named, will be new to the principality. *H. umbellatum*, L. Not seen.

No species of *Campanula* observed, except *rotundifolia*, L.

Wahlenbergia hederacea, Reich. At one spot on the Wye bank near Erwood Station.

Jasione montana, L. Not seen.

Vaccinium Vitis Idæa, L. Occurs on the highest point of Glascwm Hill. *Myrtillus*, L. Occurs on the higher grounds. *Oxycoccos*, L. Searched for in vain at Llanbwchllyn.

Erica Tetralix, L. On Llandeilo Hill. *Calluna vulgaris*, Salisb. Abundant on the higher ground.

No *Pyrola* seen, although there is suitable ground in the wooded gorge.

Fraxinus excelsior, L., was abundant, and of good size.

None of the *Gentianaceæ*, *Convolvulaceæ*, or *Solaneæ* observed.

Verbascum * Thapsus, L. Fairly abundant in the gorge.

Scrophularia Balbisii, Hornem. At several places.

Digitalis purpurea, L. Abundant.

Linaria vulgaris, Mill. Very fine and deeply coloured, in a hedge. No other species observed.

Veronica hederifolia, L., * *agrestis*, L., *arvensis*, L., and *serpyllifolia*, L. Seen. * *Chamædrys*, L. Common. *Officinalis*, L. In several spots. *Beccabunga*, L. Noticed in a ditch. No other species seen.

Euphrasia officinalis, L. Abundant in the dry gorge.

Bartsia Odontites, Huds., var. *serotina*. Common on roadsides.

Pedicularis palustris, L. Occurred at Llanbwchllyn pool. **Sylvatica*, L. Common.

Melampyrum pratense, L. In the wooded glen.

Lathræa squamaria, L. Both in the woods of the gorge, and in a small wood on the bank of the Wye, near the junction of the Edw.

Lycopus europæus, L. At Llanbwchllyn pool.

Mentha * piperita, Huds. Near the Edw, in the village. * *Sativa*, L. A form with short calyx, at the village. No other member of the genus seen.

Thymus * Serpyllum, Fr. Common on the open ground. *Chamædrys*, Fr. Not seen.

Origanum * vulgare, L. On a bushy bank under the churchyard.

Calamintha * Clinopodium, Spenn. Near the village.

Nepeta Glechoma, Benth. Common. *Prunella vulgaris*, L. Seen. *Scutellaria galericulata*, L. At Llanbwchllyn.

Stachys Betonica, Benth. In the woods, not abundant. *Ambigua*, Sm. At the village. This (understanding by the name the series of intermediates between *palustris* and *sylvatica*) is widely distributed in Brecon and Radnorshire. *Sylvatica*, L. Seen. *Arvensis*, L. In tillage at one spot.

Lamium *†maculatum, L. In the village. The rest of the genus unnoticed, except *Galeobdolon*, Crantz.

No others of this order noticed, except *Ajuga reptans*, L. (in the wooded gorge in small quantity), and *Teucrium Scorodonia*, L., which was abundant.

Myosotis cæspitosa, Schultz. On the Edw in the village. *Arvensis*, Hoffm. Noticed. * *Versicolor*, Reich. Abundant on dry ground at Aberedw; noticed at several other spots.

Symphytum * officinale, L. Seen.

Cynoglossum * officinale, L. Abundant near the bottom of the rocks.

Pinguicula vulgaris, L. Absent apparently from the district.

Primula vulgaris, Huds., and *officinalis*, L. Both abundant, especially the latter. None of the intermediates seen.

Lysimachia *Nummularia, L. Occurred near Builth. *Nemorum*. At one station at Aberedw.

Anagallis arvensis, L. In tillage.

Plantago major, L., and *lanceolata*, L. Common.

Litorella lacustris, L. Plentiful at Llanbwchllyn pool.

Chenopodium Bonus Henricus, L. Noticed at the farm house, Llanbwchllyn. No other member of this genus, and no *Atriplex* noticed.

Rumex nemorosus, Schrad., var. *viridis*, and *obtusifolius*, Auct. Common. * *Pratensis*, M. and K. Noticed on a roadside. * *Crispus*, L. Seen. *Acetosa*, L., and *Acetosella*, L. Common.

Polygonum * aviculare, L. Seen. *Hydropiper*, L., *Persicaria*, L., with its var. * *elatum* (well marked), *lapathifolium*, L., and * *maculatum*. All abundant in a single tillage field. The *green* variety of *P. lapathifolium* was present as well as the red-coloured one.

Empetrum nigrum, L. Plentiful on Glascwm hill.

Euphorbia Helioscopia, L. In tillage. No other species of this

genus seen. The woods here as elsewhere in Radnorshire are devoid of the beautiful lowland *E. amygdaloides*, L.

Mercurialis perennis, L. Common; also *Urtica dioica*, L. *U. urens*, L. Unnoticed. Rare or absent throughout Radnorshire?

Humulus * Lupulus, L. Noticed at one station in a hedge.

Ulmus suberosa, Ehrh. Absent either as spontaneous or planted. *Montana*, Sm. Common.

Quercus * Robur, L. (I think the var. * *pedunculata*). The main tree of the aboriginal wood. *Fagus*. Seemingly absent.

Corylus Avellana, L.
Alnus glutinosa, L.
Betula alba, L.
} Very abundant.

Myrica Gale, L. Absent here as throughout Radnorshire. No *Populus* seen.

Salix viridis, Fr. and **Russelliana**. Very common, and often of large growth. The *alba*, *triandra*, and *purpurea* groups apparently absent. *Viminalis*, L., by a brook near the village. A form referrible to *Smithiana*, Willd., abundant on the Edw one mile above Aberedw. *Cinerea*, L., *aurita*, L. and *Caprea*, L. Common.

Taxus baccata, L. Represented by numerous fine old yews in the churchyards, at Aberedw, Cregrina, and Rhulen.

Typha and **Sparganium**. Unnoticed.

Arum maculatum, L. Abundant.

Lemna * minor, L. Noticed. *Trisulca*, L. At Llanbwchllyn. No other *Lemna* seen.

Potamogeton prælongus, Wulf. At one station on the S.E. of Llanbwchllyn pool. No other species observed; none seen in the Edw or Wye.

Triglochin, **Alisma**, and **Elodea**. Unobserved.

Orchis * mascula, L. and **maculata**, L. Seen; no others noticed; nor any other genera of the Order.

Narcissus Pseudo Narcissus, L. and **Galanthus nivalis**, L. Both grow in this part of Radnorshire; but were unnoticed near Aberedw.

Scilla nutans, Sm., also unnoticed.

Allium Schœnoprasum, L., is abundant on the Wye both above and below Erwood station.

Narthecium. Unseen.

Colchicum * autumnale, L. Unnoticed; but one pasture adjoining the station at Boughrood is full of it.

Luzula * Forsteri, D.C. In the wooded glen. *Pilosa*, Willd., *sylvatica*, Beck, and * *campestris*, D.C. All abundant. *Multiflora*, Koch. Not seen.

Juncus. Unnoticed, and *Scirpus*.

Eriophorum vaginatum, L. and **angustifolium**, Roth. Both occurred, the latter abundantly, at Llanbwchllyn. *Latifolium*, Hoppe. Not seen.

Carex pulicaris, L. On Llandeilo hill. * *Muricata*, L. In more than one spot, in hedge banks. *Remota*, L. On the Edw in the village. * *Curta*. Good. At Llanbwchllyn. *Vulgaris*, Fr. A var. approaching *Juncella*, at Llanbwchllyn. *Glauca*, Scop. *Præcox*, Jac. *Panicea*, L. *Fulva*, Good, and *flava*, L., var. *minor*. Noticed. * *Paludosa*, Good. Abundant at Llanbwchllyn.

Anthoxanthum odoratum, L. Abundant.

Digraphis * arundinacea, Trin. Occurred on the Edw in the village.

Alopecurus and **Phleum** were unnoticed.

Agrostis canina, L. and **alba**, L. were found at Llanbwchllyn. *Vulgaris*, With. Common.

Aira caryophyllea, L. On the rocks in the wooded gorge. *Præcox*. On the railway and at other spots. *Cæspitosa*, L. and *flexuosa*, remained unobserved.

Avena flavescens, L. Abundant. *Elatior*, L. Abundant. No other species seen.

Holcus lanatus, L. Abundant. *Mollis*, L. Not seen. *Triodia*, unnoticed.

Melica uniflora, Retz. Abundant in the gorge.

Catabrosa. Unnoticed.

Glyceria fluitans, Brown. Near the Edw in the village. *Plicata*, Fr. At Llanbwchllyn.

Sclerochloa. Not seen.

Poa annua, L. Noticed. *Nemoralis*, L. Abundant both on wooded and exposed rocks. *Pratensis*, L. and *trivialis*, L. Abundant. *Compressa*, L. Not seen.

Briza media, L. Seen at Aberedw, but not abundant.

Cynosurus cristatus, L. Abundant; also *Dactylis glomerata*, L.

Festuca sciuroides, Roth. Seen near the Church. *Ovina*, L. Abundant and general. *Rubra*, L., var. *duriuscula*. Abundant. *Pratensis*, Huds. Near Llanbwchllyn. *Elatior*, L. Not seen. *Sylvatica*, Vill. Searched for in the gorge in vain.

Bromus asper, Murr., var. *serotinus*. Occurred. Var. * *Benekenii*, well marked on some of the wooded rocks in the gorge. *Sterilis*, L. and *mollis*, L. Common. *Commutatus*, Schrad. Was noticed among clover above the gorge.

Brachypodium sylvaticum, R. & S. Abundant. *Triticum*. Unnoticed.

Lolium perenne, L. Noticed. *Italicum*, Braun. Abundant on the railway bank, &c. *Hordeum*. Unnoticed.

Nardus stricta, L. Seen on Llandeilo hill.

Hymenophyllum *unilaterale, Willd. Noticed at one spot.

Pteris *aquilina, L. Abundant.

Lomaria spicant, Desv. Small, on Llandeilo hill.

Asplenium Trichomanes, L., and *Adiantum-nigrum*, L. Common, especially the former.

Ruta-muraria, L. On rocks in the dry gorge, &c. *Viride*, Huds. was formerly reported from Aberedw (*Transactions of the Woolhope Club*, 1870, p. 6).

Athyrium filix fœmina, Bernh. Seen at several spots. *Ceterach*. Not observed. *Scolopendrium vulgare*, Sm. In the wooded gorge.

Cystopteris *fragilis, Bernh. Abundant in the wooded gorge and elsewhere.

Aspidium *aculeatum, Sw., and *angulare*, Willd. Both observed, the former common, the latter abundant in the wooded gorge.

Nephrodium Filix-mas, Rich., and *dilatatum*, Desv. Seen. **Oreopteris*, Desv. Scarce and poor. No other species noted.

Polypodium vulgare, L. Common. *Dryopteris*, L. Occurred in the gorge. *Vulgaris*, L., *Phegopteris*, L., and *Robertianum*, Hoffm. Unnoticed, but the former used to occur in Aberedw gorge; the latter reported in the *Woolhope Club Trans.*, *l.c.*

Osmunda. Absent from Llanbwchllyn.

Ophioglossum *vulgatum, L. In some plenty in the Edw valley above Llanbadarn-y-garreg. *Botrychium*. Not seen.

Lycopodium. Unnoticed.

Equisetum *limosum, L., and *palustre*, L. Both seen at Llanbychllyn. The other species unnoticed.

None of the *Characeæ* seen.

MUSCI.

[*Ordinaverunt*, Hobkirk and Boswell, 1877].

The hills were much too dry for *Sphagna*.

S. cuspidatum, Ehrh., with var. *plumosum* occurred on the Maun pools, Glascwm hill.

Andreæa. Absent.

Gymnostomum rupestre, Schw. In tolerable abundance in the small cwms.

Weissia viridula, Brid. Rather common in hedge banks. *Cirrhata*, Hedw. Once seen on a rotting pale at Rhulen.

Rhabdoweissia and **Cynodontium**. Not seen.

Dichodontium pellucidum, L. Not plentiful nor fine. Var. *fagimontanum*. Well marked, on Llandeilo hill.

Dicranella heteromalla, Hedw. Once or twice observed. No other of the genus seen.

Dicranum scoparium, L. Plentiful. *Majus*, Turn. In the wooded gorge, but barren. *Palustre*, Brid., and other species unnoted.

Campylopus. Apparently absent from the hills. *Fragilis*, B. & S. Noticed at one spot near Erwood Station.

Pleuridium subulatum, L. Noticed more than once, on open ground.

Leucobryum. Absent. *Seligeria* and *Blindia*. Not seen.

Phascum and **Pottia**. Not in season to be noticed.

Didymodon rubellus, B. & S. Very sparingly seen. *Luridus*, Hornsch. Not seen. *Flexifolius*, Dicks. In one spot in the wooded gorge, barren. *Cylindricus*, Bruch. Noticed in a single station. *Sinuosus*, Wils. Not seen.

Eucladium verticillatum, L. Noticed at a single station in the rocks by the Edw, barren and not encrusted. *Ditrichum flexicaule*, Schwg. Absent.

Trichostomum tophaceum, Brid. Not noticed. *Mutabile*, Bruch. At one spot near Llanbadarn. *Crispulum*. Bruch. In large barren tufts on rocks by the Wye at Erwood Station.

Barbula muralis, L., and *unguiculata*, Dill., were not very abundant. *Fallax*, Hedw., and *Hornschuchiana*, Schultz. Both together on the railway bank under the Castle, the latter fruiting. *Revoluta*, Schw. On a bridge wall. *Convoluta*, Hedw., var. *sardoa*. Plentiful upon the dry exposed rocks. *Tortuosa*, L. Both in the wooded gorge and (in very fine but barren tufts) on the hill above. *Subulata*, L. Both in hedge banks and in river-side stumps on the Wye. *Lævipila*, Brid., *ruralis*, L., and *intermedia*, Brid. All noticed, but in no great quantity. *Latifolia*, B. & S. Near Erwood Station on riverside stumps.

Ceratodon purpureus, L. Seen, but very poor.

Encalypta streptocarpa, Hedw. Noticed at three stations. *Vulgaris*, Hedw. and *ciliata*, Hedw. Not seen.

Grimmia apocarpa, L., with its var. *rivularis* was noticed. *Pulvinata*, Dill., and *trichophylla*, Grev. were also observed. No other species seen.

Racomitrium aciculare, L., was abundant. *Heterostichum*, Hedw., *lanuginosum*, Hedw., and *canescens*, Hedw. Observed on the hills, the latter also on river side rocks near the Wye at Erwood Station. *Ptychomitrium*, was not seen.

Amphoridium Mougeotii, B. &. S., was very abundant and fine on the wooded rocks, and those of the lower parts of the hills.

Zygodon viridissimus, *Dicks.* Fairly plentiful, but not seen fruiting.

No **Ulota** was discovered.

Orthotrichum affine, Schrad., was plentiful in the higher parts of the Edw Valley, but very poor and rare about Aberedw. *Stramineum*, Hornsch. Fine and plentiful on the Edw, on Ash, Wych Elm, and Alder. *Lyellii*, H. & T. Abundant, but barren. *Leiocarpum*, B. & S. In several places, in very small scraps. *Rivulare*, Turn. Very fine on the Wye. None of the other species were discovered.

None of the *Splachnaceæ* were seen. *Funariaceæ*. Only represented by **Funaria hygrometrica**, L. Very poor and scarce.

Bartramia pomiformis, L. Very fine and abundant. *Ithyphylla*, Brid. Also occurred in small quantity in the gorge of the Edw. *Halleriana*, Hedw. In the same locality, on wooded rocks; and *Œderi*, Gunn. In several spots.

Philonotis fontana, L., was not abundant, nor noticed in fruit. *Calcarea*, B. & S. Seemed to be absent; also *Breutelia arcuata*, Dicks.

Webera nutans, Schreb., was very small and poor on the hills. *Cruda*, Schreb. Scarce, on the wooded rocks of the gorge. *Carnea*, L. Not seen; and *albicans*, Wahl., small and poor.

Zieria. Not discovered.

Bryum bimum, Schreb. (? I believe) occurred at Llanbwchllyn, and at other spots, but barren. *Cæspiticium*, L. Rare and poor. *Capillare*, L. Fine and frequent. *Pallens*, Swartz, and *pseudotriquetrum*, Hed. Pretty plentiful and fruiting in the cwms. *Roseum*, Schreb. Noticed in small quantity in the wooded gorge.

Mnium undulatum, Hedw., and *hornum*, L., were very abundant. *Rostratum*, Schrad. In large barren masses of many feet square, at Llanbwchllyn. *Stellare*, Hedw., in several places, and *punctatum*, Hedw. None of the rarer species were seen.

Aulacomnium palustre, L., was noted in several places, but poor and barren.

Tetraphis was not noticed.

Atrichum undulatum, L. On hedge banks, but not abundant.

Pogonatum aloides, Hedw. Plentiful. No other species seen.

Polytrichum formosum, Hedw. In fair plenty in the woods. *Juniperinum*, Hedw. On wall tops. *Piliferum*, Schreb. Not seen. *Commune*, L. Occurred on the hill tops, mostly the var. *minus*, or near it. *Diphyscium* was not discovered.

No **Fissidens** was found in the streams. A large var. of *taxifolius*, L., simulating *decipiens*, occurred on wet shady rocks. *Decipiens*, De Not., itself occurred sparingly. None of the other species were seen.

Epipterygium Tozeri, Grev., was discovered, barren, and in small quantity on the Wye near Erwood bridge.

Cinclidotus fontinaloides, Hedw., occurred in the Wye; and *Fontinalis antipyretica*, L. In very long barren masses in the dry bed of a small stream. *F. squamosa*, L., *Hedwigia*, and *Cryphæa* remained undiscovered.

Leucodon sciuroides was rather scarce.

Antitrichia was not found.

Neckera complanata, L. Common, but barren. *Crispa*, L., occurred on the wooded rocks.

Homalia trichomanoides, Schreb., was seen in several places, but always barren.

Pterygophyllum remained unseen.

Leskea polycarpa, Ehrh., was absent from the Edw, but present in small quantity upon the Wye.

Anomodon viticulosus, L. Frequent, but barren. *Heterocladium* was not discovered.

Thuidium tamariscinum. Fine in the wooded gorge, but barren.

Pterogonium gracile, Dill., was noticed at several spots.

Thamnium alopecurum, L. In the wooded gorge.

Climacium dendroides, L. Very fine at Llanbwchllyn, and occurring by the Wye at Erwood; in both places, of course, barren.

Isothecium myurum, Poll. Plentiful and fruiting.

Homalothecium sericeum, L. Very common.

Camptothecium lutescens, Huds. Only noticed at one spot, in the wooded gorge.

Scleropodium cæspitosum, Wilson. Absent both from the Edw and Wye. *Illecebrum*, Schw. Fine and plentiful, on a hedge bank (one *capsule* noticed); also on the wooded rocks of the gorge.

Brachythecium glareosum, B. & S., was not seen. *Velutinum*, L. Occurred sparingly in the upper part of the Edw valley. *Rutabulum*, L., and *rivulare*, B. & S. Both common. *Populeum*, Hedw. Noticed at several spots in the gorge. *Plumosum*, Swartz. Not noted.

Eurhynchium myosuroides, L. Very abundant, and fruiting on the shady rocks. *Striatum*, Schreb. In all kinds of situations. *Crassinervium*, Tayl. Abundant both on exposed and wooded rocks, but barren. *Swartzii*, Turn. Small and poor. *Prælongum*, Dill. Pretty common. Var. *Stokesii*

abundant by the rivers. *Pumilum*, Wils. Seen. *Tozdalei*, Sm. In a single shady rivulet.

Hyocomium seemed to be absent.

Rhynchostegium depressum, Bruch., occurred at one place in the wooded gorge. *Confertum*, Dicks, and *murale*, Hedw., remained unseen. *Rusciforme*, Weiss. Abundant.

A **Plagiothecium**, probably large **denticulatum** L., but barren occurred in the woods. *Undulatum*, L. Seemed to be absent.

Amblystegium irriguum, Wils. and **fluviatile**, Swartz. were searched for in vain. *Serpens*, L. was quite a rare plant (Llanbwchllyn). *Riparium*. Absent.

Hypnum aduncum, Hedw., and its congeners were not met with. *Revolvens*, Swartz. On Llandeilo hill. *Filicinum*, L. Poor and rare. *Commutatum*, Hedw. Occurred barren, but no *falcatum*, Brid. *Hamulosum*, B. & S. Occurred on the Wye at Erwood station. *Cupressiforme*, L., and the var. *resupinatum*. Abundant. *Arcuatum*, Lindb., was only noticed in damp grass near the Wye at Erwood station. *Molluscum*, Hedw., was pretty abundant in the wooded rocks, but barren. *Palustre*, L., var. *subsphærricarpon*, was fine in a dry rill. *Ochraceum*, Turn., occurred in the Edw. *Stellatum*, Schreb., with its congeners, remained unnoticed. *Cordifolium*, Hedw., occurred in plenty at Llanbwchllyn, and was noticed at one other spot. *Cuspidatum*, L. Common; in fruit at Llanbwchllyn. *Schreberi*, Ehrh. Abundant in the gorge, and *splendens*, Dill.: *purum*, L., *loreum*, L., and *triquetrum*, L., all fruited in the wooded gorge very abundantly. *Squarrosum*, L., was common. A marsh variety, approaching *calvescens*, Wils., in size, occurred at Llanbwchllyn.

SUMMARY:—

Flowering plants	340
Ferns, &c.	18
Mosses	120
Total ...	478

Woolhope Naturalists' Field Club.

JULY 28TH, 1891.

THE third Field Meeting this year was held as a Ladies' Day, at Llanthony Abbey, on Tuesday, July 28th. The following members attended: the Rev. Sir George H. Cornewall, Bart., President; Sir Herbert Croft, Bart., Vice-President; Count Lubienski, Captain de Winton, Revs. J. Barker, J. O. Bevan, W. K. Brodribb, J. Dunn, Edwyn A. Ely, C. S. Hagreen, M. Hopton, H. B. D. Marshall, and Plaskitt C. Lewis, Dr. F. Bainbridge, Dr. Fitzsimons, Messrs. H. G. Apperley, W. H. Banks, W. H. Barneby, H. C. Beddoe, C. P. Bird, C. G. Blathwayt, T. Davies Burlton, J. Carless, Sam Carrington, R. Clarke, George Cresswell, Luther Davis, M. J. Ellwood, C. J. Lilwall, H. Southall, H. G. Sugden, H. C. Moore (Honorary Secretary), and James B. Pilley (Assistant Secretary). There was a large attendance of ladies and other visitors, as shown in the following list:—Lady Cornewall, Lady Croft, Miss Apperley, Mrs. Armstrong, Mrs. Craigie Halkett, Miss Bainbridge, Miss Banks, Miss Barker, Miss Beddoe, Mrs. C. P. Bird and friends, Mrs. R. H. Bird, and friends, Mrs. Blathwayt, Miss M. A. Boycott, Miss E. Bull, Miss L. Bull, Miss Carless, Miss E. Carless, Mrs. R. Clarke, Mrs. Cresswell, Miss de Winton, Mrs. Ellwood, Mrs. Fitzsimons, Miss Goldfinch, Miss Holmes, Mrs. Horton, Miss Horton, Miss Lamb, Miss Lewis, Mrs. McEwen, Miss Marris, Miss D. Marshall, Mrs. Moore, Miss Moore, Mrs. Pilley, Miss Pilley, Miss Shaw, Mrs. Sugden, Miss Thomas, Mrs. Timmins; Major Craigie Halkett, Rev. R. H. Bird, Mr. W. Blake, Mr. E. W. Bowell, Mr. A. E. Boycott, Mr. R. W. Brown, Mr. Caffull, Rev. John Davies, of Pandy, Mr. N. Kennedy, Mr. L. Riley, and Mr. H. T. Timmins, of Edgbaston, who was preparing pen and ink sketches for illustrating his forthcoming work on *Nooks and Corners of Herefordshire*.

The members trained to Llanvihangel, where they were met by brakes from the Angel Hotel, Abergavenny, which conveyed them over the six and a half miles of road which, so soon as the Honddu river is reached, opposite the village of Cwmyoy, runs along its right or western side, in the Vale of Ewyas, as nearly parallel to the course of the river as the contours of the ground will permit. The position of the village of Cwmyoy is very prominent, situated under a large outlier from the Hatteral Hill, which outlier, called Graig, has the appearance of having being divided into two parts. The lofty heights of the Hatteral Hill, proceeding more northerly, present, in their almost perpendicular grand precipices, the appearance of escarpments of a miniature Gibraltar, or of Aden upon its landside, inaccessible even to an escalading party.

As the traveller approaches Llanthony through the picturesque Ewyas Valley he witnesses in the plantation of Spanish Chestnut trees skirting the

road a fragment of the improvements carried out in the earlier part of this century by the proprietor of the estate, the late Walter Savage Landor. At the site of the Abbey the valley widens out, and the noble, although bare, hills enclosing the massive towers of the ruin present a majestic circumvallation. The first inspection of the ruins might dispose the contemplative visitor to exclaim with the author of "Imaginary Conversations,"

> "Ichabod! Where is the glory?
> Llanthony! an ungenial clime
> And the broad wings of restless Time
> Have rudely swept thy massy walls,
> And rock't thine abbots in their palls!
>
> *Works II.*, 635, 636.

Having, however, entered the precincts, gazing in admiration of the magnificent lofty pointed arches, the artistic corbels and ornamented gigantic pillars, and standing in the roofless nave, chancel, or transept wherein the wind now plays where formerly resounded Latin hymns of praise, the visitor is carried back in solemn meditation to the days when pious men and pious women contributed not only their tithes, but, with much self-denial, the greater part of their substance, to rear here a temple to the Most High, and when architects applied their utmost skill to make the building worthy of the name. Drayton, in his "Polyolbion" thus expresses himself in his description of this secluded valley.

> "'Mongst Hatterills' lofty hills, that with the clouds are crown'd,
> The valley Ewias lies, immur'd so deep and round,
> As they below that see the mountains rise so high
> Might think the straggling herds were grazing in the sky;
> Which in it such a shape of solitude do bear,
> As nature at the first appointed it for prayer."

and a writer in *Archæologia Cambrensis* has the following lines:—

> "There may be mightier ruins—Conway's flood
> Mirrors a mass more noble far than thine;
> And Aberystwyth's gaunt remains have stood
> The ceaseless shock when wind and waves combined:
> Lone is Dolbadarn, and the lovely shrine
> Of Valle Crucis is a spell of power,
> By which each meaner thought and sense are charmed.
> Proud of that long array of arch and tower
> Raglan may claim a rude pre-eminence;
> Tintern is peerless at the moonlit hour;
> Neath, Chepstow, Goodrich, each has its pretence;
> But 'mid thy solitary mountains, gained
> By no plain beaten track, my spirit turns
> To thee, Llanthony; and, as yet untrained,
> Would freely worship where thine altar burns,
> All, save by nature's priests, unseen and unprofaned."

When the party had assembled at Llanthony Abbey, the business of the day was despatched. It commenced by the election of three members, and the proposal of two gentlemen to be balloted for at the next meeting, after which the Rev. J. O. Bevan read a paper on "Certain useful subjects of scientific investigation." Most of the subjects herein referred to have already had considerable attention devoted to them by the Club—most notably the entomolgy,

the geology, and botany of our county—but the British Association for the Advancement of Science has, by long tried experience and interchange of views of the experts who adorn it, the credit of elaborating out of every subject which it touches a condition as near perfection as mortals can expect to attain. No wonder, then, that our delegate, Mr. Bevan, should endeavour to make the results of the work of members of our Club more valuable by placing within their reach the formulæ employed by the parent association, and by indicating the direction of the lines of research along which they are recommended to travel. Some of the subjects upon which Mr. Bevan made observations were—meteorology, photography, phenology, forestry, geology, biology, botany, entomology, anthropology, archæology, &c., &c. Upon conclusion of Mr. Bevan's address Mr. Moore suggested the formation, without delay, of committees to carry out the observations in accordance with the authorized forms adopted by the British Association. Some names were easily selected to entertain the subject of an Archæological map of the county of Hereford, and Mr. Moore was able without difficulty to give the constitution of a committee upon Geological photographs.

The Architectural features of the Abbey were now pointed out by the Rev. Sir George Cornewall, and in giving us its history he informed us how the Norman Knight William, accidentally carried into this isolated locality whilst hunting, was seized with a devotional impulse, and leaving the ways of the world devoted himself straightway to the solitude of a hermitage in 1100, where he was joined in 1103 by a congenial spirit, one Ernisi, chaplain to Henry's good queen Matilda, their combined zeal and efforts leading to the foundation, in 1107, of the Priory, under the fraternity of the monks of St. Augustine. These Austin canons formed a link between the regular and the secular clergy. Llanthony, from its situation, appears more adapted as a place for the Cistercian monks who delighted in mountains, trees, and rivers. Before these Austin monks had been thirty years at Llanthony they desired to get their foundation removed to Gloucester, where a second distinct monastery was formed, which was afterwards united, and then the Church must have been re-built.

Llanthony was visited in A.D. 1188 by Archbishop Baldwyn on his journey through Wales to preach the Crusades. He was accompanied through the Principality by Giraldus de Barri, Archdeacon of Brecon, whom he found residing at Llanddew near Brecon, whence they crossed the mountains by Talgarth to Llanthony.

To go still further back in history, the earliest mention of Llanthony dates from St. David, uncle of King Arthur, being wont to kneel and pray in his cell here situated. Where was the St. David's cavern which Drayton places there? Walter Savage Landor, replying to Southey, says:—"I have looked in vain for St. David's cave; not a cave is there in my whole manor."* At the present time there is a cave five miles distant from the Abbey under a huge mass of calcareous tufa rock, Travertine, an offspring detached from the parent above. This rock is about half a mile distant from Father Ignatius's monastery, but we do not believe that it could have been in existence in the time of St. David, who died in 544.

* Forster's "Biography of Walter Savage Landor."

Drayton may have obtained his authority from Giraldus de Barri (*Giraldus Cambrensis*).

A short notice of Llanthony by Mr. Thomas Blashill is to be found in *Transactions*, 1876, page 204. An elaborate and carefully compiled report of Llanthony Priory appears in *Archæologia Cambrensis*, Part III., by the Rev. G. Roberts, afterwards published separately with an appendix, and illustrated with engravings—(W. Pickering, 177, Piccadilly: and Monmouth; E. Heath, J. Farror, 1847)—but the Rev. John Davies, of Pandy, pointed out some errors in it discovered by Freeman which are given further on in the *Archæologia*. Mr. Davies has kindly favoured us with a short notice of these errors. The Rev. W. Bagnall-Oakeley pointed out, made a sketch of, and furnished the following notes.

A CRESSET STONE AT LLANTHONY.

There is still to be seen at Llanthony Priory an interesting relic of monastic life in the shape of a cresset stone. It now rests on the base of a ruined pier near the entrance of the present residence. It is circular headed, measures 12 inches in diameter, 6 inches in depth, and has on its surface three cup-shaped cavities, 2 inches deep, and 4 inches across, the bottoms of the cavities show marks of the oily matter that had been burnt in them.

There exists at Durham a description of all the rites, customs, and furniture of the Church of Durham written in 1593; and the following passage explains the use of these stones. "In either end of the dorter (the old name for dormitory) was a four square stone, wherein was a dozen cressets wrought in either stone, being ever filled, and supplied by the cook, as they needed, to give light to the monks, and novices, when they rose to the mattins at midnight, and for other necessary uses." And as we look at the old Llanthony stone it seems to recal the time, when the bearded monks passed along the silent corridors, clothed in their long black habits, and white rochets, as they went into the Church to sing their mid-night office.

The very threatening aspect of the weather shortened the examination of the buildings and rendered it most prudent to hurry on the preparations for luncheon. This *cold* luncheon, *al fresco*, on the Abbey green, was hurriedly despatched. Of provisions there was plenty, and the serving was better than is often obtained, but the unpleasant chilly blasts of wind suddenly rising caused it to be partaken of under difficulties, and necessitated an early removal of the cloth. After luncheon a warmer temperature prevailed with re-appearance of sunshine, which enticed the company to disperse in different directions.

Some visited the site of the late Walter Savage Landor's projected palace at the bottom of Wirral Wood a few hundred yards north of the Abbey. A large proportion of the numerous company ascended Hatteral Hill by the saddle road, the oblique direction of which forms so conspicuous an object as one looks eastwards from the Abbey grounds, and thence found their way to meet the return railway train at Pandy station. It must not be forgotten to record that a few of

Cresset Stone. Llanthony Priory.

this party lost their way, though how they could do so seems almost unaccountable if they had faithfully adhered to their instructions, which were, to "follow the ridge until they came in sight of Trewyn House." Nevertheless, the whole were amply rewarded, owing to the remarkably clear atmosphere, by obtaining from this elevation of more than 1,600 feet the most distinct view of the extensive panorama of country that, within the knowledge of those who had often previously traversed this range, had ever been known. A few members of the party proceeding northward from the Abbey, despising beaten paths, actually assailed the heights of Loxy Tump, mastering the treacherous slippery condition of the grassy slopes by the expedient of taking off their boots and stockings, and from this their more northerly elevation on the Black Mountain of 1,800 to 1,900 feet, descended to join the previous party at Pandy Station.

Some members preferring to linger over the associations of the sacred building found some cause of lamentation in the fact of the Gate house, a fine specimen of pointed architecture, being converted into a barn, and the humble hostelry being licensed within the precincts of the enclosure. In the *Beauties of England and Wales* Walter Savage Landor is unjustly accused of erecting the building against the ruins. That it was the act of his predecessor, Colonel Wood, is evident from the following extract from a letter to Southey:—

"I am about to remove an immense mass of building which Colonel Wood erected against the Abbey, and with which he has shamefully disfigured the ruins. I would live on bread and water three years to undo what he has done, and three more to repair what he has wasted."—Forster's "Biography of Walter Savage Landor.'

The Parish Church is situated south of the conventual buildings.* In its present condition it is sadly unworthy of the glorious traditions of its past history, but members rejoiced to find that the Vicar, the Rev. Lewis Lewis, of Cwmyoy, was appealing for funds for its restoration. Surely Llanthony Priory has claims upon the sympathy of all who have a reverence for the memorials of those who implanted the Christian Church within our realms; of all whose daily prayer is for the enlargement of the borders of the House of God—"Thy Kingdom come"; and especial claims has it upon the patriotic and religious sympathy of all Welshmen, seeing that it was founded by St. David, the patron saint of Wales; of Wales whose Church is older than the Church of England, centuries older than our Throne and State of England, and whose union with the Church of England has been "not nominal only but organic. . . . The organic union is complete and has been so for 800 years (Lord Selborne)." We wish the vicar, the Rev. Lewis Lewis may receive that sympathy and support in carrying out the restoration which the privilege of enjoyment of this inheritance demands.

* Whilst this volume is passing through the press, the subject of "Orientation of Churches" is being carried on in *The Builder*. In the issue of December 24th, 1892, page 504, the writer (J. Houghton Spencer, of Taunton), referring to Llanthony, says:—"The Priory Church is dedicated to St. John the Baptist. It has a bearing of about 5 degrees to the south of east as taken from the 1—2,500 Ordnance Map of 1880. The conception of St. John Baptist, Sept. 24th, seems the day referred to by this orientation."

"The Parish Church, adjoining the ruins of the Priory and formerly connected with them, is dedicated to St. David. The bearing of its axis as taken by the compass and corrected is about 12 degrees south of east, and therefore the building is oriented for March 1st, St. David's Day."

There were found some few of the party who, proceeding up the valley northwards for a distance of four miles reached Capel-y-ffyn (the Church of the boundary). The boundary line between Monmouthshire and Breconshire is here crossed about 500 yards before reaching the Church. Capel-y-ffyn is a hamlet of Gilvach (synonymous with the Glyn-fâch of the Ordnance Map) in the parish of Llanigon. The Church is a small stone building, 27 feet by 18 feet, with a bell-turret on the west end, two windows in the south wall separated by a porch, one in the east end, and one in the north wall. All the windows are filled up with square-headed wooden frames. Through the window in the north wall the ancient font may be seen. It has an octagonal bowl, somewhat mutilated, apparently about two feet in diameter externally, on an octagonal shaft from four to five feet high. Through the east window it was observed that the gallery is approached by steps at the west end, that it occupied the whole of the north side abutting almost over the north end of the altar table. In the south of the churchyard there is the lower portion, about 2½ feet high, of what probably was a sun-dial, the dimensions of the shaft, 6 inches by 3 inches, being too small for a cross. Of seven lofty yew trees in the churchyard the largest was found to have a girth of 18 feet at the height of 5 feet from the ground.

Father Ignatius' Monastery, in the parish of Glasbury (Breconshire) is situated higher up the hill about half a mile further westward. A welcome is offered to the passer by, pilgrim in this world, and upon the entrance gates is offered an invitation to "Enter into His gates with thanksgiving, and into His courts with praise." The Monastery buildings are substantially built of stone. The magnificent altar is crowded with tapers, flowers, marbles, precious stones, statuary in admirable confusion, the most gigantic candles one has ever seen, and other emblematic surroundings which, if the curtain be withdrawn, can be viewed through a wooden latticed screen underneath the organ, which latter occupies an elevated position a few feet distant from the western entrance. The Church door is, as it should be, always open, and the beautiful tracery of architecture entrances the visitor as, in the dim religious light, he views through the closely latticed screen the choir with the altar and reredos at its extremity. The portion west of the screen is called the "Secular Church" with "Our Lady's Altar" on its north or gospel side, and the "Shrine of our Lady of the apparition" on its south or right side.

The Altar is of white stone, supported on six columns of porphyry, with a fresco painting behind it, on which are represented saints with their characteristic symbols, choirs of angels with harps and palms and censers, the outer panels representing the Church militant. Above the altar is the tabernacle glittering with crystals and carbuncles, crimson lamps shedding a chastening light in front of it. Over this again, supported on pillars of green marble is a lofty throne, and on the throne a jewelled crucifix of immense size. Over this throne and crucifix a massive canopy of delicately carved Caen stone supported on the shafts of red Belgian marble. On either side of the canopy, some 40 feet high, are the candles in magnificent brass candlesticks. A perfect shrubbery is arrayed on each side, every available space being occupied by flowers and tapers. The incense-bearing

figures of statuary on the sides are life size. The excellence and extent of the building of the Monastery and Church since the founder, Rev. Joseph Leycester Lyne, better known as Father Ignatius, O.S.B., laid the foundation stone of the Abbey on March 17th (St. Patrick's Day), 1870, show that there has been no apathy on his part.

He is a fervent religious enthusiast, or as he calls himself "an Anachronism," his object being the revival, in his sequestered nook, of the 14th century monasticism in the latter half of the 19th. He calls his building the Church of England Benedictine Monastery of S. Mary and S. Dunstan.

After visiting the Monastery, the ascent was made of the hill under Taren-yr-Esgob, about half a mile further. The huge mass of Travertine Rock at Tal-y-sarn, 24 feet wide, 30 feet high (according to the dimensions given in *Transactions*, 1867, page 47) was examined. This mass of Calcareous Tufa had evidently fallen from the heights above which appeared to be either constituted of, or at least to be coated with an unknown thickness of, this same material. From its appearance the mass has obtained the appropriate name of "The Honeycomb Rock." Moreover it is hollowed so as to form a small cave which is called "Twlch-y-foel-las," or the cave of the grey stone. Query? Is this the cave previously referred to on page 201 as being, on the authority of Drayton, called "St. David's cavern?"

Whilst engaged in the examination of this Travertine, after a fruitless attempt to scale the nearly vertical heights above it, a thorough-born native named James Lewis appeared on the scene and proposed himself as our guide to the waterfall about half a mile further. His invitation was accepted. These falls have been frequently written of under the term "falls of Afon Honddu." They are really the falls of a tributary brook called "Nant Bwch"; the neighbouring farm-house on the opposite left or northern-side is called "Blaenbwch." This brook, meandering through the green solitude, falls into the Honddu about two hundred yards below the Church of Capel-y-ffyn.

The time to return to Llanthony Abbey was now due, so with hurried steps the five miles of ground was retraced. Upon arrival at the Abbey green at 5.30 what remained of the original party was found taking their seats for the return journey to Llanvihangel Railway Station whence they proceeded home, picking up the complement at Pandy. All had pleasant recollections of the day, excepting only the *cold* luncheon from which they had so hurriedly dispersed in the earlier part of the day.

It would be unpardonable to quit Llanthony without some few reflections upon the connection of the late Walter Savage Landor with this locality. It is not, however, a theme sufficiently inviting to say much about, for this intellectual genius for years retained unpleasant reminiscences of it. He was born on January 30th, 1775, in Warwick, where his father was the leading physician; his mother was Elizabeth Savage, of Tachbrooke. Exchanging his inheritance in Warwickshire for a wilderness in Wales, he burdened his estate heavily in order to possess himself of it, and lost so much money on projected improvements that he was ruined before he could complete them. We have his "Biography," a book of two

volumes, by John Forster—Chapman and Hall, 1869. Forster also edited a nearly complete edition of his entire writings. This year, 1891, his "Imaginary Conversations," in six volumes has been edited by C. G. Crump.* Forster shows (page 309)† how the acquisition of the Abbey cost him much more than was justified or was repaid by any happiness it yielded him, for no sooner was he in possession of it than there commenced an "uninterrupted series of vexations and disappointments in connection with it." His praiseworthy wish was to restore the magnificent centre nave, towards which the many stones which were taken down and numbered only added to the fragments of the ruin. He made his residence in the shooting box, originally fitted up by Colonel Wood, in the southern tower, now the Inn, with its antique kitchen at its base, the arched refectory serving as a cellar, portion of the adjacent abbot's residence fitted up for domestic purposes, as well as contiguous buildings now used as a farm. His efforts of restoration of the mountain wastes, of the Church and Abbey ruins, and of the shocking impassable roads of nearly a century ago, terminated in a lamentable and despairing failure.

In 1810 he writes (page 318), "my house is not half-finished and has cost already two thousand pounds. I think seriously of filling it with chips and straw and setting fire to it. . . . I doubt whether they (the Welsh) will allow me to make improvements, I am certain they will not allow me to enjoy them. I have expended in labour, within three years, eight thousand pounds amongst them, and yet they treat me as their greatest enemy." His planting did not thrive; his cedar-groves were like the groves of romance, and he saw the million trees with which he had indulged his fancy daily decaying or being rooted up by his enemies. He began by buying two thousand cones, calculating a hundred seeds to each, and believing that such had really been the product, "but, alas! the rains and field-mice have hardly left me a thousand, I must begin again; and instead of raising a hundred and fifty thousand trees, must be contented with fifty thousand, or perhaps with thirty." At last, as an oasis in the desert, a bright spot appears, as we read, "I have made a discovery, which is, that there are both nightingales and glowworms in my valley. I would give two or three thousand pounds less for a place that was without them;" and again when he writes in 1811 to Southey, "I have found a girl without a sixpence. . . . She is pretty, graceful, and good-tempered," of whom he says, writing to his mother, "The name of my intended bride is Julia Thuillier. She has no pretensions of any kind, and her want of fortune was the very thing which determined me to marry her."

In 1812 (page 333) he wrote again, "Violent floods have carried away two bridges. I am engaged in building a third also for the union of two farms now under one tenant." And in August of the same year he writes, "My masons have left me, after a job of three years. I live in my house merely to keep it dry, just as a man would live in a dog kennel to guard his house. I hate and detest the very features of the country, so much vexation have I experienced in it. . . . I never can be happy here, or comfortable, or at peace" (page 335).

* Since that period his Poems, Dialogues in Verse, and Epigrams have (1892) been brought out by the same Editor, making a total of eight volumes: reviewed in *Macmillan's Magazine* for February, 1893.

† Forster's "Biography of Walter Savage Landor.

Injury is added to insult by the removal of his boundary fences, and the uprooting of his trees so that not one hundredth part of his million trees that were to have enriched his estate, eight miles long, is now represented.

In 1813 we find, from a letter to his friend Southey, that he is overwhelmed in disputes of an irreconcileable bitterness with his tenant "Betham," who, unfortunately, had been introduced by Southey, through one of his (Southey's) sisters. "Mr. Betham neglected to gather in his corn of which his crop is excellent, and he lost £200 by this; he did not thatch his hay by which he lost £200 more; and by a series of such conduct as might be expected from a sailor turned farmer, and by living at the rate of £1000 a year, he has succeeded in spending his wife's fortune, about £3000. In fifteen months I have received no rent from him, though his rent amounts to over £1100. I did not demand it the *first* half-year however much I wanted it; and that he might not pay it the *second* he lopped my trees and ploughed all the meadow ground on one farm. . . . . To prevent my other meadows from being ruined, I have (as he foresaw and wished) brought an action against him, but expressed at the same time a readiness to settle it by arbitration. This he refused; and refuses also to pay any rent, under the pretext that the matters in dispute will be settled in a court of law." In the same letter follow charges of "roguery and ingratitude." "Betham told Addis, my tenant, and a very honest mason, that he should pay me no rent at all events for four years. Here is between four and five thousand pounds gone by trusting to his honour. I suffered the same infatuation before" (p. 387).

Matters grow worse to still further embitter his life, as sundry minor differences with all sorts and conditions of men who took Betham's part spring out. Insult is added to injury. Lawsuits follow unfavourably for him in quick succession. In a letter to Southey, conveyed by the post of May 27th, 1814, he writes (page 406), "I go to-morrow to St. Malo. . . . My wife follows me when I have found a place for her reception. Adieu." And on November 4th of the same year he writes from Tours (page 414) full of gratitude for the sympathy of Southey, "I am told that all my woods and plantations are laid waste; three hundred thousand trees are lost—but not to me—nor have I room for any more vexations."

From 1814 to 1835 he lived, save for a short time abroad, and chiefly at Fiesole. During this interval of nineteen years, owing to the economical and judicious management of his more prudent mother he is more fortunate with his *real* estate. She, becoming the first of his creditors, demands conditionally the management of Llanthony, and a few years after her death we find that in 1835 (page 557) his estates of Llanthony and Ipsley may be said, at a rough calculation, to have been yielding very certainly more than £3000 a year rental. From 1837 to 1858 he was at Bath. At the age of 83 he flies from England once more, and the last stage of his long and strange life of nearly ninety years is spent, thanks chiefly to Robert Browning, in comparative peace: bearing his years with but little loss of intellectual power, he died at Florence, September 17th, 1864, maintaining an unquailing heroic aspect to its close,

"Implored so long in vain, at last is come
The hour that leads me to a peaceful home."
(Page 586).

and leaving behind him, in the estimation of critics, a surely awaiting fame, although the public has failed to admire his "Imaginary Conversations." The vast stores of his entire works embrace forty or fifty thousand lines of verse and some three thousand large and closely-printed pages of prose, of which, says George Saintsbury, in his review (*Macmillan's Magazine*, February, 1893), "the verse might almost always be, according to the old trick, 'unrhymed' and made into prose with but slight alterations; the prose, with certain allowances for greater exuberance and verbosity, in parts might with hardly greater trouble be arranged into Landorian verse."

LLANTHONY ABBEY.

By the Rev. JOHN DAVIES, of Pandy.

THERE are two important descriptions of Llanthony Abbey in the *Archæologia Cambrensis*, one is by the late Rev. George Roberts, M.A., of Monmouth, the other by the late Professor Freeman, the eminent historian and archæologist. Mr. Roberts' description appeared in the year 1846, and has been published since in a pamphlet form, and Mr. Freeman's appeared some ten years later.

Mr. Roberts has entered largely into the history of the Abbey, which he has worked out at considerable length and with great success. Mr. Roberts infers that the Church now remaining is the original one, and that the architectural details confirm his views. Mr. Freeman, on the other hand, has not entered into the general history of the foundation, but he has given a remarkably lucid and exhaustive architectural history of the remains of the Church and other buildings of the Monastery. Mr. Roberts says that Llanthony was built between 1108 and 1136, but much nearer the former date than the latter, as it was abandoned for Gloucester at the latter period. He puts therefore the completion of the structure not later than the year 1115. Mr. Freeman says that such an early date is impossible, and proves this beyond all gainsaying, if the details can speak for themselves. Mr. Roberts has taken for granted that the present Church at Llanthony was the one founded by Hugh de Lacy, Earl of Hereford, in 1108. The architectural style of the Church proves beyond any doubt that the work belongs to a later period than that between 1108 and 1115. If the work was carried on between these dates, we should have expected to find almost everything Norman in the architecture, but Llanthony has nothing Norman about it, except that it retains the cushion-capital in its decorative shafts, and the round arch in some of its smaller apertures. The Church could not have been built till the very last year of the 12th, or the first years of the 13th century.

Llanthony is later than the earliest parts of St. David's and earlier than the nave of Llandaff, so that it stands in date between the two South Wales Cathedral Churches.

The earliest transitional building in England, according to Mr. Freeman, is Malmesbury Abbey, commenced about 1135, and is thoroughly Norman, except that its pier-arches are obtusely pointed, whereas the transitional work at Llanthony is far in advance of this, the west front being nearly confirmed lancet-work. Mr. Roberts puts the completion of the work at Llanthony not later than 1115: if such was the case we should have expected the work to be nearly all Norman.

Mr. Roberts' notion, and that of others who have followed him, of the present Church at Llanthony being the original must therefore be condemned. Architectural science is against it, and if architectural science proves anything, it proves that Mr. Roberts has taken the present building at Llanthony for an earlier one. The style of the present Church is a complete 13th century style.

The Church had three massive towers—a central one, and the others at the end of the two aisles. It had transepts, the eastern limb, as was usual down to the 12th century, being a short one.

Llanthony Church evidently was built during the transition from the round arch to the pointed, and the styles are intermingled throughout the whole building.

The great constructive arches are pointed, and the transept window has a round-headed light. The corbel shafts have the same capitals, and are grouped the same as St. David's. The great east window was put in in the 14th century, and this is the only change of importance in the main body of the Church.

Mr. Roberts appears to be wrong again in the historical details of the Abbey. He brings down the minute details of its history to 1178, and only adds that the establishment "fell into contempt and ruin in the time of Edward IV." Mr. Freeman shows that Llanthony Abbey continued to exist until the time of the dissolution, and was *only annexed* to the Gloucester Llanthony by that king. The house at Llanthony in Monmouthshire was undoubtedly re-built, and there is no historical evidence against the re-building, which architectural science makes perfectly certain.

The monks got tired at their home in Monmouthshire before they had been there thirty years; they wished to get their foundation removed to Gloucester.

The Monmouthshire house was Llanthony the first, and the Monastery built at Gloucester was Llanthony the second.

During the 12th century there was a single Prior and a single set of monks dwelling in one or other of the two Abbeys. The deed of Edward IV. set forth separate priors, separate monks, and separate properties. How this separation was made is uncertain. During the establishing of the Gloucester house, the old Church in the vale of the Honddu, would probably be neglected, and when the relations of the two foundations were finally settled, and the Monmouthshire Llanthony became a distinct establishment, the old Church at the latter place was re-built.

Mr. Freeman puts the re-building about the year 1200, the work being gradually done, so that some portions date from the 14th century.

Mr. Roberts, in his History of Llanthony, takes for granted that the Church, founded in 1108, is the existing Church. Also he takes for granted that the old Church was altogether abandoned when the second Llanthony was founded.

When the Woolhope Club visited Llanthony on July 28th, 1891, a sepulchral slab attracted the attention of the members of the Club after the president, the Rev. Sir G. H. Cornewall, Bart., described the ruins of the Abbey. This slab is fatal to Mr. Roberts' theory—namely, that the buildings "fell into ruin and contempt" before the end of the 12th century:—the ornamentations on this stone prove that the establishment existed at Llanthony the first in the 13th century. Here we have a real 13th century slab, of somewhat advanced character, and which would, to a certain extent, show that the monks at that period were settled in their Monmouthshire house.

CERTAIN USEFUL SUBJECTS OF SCIENTIFIC INVESTIGATION.

By the Rev. J. O. Bevan, M.A., F.G.S., F.R.M.S., Vicar of Vowchurch, Hereford.

Life, no doubt, is short; but after all, it is not intended to be measured by length of days alone, but by the feelings, thoughts, and events which conspire to make it memorable, and to fill it to fulness. Again, knowledge, doubtless, is inexhaustible, but in the multitude of investigators there is safety, and we indulge the hope that it may yield some facts, year by year, to the circle of the sciences, and respond to the cry uttered (with more or less of anguish) by each of us—"Let there be greater light, and may knowledge grow with time."

All of us have the main work of our life shaped out by circumstances which involve inexorable fate—that is the *utile*, and leads to many ways of obtaining bread, and perhaps butter. But there is also a divinity within, controlled by our own aspirations alone, which thirsts for the acquisition of knowledge—that knowledge which may be loved for its own sake, and with a freedom from all sordid thoughts *(a)*. This divinity leads us to belong to the Woolhope Club.

It is the opinion of many a heathen man and publican that this Club exists but for the purpose of providing its members with a certain number of pic-nics in a year—flowering off with what is called "a Ladies' Day," but we who are in the secret know better, and claim that our right to exist is founded solely upon our devotion to science.

I take the liberty, then, on this occasion, of bringing under your notice certain useful subjects for scientific investigation. All those whom I have the honour of addressing are familiar with the progress of present-day investigation in different branches of science, but it may be allowed to a weakling like myself to bring all this before the Club in one view, if only by way of justification of one's own position. By your favour, during the past three years, I have been successively appointed a delegate to the meetings of the British Association for the Advancement of Science. This body has admitted our Club to the rank of a Corresponding Society, and the representatives of all similar societies, assembled in solemn conclave last year in Leeds, were invited to lay before their Clubs the various subjects touched upon by the different sections of the British Association and its associated Committees and affiliated societies, and to invite the co-operation of all Clubs such as ours, either in their corporate capacity, or through their individual members. The general work and aims of what I may call the central, or parent, Association are set forth, in a most interesting manner, in the annual reports, now regularly forwarded to our Secretary.

The advantage of engaging in a business-like and methodical manner in one or more of the departments of observation favoured by the British Association are very apparent.

(a.) As regards individuals. It leads a man out of himself, causes him to forget his daily worrying round of duties, prevents his preying too much on his fellow creatures, sets him on that most interesting of the equine tribe, a hobby horse, stimulates thought, gives a changed and useful direction to his energies, and tends to develop many a Gilbert White, a Waterton, a Phillips, and a Buckland.

(b.) As regards the mass. It softens the manners, and renders them less fierce. The popularization of knowledge tends to culture, even in the case of men possessed of but few natural advantages, as witness the case of the Scotch naturalists, Dick and Edwards, as related by Smiles.

(c.) As regards our Club. An increase of its activity and usefulness will tend to enlarge its constituency. In addition, it will evoke a new spirit of affection and loyalty on the part of the members.

(d.) As regards science in general. Science is thoroughly democratic and generous to all. She suffers all worshippers to enter into the holy place, and displays her *arcana* to all, without distinction of age, or race, or rank, or sex. The humblest votary may be entrusted with some of her choicest secrets if only she be wooed with diligence and self-abandonment.

Each member of the Club, without exception, has various energies and capacities which can be regularly exercised in her service. The results will not fail to bring about not only the good of the individual, but the good of all,—further, they will ultimately lead *ad majorem gloriam Dei*.

In time to come the Club may see fit to undertake extended investigation on more than one line. (I am not, of course, forgetting what has already been done.) This, as I have said, will not only increase its usefulness, but also its popularity. It will bring about its affiliation with other Clubs (*b*), it will lead to an exchange of publications (*c*), the enlargement of its Museum and Library, and a system of exchanges also in respect of objects contained in these (*d*). It will tend to periodical visits to other provincial towns, such as York, Chester, Oxford, Cambridge, where there is a wealth of interest too little accounted of. It will forge a link in the chain of scientific evolution and progress. Now, many important observations are made only to be neglected. Many more are noted, but are of little value, inasmuch as they are not tabulated, systematized, compared, and correlated with others. From these comparisons of one fact with another, noted at the same time, and again at distant intervals, are to be learned the wisest and surest teachings of the Book of Nature, and of the changes wrought by the tooth of Time.

My subsequent remarks will form little more than a catalogue of subjects, to a greater or less degree worked upon at the fringe by Committees already in existence, and suggested for further observation and elucidation by the authorities of the British Association.

(*a.*) It may be allowed here to quote the practice of a Club at Cambridge, composed of students of a particular and exclusive branch of learning, whose toast at each assembly was—"Here's to pure mathematics, and may they never be of use to anybody."

(*b.*) The Midland Union of Natural History Societies is a striking instance of the value of federation.

(*c.* and *d.*) A suggestion has been put forth that exchanges might advantageously be conducted through a central depôt in London.

SECTION A (*c.*)—MATHEMATICAL AND PHYSICAL SCIENCE.

1. Meteorology.—The ordinary observations are satisfactorily carried out. There are about 14 stations in Herefordshire connected with the Royal Meteorological Society, viz., Wigmore, Pembridge, Lynhales, Hampton Court, Dilwyn, Stoke Bliss, Brinsop, Burghill, Hereford, Bryngwyn, Much Marcle, Putley Court, Ross, and Buckenhill. In addition some observers in the county send the results to Mr. Symons. The systematic investigation of the rainfall of the British Isles was commenced by Mr. Symons in the year 1860, and his first report on the rainfall, which was for the years 1860 and 1861, was communicated to the British Association at Cambridge in 1862, a Committee with a grant being subsequently appointed. From 1877 Mr. Symons has undertaken the collection, compilation, and annual publication in his *British Rainfall* of statistics of the rainfall of the British Isles, at his own expense, assisted by contributions from observers and others. His staff of observers now numbers nearly 3,000 *(f.)* The energy of such a man is admirable, and tends to contagion. He has 24 observers in Herefordshire.

2. There is much to be done in respect of determining the height and shape of clouds, the velocity of wind, the amount of bright sunshine, the occurrence of lightning with or without thunder, the observation of the causes which locally modify weather, the collection of weather proverbs, with notes as to their present inapplicability owing to changes of climate or to conditions brought about by deep draining, disafforestation, the construction of railway lines and cuttings, the heat and movement of railway trains, the extension of towns, &c., and the reduction of observations so as to obtain principles for the purpose of more accurately forecasting the weather.

3. The utilization of photography for the rendering permanent the lightning flash, and for other meteorological purposes. The notification of haloes, lunar, and solar bows, luminous meteors, what are popularly called thunderbolts, and the collection and identification of meteoric dust.

4. Observations with regard to terrestrial magnetism and earth tremors, perhaps as indicating lines or centres of past volcanic activity in this country.

5. Phenological observations.

"This subject may be said to have originated with Gilbert White, but it received little attention in England until 1874, when a Report was drawn up under the auspices of the Royal Meteorological Society in which 71 flowering plants were recommended for observation, 8 insects, and 17 birds as to their migration and return. From 1875 to 1888, both inclusive, the Rev. D. A. Preston prepared, and the Society printed, annual reports embodying the results obtained. Mr. Mawley prepared the Report for 1889. The list is now reduced to 13 plants, 5 insects, and 5 birds." The Council of the Royal Meteorological Society is desirous of enlisting as many observers as possible, all of whom should work according to a certain form, of which a specimen is appended (*g*).

(*e.*) The sections are numbered according to the plan of the British Association—(A.) Mathematical and Physical Science, (B.) Chemical Science, (C.) Geology, (D.) Biology, (E.) Geography, (F.) Economics and Statistics, (G.) Mechanical Science, (H.) Anthropology.

(*f.*) Mr. Symons will supply, gratis, instructions to rainfall observers, and forms on which to enter the records to be sent to him.

(*g.*) Various forms relating to the different subjects touched upon are also appended to this paper. Possibly they may be suspended on a screen in the Club-room.

6. Lists of the fauna and flora of each particular county. These, in many cases, are already well advanced.

7. Another important series of subjects has reference to the circulation of the underground waters in the permeable formations of England, and the quality and quantity of the water supplied to various towns and districts from these formations.

8. Also to the varying height of the water in deep wells in different years and at different seasons in the same year. This is a most important subject, with a marked bearing on the future. Owing to deep draining and the systematic drainage of large tracts of marshy land, combined with other causes, the soil is desiccated to a greater extent than formerly. This, in time, must bring about a change of climate and greater variations of heat and cold. It is reported that the water in deep wells in the neighbourhood of London has considerably lowered during the past few years. "The Committee of the British Association has carried on this investigation by means of forms of inquiry as to the nature of the sections passed through in wells and borings for water, the effect of faults upon the water supply, the character and quality of the water obtained, and the varying heights at which the water was found to stand, when the works were first commenced, and then after long pumping. The securing of old records might doubtless be brought about by strict search and inquiry, and would throw considerable light upon the rate of change in the course of many years" (*h.*)

9. The seasonal-temperature-variation in lakes, rivers and estuaries.—"The Committee wishes to ascertain the relation between the climate and weather of different parts of the country and the temperature of the surface-water. This can only be done by the co-operation of a large number of observers with instruments of the same kind and used in the same manner" (*h.*)

10. The seasonal rate of evaporation of water in reservoirs, open and under cover--a subject of striking importance to water companies, on which depends perhaps the provision of roofing for reservoirs in the future. This and many other subjects touched upon in this paper—such, *e.g.*, as that relating to noxious insects—have a direct industrial application.

11. The position of springs, their temperature, and chemical constitution—whether or not medicinal—and their seasonal variations.

12. The limits of afforestation.

13. The return of sewage to the land; the influence of the dressing of the land in this and other ways upon the water supply over large areas for use in towns.

14. The height of water in rivers at different points taken at the same time, determining the rate of flow between two distant points under different conditions of flood and low water, (*i.*) the estuarine condition being also taken into account.

(*h.*) When inverted commas are used, the words are taken either from the Reports of the Delegates of the Corresponding Societies, or from similar publications.

(*i.*) The Club for some little time past has paid an observer to register the daily level of the Wye, but has discontinued the practice since the self-registering water-gauge got out of order, which had been so well kept by Mr. J. B. Evans at his residence, the Saracen's Head, Wye Bridge, Hereford.

SECTION C.—GEOLOGY.

Under Geology there is much to be done.

1.—The rate of erosion of the sea coasts, and the influence of the artificial abstraction of shingle or other material in that action. "The Committee require the rate of the erosion of the sea on the coast of this country, and inquire as to how far that regular erosion has been artificially increased by the operations of man, by the cutting away of stone upon the sea cliffs for economic and building purposes, and by the building of sea walls in positions, and under conditions which were unadvisable, and by breakwaters not leading the water in the right way, which in many cases increased the coast erosion." I believe that Shakespeare placed Bohemia upon the sea coast. I am not aware that he did the same for Herefordshire, so that it is impossible for the Club to move directly in this matter, but it is a matter of national importance, as the Fates have planted us upon an island, which is all too small; and much interesting information might be derived from the Transactions of Societies engaged in the work (which we might acquire by exchange), for they would contain reports respecting the actual rate of erosion now going on, and also copies of old plans, documents, and deeds, which would show the outline of the coast in days gone by. The special detail would be concerned with submarine forests. How important a similar inquiry may become can be discerned by a reference to the Falls of Niagara, which have materially altered their form during the last 50 years, the last great fall of rock occurring about four years ago.

2. "Recording the position, height above the sea, lithological characters, size and origin, of the erratic blocks of the United Kingdom, reporting other matters connected with the same, and taking measures for their preservation."

3. Geological Photography. Here the object is to secure by systematic action in the various districts a series of photographs illustrating the features which geologists think most worthy of being recorded in their respective localities. Instructions have been issued with reference to the size and character of the plates required. It is suggested that the Geological Society should have the custody of the negatives, a selection of which would be available for publication in a representative form. Professor Meldola has suggested the use of orthochromatic plates, which would render more perceptible than those in ordinary use the small differences in colour between the different strata.

4. The Registration of Type Specimens of Fossils. A recommendation has also been sent in for the appointment of a Committee for reporting on type specimens in museums.

5. The Teaching of Science in Elementary and Secondary Schools, in relation to which a word from the Club, occasionally uttered in an official manner, would have great weight.

In connection with investigations on Geological subjects, the "Geological Record," edited by Mr. W. Topley, would convey much useful information.

SECTION D.—BIOLOGY.

1. Investigation of the Invertebrate Fauna and Cryptogamic Flora of the British Isles. The object is to make a systematic investigation of the rivers and

lakes, and it is hoped that the microscopists will undertake definite work. They are expected to take note of the physical features of the stream or the lake which they study (of course including the geological formation), of the temperature at different periods of the year, and in the case of lakes, at different depths.

2. The stocking of rivers and lakes with new varieties of fish and plants, obtained from various quarters. If the Club ever betake itself to Malvern, I should think that a visit to Mr. Burgess's fish ponds would be interesting. In connection with this subject, it would seem that something more might be done by such a nation as the British in the way of experimenting with a view to acclimatizing foreign productions—involving the starting of an establishment upon a broad basis for commercial purposes, like to the Jardin d'Acclimatisation at Paris, or our own Kew Gardens and Zoological Gardens united in one.

3. The observation of the habitats of rare plants, and the registration of an oath that we will suffer all such secrets to die with us.

4. The disappearance of native plants from their local habitats. Professor Hillhouse, of Birmingham, in 1888, treated of the disappearance, or partial disappearance, of 55 different kinds of plants in Scotland. This is mainly attributable to the action of dealers and collectors. "The Committee would be very glad if local naturalists' societies would take the matter up and try to chronicle the disappearance of plants as far as they can. Professor Hillhouse suggests the use of the 8th edition of the *London Catalogue* as a basis for their observations. He calls attention particularly to the disappearance of certain plants, and shows the way in which they might disappear—for instance, *Hypericum quadrangulum* disappeared, having been eaten by cattle or trodden down. *Sedum reflexum* has disappeared from a wall owing to repairs. Various other ways are mentioned, and amongst these, drainage seems to have been a great cause of the disappearance of native plants." Again, "The encroachments of the sea on the Cumberland coast and elsewhere have brought about the disappearance of several littoral plants; but in the majority of cases the hand of man has been recognizable. Disappearance through human agency may be classified under two heads—personal and impersonal. Impersonal action is illustrated by the results of building works, agricultural operations, drainage, &c., which cause constant changes in local flora. Thus the Isle of Man *Brassica* (*B. monensis*) first found by the famous botanist John Ray, at the Moiragh, Ramsey, in 1670, is in danger of extirpation there, and has already been extirpated at Douglas by building operations; and the commonest of the scarlet poppies (*Papaver rhœas*) is greatly diminishing in the county of Cumberland, through the gradual abandonment of cereal tillage. It is only incidentally, however, that these impersonal changes affect plants of special interest, while the personal actions of man, that is, his actions directed intentionally at some particular plant, have naturally their chief influence upon plants of peculiar interest, rarity, or beauty. Here, again, it is the 'collecting dealer' whose ravages form the main burden of complaint. The Ladies' Slipper Orchid (*Cypripedium calceolus*) once not uncommon in Yorkshire, Durham, and Westmoreland, has well-nigh succumbed, and the hillsides, banks, and hedgerows are being rapidly stripped of their once abundant ferns. As an

example of the systematic way in which this is done may be instanced the case of the Maiden Hair (*Adiantum capillus-veneris*) which, in the Isle of Man, is regularly hunted for by men with boats and ladders, and sold to 'trippers' in the Douglas market." Heaven forefend that we should endeavour to rob lovers of nature of any gratification derivable from the contemplation of nature's most beautiful works, but it is the part of such societies as this, which combine knowledge with taste, to point out the more excellent way of enjoyment—the greatest good of the greatest number for the longest possible period. The dealer or collector who tears a rare root from its native bed for filthy lucre's sake, or personal pride and gratification, should be done to death without benefit of clergy. Let there be no quarter to the spoiler. The society might exercise a useful function in inviting eminent statesmen to forbear expressing a preference for any native flower, or anything short of an orchid. A late Prime Minister has much to answer for if he in truth—which I very much doubt—affected the primrose. At all events, the very report has been disastrous to the first and sweetest rose of spring, for there is a danger of its becoming exterminated in time from the London district, as flowers are taken to the metropolis by cartloads every year.

5. Injurious insects. "The appearance in unusual numbers of any insects injurious to field and garden crops, and injuries done by them, and the degree of success which has attended any methods of prevention which have been tried," should be recorded and communicated to Miss Ormerod, Torrington House, St. Albans, Consulting Entomologist to the Royal Agricultural Society,* who will assist observers in identifying insects which are injuring crops, and advise them as to the means to be adopted to prevent injury. From the year 1878, Miss Ormerod has published an Annual Report of Observations of Injurious Insects. What such pests as these can do may be told in the history of the phylloxera in France and other countries.

Section H.—Anthropology.

Prehistoric and Early Historic Remains. The Birmingham Philosophical Society has set a good example in showing itself alive to the importance of recording the ancient remains in their district. Throughout England, in every district, there are still remains which have survived the gnawing tooth of time, the hand of the spoiler, yea, of the restorer also. British, Roman, Saxon, Norman—there they stand, histories writ in stone. "It is recommended that the prehistoric remains of the British Isles be tabulated under the following groups:—(1) caves, artificial and natural; (2) camps and earthworks; (3) lake dwellings and crannoges; (4) maeni-herion and dolmens; and (5) barrows, tumuli, and other burial places. Their position should be laid down in the one-inch Ordnance maps, and distinctive signs should be used, for which see 'Rep. Brit. Assoc.' for 1888,

* Miss Ormerod has since that period resigned her honorary appointment of Consulting Entomologist to the Royal Agricultural Society of England. We are, however, fortunate in still having her Annual Reports, published by Simpkin, Marshall, Hamilton, Kent & Co. The sixteenth Report of Observations during the year 1892 (published 1893) contains valuable researches on the life-history of the *Currant-shoot and Fruit Moth*, by Dr. T. A. Chapman, who was President of our Club in 1896. His paper entitled *Lampronia Capitella* originally appeared on pp. 297—300 of No. 36 of the *Entomologists Monthly Magazine* for December, 1892, price 6d., Gurney and Jackson.

p. 289. The position may be denoted thus: Anbury Camp, near Redbourn: 46 9·6/3·4, this indicating that the camp is 9·6 inches from the top, and 3·4 inches from the left hand margin of sheet 46 (old survey), or, on the actual ground, about 9¼ miles from the north and 3¼ from the west margin of the area represented in the map."

There are also to be noted other sepulchral monuments, cromlechs, eminences on which watch towers have stood, or from which signal fires shot their baleful lustre into the sky, stone circles and forts, round towers, rock dwellings and shelters, cairns, and fragmentary remains of settlements. All these, from the kitchen-midden of the remote past, to the battle ground of the middle age, are full of instruction and of interest to the student of questions affecting the country as the race. Many barrows have been destroyed with the best intentions. "It is not uncommon for a certain investigator, who is interested in history, to dig up one of these ancient structures and extract all the pottery. There may be other relics of great importance, skulls or bones of various animals, all of which are important in fixing the date of the barrow or the habits of the people, and these things are all lost. In like manner people who are searching for human remains only, are likely to overlook all the other things, such as works of arts and similar objects, which yield very valuable information." A Committee has been elected by the Council of the Anthropological Institute to draw up a series of directions to those who desire to explore barrows and other ancient remains. The Council would be extremely glad if any one desirous of exploring a barrow would communicate with the Committee of Aid. It consists of experts, and has no desire to obtrude itself unnecessarily. It is important also to mention that the Society of Antiquaries has undertaken an Archæological Survey of England. They enter not only the prehistoric, but the Roman and Saxon remains and earthworks. Each county would be accompanied by a list which would be classified under different heads and indexed, so as to show the discoveries which had been made. The road along which we should travel is, in this respect more than any others, definitely marked out for us. The Ordnance Survey furnishes a rough catalogue, and all the elements of position. It is not too much to expect that a correspondent—more or less skilled—could be found in every district or parish to undertake to classify the information obtainable respecting the monuments of the past within his limit, and to communicate such information to a Committee of the Club, who would sift it and prepare it for publication.

I venture to suggest that this work, including the provision of a Map similar to one published by the Kent Archæological Society is well within the scope of our constitution and our energies; and I look upon it as likely to come to fruition in the immediate future. It will cost money doubtless, but I indulge the hope that, in the course of the investigations, a gold mine will be somewhere discovered, to which the Treasurer may find access.

It was whispered to me the other day that our botanists and geologists felt that archæology received too great a share of attention in the proceedings of this Club. I should be unwilling to press forward any subject likely to cause, or to increase, any division in our councils or our energies, but I think I can assert that

this particular scheme would receive influential support from many, if not most, of our members; and further, that its execution need not necessarily interfere with the other legitimate interests and researches of a Naturalists' Field Club.

I must now draw to a conclusion, apologising for taking up so much of your time. I have said enough to show the wide field that exists for work and workers of every kind. Few people are aware of the stimulus which the British Association gives to investigation in these and kindred subjects, for I have given but a selection from the list just published by them of objects attracting the attention of different Committees and isolated observers, to whom grants are made from year to year, in sums varying from £5 to £500, to enable them to continue their researches. The total contributed depends upon the success of the annual gathering. In 1889 it was £1,417, last year, £799.

Many of these subjects naturally demand more time, thought, and sustained observation than any but professed scientists could give, and complicated instruments might also be necessary.

My object this morning has been to suggest certain matters which may fitly come within the compass of members of our Club.

What is particularly needed is a series of observations concerning the unceasing changes in the structure of our planet and its atmospheric envelope. All things about us are in a condition of unstable equilibrium. The earth, as of old, stands partly in, partly out of, the water. No day is exactly like the preceding; new elements and combinations of change and chance are introduced. At the close of the day no particle stands, in relation to its fellows, in exactly the same position as it did when the day dawned. The summer's sun, the winter's frost, yea, even the vernal air that fans the cheek of spring, all work a change, and tend to pulverise this outer crust which serves us for a home. The force of gravity is constantly in exercise. It clings to each particle of matter as its Fate, and tends to drag it down to the lowest attainable level. The weathering and denudation that go on in respect of the surface of the soil are more extensive than we wot of, and are unnoticed only because the change is uniform and constant. If photographic or other records could have been preserved from age to age of the contour of the mountain, or the line of a wave swept bay, how interesting would not the tale have been to those who now dwell in their neighbourhood? We want to do in the future what the past has, in a measure, failed to do for us, and perpetuate the fleeting record ere the forms vanish for ever.

I would plead for original work, if of a character never so humble. The tendency of the age, with its flood of popular scientific literature, is to turn out a race who read, but do not think—who are content to think the thoughts of others—so that they are led captive by any theory, if only sufficiently plausible and novel. In nature, the parasite is not considered to be a strikingly noble animal; yet many individuals, even though they be extensive readers of popular scientific works, are not a whit better than parasites. The cure for this is the accurate observation and patient setting down of a series of facts, it may be within a very limited radius. What interest can be derived from a single wasp Sir J. Lubbock can tell us; what a feast of mind a despised earthworm can furnish Charles

Darwin teaches. A fernery or aquarium, yea, the very smallest of all God's creatures, would furnish us with a world far too wide to be conquered in a lifetime, and it could not fail to be that, with longing and persistent sight, we should find out some fact about such, altogether new to science, and capable perhaps of illustrating some subtle law of Nature's working in an obscure corner of her laboratory, and mayhap of furnishing a key whereby a new chapter in the mysterious book of our common mother might be deciphered; and, although the British Association may not immediately crown our labours with its approval, or universal science applaud, we may have the proud satisfaction of electing ourselves fellows of a new society, consisting only of one person, and that person, our noble self; and, in addition, of presenting ourselves, at our own expense, with the biggest gold medal of which anybody has ever heard.

Woolhope Naturalists' Field Club.

TUESDAY, AUGUST 25th, 1891.

WHEN the programme drawn out by the President, the Rev. Sir George H. Cornewall, for a visit to his residence, Moccas Court, to Bredwardine and Monnington, for the fourth Field Meeting of this year, reached the members, its popularity soon became apparent, and was proved by the fact that no fewer than one-third of them accepted his invitation. Amongst the visitors must be mentioned the Rev. William Henry Purchas (co-editor with the Rev. Augustin Ley of *The Flora of Herefordshire*), and the Rev. Moyle Rogers, the great authority on the species of *Rubus*, of which we find in the 8th edition of *The London Catalogue of British Plants* no less than ninety-eight varieties.

Upon their arrival in Moccas Park the members were met by the Rev. Sir George Cornewall, who without delay directed them to his Church. Having explained the symbolical Tree of Life on the tympanum over the entrance door on the south side, he conducted them into the interior, where he read a paper explanatory of the more than usually interesting features of this Early Norman building, chiefly owing to its antiquity and uniformity of style, being perhaps older than that of Kilpeck, and free from the grotesque architectural designs executed on the latter Church. Another feature which makes it unique is the fact that it is constructed of Travertine* with the exception of the jambs, &c., of the windows and doors, and the decorative mouldings which are cut in the Old Red Sandstone of the county. The organ, the case of which is decorated by Kemp, situated at the west end of the Church, is blown by hydraulic power, the water supply of which has never failed, neither during the drought of 1886, nor the almost unprecedented winter of 1890—91. From the Church the President conducted the members through his garden lawn, in which were growing some handsome trees, notably Cryptomeria japonica, Occidental plane, Wellingtonia, Hemlock spruce, and the great Cedar of Lebanon, of which last the dimensions were taken four feet above the level of the ground, where the girth was found to be 16 ft. 1 in., being an increase of exactly 2 ft. during the last 17 years. A tablet fixed on the tree gives the girth as follows:—

14 feet 1 inch in 1875;
14 „ 11 inches in 1880;
14 „ 16 „ 1883;
to which we now add 14 „ 25 „ 1892, or more properly 16 feet 1 inch.

* Fragments of Calcareous Tufa are met with in the following Herefordshire Churches: Aymestrey, Bredwardine, Humber, Letton, Lyonshall, Monkland, Much Dewchurch, Wigmore, and probably in several more Churches. Before the restoration of Wigmore Church about twenty years ago, the ancient chancel arch was built entirely of Tufa. It was removed, carted away and sold; some of the blocks were very massive. We have seen some of them now appropriated as rockwork in a garden.

Leaving the lawn by a bridge which overlooks the large fernery, containing numerous and rare specimens growing in a rockery formed principally of Travertine, the members reached the garden, where the cultivation of the most showy British wild plants, mixed with plants from Italy, Switzerland, and other more distant foreign parts, has been so successfully carried out during a long period of years under the horticultural taste and supervision of Sir George. It was somewhat surprising to find that a most healthy specimen in blossom of an Aralia, more generally cultivated in greenhouses, had survived even the inclemency of the almost unprecedented winter of 1890-1891. Amongst British wild plants were seen handsome plants of Inula Helenium, Dipsacus, Lythrum salicaria, Lysimachia vulgaris and nummularia, Thalictrum majus, Eryngium maritimum, and many others, including the very rare Asarum europæum; interspersed were plants from all parts, amongst which should be mentioned Eryngium amethystinum, Smilax sarsaparilla, Canna, Gentians and Saxifrages from the Alps, Ranunculus aconitifolius, Polygonum cuspidatum, Potentilla fruticosa, Veratrum album, Rubus spectabilis, and the handsome digitated blackberry from America, with varieties of Spiræa, Tropæolum, Alchemilla conjuncta, Acæna Nova Zealandica, or Great Burr, so troublesome in the sheep's wool in New Zealand, and a host of other plants far too numerous to be here mentioned, unless we call attention to a well-grown, healthy plant of the true Holly Fern, and Water lilies with the Arrow-head growing in the tank in the inner enclosure. In the garden the botanists found a Rubus thyrsiflora.

Punctually at one o'clock the party arrived at The Court, where the President exhibited some specimens of rare British plants of the locality, which included Ranunculus lingua and Wahlenbergia hederacea, or, according to Sir Joseph Hooker, now called Campanula, both in flower. The visitors were entertained at luncheon by Lady Cornewall, and afterwards Sir George, having briefly conducted the business of the Club, read an explanatory paper upon the formation of Travertine, not only in this locality, but also in many other places on a far larger scale; adding that its process of growth, or formation by the deposition of carbonate of lime over vegetable growths, would be seen in Depple Wood, within a mile of Moccas Court. Time only permitted of too brief an expression of thanks to Sir George for his interesting paper, and to Lady Cornewall for her hospitality.

Proceeding to Depple Wood after luncheon, the first curious and rare object which attracted attention was an ancient Sundial on the lawn, of which more will be said hereafter, and in the meadow close to the entrance into Depple Wood were gathered many specimens of the aforementioned Campanula hederacea, this being the only known locality in Herefordshire for this plant. In the wood many exposures of the Travertine were met with in the diminutive streams running down the slope of the hill into the Wye below, and it was astonishing to hear from Sir George of the rapidity of its growth, as he pointed out the masses accumulated since he had removed so much for the restoration of his Church.

Quitting Depple Wood, a route was taken by Cross End Farm to the Deer Park, passing thence round Lawn Pool (which, owing to the lower average of the rainfall during the last 12 months, was nearly dry), where Lysimachia vulgaris and Scutellaria galericulata were gathered in flower. Botanists will regret to learn that, since the drying up of this pool, that interesting plant Utricularia minor, which we always took a delight in seeing on its margin, has entirely disappeared.

The visitors having reached the Deer Park, examined some of the most magnificent oak trees in the kingdom, such as have been called in the *Woolhope Club Transactions* the Moccas Oak, the Club Oak, the Tall Oak, and many others. It may be mentioned that the Moccas Oak, hollowed with decay, and charred internally, owing to its having been accidentally set on fire, now measures 36 ft. 6 in. in circumference at 5 ft. from the ground, and the Club Oak 20 ft. 10 in. In *Transactions*, 1870, page 314, the girth of the Club Oak is given 19 ft. 5 in., and its height 94 ft. The Tall Oak, a magnificent tree in complete decay at its base, fell a short time ago. Unfortunately its true length was not measured before the foresters had removed the upper portion of it, but it was possible to take its girth, which was found to be 18 ft. In *Transactions*, 1870, page 315, the girth of the Tall Oak is given 18 ft. 7 in., and its height 118 ft. A photograph of this tree is represented there on the opposite page. The Broad Oak, so called from its extraordinarily wide-spreading canopy, covered a radius of more than 60 ft., or including the bole, a diameter of from 120 to 130 ft. Amongst other trees ought to be mentioned an Oriental Plane in the grounds on the western side of the house, its leaves less deeply indented than those of the Occidental Plane in the garden lawn, and in the same direction, within 100 yards of the drive upon the right hand side, towered an Ash tree of huge proportions and magnificent growth.

The Sundial on the lawn is one of the most elaborate ever constructed. A picture of it is deservedly represented in Miss Gatty's work on Sundials. The stone has perished in the spot where the date was probably inscribed. Judging from the architecture of the base, Sir George Cornewall ascribes it to about the year 1600. We are indebted to Lady Cornewall for the following description.

SUNDIAL AT MOCCAS.

"Tyme passeth and speketh not,
Deth cometh and warneth not;
Amend to-day and slack not,
To-morrow thyself cannot."

The above lines are inscribed round the four sides of a very beautiful old dial pillar at Moccas Court, Herefordshire. It bears several dials of various shapes, circular and heart shaped, concave, triangular, &c.; between and around these faces the following Latin mottoes are sculptured. The first is from the Vulgate Psalm xix., 1.

(1.) Coeli enarrant gloriam Dei et Operationem manuum eius annunciat firmamentum.

"The heavens declare the Glory of God and the firmament showeth His handywork."

(2.) Si culpare velis, culpabilis esse cavebis: Nemo sine crimine vivit; id circo ne temere judicato.

"If thou wouldst blame, thou wilt beware of being blameworthy. No one lives without reproach, therefore judge not rashly."

(3.) Instar globi stat machina mundi.

"Like a ball stands the framework of the world."

(4.) Dilige Dominum Deum toto corde.

"Love the Lord thy God with all thy heart."

(5.) Sol est lux et gloria mundi.

"The sun is the light and glory of the world."

This is round another circular face. On the north side beneath the signs of the planets is Domus Planetarum, and on south side, Philippus Jones fecit.

The dial pillar which now belongs to Sir George Cornewall, is thought to have been made in the reign of Charles II., and was first set up at Monnington Court (on the opposite side of the Wye) the property of the Tompkyns family. When this property came into possession of the Cornewalls, the dial was brought to Moccas. A similar one is at Kinlet near Bewdley, but it is not in such good preservation as the one at Moccas.

The following is from *The Archæological Journal*, Vol. xxxiv., No. 136—1877, page 502, when the Royal Archæological Institute of Great Britain and Ireland visited the district of Hereford, Monday, August 13th, 1877 :—

"The members then examined a curious sundial in the garden in the form of a St. Andrew's cross, raised upon a pedestal, the various sides being cut into as many dials, with English and Latin inscriptions. This sundial resembles in its general character that in the desolate courtyard of the ancient manor house of the Dove's at Upton near Peterborough, and may be compared with one at Kelburne House in Scotland, which exhibits sixty dials."

Passing from the Deer Park, the route was taken towards the river again, where an advanced outwork, succeeded by embankments, indicative of outer defences, moat, &c., terminating with the inner line of defence, and the Keep, showed the site of Bredwardine Castle, and that it must have been a place of considerable size and importance in the time of the Vaughans. Close by is the Church, another specimen, at least partly, of Norman Architecture. Herring bone work on the north wall faces the visitor as he enters the building by the south door; it is also conspicuous externally on the north side, to a height of five or six feet above the ground. As in Moccas Church, so also in Bredwardine Church are tympana over both the south entrance door and the closed-up north door. The history and features of the Church were explained in a paper read by the President.

The similarity of the font to that in Kilpeck Church is remarkable, not only as regards design and huge dimensions, but also in the fact that its bowl is made of the same conglomerate stone.

Here is a comparison :—

	KILPECK.	BREDWARDINE.
Inner diameter of bowl ...	2 feet 10 inches.	2 feet 10 inches.
Outer diameter ,, ...	3 feet 5 inches.	3 feet 7 inches.
Depth of bowl, internally ...	10 inches.	10 inches.
Height above ground floor ...	3 feet 5 inches.	3 feet 6 inches.

At Kilpeck the circumference internally is 8 feet 6 inches, and externally 10 feet 3 inches. Externally it increases in size from the top downwards in an elegant convex form.

Leaving Bredwardine Church, the condition of the weather did not admit of more than a hurried run over the lawn, and a glance at the grounds of Bredwardine Vicarage, charmingly situated on the right bank of the Wye, with the Quinta, the residence of Mr. Peter Giles, opposite, and commanding a view of the pretty Bredwardine brick bridge.

There are some handsome trees in the Vicarage grounds, including Pinus Cephalonica, a tall Sallisburia Adiantifolia, more commonly known as the Ginkgo, after its name in Japan (see *Transactions*, 1890, Fungus Foray, p. 99), an Abies either pendula or merinda, and a Cedar of Lebanon, aged 68 years, which now measures, below its first bough, 13 feet 10 inches, being an increase of 22 inches in circumference during the last thirteen years, or since it was measured by this Club. See *Transactions*, 1878, p. 105. It should be mentioned here that the Lysimachia thyrsiflora, which was stated in the programme to be found near the site of Bredwardine Castle, must not be considered a wild plant. The plant referred to grows in the garden of the vicarage, and upon examination is pronounced to be the Lysimachia ciliata.

From Bredwardine Church the members crossed the Wye over Bredwardine Bridge, thence passed the Quinta, and within a hundred yards of the old parish Church of Brobury, of which the ruinous walls have been taken down, the chancel being fitted up for divine service. It contains a curious font, and a canopied tomb of the 14th century. Onwards through Monnington Wood surmounting Brobury Scar, and through the avenue of Sweet Chestnut trees terminating in Scotch Firs and Yew trees, the total length of which is nearly one mile, to meet the carriages at the lodge near Moccas Bridge. This avenue is called Monnington Walk. Judge Cooke, in his continuation of *Duncumb's History of Herefordshire*, informs us that this "ornamental planting was made as an approach to Monnington Court through Bredwardine Ford in 1623, to commemorate the success of James Tomkyns as M.P. for Leominster.

It hardly ceased raining all day, but, nevertheless, the enthusiasts, headed by the President, stuck to their work with their usual well-known pertinacity. The time was now 5.30, and it is to be regretted that both the wet weather and want of time prohibited a visit to Monnington Church. Near the porch of this Church is the traditional gravestone of Owen Glendower (*Archæological Journal*, 1877, Vol. 34, No. 136, p. 501).

THE BURIAL PLACE OF OWEN GLENDOWER.

The Rev. Thomas Thomas, in his *Memoirs of Owen Glendower*, published in 1822, gives (page 169), an extract from the Harl. MSS., 6832, notifying that when the Monnington Church was re-built in 1680, a large gravestone, without any inscription, was found about a foot below the surface of the ground whilst removing the trunk of a Sycamore tree in the churchyard. Upon the removal of the gravestone "there was discovered at the bottom of a well-stoned grave the body (as 'tis supposed) of Owen Glendwr, which was whole and entire, and of goodly stature. But there were no tokens or remains in the coffin. When any part of it was touched, it fell to ashes. After it had been exposed two days Mr. Tomkins ordered the stone to be placed over it again, and the earth to be cast in upon it."

It may be remarked that the inhabitants of the locality of Monnington Straddle in the Golden Valley, near Vowchurch, believe that Owen Glendower was buried in their district, deriving their conjectures perhaps from Mr. Thomas' statement that his second daughter, Elizabeth, according to some, Alicia, was married to Sir John Scudamore, of Ewyas and Holme Lacy, and proprietor of Kentchurch, not many miles distant (page 51).

We find, on reference to page 51 of Rev. Thomas Thomas's *Memoirs of Owen Glendower*, that "his fifth and youngest daughter, Margaret, was married to Roger Monington, of Monington, in the county of Hereford. Mr. Pennant says that he had the pleasure of seeing at his house two ladies, owners of Monington, and direct descendants from the daughter of Glyndwr." From the same authority we also learn that "Janet, his third daughter, was married to John Crofts, of Croft Castle, in the same county of Hereford."

Unwillingly we must confess that, after submitting this traditional question to our historian, Judge Cooke, our long-cherished confidence in these statements of Rev. Thomas Thomas has been shattered. Judge Cooke asserts that at the time of Owen Glendower's rebellion, and for many years afterwards, Monington-on-Wye was never possessed by an owner named Monington. Reference to pages 131 *et seqq*, of his continuation of *Duncumb's History* proves that Monington was in the possession of the Audley family at the period of Owen Glendower's rebellion, and for many years afterwards, until 1525. The visitation of 1634, he adds in a footnote on page 137, "contains a pedigree of Monington commencing in 1385, yet does not include a marriage with a daughter of Owen Glendower." Judge Cooke thus proves the tradition of Monington-on-Wye being the burial place of Owen Glendower to be only founded on prominent credulity during four centuries! (p. 135).

How conflicting are the pages of history! On page 39 of MS. of the late Rev. J. Webb, of Tretire, now in the Hereford Cathedral Library, we read:—"There is a record in the Tower of London, published by Mr. Rymer; in Fœdera Tom. viii., pages 608 and 733: Tom. ix., pages 283 and 330. Browne Willis, Esq., in his history of the Bishop of Bangor, says:—Owen Glendower died, and was buried at Monington, the 20th September, 1415, etc."

Judge Cooke suggests the probability (p. 137) that "his remains may be covered by a stone in the churchyard on the south side of Corwen Church, and known as Owen Glyndwr's sword. It is a cross on an old coffin-shaped stone, not uncommon in many churchyards."

Mr. Moore has seen the stone referred to, and has corresponded with the Rev. Canon Wm. Richardson, for many years Vicar of Corwen. All that can be said is that there is a cross on an old coffin-shaped stone over what is called the Priest's door on the south side of Corwen Church. It is generally called Owen Glendower's dagger, and the guide books give the absurd tradition that Owen Glendower, in an act of rage, threw his dagger against it from the heights above. The stone was, in all probability, an old gravestone. Mr. Ferrey, architect for the late restoration of Corwen Church, gave its date as 11th century. The shaft of a cross at the western side of the churchyard is supposed to be of earlier date.

The neighbourhood of Corwen abounds with associations of Owen Glendower. About three miles distant, on the road to Llangollen, is pointed out the site of his palatial residence near Carrog ûcha, a large tumulus from the heights of which he surveyed miles of his country, and a huge oak table in the kitchen of the neighbouring farm house which is said to have been used by him. Opposite the farm of Penybont, and close to Carrog Railway Station is a field called the "Parliament field." Mr. Jones, of Penybont, possesses a fragment of a skull which has been dubbed the skull of one of Owen's chieftains!! On the opposite bank of the Dee, in the parish of Llansantfraid Glendwrdy, is still to be seen the prison, called Cachardy Owen Glendwrdy where he confined his captives; it is modernised into a habitable cottage, at present perilously near the river bank.* But as to the place of Owen Glendower's burial, it still remains unknown.

When the party re-assembled, the seats in the carriages were resumed, the return journey to Hereford being carried out under a series of showers of rain, with few intervals of intermission, and those of short duration, insomuch that for once, and it is worthy of being chronicled, the ardour of the majority had become so damped, after four hours exposure to rainfall, that they would not run further risk of lumbago, bronchitis, influenza, and a host of other maladies, no, not even in the pursuit of the structure of antiquity, which had recently been unearthed on the premises of the New Weir, only a few feet distant from the exposed section of a road buried nearly two feet below the ground level.

The situation of this buried masonry, or well of five steps, is at a distance of fifty yards below masses of masonry which some believe to have been the abutment of an ancient bridge across the Wye, leading from Gobannium (Abergavenny), through Stone Street, in the parishes of Madley and Eaton Bishop, to the Roman station of Magna Castra, now called Kenchester, and

* As this volume is passing through the Press, in June of this year, 1893, large masses of oak timbers mortised with wooden pegs, evidently fragments of a roof, have been discovered in the River Dee, below Carrog Bridge, by Mr. Hugh Jones, of Penybont. The timbers are too large to have passed through the arches of the bridge; the date inscribed upon the bridge is 1661. There is every reason to believe from their scantling, shape, and length, that these beams are fragments of the roof of the ancient Church, which traditionally existed about 500 yards higher up the river, on a site a little above Glendower's Prison.

thence on to Uriconium (Wroxeter). Our reasons for declining to believe this masonry to have been an abutment of a bridge, and in favour of its being an ancient wharf, are due to no discovery having ever been made of piers of the bridge in the river, nor on the opposite bank thereof.

The following is a list of the members and visitors who attended this, the fourth Field Meeting this year:—Mr. F. Bainbridge, Mr. H. C. Beddoe, Mr. C. P. Bird, Mr. C. G. Blathwayt, Colonel Linley Blathwayt, Mr. R. Clarke, Mr. G. Cresswell, Mr. G. Davies, Rev. F. Dunn, Mr. C. Fortey, Mr. G. H. Hadfield, Rev. A. W. Horton, Mr. T. Hutchinson, Rev. A. G. Jones, Rev. Preb. Lambert, Rev. Augustin Ley, Mr. C. J. Lilwall, Dr. S. R. Matthews, Rev. H. B. D. Marshall, Rev. W. Bagnall Oakeley, Dep. Surgeon-General W. Perry, Mr. G. H. Phillott, Mr. W. Pilley, Rev. T. Prosser Powell, Mr. Warre Prescott, Rev. F. S. Stooke-Vaughan, Mr. H. G. Sugden, Rev. R. H. Warner, Rev. M. G. Watkins, Mr. A. W. Weyman, Dr. J. H. Wood, Mr. H. C. Moore (Honorary Secretary), and Mr. J. B. Pilley (Assistant Secretary), with the following visitors:—Mr. C. J. G. Bird, Mr. W. R. Diamond, Rev. E. R. Firmstone, Mr. W. B. Giles, Mr. R. Lewis, Rev. W. R. Lloyd, Rev. G. O. K. O'Neill, Rev. Wm. Henry Purchas, Rev. W. Moyle Rogers, Mr. C. Whatmore, Mr. B. G. Wood, and Mr. H. E. Wood.

At this meeting Mr. Philip Baylis, of Ledbury, and the Rev. Charles Black, of Colwall, were elected members, and the name of Mr. Wm. B. Giles, of Newport House, was proposed to be balloted for at the next meeting.

MOCCAS CHURCH.

By the Rev. Sir Geo. H. Cornewall, Bart., President.

Moccas disputes with the banks of the Gwain, near Fishguard, the honour of being the birthplace of St. Dyffryg or Dubricius, who lived about the year 470, perhaps later, began by being Bishop of Llandaff, and was afterwards Archbishop of Caerleon—the greatest representative of that ancient British Church, which some have supposed was founded by St. Paul. The chronicler in the *Liber Landavensis* describes Dubricius as dwelling for some time in a corner of the island of Enerdil, his mother's name, at Moch-rhos, so called because an angel of the Lord appeared to him and bade him build an oratory to the Holy Trinity, where a white sow was lying with her pigs. As it seems to me, a more suitable interpretation of the name than this convenient monkish legend would lie in the fact that the neighbourhood of Moccas is peculiarly favourable to the growth of the oak, and, therefore, to the feeding of large herds of swine—moch, in Welsh, signifying a pig, and rhos, a large uncultivated space or moor. That which would seem to fix the dwelling place of Dubricius on the banks of the Wye, rather than on the banks of the Gwain, is the fact that four churches in Herefordshire are dedicated to him, and none in either Pembrokeshire, Monmouthshire, or Breconshire. As regards the date of the building of the present Church of Moccas we have no record, and as the *Liber Landavensis* is not considered trustworthy, any hints that might be gleaned from it are hardly worth explaining as far as fixing a date is concerned. It was probably built before 1100. It is related in the *Lives of Welsh Saints* that St. Cadoc, at the close of his life, visited Brittany and built a "basilica" on an island in the archipelago of Morbihan. St. Cadoc was contemporary with Dubricius. They were both important personages in the Court of King Arthur. Have we here any clue to the building of our "basilica" at Moccas? You will find in the neighbouring Church of Bredwardine traces of very early work, and an interesting Norman doorway. The original Church of Bredwardine may have been built at nearly the same period as Moccas—the tympana over north and south doors would seem to be early; its basilical form and proportions have also been considered to point it out as very early Norman. At the time of the Domesday survey Moccas (spelt Moches) appears to have been divided between St. Guthlac's Priory and Nigel, the physician. Many explanations have been given of the Norman Tympana; and De Caumont, who enters at some length into the question of sculptured tympana, remarks that they commonly manifest an Eastern origin. A tree of life in the centre, and monsters of various kinds on either side. There appears to be this tree of life in the tympanum over the south door, partly altered into a cross, to which human beings are holding while exposed to the attacks of beasts. Mr. Barnewell, of the Cambrian Archæological Society, who described it in this manner, was unwilling to extract any further allegorical meaning from this strange piece of sculpture. The north door, the door of the Evil Spirit, is also adorned with a tympanum, which is supposed to represent the

Evil Spirit in the flames. Others have recognised Leviathan in the waters, or the wild boar rooting up the vine, but the first interpretation seems the true one, except that the tail of the beast terminates in what appears to be a crozier. The inserted decorated windows contain fine canopies of stained glass, in which are represented the arms of De Fresne or De Fraxino, Lords of Moccas. I discovered some years ago the site of the castle in which no doubt they dwelt. The remains of the moat are clearly traced, as also the causeway leading to it across the Marsh. There is also an old tradition in the valley that the effigy in the Church was that of a man who lived in the Meres, the site of the castle. It seems not unlikely that the recumbent figure in the Church was the same person who inserted the decorated windows, and if it can be discovered to whom the arms in the window belonged it may be possible by this means to identify the knight whose tomb is in the chancel. The effigy is remarkable as regards armour, and this example of rounded form of the surcoat is unique in England. We have notices of three De Fresnes—Hugh De Fresne, who obtained a licence to erect battlements at Moccas in 1294; Walter de Fresne, member for the county of Hereford in 1307-8-9-10; Sir Richard de Fresne, 1375, after whose death the property was divided between his three sisters. The Church was repaired in the beginning of the century by Mr. Westmacott. At that time the south window of the apse was like an ordinary cottage window, as I can show you by a drawing. He probably added the fireplace and chimney, and may have rebuilt the bell-cote. The Church, before it was restored by Mr. George Gilbert Scott, was ceiled, a semi-domical lath-and-plaster ceiling being in the apse, and the effigy was then placed in the corner of the chancel. The chancel and the apse were both raised, and the windows of the chancel which had been crushed by the lowering of the walls, were restored according to their original design, there being little difficulty from the tracery which remained in determining what that must be. The old glass was also restored. About half of it is new, The chancel arches were terribly cracked, and had to be taken down and rebuilt. The porch was raised, and details imitated from the porch of Turnastone, about six miles off. Before the restoration the west wall was plastered up to a certain height, evidently for the purpose of a fives court. A very early sepulchral stone was discovered when digging round the Church, which remains in the place where it was found. I cannot help pointing out, in conclusion, the admirable manner in which the interior fittings, chancel, stall, &c., have stood since the work was completed. Thoroughly well-seasoned oak is difficult to find, and it is to the credit of Messrs. Franklin, of Deddington, who executed the work, that I should point out to intending restorers that it is possible to have work of this kind executed in a satisfactory manner. I have already reminded you that in Moccas we possess the earliest type of Church, the basilica. The early Church, we know, adapted the Roman Halls of Judgment, styled basilicas, to Christian worship. The apse once devoted to the presiding judge and his assessors would now be claimed by the bishop and his presbyters, the bishop's throne being placed under the eastern wall of the apse. The altar of libation would give place to the Christian altar. What we call the chancel would in the basilica be devoted to the pleaders; the nave to

the public, as a mart or exchange. The basilica form having thus become endeared to the people, the earlier Churches were erected on that model. In Moccas, we have in its large round arches, its basilica form, in the proportions of its nave (a double cube) some traces, as in other early Romanesque Churches, of classic origin. Such examples of Roman architecture as we find in the Coliseum at Rome and in the Porta Nigra of Trèves, teach us whence came the inspiration which influenced the builders of the earliest Christian Churches. It is surely interesting to trace the growth of that Gothic architecture, of which we have such splendid examples, back through these early Romanesque Churches to the source from which they were derived, and I believe that it is generally felt that, if in this 19th century we are to bring into being a new school of architecture, we must go back to these early forms from which was evolved all that is grand and beautiful in its later development.

BREDWARDINE CHURCH.

By the Rev. Sir Geo. H. Cornewall, Bart., President.

Bredwardine Church possesses many remarkable architectural features, but it cannot, I fear, be ranked among Churches remarkable for beauty of design. There are certain interesting problems here for which we must endeavour to find a solution. (i.) Why is the tower placed in its peculiar position, marring the effect of the interior? (ii.) Why have we a skew chancel? (iii.) What is the intention of the block of masonry added to the base of the tower on the east side? (iv.) Is there any cause to account for the south wall of the nave being thrust so sorely out of the perpendicular, as it evidently is? To answer these questions is to give a conjectural history of the Church. I should conceive the tower to have been the earliest portion of the whole Church, it being an argument in my favour that it was rebuilt about 100 years ago. It was probably a watch tower connected with the Castle, guarding the important ford of Bredwardine. A chapel or cell may have been attached to this tower; in reading the history of the Irish Saints of the time of St. Columbanus we find such cells were not uncommon. Being a holy place, a Church of the type of Moccas was built to replace it, but in the same position, notwithstanding that the tower would awkwardly mar the effect of the interior. There would be round arches between chancel and nave, the thrust of the arch being sustained on the north by the tower, the south wall would suffer, as you may observe to be the case. The thrust in the choir portion of the south wall being very severe, and the Church being very dark, a portion of the wall was rebuilt and a large window, the peculiar working of the tracery reminding us of Almeley, inserted; at that time (it may be earlier) the round arch was removed, and when the period of erecting rood-lofts was reached one was erected here, accounting for the block of masonry I have mentioned, which probably contained the staircase leading up to it. At a later period still, the lines of the interior of the Church being hopelessly irregular, a skew chancel was intentionally added. Attention must be called to the font, of remarkable size and beauty, to be compared with the still larger one at Old Radnor. The tympana with quaint figures betray, Mr. Chester supposes, an Eastern origin, as do the tympana at Moccas prove the original Church to have been early Norman; the herring-bone masonry on the north side is an additional proof of this. The recumbent figures in the chancel are well worthy of inspection. They are effigies probably of members of the Vaughan family, the ancient owners of Bredwardine Castle. With reference to the recumbent figures in the chancel, the Vicar of the Church, the Rev. H. T. Williamson, unavoidably absent, supplies the following notes:—

Canon Phillott, in an article on Bredwardine Church, which appeared in the *Ross Gazette*, quotes Silas Taylor:—"Tradition delivers that the north figure represents John de Bradwardine, who had possession of the place at the time of the Conquest. The other—the south—one who married his daughter and heiress." "But," says the Canon, "Mr. Robinson has shown that Taylor was mistaken in

both these suppositions, and the older figure, which has been shortened by the length of the legs below the knees, is not earlier than the middle or the latter end of the 14th century. Mr. Robinson conjectures that it represents either Walter Baskerville, who died 1369, or Walter de Bredwardine, the grandfather of Sir Roger Vaughan. He inclines to this latter view on the ground that the Baskerville family are not known to have resided at Bredwardine." Of the second figure Canon Phillott says—"The armour is of the pattern usual in the latter part of the 14th or early 15th century, and the collar of SS., so mysterious in its origin, but so undoubted in its application, denotes the personage represented to have belonged to the Lancastrian party. Mr. Robinson therefore concludes that the figure represents Sir Roger Vaughan, of Bredwardine, who married the daughter of Sir David Gam, and who together with his father-in-law fell in defence of the person of King Henry V. at the battle of Agincourt, October 25th, 1415." In the tablet over the monument of the Vaughan family in Kington Church this fact of his marriage with Gladys, daughter of Sir David Gam, and of his knighthood, are commemorated. What was the SS. collar? In an article in the *Saturday Review*, October 21st, 1876, on recumbent effigies in Northamptonshire, it is stated that this decoration occurs on 14 effigies in that county, three of these monuments being female figures; and that the earliest recorded description of the collars is in a wardrobe account of Henry, Earl of Derby, afterwards Henry IV., in 1391. There seems but little doubt that it was a badge of the House of Lancaster; and in a window in Old St. Paul's, John of Gaunt was represented as wearing it. The writer of the article suggests that in the SS. of the collar there is an allusion to the word "Soverayne," which formed the motto of Henry IV. and is written and carved on his tomb at Canterbury. But if his father John of Gaunt wore it we can hardly rest satisfied with this explanation. Others say that it was the device of John of Gaunt, he being the "Seneschallus" or Steward of England, and that SS. represents the first and last letter in the word. Some attribute the origin to the initials of the "Sanctus," "Sanctus," "Sanctus." In an article on this collar in the *Globe* newspaper, March 17th, 1890, it is said that it was gilt, and made of continuous links of the letters SS., with a rose pendant, and free from any ornament. At first it was exclusively intended as a mark of honour for foreign envoys, but later, the collar adorned the Chief Justices of the Law Courts, then three in number, military commanders of high rank, heralds, Kings of Arms, esquires, and distinguished members of the Royal Household. At present the number of wearers is extremely limited, and still from time to time we can read in the Levée Notices in the *Gazette*, N.B.—This being "Collar Day," the privileged must wear their "collars," *i.e.*, the SS. Decoration.*

* Since writing the above Mr. Moore has kindly drawn my attention to the correspondence which was carried on in the *Times* about the Collar of the Garter and the SS. during August and Sept., 1691. The general impression seems to confirm what I have said above in that this SS. collar was a livery collar adopted by the house of Lancaster (although introduced before that period), and which, as time went on, became the badge of a great political party. One writer says that the SS. collar had no special pendant. The one in Bredwardine Church certainly has. Certainly it is a small one, and is attached to the ring which unites the two ends of the chain. The surface of the pendant is so much worn that I cannot make out if there ever was any design engraved upon it.

About ten yards south of the modern porch is situated a recumbent tombstone, the fifth stone from the porch, upon which was formerly the following quaint inscription, now quite illegible :—

Reader observe here under
Neath doth lye one that
Was once Rector of Brobury
Vicar of Bredwardine and if
You trace ————————
His Birth a Briton him of
Norman Race————————
Profoundly learned and
A man of parts————————
Bred up in Oxford M'r
Of the Arts————————
His name was Thomas
Aubrey,now in the dust
Waiting the Resurrection
Of the Just. He Died the
22nd day of May 1707
Aged 59 years.

And about ten yards south-east of this stone is the base of an old cross, which within the memory of the old sexton was surmounted by a sundial, which also has disappeared. The basement has a small dressed cavity on the north side for the stoup for holy water and a kneeling-stone fourteen inches by twelve. When the tower of the Church was re-built in 1790, the old ivy stem was not removed, its age being manifested by its enormous girth. There are four bells, dated and inscribed as follows :—1st bell, A. R. 1729, between A. and R. is stamped in the metal a bell. The letters are probably the initials of the founder. Henry Davis and W. M. Hampton, Ch. Wardens. 2nd bell, I. R. fecit, 1810. By Music, Minds an equal Temper Know. 3rd bell, A. R., 1747, Peace and good neighbourhood. 4th, large bell. 1826. John Rudhall fecit. The plain silver chalice, which belongs to the Church of Brobury, is dated 1686. There is a memorandum in the Parish Register to the following effect :—February 10th, 1795. The greatest flood in River Wye as ever remembered.

FLOODS OF THE RIVER WYE.

Upon this subject it may be noted that the date given upon the plate in Mr. Pritchard's yard at the bottom of Gwynne Street, Hereford, is February 11th, 1795, when the river rose to what may be fairly estimated, in comparison with the gauge upon the central pier of Wye Bridge, according to Mr. Moore's observations and measurements, as being as much as nineteen feet above the summer level of the river.

The mark, F. 6, 1852, painted in black on the south-west side of the southern pier of Wye Bridge at Hereford, was incised by Mr. Nott, who kept the provision shop near the south end of the bridge. On the authority, however, of Mr. Stephens, the mark represents the highest portion of the pier splashed by the waves on that occasion, and may be considered an exaggeration of the real height of the water. An inspection of the arch will show that the flood must have filled the entire archway.

Mr. Moore, having recently interviewed Mr. Thomas Nott, has obtained from him the admission that his mark represented the highest reach of the wave created by the obstructing pier, possibly three feet above the actual level of the flood.

A reference to *Transactions*, 1869, page 151, gives us the following information:—"The flood of December 19th, 1869, was 16 feet. The only higher floods on record are of February 6th, 1852, 18 feet 4 inches, and of February 11th, 1795, 20 feet." See also on the same page Mr. Curley's useful Table of Cubic Feet of water per minute passing through Wye Bridge, Hereford, up to 10 feet in height of flood.

In May, 1886,—a strange season of the year for a river's overflow—we experienced a rapid and severe flood on the Wye. The same rainfall, however, influenced the overflow of the Severn more severely than that of the Wye. We read on page 201, the second edition of "Deerhurst," by the Rev. G. Butterworth, that in that locality "the Severn rose to just the same height as in 1852," which earlier flood was always referred to by the distinctive title of "the great flood." In the flood of May, 1886, several bridges on the Teme were washed away, including the railway bridge between Bransford and Worcester. An estimate of the force of the water may be obtained from the fact that the *débris* of the brickwork of this bridge were collected along the hedge of the field at the distance of two hundred yards below the bridge.

THE COLLAR OF SS.

A correspondence in the *Times*, generated out of another correspondence on the Longford Holbein, has brought us authoritative information respecting the SS. collar.

The correspondence occupies the papers from August 25th, 1891, to Sept. 3rd.

Mr. W. H. St. John Hope writes in the *Times* of Sept. 2nd, "I must again repeat that the collar of SS. has no connexion with the Order of the Garter. It was a livery collar, pure and simple, and was worn by esquires and ladies, as well as knights who were not of the Order of the Garter. The effigies of the poet Gower in St. Saviour's, Southwark, of Queen Joan of Navarre at Canterbury, and of Sir Edward Thorpe and his lady at Ashwellthope are cases in point."

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"In quoting the brass in Trotton Church, Sussex, S.H.C. (*Times*, August 31st), should also have told us that Lady Camoys, as well as her husband is shown with the collar of SS."

Mr. Albert Hartshorne, Bradbourne Hall, Ashbourne, writes on Sept. 3rd—

THE COLLAR OF THE GARTER AND THE COLLAR OF SS.

Sir,—The interesting correspondence concerning the Longford Holbein has brought up the subject of the knightly collar of the Garter and the livery collar of SS.—two totally distinct decorations. The subject of the Garter is too familiar to need any comment now, but it is not so with the SS. collar.

Few antiquarian matters have excited more research and controversy, but, like the two most exalted Orders in Europe, the Garter and the Golden Fleece, the origin and real meaning of the SS. collar still remain a mystery. The popular derivation is that it was first devised by Henry IV. when he was Earl of Derby, in allusion to his motto, "Soverayne." Like many popular attributions, this has no foundation in fact; indeed, the collar was in use as early as 1371, as is distinctly proved in the example shown on the effigy of Sir John Swinford at Spratton, in Northamptonshire, who is known with absolute certainty from the public records to have died in that year. Whether the mysterious letters originated in the S. of *Seneschallus*, in allusion to the office of Seneschal held by "time-honoured Lancaster," or in the S. of Sanctus, we shall probably now never know, but *Seneschallus* seems the most likely source. And it is easy to conceive that the events of that stirring time would rapidly develop the family collar of an august house into a badge of feudal allegiance, to become, eventually, the decoration of a great political party. Its subsequent employment as the "Livery" of the great Lancastrian party during the reigns of Henry IV., Henry V., and Henry VI., is a matter of history, which is amply illustrated in almost endless variety by the effigies and brasses of this period.

The collar of SS. appears to have been repeatedly conferred upon envoys

and foreigners of distinction, and notably upon certain Italians who visited this country in the early part of the 15th century, the decoration appearing upon their monuments in the Churches of St. Eustorgio and St. Ambrogio at Milan. I find also, from my notes upon the subject, that the chivalrous Swiss traveller, Conrad von Scharnacthal, received this mark of the Royal favour from Henry VI., when he came hither in 1446; it is stated that he constantly wore the collar of SS., which is represented in his memorial in a window of the Church of Oberhofen, on the northern shore of the Lake of Thun.

Nothing is more probable than Mr. Walter Money's suggestion that Castiglione had the livery collar of SS. granted him by Henry VIII. when he received the Garter on behalf of his master; indeed Henry VIII. would only be following the precedents of earlier times in thus honouring an eminent foreigner.

The brass of Lord Camoys, "strenuus miles de Gartero," who married the widow of Hotspur, is an interesting example of the SS. collar and the Garter appearing upon the same figure, and I do not at the moment recall another instance. But the one decoration has nothing whatever to do with the other, and perhaps the isolated evidence of a lost drawing from an effigy in a forgotten Church of a George appended to a collar of SS., mentioned by "G. A. S.," need not be taken seriously into account.

I am, Sir, your obedient servant,

Bradbourne-hall, Ashbourne, Sept. 1. ALBERT HARTSHORNE.

THE FORMATION OF TRAVERTINE.

By the Rev. Sir George H. Cornewall, Bart., President.

In offering a few remarks on the subject of Travertine, I do not suppose that I shall be able to advance anything new, or to state facts which may not have come under the observation of many members of this Club. At the same time I have this advantage—I can show at no great distance from this house the rock in process of formation, growth I may truly call it, and I can ask you to judge of its value as a building material, since the walls of Moccas Church, reported to be the oldest in the County of Hereford, are built of travertine and nothing else. First, as to the name of this rock. Many persons on visiting Moccas Church have said, "I see that it is built of tufa." I have corrected them, and maintained that tufa is a volcanic product, and that the stone here, being formed by incrustation of lime, differs from tufa, and should properly be called travertine. I do not know that I was so very far wrong, but it is fair to say that, on looking more fully into the matter, I have discovered that the custom of calling the stone which we are discussing "tufa" is a very common one, and I dare say many would contend that "calcareous tufa" is the name by which this stone is most commonly known. As regards the derivation of the words "tufa" and "travertine," for both names are Italian, it is very difficult to come to any sound conclusion. "Tufo" and not "tufa" seems to be the original Italian word. There is a verb "tuffare" (to plunge, to dip), but that does not help us much, although it may indicate the moist spongy situations where calcareous tufa is ordinarily found. On the other hand we have the geological term "tuff," as to the meaning of which there never has been any doubt, it being a volcanic product. The word "travertine" would seem to suggest that which is changed; action by which (where travertine is found) moss roots and like substances are changed by incrustation into stone. But, unluckily, there seems no word in Italian which we might coin by analogy with the Latin, such as "travertere," the ordinary word in Italian to change is "cambiare" or "mutare," which do not help us. Sir Charles Lyell throws out the idea that the stone being commonly found at Tibur on the Anio, the modern Tivoli, and being therefore called by the ancients "lapis transtiburtinus," has been first corrupted into "trasteverino," and finally into "travertino," but "Tevere," the Tiber, is not the same word as the town on the Anio. "Tibur," the Trastevere, as is well known, is that suburb of Rome which lies on the other side of the Tiber; consequently his derivation does not appear altogether satisfactory. At the same time the opinion of Sir C. Lyell on the subject of travertine is one of great weight, for he has observed very carefully in various parts of Italy the growth of this rock, and would no doubt have given a satisfactory explanation of the names tufa and travertine had it been possible. In the glossary appended to "The Elements of Geology," p 785, we find:—

Tufa calcareous.—A porous rock deposited by calcareous waters on their exposure to the air, and usually containing portions of plants and other organic

substances incrusted with carbonate of lime. The more solid form of the same deposit is called "travertine," into which it passes.

Tuff, or Tufa Volcanic.—An Italian name for a variety of volcanic rock of an earthy texture, seldom very compact, and composed of an aggregation of fragments of scoriæ, and loose materials ejected from a volcano.

Travertine.—A white concretionary limestone usually hard and semi-crystalline, deposited from the waters of springs holding lime in solution.

As regards nomenclature, therefore, it would seem that they who assert that Moccas Church is built of calcareous tufa are not altogether in error, but they run the risk of confusing travertine with the volcanic tuffs, which are a perfectly distinct formation. As regards the name of travertine there is no such difficulty. Again, to found the name on the relative compactness or porousness of the stone does not supply a very clear distinction, as may be seen on examining the walls of Moccas Church.

And now with respect to what I have called the growth of the stone. In an ordinary quarry of building stone it is usually conceived that the upper layers of the stone are not so hard or so valuable as those which lie deeper in the bed. It is not so with travertine, for it grows on the surface.

There is needed, in the first instance, a spring strongly impregnated with bi-carbonate of lime, also, as in other springs, an impermeable stratum which forces it to the surface. Exposed to the air it deposits an incrustation of lime on all surrounding objects over which the water may drip, it being needful that the lime-impregnated spring should be exposed freely to the action of the atmosphere, or no deposits will be made. But there is another element in the growth of travertine, as observed in this neighbourhood, which must not be omitted. There is a certain moss, Hypnum commutatum, which flourishes freely in this lime water, it grows and thrives in the drip of the water, and in its luxuriant growth opposing itself to the free course of the rivulet, forces the water to percolate among its roots, the lime is thereby incrusted upon them, but the growth and the health of the moss do not suffer, as the lime is deposited; that which was once the roots of the moss becomes now a porous stone, as the moss grows the stone increases; as the cushion of rich green moss becomes larger and larger, higher and higher, so does the stone which underlies it. At last arrives a time when the growth which I have described affects the course of the stream; it can flow over it no longer; the level of its course will not permit it; the stream must find a different channel; the moss dies; the lump of travertine becomes overgrown and is forgotten; a new formation of a precisely similar kind begins. This action may be readily observed in Depple Wood.

There can be no question as to the value of travertine as a building material. A large proportion of the most splendid edifices of ancient and modern Rome are built of travertine, derived from the quarries of Ponte Lucano, on the Campagna. St. Peter's and the Coliseum, to name two well-known buildings, are constructed of travertine. When I made a somewhat perilous journey to visit the temples of Pæstum in 1863, I was surprised to find that these ancient structures, with their colossal columns of simple Doric, perhaps the most striking relics of the past to be

seen in Europe, were built of the same material as my own Church. The date of the building of these temples cannot be precisely determined, no record that we possess helps us in the matter; one thing is certain, that they are of great antiquity. Situate as they are on the seashore, and, therefore, exposed to the tempests of centuries, they, nevertheless, show little weathering, and under that southern sun their colour, of a warm orange yellow, is extremely beautiful. Notwithstanding the value attached by the Romans to travertine as a building material, it is not to be supposed that we have any large store of it in England, a treasure, which, remarkable as it is for combined lightness and durability, could easily be turned into profit. The growth of travertine in Italy and in Auvergne is promoted by the prevalence of springs highly charged with carbonic acid. The solid carbonate of lime is thus deposited extremely rapidly, and I cannot resist quoting a few instances mentioned by Sir C. Lyell which prove this.

In a short paper of this kind I cannot enter at any length into the description which he gives of the various masses of travertine which he has visited. *The Elements of Geology* is a book accessible to all, the whole subject is exhaustively treated there, and his authority, which may on many geological questions have been disputed by later writers, on the subject of travertine, (which he was able to observe in process of formation), will hardly be questioned. Nor can I enter into his interesting disquisitions on the formation of the spheroids of concretionary travertine. It is sufficient to say that the remarkable concentric layers deposited are owing, he believes, to the absolute uniformity in which the deposits were made. The first mass of travertine which he mentions occurs near Clermont Ferrand, in Auvergne, 240 feet in length. At its termination, 16 feet high, and 12 feet wide—I have myself seen it—it had the appearance of an artificial embankment. The growth here was aided by the springs being charged with carbonic acid, produced by volcanic agency, so marked in the neighbourhood of Clermont. He next mentions the deposit at the baths of San Vignone, situate between Rome and Siena, it may be said to cover the hill on which the baths are built; the pipe which conducts the water to the baths deposits half a foot of travertine every year. At San Filippo the water supplying the baths which falls into a pond has been known to deposit a mass 30 feet thick in about 20 years; the stratum there is a mile and a quarter in length, one-third of a mile broad, and in thickness 250 feet.

I must pass over the description of the springs at Viterbo, on the Campagna at Rome, at Tivoli, which are not less interesting than those which I have previously named. I would rather devote a few lines to the description of travertine masses which lie within reach of a visit by members of this Club. By the kindness of the Rev. Martin Buckle, Vicar of Clifton-on-Teme, I have been put in possession of Mr. Noake's published description of the travertine mass known as Southstone Rock. He writes:—"About a mile from Stanford Church stands Southstone Rock, in ancient times the retreat of hermits and the resort of pilgrims, to taste the waters of a holy well, which had for ages dispensed their miraculous effects throughout and beyond the district far and wide. The rock stands out perpendicularly from the high ground with which it is connected, and

forms one side of a delightful ravine, watered by a rivulet which runs into the Teme; while the wood of noble forest trees in which it is embosomed, serves as a shaggy crown to the wild scenery. Some rooms or cells were formerly hewn in the rock, and at the top was a chapel dedicated to St. John, on the feast of whose nativity there was a solemn offering." Further particulars respecting the chapel are given. It is proved that it was a chapelry of the Abbey of Evesham, and the Winnington family were once in possession of an alms-dish found on the site of the chapel with very remarkable inscriptions. Mr. Noake continues:—"Geologists tell us that the rock is the largest mass of travertine hitherto discovered in Great Britain, the surface extending over half an acre. At the northern extremity it terminates in a bluff precipice from 50 to 60 feet high, faced with gigantic botryoidal stalactites, which hang over the dingle; and the mass being full of cavities, some of the interior passages lead by winding paths from the base to the summit. This rock has been entirely deposited by the spring which gushes out on the east side of the cornstone, and daily forms a fresh incrustation upon the edges of plants and stones;" and then, quoting Sir Roderick Murchison, he proceeds, "We hardly know how to estimate the antiquity of this rock, so modern as respects geological monuments, and yet perhaps of such high antiquity in relation to man." It would not, however, be presumptuous to affirm that the spring which formed it has deposited similar matter without interruption ever since the substrata were first exposed to the atmosphere, and far back indeed must we recede to account for the commencement of this massive production. Southstone Rock possesses to me a peculiar interest, for, when my Church was being restored, I found great difficulty in procuring a supply of travertine for the needful work. I got two waggon loads from Depple Wood, where its formation may now be observed, and through the great kindness of the late Sir Thomas Winnington, I was enabled to obtain several truck loads from Southstone Rock, near Clifton-on-Teme. It is supposed, I believe, that a considerable part of the groined roof of Worcester Cathedral was obtained from the same source; of course in a stone roof its lightness would be a great recommendation.

A very peculiar phenomenon connected with the deposition of travertine has been observed in the Walker mine, near Newcastle, of which the particulars have been furnished by Mr. Moore. It duly registers its own age, forming a singular chronometer or calendar of time, and from its inscription of lines has been called the "Sunday or Walker Almanack." It occurs in this manner:—During the operations of mining, the water is rendered dark and turbid, and the laminæ there deposited are of a dark hue, the streaks of a light hue are nocturnal depositions, when the miners cease from working. The double space of a light colour distinguishes the Sunday, and thus curiously indicates the several weeks, a diminution in the dark lines which denote the working day, and corresponding increase of light space exhibits "occasional holidays," with the miner's cessation from work. Twenty weeks are enrolled in a deposition of 4½ inches in a specimen under examination, and taking the popularly received date of the creation up to the year 1891, it would have reared during that period a mountain nearly 6,000 feet high (5,895). The calculation here made by the writer who observed this

curious phenomenon, points to a special interest which attaches to this rock of travertine. We are in the presence, I may say, of a rock building force in action, a force acting continuously, one calling to its aid chemical and even botanical transformations, and we are permitted to examine the operation of nature from day to day, and from year to year. Geology has been called the testimony of the rocks. The stratified rocks, one may name more particularly the Chalk and Oolite formations, both containing lime in abundance, have required, it is estimated, for their deposition, a period which defies calculation, that deposition being supposed to be uniform. But in the formation of travertine, we find that the deposition is not uniform. It is sometimes deposited rapidly, sometimes slowly. We find the power in actual operation, and so calculations made as regards the stratified rocks, on the supposition that they are deposited at a uniform rate, may be misleading. The bastard limestone or Cornstone which is met with in our Old Red Sandstone throughout this district is dissolved only to re-appear in the rock which we are now examining. The carbonate of lime in the cornstone is dissolved by water, and again appears in a solid form in the travertine. The process is thus explained by Professor Fownes (*Elements of Chemistry*, p. 255):—"Although carbonate of lime is not sensibly soluble in pure water, it is freely taken up when carbonic acid happens at the same time to be present. If a little lime water (which is the hydrate of lime obtained by slaking quicklime) be poured into a vessel of that gas, the turbidity first produced disappears on agitation, and a transparent solution of carbonate of lime in excess of carbonic acid is obtained. Since all natural waters contain carbonic acid, it is expected that lime in this condition should be of very frequent occurrence, and such is really found to be the fact, river, and more especially spring, water almost invariably containing carbonate of lime thus dissolved. In limestone districts this is often the case to a great extent. The beautiful stalactitic incrustations of limestone caverns, and the deposits of calc-sinter or travertine upon various objects and upon the ground in many places are thus explained."

The formation, therefore, of travertine depends on the property which spring water in which carbonic acid is present in considerable quantity possesses, of dissolving the carbonate of lime in calcareous districts; then, by exposure to the air, the excess of carbonic acid is driven off, and the carbonate of lime reverts to the solid form. The rapid formation of travertine in volcanic districts is due to the presence of carbonic acid in large quantities in the spring water, thus rendering it capable of dissolving a larger percentage of the carbonate of lime which it meets with than in less favoured localities, resulting in a larger deposit of the rock called travertine. Thus we learn that tons of solid lime rock are being conveyed, not by busy gnomes, or by elaborate engineering appliances, but by a spring of bubbling water to re-appear miles from their original position on the hill-side where the stratified rock is found. There are many mysteries no doubt yet unsolved connected with the formation of this interesting stone. I have endeavoured to search out some of them. The lover of solitude, mentioned by the poet, may, indeed, while observing these curious transformations, confess that here in the most direct manner he discovers—

Sermons in stones,
Books in the running brooks,

And, as always where these studies are pursued—

Good in everything.

DISCOVERY OF A SUPPOSED BURIED WELL, OR MASONRY STRUCTURE OF FIVE STEPS, IN THE GROUNDS OF THE NEW WEIR, KENCHESTER.

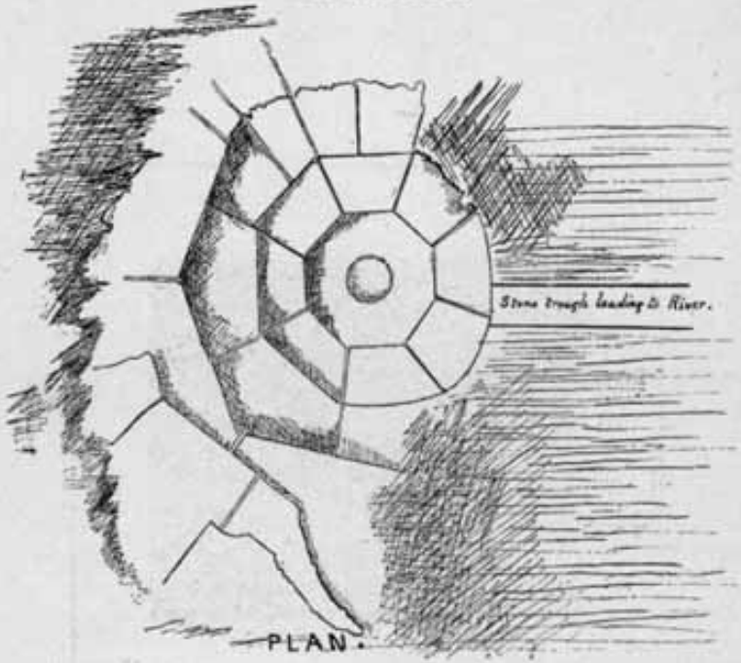
By H. C. Moore.

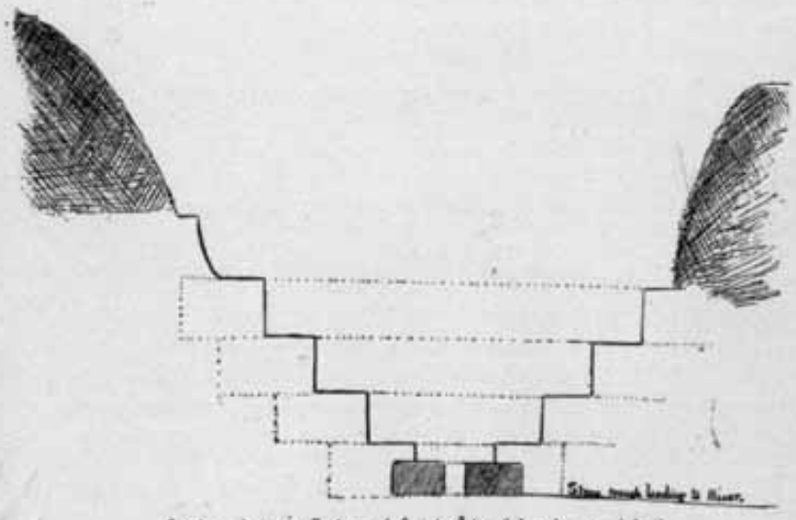
In the month of August, 1891, owing to the continued dry weather, the spring of water ceased to supply the hydraulic ram connected with the Hon. Mrs. Griffiths' house, the New Weir, Kenchester, five miles from Hereford. Mr. Godsell, architect, of Hereford, was consulted to give advice upon this serious matter, and engaged to discover, if possible, another source of supply whereby the deficiency could be remedied.

An examination of the surroundings disclosed to Mr. Godsell that an abundant supply of water was running to waste into the Wye a few yards lower down. He caused an excavation to be made running parallel with the river, and entrusted the conduct of this part of the work to Mr. Hilo Davies, contractor, whilst he placed the fittings of the galvanised iron connections under the charge of Mr. J. S. Bridgwater, of Whitecross Street, fitter to Mr. Morley. In the process of the work of excavation, an apparently favourable water supply was intercepted, and in following the course of its stream, the workmen found their operations when at a depth of from four feet to nine feet, obstructed by enormous stones, which were broken and otherwise got out of the way, until their attention was drawn to the fact that these stones were carefully hewn, dressed, and of an unusual shape. As soon as it became evident that they had come across some artificial structure, thenceforward the excavations were proceeded with more carefully, until what remained undisturbed of a buried mass of masonry exposed to view a structure about seven feet in diameter, forming a series of steps conducting, in gradually diminishing diameter, to a single large stone at the bottom, perforated by a circular hole six inches in diameter. When this hole was cleared out numerous tesseræ were brought out of it in handfuls. The position of the circular hole was found to be in the course of a streamlet, issuing from the high grounds above, the overflow of which was conducted to the river along a shallow stone channel or trough. A plugging of this trough would cause the water to rise in the well-shaped basin, provided that the basin was rendered water-tight by mortar and cement.

A photograph of the well, taken by Mr. Walter Pilley shortly after the discovery, shows its shape, and its size can be estimated by comparison with the spade and workmen's tools, and the figure of myself taken as I was sketching its plan, which was found to be not quite, but only approaching, circular in form, it being octagonal. Commencing at the bottom, the base was formed of one large stone exposing a diameter of 20 inches, with a circular hole of 6 inches diameter in the centre. The thickness of this stone was not measured, it was probably 6 or 8 inches thick.

PLAN AND SECTION
OF THE
MASONRY WELL DISCOVERED AT THE NEW WEIR, KENCHESTER.





Section of stone well discovered buried 3 feet below the ground level.

STONE WELL OR BASIN,

Discovered in the grounds of the New Weir, Kenchester, at a distance of about 50 yards below the two ancient abutments of masonry on the left bank of the Wye.

The first tier of steps, forming the lowermost octagon, was composed of eight stones, 11 inches total depth externally, with a rise of 5 inches, and a tread of 7 inches. Each side of this octagon measured 8 inches, and it was complete, having been undamaged by the excavators.

The second tier was found rather more than half complete, with a rise of from 8 to 9 inches, and a tread of from 8 to 10 or more inches. At least four of the eight sections constituting this second tier were constructed by the use of one entire large stone, the internal face of which measured 14 inches.

The third tier was very little more than half complete, with a similar rise of 8 or 9 inches, its tread varying in width, being necessarily greater at the angles of the octagon. The inner face of each octagon of this third tier measured 23 inches, and at least three of the sections of the octagon were formed of one entire large stone.

The fourth tier followed similar dimensions as regard rise and tread. Only three stones were found *in situ*, of which only the central was entire, measuring 17 inches along its internal face. The contiguous stones on each side were fragmentary.

The fifth or uppermost tier presented only one large stone, cut concave at its angle internally. Hence, apparently the fourth tier was the highest in which the formation of the octagon had been completed.

In plan, the internal dimensions of the well would give an approximate diameter of 7 feet at the top. Descending, the diameter decreased tier by tier by nearly two feet, until it was reduced to 20 inches at the base. The stones were very accurately fitted; mortar and cement may have been originally employed in the construction, but if so, all traces of either were washed away by the action of centuries of water flow.

The situation of this buried structure was about 50 yards below the two ancient massive masonry abutments on the left bank of the river, and it was buried a little more than 3 feet below the present ground level. The ground above is steep. *Débris* from above would, after heavy rains, accumulate rapidly.

The course of Mr. Godsell's excavation, which was conducted parallel with the river, cut obliquely across a road which was buried only about 18 inches below the present ground level. The site of this road lay between the above mentioned abutments and this buried structure.

The questions before us are—what was the octagonal well or basin? and what was its use?

Professor Middleton, writing on January 22nd, 1892, from King's College, Cambridge, after an inspection of the photograph, says:—"It looks to me like a Roman basin at a spring. The spring comes up through the hole in the stone basin. This, at least, is a usual Roman method, but without seeing it I cannot be sure whether that is what the photograph shows." After Professor Middleton had seen the plan and section of the drawing, and had been informed that the well, in the absence of mortar, cement, or puddling, would not hold water, he wrote on January 28th:—"Without seeing the thing it is impossible to form an opinion which is worth anything, but I shall be inclined to suggest that the fountain is of mediæval rather than the Roman date, judging from the rough sketch."

The fact which might have induced me to consider the work Roman rather than mediæval was the hauling out of so many tesseræ from the bottom of the circular hole. I account, however, for their presence in two ways—either by being washed in from any neighbouring structure, or by being thrown in by the young, or by children of a larger growth. Such disrespect of Roman remains would be *pari passu* with the reckless undermining, in a frolic, of what was, in Leland's time, "the King of Fairies' Chair," which, in the early part of this century, occupied a position near the eastern gate of Magna Castra. (See Stukeley's Map in *Transactions*, 1882, facing page 241). When our local Museum can only exhibit to an interested public a quern, and three fragments of tesselated pavement out of the large amount of Roman remains, which in the time of the late Dean Merewether, less than half a century ago, strewed the camp of Magna Castra, we can no longer cease to be astonished at finding some hundreds of tesseræ at the bottom of a well. Notwithstanding the presence of these tesseræ; notwithstanding the close proximity of flanged tiles which I have extracted from the ancient abutments fifty yards higher up the river, which tiles, upon submission to experts, have been pronounced to be of Roman manufacture; notwithstanding all these characteristics of Roman occupation, I do not consider this structure to be Roman.

It is a subject for regret that no records can be found of the many dams, weirs, forges, fulling mills, corn mills, and other buildings on the banks of the Wye when it was a navigable river, beyond the "Papers relating to the History and Navigation of the Rivers Wye and Lug," by John Lloyd, junr., published in 1873, which afford no information about this particular locality.

With respect to the objects and uses of the well. Under any circumstances and at any time water could be drawn, for the spring apparently is perpetual: and as it seems quite possible that it was originally cemented, water might have been retained in it by plugging the exit pipe leading to the trough, and by other ingenious hydraulic aids and appliances.

Woolhope Naturalists' Field Club.

OCTOBER 8TH, 1891.

THE last Field Meeting of this year took place on Thursday, October 8th. Ever since the inauguration of the Fungus Forays in 1868 it has been customary to have an extra Field Day at this season of the year, with the object of familiarising the members of the Club with this branch of botany. The last few years have been very unpromising, and have added but few species to the list of nearly two thousand fungi of Herefordshire, which was elaborated by Dr. Cooke and Mr. William Phillips, and occupies twenty-two of the concluding pages of *The Flora of Herefordshire*. The exigencies of important duties, counter-attractions, amongst which must be mentioned a Fungus Foray at Rouen, and divers causes, contributed to deprive us this year of the services of our leading mycological authorities, who for the last twenty-three years have been attracted to visit us. The foray was consequently limited to an excursion of one day, the locality of exploration being the "Paradise Wood," in the neighbourhood of Pontrilas, and the result, as may have been expected in the absence of any authoritative referee, may be at once summed up that this science was not enlarged upon on this occasion, nor any new discovery made. It so happened, however, that as the members were exploring a spacious meadow on the summit of "Paradise," they found themselves close to Rowlstone Church, and, knowing that it was one of the earliest Churches of the county, were glad to embrace the opportunity of inspecting it. An inhabitant of the parish having been met with, was immediately dispatched for the key, the interval being occupied in admiring the exterior of the Church and the fine yew trees at the four angles of the Churchyard, one of which, that at the south-eastern angle, attracted special admiration from the great height and unusual uprightness of its bole. Not a single burial mound disturbed the evenness of the Churchyard upon the north side. Upon the south side were the vestiges of an ancient cross consisting of a square of four steps leading to the massive base, a stone three feet square and more than two feet high, which formerly supported the pedestal of the cross. This stone rested upon another more massive monolith which measured four feet six inches square, and at least one foot in depth, being the uppermost tier of the four steps alluded to. No one could look upon this ponderous mass without wondering how and whence the stone material came, and how it could have been transported to its position. The Vicar afterwards informed us that the dimensions of these stones are given in *Duncumb's History of Herefordshire*. Long stones, reaching up to three feet in length, have also been employed in the masonry of the Church, which is especially noticeable in the chancel as being much more rough in character, indicating an earlier construction than that of the nave and the tower.

The arch of the Early Norman window in the south wall of the chancel, with three stones on each side forming its jambs, is surmounted by one large stone, upon which is exhibited what appears to be one of the earliest attempts of rude carving in the form of two arcs over the arch: this stone extends over the arch of the window, resting upon the two side jambs.

The arrival upon the scene of the Rev. J. W. Kennedy, the Vicar, was very gratifying. He lost no time in explaining the interesting features of this Church, which owes its restoration, in 1865, to his energies shortly after his institution, in 1864. The building, dedicated to St. Peter, consists of a nave with a south porch, a chancel, and a tower with three bells of the seventeenth century. The lights in the north wall of the nave are Norman; a fourteenth century window has been inserted in the south wall. In the chancel the east window is 14th century work, with traces of fresco colouring work of the same period, and Norman lights in both north and south walls. The string course of the chancel arch was admired for its more refined character of ornamentation. The parish registers date from 1758. There is a black letter Welsh Bible, dated 1588, belonging to the Church. The font is Norman, with a bowl about two feet six inches in diameter. The Vicar directed particular attention to the peculiar construction of the series of three arches over the tympanum of the entrance doorway, in that the inner ring of arches was a prolongation of the moulded jambs, thus presenting the appearance of their square capitals being penetrated by the moulded jambs. The remarkable character of the sculptured archway has one or two points in resemblance to that at Shobdon, which was built in 1141 by Oliver de Merlemond. We are reminded at the same time of Kilpeck, which benefice was given about the year 1134, by Hugh, the son of William Fitz-Norman, lord of Kilpeck Castle, to the Abbey of St. Peter at Gloucester, though there is no proof of the existence at that time of the present fabric; and our thoughts are carried also to the tympana and sculptured doorways which we saw last August at Bredwardine and Moccas, which latter Church was probably built before 1100.

Mr. W. H. Jones, of Cherbourg, Malvern, having examined the bells, as he does on every possible opportunity, found one bell with the following reading:—*Personet hec celis dulcissima vox Gabrielis*, which he considers a re-cast, the old inscription being retained. Another bell reads:—*Christus via veritas et vita*, distinctly a *post*-reformation inscription. A third—*God save the King Richard, C. W.*, 1685, or possibly 1658—as well as Mr. Jones can now state from memory, as he had not with him materials for taking a rubbing of the bells.

Mr. Thomas Blashill has furnished us with the paper which he read before the British Association at the Hereford Congress in 1870, from which excellent authority we give the following extracts, with our expressions of gratitude to the Vicar for pointing out the practical details of this ancient Church.

ROWLSTONE CHURCH.

By Mr. Thos. Blashill, F.R.I.B.A.

The main portions of the Church at Rowlstone appear to belong to the period of 1130 and 1150. Its twelfth century work, although possessing some peculiarities which I shall have to point out, is generally consistent with the Norman type and free from ornament of the Celtic class. Yet there is a piece of foliage on the south doorway similar to some that I have pointed out at Kilpeck, and exactly like that which is used in a similar position at Shobdon. The sculpture in the tympanum of this door, which represents our Lord in an aureole supported by four angels, is also like that at Shobdon, except as to the position of two of the four angels. This carving has been said to have reference to the text, "I am the door." But it is really and solely that most favourite subject with all mediæval artists which is known in England, France, and Italy alike as a "Majesty." We find it as early as the 4th century in the catacombs of Rome, where Christ is represented blessing, with His right hand open, and having a roll in His left. It was used profusely, and with many varieties—in sculpture, painting, stained glass, and MSS., and of course over doorways also. Sometimes, in large churches, an attempt was made to represent, in some measure, the striking scene described in the 4th and 5th chapters of the Revelation. There is the Lord sitting on the throne surrounded by the rainbow like unto an emerald. At the four angles of the subject are the four beasts, which in process of time were considered to be symbolical of the four Evangelists, and on the arch above and the lintel below, encircling all, are the four-and-twenty elders. Here we have simply the Lord in an aureole supported by four angels. The sculptor, for the sake of increasing the size of the tympanum, has brought it down below the upper line of the capitals, and has also adopted the heavy roll-moulding of the arch, of the same thickness as the column below. These were local peculiarities, of which other instances may be given, as that of Bredwardine; and they were also adopted in Ireland and in Wales in the 12th century. Two remarkable pieces of sculpture exist at the sides of the chancel-arch. In each of them is the figure of a saint with an attendant angel, in the traditional flowing costume used in early sculpture, and with bare head and feet, and the flat nimbus behind the head. Those on the north side carry each a cross and book. The practice of placing the attributes of the Apostles in their hands, as the keys in that of St. Peter, was of recent introduction at the time these figures were cut; and it would not be easy to identify them if those on the south side were not placed with their heads downwards—a plan indicating that the figure on this side, if not on the other also, is intended for St. Peter, to whom the Church is dedicated. This was a very favourite subject with the mediæval artists, Peter having been, by tradition, supposed to be crucified in that position by his own desire. Samuel Downing, who was authorized to go through Suffolk in 1643, breaking all the pictures and figures which he could find, makes this entry in his journal with reference to the

Church of Allington: "In the chancel was Peter pictured, and crucified with his heels upwards; and there was John the Baptist and ten more superstitious pictures." The best known instance of this subject is the remarkable altar-piece painted by Rubens for the Church of St. Peter at Cologne. In the reversed figure at Rowlstone the saint carries in one hand a long label, in allusion to the tradition which attributed to each of the Apostles one sentence of the Creed. The cocks, which are finely sculptured on the adjacent capitals, doubtless refer to Peter's denial of our Lord. The birds carved on the string courses are of the same kind as those already seen at Kilpeck. They are set amongst tufts of herbage, and are excellent specimens of 12th century carving. The two iron brackets fixed to the walls of the chancel seem to be of the 14th or 15th century, and they are hinged so as to fold against the wall, and have each five prickets for holding the ends of long candles which would go through the rings above. Alternate ornaments of cocks and fleur-de-lis, cut out of thin iron, are fixed on both sides. The two brackets differ both in size and in design, and were probably not the work of the same hand. They are the only examples of this kind in England.* The chancel is ceiled with an oak-ribbed and panelled ceiling of the ordinary type, though there are not many specimens in Herefordshire Churches. The old porch of this Church had a similar one much decayed. The other day, when the Congress visited Leominster, I had the opportunity of showing that carvings of almost precisely the same pattern, and certainly of the same workmanship, as those on the doorway at Rowlstone, exist on the side of the west window of Leominster Church. Now beneath this window is the large west doorway, which has a pointed arch. The existence of this feature, which indicates late Norman work, in conjunction with work similar in all respects to that which forms the subject of this paper, tells strongly against the views which some hold as to its extraordinary antiquity. To the archæologist this district possesses unique attractions. In the Church of Kilpeck we have the very last struggle of the decaying style of Celtic ornament. In Rowlstone we see the Norman work of the 12th century, with perhaps Byzantine influences. In the neighbouring Church of Garway, built by order of the Knights Templar, the sub-arch of the chancel opening is of a pattern which, if not Saracenic, is at least quite foreign to the native Norman style. Besides these, few village Churches are without substantial remains of the later or transitional Norman; and in the remains of Abbey Dore we see how the native English architects, although greatly under the influence of foreign orders of monks, knew how to throw aside the influences which then prevailed in France, and to work out for themselves a beautiful style of architecture, which, as the Early English, in its own way rivals the choicest specimens of Continental art."

The inspection of the Church having been completed, it became necessary for the members, who had been thus led astray from the science of mycology, to resume their search for funguses on their return to Pontrilas Court, where their hostess, Mrs. St. John Attwood-Mathews, the wife of one of our members, High Sheriff of the county this year, had prepared for them a banquet upon a table

* For a pen and ink sketch of these iron brackets, see page 108 *Nooks and Corners of Herefordshire*, by H. T. Timmins, published in 1892, since our visit to the Church.

artistically and beautifully laid out. Amongst the table decorations were observed eight brilliant-hued funguses on mossy beds, rivalling nature in their gorgeous colours; so correctly had these wooden specimens been painted in imitation of nature that many a remark was heard, "Is that a natural or is it an artificial fungus?" Sir Herbert Croft, President of the Club, in the absence, through indisposition, of the Rev. Sir George Cornewall, in returning thanks for the hospitable reception, was only obliged to desist from expatiating upon the charming surroundings with which the High Sheriff was blessed, by being reminded that trains, no less than tides, wait not even for members of the Woolhope Club. None of the members had to-day, in their devotion to the cause of science, tasted any of the suspicious funguses, and it is comforting to have to relate that a similar bewilderment did not influence their brains as occurred on the occasion of the previous visit of the mycologists to the same house in 1885, when the members, leaving to catch the train, took their neighbours' hats and coats for their own, nay, even went so far as to carry away the hat of a visitor in the house who was bound for a directly contrary part of the kingdom. Such amenities of science will occur occasionally.

Upon the return to Hereford the Annual Meeting was held in the Woolhope Club Room, when the Officers were elected for the ensuing session of 1892. There was no change in the Official Committee. Mr. Wm. Henry Barneby, of Bredenbury Court, was elected President; the Rev. Sir George H. Cornewall one of the Vice-Presidents. Mr. William Broome Giles, of Newport House, Almeley, was elected a member of the Club, and four names were submitted for election at a future meeting.

The Honorary Secretaries of the Archæological Section laid before the meeting a prospectus detailing the general scheme of their proposed Archæological Map of the county. A copy of this prospectus had been forwarded to every member of the Woolhope Club, and to 380 landowners and clergy, including any one whom they consider able and likely to further the progress of the undertaking.

The following attended the Fungus Foray Meeting:—Sir Herbert Croft, Bart. (acting as President), Mr. T. B. Acton, Rev. J. O. Bevan, Mr. C. P. Bird, Captain Campbell, Mr. George Cresswell, Mr. R. Clarke, Dr. A. H. Crespi, Captain de Winton, Rev. C. S. Hagreen, Rev. E. J. Holloway, Mr. W. J. Humfrys, Rev. A. G. Jones, Rev. W. H. Lambert, Rev. H. North, Mr. T. C. Paris, Deputy-Surgeon-General William Perry, Mr. J. F. Symonds, Mr. Walter Pilley, Mr. H. G. Sugden, Rev. F. Stooke-Vaughan, Dr. J. H. Wood, Rev. R. H. Warner, Mr. Alfred Watkins, Mr. H. C. Moore (Honorary Secretary), and Mr. James B. Pilley (Assistant Secretary); with the following visitors: Mr. Hugh Croft, Mr. W. H. Jones, Rev. D. C. Moore, Mr. J. P. Sugden, Mr. S. E. Watkins, to whom the Club is indebted for conducting the Club over the ground.

Dinner took place in the Green Dragon Hotel, when a paper on "The Welsh Names of some Birds of Prey," was read by Mr. E. Cambridge Phillips, in which he pointed out an extraordinarily close analogy in some instances with Russian, Persian, and Turkish names. This was followed by a very elaborate, carefully prepared, and highly interesting paper by Dr. J. H. Wood on

"The Nepticulæ of the Woolhope District." Mounted specimens of these beautiful moths, the most diminutive amongst our British moths, were exhibited by him. The paper displayed a highly creditable amount of original observation in the minutest details of entomological research.

On the following evening, Friday, October 9th, a lecture was given voluntarily by Mr. Cecil Carus-Wilson, F.G.S., F.R.G.S., Oxford University Extension Lecturer, on "Sands and Sandstones," with especial reference to Musical Sands. His lecture embraced an enumeration of the rocks, not even omitting the ice of the glacial regions, which form the "Crust" of the earth, the formation of sands by the disintegration of rocks, by the decay of the harder portions of organisms, and by the growth of crystals, the description of aqueous rock, of sands organic and inorganic, the causes of the colours of sands and sandstones, the properties of the various cementing materials which bind their grains together, the mechanical action of drifting sand upon rock-surfaces, the burial of towns and the encroachment upon the land by the formation and "march" of the dunes; the lecture being illustrated by diagrams, and numerous specimens. He exhibited the wonders of the sand-blast process by engravings upon glass, upon wood, and, more marvellous of all, by its capabilities of employment for the process of boring through so hard a rock as granite. Having most lucidly, fluently, and in language easily to be understood, and as free as possible from scientific long technical names, grounded his audience in the nature and properties of sands, he experimentally produced musical sands from the compression of sand-grains, and artificially produced musical sounds from non-musical sand-grains. Under six or seven microscopes on an adjoining table were exhibited foraminiferous sands from Dog's Bay, west coast of Ireland; millet-seed sands of the "Bunter" age, with rounded grains, a characteristic desert sand; sands from Bournemouth containing microscopic gems separated by Mr. Carus-Wilson's process; "Bagshot" sands; iron sand from Compton Bay, Isle of Wight, from which Mr. Carus-Wilson made the musical sand (see *Nature* for August 6th, 1891), Natural Musical Sand from the Island of Eigg in the Hebrides (see *Cruise of the Betsy*, by Hugh Miller, chapter iv.) In the latter work reference is also made to the hill of Reg Rawan, or the moving sand, about forty miles north of Cabul, described by Sir Alexander Burnes in 1837, and the Jabel Nakous, or the Mountain of the Bell, in Arabia, described by Lieutenant Welsted, of the Indian Navy, a few years earlier, as producing such strange music when walked upon, such a combination of tones, that it has, by various listeners been likened to the sound of a convent bell, a humming-top, the striking of a clock, the faint strains of an Æolian harp, or that produced by drawing the moistened finger over glass, whilst the warlike Zahor Ed-Din Muhammed Baber likens the sound from Reg-Rawan to that of drums and nagarets.

The attendance was open to ladies and visitors. Many members of the Woolhope Club and their families attended. Sir Herbert Croft, who presided, thanked the lecturer, and a very general approbation of his style and method of teaching was expressed, inasmuch as that, (as he was engaged for a course of

twelve lectures on the Elements of Geology at Malvern, Brecon, and probably Leominster), it was hoped that his services would be secured for a course in Hereford, commencing in the following January. The privilege of listening to lectures delivered in so simple and masterly a manner should not be lost when close within our grasp; they would produce that stimulus to the study of Geology for which so many members of the Woolhope Club have long been pining.

A few weeks before the above meeting, and about the date of September 14th, a discovery was made in the Brickyard at Pontrilas, at the depth of 8 feet below the ground-level, of a small enamelled gilt ornament, which has since been pronounced by the authorities of the British Museum to be a Book-boss or Shrine-boss of early mediæval date. It has been placed where it ought to be, namely, in our County Museum, having been presented by the Rev. M. G. Watkins.

ON THE WELSH NAMES OF BIRDS OF PREY.

By E. Cambridge Phillips, F.L.S., M.B.O.U., M.P.I.O.C.

[Partly re-printed from *The Zoologist* for May, 1891. Re-written for the Woolhope Naturalists' Field Club; read October 8th, 1891.]

It is to be regretted that the Welsh names applied to certain species of birds at the present day are generic, and not specific. The deep Welsh known to cultured Welshmen is scarcely ever used in everyday life, and is now rarely or never written. Hence many of the old Welsh names of birds are likely to die out. Take, for example, the Welsh word, *Giach*, Snipe. This word expresses the vocal sound uttered by the Snipe in rising, but is applied equally to the Jack Snipe as well as to the Solitary Snipe, supposing (which I much doubt) the Welsh have a knowledge of the latter bird, which occasionally occurs in Wales.

Thanks, however, to the kindness of a fellow townsman, I have lately had the pleasure of consulting a rare old Welsh dictionary, which is more historical and descriptive than dictionaries usually are. It is by Edward Williams, Bardd Glas Morganwg (the blue Bard of Glamorganshire), and was printed in Brecon in 1826. It was evidently compiled by a man of considerable intelligence, who possessed some knowledge of birds, as will be seen by my notes on the Eagle, Owls, and Crows, many of which I have taken from it.

The Welsh name for the Kite is *Barcud*, pronounced *Barkit*, and sometimes in Carmarthenshire, *Barcutan*, plural *Barcutanod*. No other name seems to be in use for this bird, although a friend of mine, a native of Pembrokeshire, tells me that when a boy he well remembers a clever old keeper applying it to the Buzzard. Welsh boys at the present day, when flying their kites, call them "barcutan papur" *(i.e., paper kites)*. In the Welsh Bible the word Kite is rendered *Barcud* (Levit. xi., 14, Job xxviii., 7). In the dictionary alluded to, Williams gives it as *Barcud, Barcit, Barcitan, Barcut, Barcutan;* English, a Kite; Cornish, *Bargez;* Bretagne or Breton, which is nearly the same as the Welsh, *Barquet*. The word *Barcud* seems more generally used than *Barcutan;* and from the terminal *cud*, pronounced *kit*, comes our word Kite. Since some of these notes were first jotted down, I have had the pleasure of reading Mr. Harting's most interesting article on the *Berkute* or *Bargut* of Eastern Turkestan, which appeared in the *Field* of the 27th December last. In this he states that the name for the Eagle, which is trained for hawking by the Kirghis and Bashkyris, is variously spelled *Berkute* or *Bearcoote;* in Russia, *Berkute*. In Eastern Turkey it is *Biryut* and *Baryut*, whilst in Persian it is *Raryut* and *Baryud*. The similarity to the Welsh *Barcud* or *Barcit* is certainly very remarkable; and it is probably very ancient Welsh, which has been handed down from the earliest times, when possibly this name was generally applied to all large birds of prey in the semi-civilised world. From Mr. Harting's researches it would appear that the term is fairly general in Asia, and unknown in Europe, except where introduced into Russia and Turkey, until

Brittany is reached; then to be known in Cornwall; and finally, in all its purity, in Wales.

The Welsh for Eagle is *Eryr;* in Cornish and Breton, *Er*. Williams recognises three kinds viz., *Eryr euruidd*, the Golden Eagle; *Eryr du*, the Black Eagle; and *Eryr gynffon wyn*, the White-tailed Eagle. He adds that many Eagles were to be seen in Wales in his generation (1826). One was killed in 1776 (he does not specify the species, but probably a Golden Eagle), which he saw himself in a place called Llansanwr, near Cowbridge, Glamorganshire. It was shot in the act of killing a lamb, but its wing being only broken, it nearly killed a dog before it was despatched.

There is a place in North Wales, he says (which, however, he does not specify), called "The Eagles' Rocks," where these birds *used* to breed, and were still to be seen in 1826.

The Eagle, however, was never very common in Wales, as may be surmised from the above remarks; and this is borne out by the fact that, so far as I know, we have no rock or crag that bears its name in South Wales; although we have "The Beaver's Cave" on the Towy, and "The Wolf's Leap" on the Irvon, indicating that in bygone days both these animals inhabited this country.

Since writing the above I have received a letter from that excellent ornithologist, the Rev. Murray A. Matthew, who formerly resided in Pembrokeshire, in which he says that one of the highest points of the Precelly Mountains is known by the name of "Foel" or "Moel Eryr,"—the Eagle's Peak or Tump, but the only Eagle he has heard of in Pembrokeshire of late years was one seen by a Mr. Hugh Owen in the winter of 1851, in the neighbourhood of Haverfordwest, which frequented the covers of Picton and Slebech for some time and escaped being shot. This was probably a young White-tailed Eagle, as one is in Lord Cawdor's collection at Stackpole Court which was shot about that time. Immature examples of the White-tailed Eagle *(Haliaëtus Albicilla)* are observed from time to time on the Sea-bound Counties of England and Wales in autumn and winter when the young birds reared in the North of Europe are migrating towards the South; adults, however, are of very rare occurrence (Saunders): I mention this to show that the bird in question was not bred in Wales.

The Buzzard in Welsh is called *Bodn*, plural *Bodaod*, and this name is in general use in Breconshire, and in Carmarthenshire; sometimes, though rarely, the word *Buncath* is used, but this is applied to any large bird, such as Buzzard or even Bittern.

I hear there is an Inn near St. David's, Pembrokeshire, with the sign "Boncath Inn," *i.e.*, "Buzzard's Inn," and at the present time I am pleased to add that there are still a good many Buzzards in North Pembrokeshire.

The Peregrine Falcon, or Hunting Falcon is *Hebog;* a Falconer is *Hebogydd*, *i.e.*, one who hunts with Hawks. Sometimes *Gwalch* is given for Hawk, and *Gwalchur*, a Hawker, *i.e.*, a man accustomed to catch birds with a Hawk (*Hebog*, Williams). The words *Hebog* and *Gwalch* are probably synonymous. The Imperial Dictionary, however, gives the word *Gwalch* as Welsh for Falcon, and adds that it means literally "a crested one." If this is so then it is possible that

this word applies to a Hooded Falcon, the hood that is used in Falconry having a crest or tassel at the top. Williams states that Falconry was very general amongst the gentry of Wales before the introduction of shot-guns.

In Merionethshire, Lord Lilford informs me that the Peregrine at the present day is called *Cydyll glas na Craig*, but this is no specific name, and simply means "the blue Hawk of the rock;" he adds that the Merlin is there called *Cydyll glas Vach, i.e.*, "the little blue Hawk." This word *Cydyll* is the same as the word *Ciryll*, commonly used for all small Hawks in this neighbourhood, and hereafter alluded to.

Sparrow Hawk is *Ciryll*, plural *Ciryllod*, and this name is commonly used in Breconshire, but I am sure it is also applied to the Kestrel. Williams renders Sparrow Hawk, *Gwipai*, *Gwipia*, and *Gwibiar;* and adds, "A kind of Falcon *(Walch, i.e., Gwalch)*, or Hawk *(Heboy)* of a small kind," evidently meaning by this that it was used for hawking; most probably he has mistaken the Sparrow Hawk for the Merlin.* I know the word *Ciryll* is generally used by the farmers for any small Hawk.

All Owls at the present day are spoken of as *Dylluan* only, plural *Dylluanod* sometimes *Dallhuan*, from *Dall*, blind, and *Huan*, sun, *i.e.*, "Sun-blind." Williams, however, gives *Dylluan, Tylluan;* Irish, *Ean;* Hebrew, *Helil;* and he especially mentions five kinds, viz., *Dylluan wen*, the White Owl; *Dylluan frech*, the Speckled or Streaked Owl, probably the Long and Short-eared Owls; *Dylluan rudd*, the Brown or Ruddy-coloured Owl, which he also styles the "corpse bird," probably from its frequenting churchyards; *Dylluan gorniog*, the Horned Owl, which, as he afterwards says, is nearly as large as the Eagle—he probably means the Eagle Owl; and he finally mentions "a small Owl, which is the smallest of the Owls," and which can be no other than the Little Owl.

Although Crows are not strictly birds of prey, still it is worth remarking that at the present day the word *Bran* is applied indifferently both to the Rook and the Crow, but not to the Raven, which is still, and always has been, *Cigfran*, or Meat Crow. Williams, however, adds, *Ydfran*, a Rook, or rather Seed or Corn Crow; *Cogfran*, a Jackdaw, or Cuckoo Crow, probably from its smaller size; *Milfran*, the Carrion Crow, literally *Animal (eating)* Crow; and *Morfran*, a Cormorant, or Sea Crow. Somewhat singularly, he does not separate the three species of Snipe, but refers to them all as *Giach*, Snipe.

From the above remarks it may be gathered that formerly a great many native birds, if not all, had distinct specific names among the Welsh; but probably from the deep Welsh dying out and from people not writing in Welsh so much as they formerly did, owing to the teaching of English in our schools, many of the specific names of birds have ceased to be used, and in their stead names of general application have come into vogue, such as are in common use in Wales at the present day.

* There being very little difference in the respective sizes of the Sparrow Hawk and the Merlin, I feel sure that the latter is often taken, or rather, mistaken, for the former, and that, consequently, the Merlin occurs in this county much oftener than is generally supposed.—E.C.P.

THE NEPTICULÆ OF THE WOOLHOPE DISTRICT.

By Dr. J. H. Wood.

[Read at the Fungus Foray Meeting, of October 9th, 1891.]

It requires some little courage after Mr. Phillips's paper on such noble creatures as the birds of prey, to ask you to listen to anything I may have to say about the tiny-winged atoms that I have chosen for my subject, the very smallest of Lepidopterous insects. Indeed, when the selection was made, I was under the impression that our October programme would be much as usual, and that it would be enlivened by at least one paper on some microscopic fungus or alga, alongside which my little moths would have appeared gigantic, and might even have aspired to the pedestal now occupied by Mr. Phillips's Falconidæ.

But I should be no true entomologist, were I, whatever the circumstances, to be ashamed of my subject. Small and apparently insignificant as these Insects are, they really become, like most minute things, intensely interesting, as soon as a good beginning has been made, and the initial difficulties have been overcome: and I know that I am by no means singular in esteeming them the most fascinating group we have amongst the whole of the great Lepidopterous order. Many a pleasant hour have I spent in their observation, and not without some slight result, since I have, from time to time, added four new species to the British lists, two of which were besides new to science. One of these, in honour of our Club, has been christened *Woolhopiella*, a name highly musical in the ears of all good Woolhopeans, but considered, I believe, by some of the outside world as outlandish, if not barbaric. At any rate, one of my correspondents, now an authority at the British Museum, was quite irate over the matter, and wanted to know what it meant, and whence it came. Such is fame!

The *Nepticulæ* comprise one of these extremely natural genera, that frequently occur in the *Tineinæ*, in which all the species present a remarkable family likeness, whilst the characters that serve to distinguish them are few, and have a comparatively limited range in which to vary. They are at the same time a most numerous body: 70 different kinds, or thereabouts, are known to inhabit these islands, and the number would be more than doubled by including the continental species. Among such a multitude of forms, so minute and so much alike, you may well ask how is it possible to discriminate them. Perhaps you have read of the famous tulip grower mentioned by Darwin, who could sort his 1,200 varieties by the bulbs alone. So there are Nepticulists—Germans, though, to a man, who can identify at sight these tiny insects. On more than one occasion, when, by discovering the larva, one has proved the real existence of some rare species, almost identical in the winged state with another and well-known species, one could not but wonder at the brilliant discrimination and boldness of view that enabled the original observer to recognise and name it, leaving it to some humble plodder afterwards to set the seal of certainty to his work.

But it is this humble plodding, or in other words, the collecting the larvæ, and learning all about them, that is the charming part of the subject. The larvæ, with scarcely an exception, are leaf-miners, burrowing in the substance of the leaf, where both themselves and their work can be plainly seen. Some mine the leaves in broad irregular spaces or blotches, others form narrower mines or galleries, which twist and meander under the surface; and so plentiful in the larval state are some of the common sorts, that it is scarcely possible to walk a few yards along any hedgerow or woodside without noticing them. Occasionally a species will occur in prodigious numbers. I remember one autumn when the common birch species, *argentipedella*, was occupying almost every leaf on the bushes, and often two or three the same leaf, whereas at the present moment it would take an afternoon to find a score. On that extraordinary occasion no real damage was done to the birch trees; the leaves lost some of their substance, but were not otherwise injured, nor fell before their time. And so with all—to the credit of my little favourites, they are not to be ranked with injurious insects. Though many different kinds of plants are attacked, it will be found that they belong, with only a few exceptions, to one or other of the great orders, *Rosaceæ and Amentaceæ*; one reason, perhaps, being that they prefer firm and leathery leaves to soft and succulent ones. Large as are the great orders *Umbelliferæ* and *Compositæ*, not a Nepticula, so far as I know, pays the slightest attention to them, though another class of mining larvæ, viz: the *Diptera*, are very fond of their juicy leaves. Some plants are especial favourites. No less than 9 species live on birch, *Woolhopiella* is one of them; 5 live on apple, the same number on oak, 3 on elm, and so on. Usually each species have but a single food-plant; and even with such plants as birch and alder, which are generally interchangeable foods with the Lepidoptera, it no longer holds when we come to the *Nepticulæ*; none of the 9 birch species ever being found on alder, nor the two alder ones on birch. The discovery, therefore, of a strange larva on a plant is *primâ facie* a good reason for suspecting it to be a new species. There are, however, some exceptions to the rule of a single food-plant; that common, but handsome fellow, *aurella*, being most conspicuous and troublesome in this respect. I feel sure that he figures in consequence under several names in our lists; as the bramble-feeder he is *aurella*, as the raspberry and dewberry *splendidissimella*, as the *geum urbanum*, he is *Gei*, and I have besides found him on agrimony and meadow sweet, but have refrained from adding further to the weight of his nomenclature.

When I began to collect the larvæ, there were certain broad and obvious characters to be found for our guidance in the text books, such as the colour of the larva itself; the form of the mine, whether a blotch or gallery, and if the latter, whether wide or narrow; the extent to which it was filled by the frass or excrement, and such like; but they were admittedly insufficient in some of the cases where more than one species made use of the same plant. By long and patient application I have come to recognise the importance of certain other and less conspicuous qualities, so that when I now put a small tin case or two in my pocket, and set out on some autumnal afternoon for a hunting expedition on the Stoke Hills, or still better in the depths of Haugh Wood, it is with the comfortable feeling that

I shall not only be able to collect my specimens unmixed, a most important matter, but that also, should fortune be so kind as to throw a new species in my way, I shall not be likely to pass it by. It would weary you, were I to describe all these minute points in diagnosis. I will only mention two, because, as they are not anatomical characters, but are rather connected with the habits and economy of the insects, they are of more general interest.

One of these is the position of the egg. You must know that the larva, on hatching, eats through the under side of the egg straight into the substance of the leaf, packing the empty shell behind it with its frass. The egg, therefore, marks the commencement of the mine, and by tracing the latter back to its starting point, the egg will be found, and can indeed be easily seen by a good pair of eyes, or with the aid of a lens, shining and black as it now is from the contained frass. You will observe that under these conditions the larva is not a free agent, but that wherever his mother places or rather lays him, there he must set to work; and if it is necessary that he should start from some particular spot, the parent moth must deposit her egg at that spot. Now some commence their mines within the stalk or mid-rib, and thence pass into the blade of the leaf; in these cases the egg must be laid on the stalk or mid-rib, and here we always find it. A few kinds, for a very curious and interesting reason, to which I may perhaps allude later on, run a slender gallery for some distance close alongside the mid-rib, before turning off into an inter-space. Here again it is needful that the parent moth should be very precise. But in many other cases where there is not the same apparent necessity for precision, we still find that the position of the egg is not left to chance. The choice may not extend beyond the selection of one surface of the leaf in preference to the other, or it may go farther and include a particular part of that surface. On the other hand there are some species—but they are quite the exception—that are absolutely lawless in this respect, and it seems to matter little to them where they deposit their egg, so long as it is somewhere on the leaf. Let me now give an example or two of the practical use of this one little matter of the position of the egg. I will take our troublesome friend, *aurella*. Fortunately he is extremely particular, and whatever the plant selected, the egg is always deposited on the upper surface in the sulcus or depression of a vein. When I found him out of bounds mining the leaves of agrimony, I was looking for *Nepticula cuneofasciella*, the legitimate tenant of that plant, that always lays her egg on the under side, out in the open between the ribs. As in the young state the mines and larvæ of the two insects are practically indistinguishable, I should but for the position of the eggs have considered them one and the same species. The other illustration I will take from two hawthorn feeders, *gratiosella* and *regiella*. Both hollow out or blotch a lobe of the hawthorn leaf, and these blotches in size and general appearance are so much alike that it seems at first sight impossible to distinguish them. If, however, we look a little closer, we shall see that both larvæ, before they began to make their blotches, first carried a narrow gallery round the edge of the lobe, to mark out as it were the ground, and ensure their advancing from the circumference towards the centre, a not unimportant matter, for were they to push their blotches in the opposite direction, viz., from the centre to the circumference, there

would be great likelihood of the tip of the lobe withering, and consequently of the larvæ dying of starvation. Here there seems equal reason for precision in the two moths, but what we find is this: *regiella* puts her egg immediately under the edge of the lobe, so that the larva knows his whereabouts directly he comes into the world, whilst *gratiosella* deposits hers some distance away, leaving it to the larva to find his way there, which he usually does after far fewer twists and turns of his gallery than might have been expected. The positions of the eggs, in the one case on the edge, in the other a greater or less distance from it, though trivial as such differences seem, are nevertheless unfailing distinctions, and we do not want two other small characters, one connected with the frass, the other with the larvæ themselves, to tell us which of the two mines it is that we may happen to have in our hand. *Regiella* is considered a very rare species, but it is not uncommon here and will probably turn up in good numbers elsewhere, when entomologists learn to recognize its mine. Is the egg-laying instinct ever insufficient? I certainly think I know one case where a mistake happens so frequently, that one is obliged to answer, yes. It occurs with *Woolhopiella*. The moth lays her egg anywhere on the under side of the birch leaf. The larva is a blotch miner, but does not like *ignobilella* strike out a fine gallery at starting to ascertain his position, but blindly burrows away with his head towards the circumference of the leaf; should he have started well in the middle it is all right, but if too near the edge, then the portion of leaf in front frequently withers and the larva dies.

My remarks have reached such an unexpected length, that I must pass over the other point I had proposed to deal with, namely a peculiarly methodical arrangement of their frass that some of the gallery miners adopt, which I have called the "disk" arrangement, as it would take too much time to enquire into the curious and instructive conditions under which it occurs, and I am anxious to introduce another and very different matter, which will I think interest you more. This is a remarkable power that these little creatures have of delaying the ripening and death of that part of the leaf in which they are residing. The leaf shall have put on its red or yellow autumnal tint, it shall even have dropped from the tree, have died and turned brown, but the area in which the larva is feeding will remain alive and green, not merely for days but for weeks yet, provided it be not exposed to sunshine or excessive dryness. It was first noticed by the German naturalist, Von Heyden, years ago, but neither he nor subsequent observers seem to have given it the attention it deserves. It is an intricate problem, belonging perhaps rather to the physiologist than the naturalist, and I can scarcely hope to throw much light upon it.

You are no doubt aware that the ripening and fall of the leaf in the autumn is a vital process, analagous with the ripening and fall of fruit; and that it is associated with an acid condition of the sap. Now the only explanation I have met of the phenomenon we are considering is, that the larval mine cuts like a trench across a portion of the leaf, stopping the supply of this acid sap to the part beyond, and so preserves it from participating in the change going on in the rest of the leaf. But I very much think that there is an erroneous notion here,—it is

not the acidity of the sap that ripens the leaf, but rather the ripening of the leaf that acidifies the sap. If this be so, the cutting off of the supply can have no effect one way or the other, except it be to precipitate the death of that part of the leaf, which would scarcely be to the advantage of the insect. I have thought much over the matter, I have furbished up my rusty physiology, I have looked at hundreds of leaves, hoping for a ray of inspiration, I have even made a mild experiment or two, and the only conclusion I can come to is, that it depends on one or other of two things, or to speak more correctly on two forms of one and the same thing. This I believe to be irritation; either mechanical, that is, due to the simple presence of the larva, or chemical, owing to some special product or secretion emanating from him. And I further think that both forms may occur—in one case the mechanical may prevail, in another the chemical.

The *Nepticulæ* are not the only insects that have this power. It is possessed, I am inclined to think, in a greater or less degree by every creature that lives within the tissues of a leaf. Should you, in passing under a beech grove late in the year, pick up some of the dead brown leaves, you will probably find projecting from their surface certain little round swellings; these are galls, and if you look carefully, you will see that each is surrounded with a narrow zone of living green tissue. This I should consider an example of purely mechanical irritation. Again, there is a group of small moths, the *Lithocolletis*, that make very curious mines, quite different to those of the *Nepticulæ*, for they mark out at starting the exact quantity of the leaf they will require. Up to this boundary the ripening process advances from all sides, and there abruptly stops. This too, I think, is mechanical irritation. In the case of the *Nepticulæ* the patch preserved is never mapped out in this definite fashion, but the margins, except where they happen to be bounded by a rib, fade out gradually into the brown parts, and it is almost impossible to escape the conviction that it is produced by the spreading of some liquid that gets more and more diluted the farther it extends. This is what I mean by chemical irritation, for I am of opinion that there is some stimulating material, either poured out of the mouth of the larva or perhaps contained in its frass, which being taken up by the sap soaks through from cell to cell, stimulating them in its progress and getting more diluted and attenuated the farther it travels. I only regret that the backward autumn does not allow me to show you specimens. Could I have brought you aspen leaves holding the larvæ of *apicella*, they could not have failed to excite your admiration. You would have seen a large fan-shaped splash of bright green running right across the leaf from stalk to margin, whilst all the rest was yellow; and you can imagine how striking the effect must be, when, as I have more than once known it, almost every leaf on the tree was in this condition. The rare species *intimella*, in the same way, will keep one lateral half of a leaf of the Bedford Willow green long after the other half has changed first to yellow and then to brown. Both live at first in the leaf stalks of their respective plants, and it is only late in life that they enter upon that still living portion of the blade they have so cunningly provided for themselves. Even should the larva die whilst in the stalk, the green splash will occur just the same. Again, you will often see the little green patches of *subbimaculella* in the brown

oak leaves, lying on the ground in October and November. The larva is a blotch miner, but he first runs a very fine gallery choked with frass close alongside the mid rib, to catch as it were the sap just as it leaves the vascular bundles, and impregnate it, as I suppose, with the stimulating agent; the whole virtue of the process too seems to lie in this preliminary gallery, for should the larva die at this early stage, the green patch is still there, as green and fresh as if nothing were amiss. It was a consideration of facts like these, that made me conclude that there must be some peculiar substance, either secreted for the purpose by the larva, or else existing, and this seems to fit the condition best, as one of the natural constituents of its frass.

Without this adaptation between the insect and the plant, without this benificent provision that I have feebly tried to represent to you, many of these little creatures would cease to exist. Shall we say that this is all blind chance and not Infinite Design.

I seem quite to have forgotten that the heading of my paper is "The *Nepticulæ* of the Woolhope District." Suffice it to say that in one small corner of that district, with a radius of about one and a half miles, no less than 50 out of the 70 British species occur, besides which there are three or four species that I have only met with in the larval state, and from their extreme scarcity have hitherto failed to rear—but I must succeed some day, and perhaps one or two of them may want a name.

1. Nepticula atricapitella.
2. ,, ruficapitella.
3. ,, pygmaella.
4. ,, pomella.
5. ,, oxyacanthella.
6. ,, pyri. I first found this in 1889. It had not been found in Britain before, and is still, so far as I know, confined to Herefordshire. It feeds on pear, and is sparingly distributed in our orchards.
7. ,, viscerella.
8. ,, anomalella.
9. ,, aucupariella. Confined in this neighbourhood to Haugh Wood, where only its food-plant, *Pyrus aucuparia*, grows in any quantity and in a truly wild state.
10. ,, desperatella. Added to the British Lists from specimens taken here in 1886. Has since been met with in the North of England. Feeds on wild apple, and is plentiful but local in Woolhope District. More gregarious in its habits than Nepticulæ generally: one bush being full of its mines, and an adjacent one empty.
11. ,, catharticella.
12. ,, basiguttella. Reckoned a scarce species, and occurring chiefly in the Eastern Counties. Widely, but sparingly, distributed here.
13. ,, septembrella.

14. Nepticula intimella. A rare species in most places. Occasionally abundant in the larval state here. Feeds on both *Salix caprea* and *Salix russelliana*; its habits being somewhat different in the two plants.
15. ,, subbimaculella.
16. ,, apicella.
17. ,, trimaculella.
18. ,, assimilella. Very rare. First recorded as British in 1885 from specimens bred in Sussex. Confined to aspen, and is not uncommon at Haugh Wood. Elsewhere, as at Ashperton Park, though its food-plant may be plentiful, it is absent, or nearly so.
19. ,, salicis.
20. ,, diversa. Little known as a British insect. Its larva occurred here in some plenty four or five years ago, in the leaves of *Salix caprea*, but has scarcely been seen since. This irregularity of appearance is a strong feature among many of the *Nepticulæ*.
21. ,, myrtillella. At Haugh Wood, in the bilberry leaves, but not plentiful. A remnant probably of a former moorland fauna.
22. ,, floslactella.
23. ,, sorbiella. Confined like *aucupariella* to Haugh Wood, and for the same reason.
24. ,, lapponica.
25. ,, luteella.
26. ,, arcuatella.
27. ,, angulifasciella. On various roses, specially fond of *Rosa arvensis*, I have also found it on *Poterium sanguisorba*, a most unusual food, and strongly suggestive of its being a distinct species; but there is no appreciable difference between these larvæ or the moths bred from them and ordinary *angulifasciella*.
28. ,, atricollis.
29. ,, microtheriella.
30. ,, argentipedella.
31. ,, Woolhopiella. Discovered in 1887. Has since been found commonly in the North of England.
32. ,, betulicolella.
33. ,, distinguenda. A little known insect. Taken in the North of England, and at one time not uncommon here, especially at Ashperton Park on the "Old Red," but not seen for the last two years. Feeds on birch.
34. ,, plagicolella.
35. ,, malella.
36. ,, tityrella.
37. ,, fulgens. A new species described by Mr. Stainton in 1888 from North of England specimens. It feeds on beech, and is not uncommon here.

38. Nepticula glutinosa.
39. ,, ignobilella.
40. ,, gratiosella.
41. ,, prunetorum. Very common on the sloe bushes along the limestone ridges of the district, but almost absent from the valleys.
42. ,, regiella.
43. ,, torminalis. Discovered in this district, and described as a species new to science in 1890. Food plant *Pyrus torminalis*. Rare, and extremely local; confined to a small corner of one wood, although the *Pyrus* is distributed universally.
44. ,, continuella.
45. ,, alnetella.
46. ,, marginicolella.
47. ,, ulmivorella. The scarcest and most uncertain of the elm species. At the present moment it has almost disappeared.
48. ,, æneofasciella. Specimens bred from *Potentilla tormentilla* are much smaller and less richly coloured than the type, bred from *Agrimonia eupatoria*.
49. ,, splendidissimella. Probably a variety of *aurella*.
50. ,, gei. Also no doubt a variety of *aurella*.
51. ,, aurella.
52. ,, dulcella.

AN INCIDENT IN THE HISTORY OF THE EIFFEL TOWER.

By the Rev. J. O. Bevan, M.A., F.G.S., Assoc. Inst. C.E., Vicar of Vowchurch.

Chancing to be in Paris in the year 1889 at the time of the holding of the International Exhibition, I witnessed a phenomenon of a remarkable character, which was noticed cursorily in the French papers at the time; but, so far as I know, has not found a permanent record in the pages of any English scientific journal. I therefore venture to hope that a brief description of it may not be unsuitable to the pages of the *Transactions* of the Woolhope Club. The occurrence to which I refer was nothing less than the striking of the Eiffel Tower by lightning. It took place on Sunday, August 25th. After dining at my hotel, I wandered out for a stroll in the Champs Elysées. About eight o'clock a thunderstorm unexpectedly broke out accompanied by torrents of rain. Being unprovided with wraps, I ventured to seek shelter under the archway of a public building bordering the main drive. I remained there for the hour during which the downpour lasted. The position I had taken up commanded a full view of the Tower. It was impossible to regard this object without a peculiar feeling of fascination. Its novelty, its graceful outline, its giant frame towering above the multitudinous Exhibition buildings, the powerful electric light at its summit enabling a newspaper to be read by its aid at a distance of some miles—all conspired to render it of singular interest. Furthermore, I had a presentiment that its majestic form could not remain altogether unaffected by the warring elements. I had been watching it for at least a quarter of an hour, when the heavens above opened, a stream of fire issued, and (taking a slanting and somewhat irregular direction) smote immediately upon the apex of the Tower. The appearance presented was as if a reel had been suffered to drop—one end of its fiery band being fixed at a point in the heavens—the reel descending (unwinding as it fell) until at last it struck the summit. This reached to a height of 300 metres (about 984 English feet), and terminated in a pointed rod or lightning conductor. The Tower received a shock, the extremity of the conductor was fused, the iron hail falling upon the engineer who chanced to be beneath. There were about two hundred persons on the various stages when the occurrence happened. They were more frightened than hurt. To keep up appearances, two or three ladies fainted—that was all. The Tower, being formed of iron, permitted the electricity to pass freely to the ground. The foundation covered a space of four acres. The structure terminated in four legs, and was firmly connected with the sub-structure and the soil by long iron bolts. Thus there was no impediment to the free passage of the electric fluid, and all risk of damage to the structure itself was effectually removed. One singular circumstance remains to be recorded. Immediately the Tower was struck it was hidden from view by a thick haze. The density of this may be imagined when it is stated that the glow of the powerful electric light was completely obscured. At first I

thought the work of so many months had been destroyed in a second, but no crash followed, and no great cry of terror as must necessarily have followed such a calamity. After a period of four or five minutes the haze disappeared, the light shone forth at the head of the huge Gorgon as brightly as before. The obscuration was most marked for the estimated period, and in the account of the incident which appeared in the Paris journals the fact was distinctly recorded. It may be explained, I venture to suggest, by the supposition that the passage of a considerable body of the electric fluid—if I may be pardoned for speaking of it as a fluid—along a limited line determined by the position of the Tower, tended to the rarefaction of the air in that region, the lowering of its temperature, and the condensation of vapour, which resulted in the formation of a cloud. I trust the novel experience I have related will not prove uninteresting to the members of our Club, or to scientists generally.

Woolhope Naturalists' Field Club.

March 24th, 1892.

THE ANNUAL MEETING.

The Annual Meeting of the Woolhope Naturalists' Field Club held on Thursday, March 24th, was well attended. The following were present:—The Rev. Sir George H. Cornewall, Bart. (President), Mr. W. H. Barneby (President-elect), Surgeon General W. Perry, the Revs. G. E. Ashley, W. Elliot, C. S. Hagreen, A. W. Horton, W. H. Lambert, A. Ley, H. North, and Morgan G. Watkins, Drs. T. A. Chapman and J. B. Fitzsimons, and Messrs. H. C. Beddoe, J. Carless, R. Clarke, G. Cresswell, G. Davies, James Davies, T. Hutchinson, T. C. Paris and O. Shellard, with H. C. Moore (Honorary Secretary), and James B. Pilley (Assistant Secretary). Four new members were elected and ten new names were proposed, to be balloted for at the next meeting.

The financial statement, which was presented, showed the urgency of members paying in their subscriptions, in order to meet the heavy expenditure which had to be included in this year's estimates, namely, the volume of *Transactions* for 1886, 1887, 1888, 1889.

The dates and places of Field Meetings for 1892 were fixed as follows:—May 31st, Tuesday, Leominster, Laysters and Kimbolton; June 30th, Thursday, Bredenbury, and the mass of Travertine at Southstone Rocks; July 29th, Friday, Ladies' Day, Chepstow; August 25th, Thursday, the Brecon Beacons.

The following books have been received during the past year by interchange with kindred societies:—*The British Association Report for 1891; Handbook for Cardiff*, presented by the local Secretaries for the meeting of the British Association; *Proceedings of the Bristol Naturalists' Society*, Vol. vi., part 3; *Report and Transactions of the Cardiff Naturalists' Society*, Vol. xxii., parts 1 and 2 for 1890; *Proceedings of the Cotteswold Naturalists' Field Club*, Vol. x., part 2; *Report of the Dudley and Midland Geological and Scientific Society*, Vol. iv., No. 2 for 1891; *The Devonian Fish Fauna of Spitzbergen*, by W. A. Smith Woodward of the British Museum; *The Essex Naturalist*, Vol. iv. and Index; 1890, Vol. v., Nos. 1 to 11; *Proceedings of the Geologists' Association*, Vol. xi., Index 1889 to 1890, Vol. xii., parts 1 to 5; *The North American Fauna*, No. 5 from the Department of Agriculture (Division of Ornithology), Washington, United States; *Report for 1890 of the Warwickshire Naturalists' and Archæologists' Field Club.*

REPORT ON THE ARCHÆOLOGICAL MAP OF HEREFORDSHIRE.

THE Honorary Secretaries to the Archæological Map Committee presented their report as follows :—

"The Honorary Secretaries to the Herefordshire Archæological Map Committee desire to report progress of the proceedings which have taken place towards the compilation of an Archæological map, which was initiated at the Llanthony Meeting of the Woolhope Club, on July 28th, 1891.

"A Committee was then formed, with power to add to their number, and many members of the Woolhope Club have since joined. The Committee now consist of the President, Mr. W. H. Barneby, Rev. Sir George Cornewall, Sir Herbert Croft, Hon. and Ven. Archdeacon Stanhope, Canon Phillott, His Honour Judge Cooke, Rev. Joseph Barker, Mr. H. C. Beddoe, Mr. Joseph Carless, Mr. Robert Clarke, Mr. M. J. Ellwood, Mr. H. C. Moore, Mr. Walter Pilley, Mr. G. H. Piper, Mr. Henry Vevers, and the two Honorary Secretaries.

"Meetings of the Committee have been held, and a prospectus with tabular form of returns compiled. Out of a thousand copies which were printed, upwards of seven hundred were posted to the clergy, magistrates, county councillors and principal land-owners, with a request that they would kindly note any objects of archæological interest in their neighbourhoods. Already one hundred and eleven returns have been received by the Secretaries, which have all been entered in the two index registers of "Localities" and "Objects." These returns, however, only number twenty-four contributors ; therefore an urgent appeal is made to the members of the Woolhope Club to render assistance in the undertaking.

"The whole of the maps, or squares, of the Ordnance Survey, amounting to one hundred and eighty-five, have also been procured, bound in three handsome volumes, and lettered as the property of the Woolhope Naturalists' Field Club ; these await the record of the returns at a future stage of operation.

"The formation of local Committees was the subject of discussion at one of the Committee Meetings. Sir Herbert Croft kindly undertook the arrangement of the County Committees, in correspondence with the Petty Sessional Divisions ; whilst the Rev. Canon Phillott, Mr. Moore, Mr. Joseph Carless, Mr. Beddoe, Mr. Robert Clarke, Mr. W. Pilley, and the Honorary Secretaries, formed a City Local Committee, and each gentleman has undertaken certain work.

"On the subject of finance, the donations received amount to £26 11s. 0d., and the payments, including the volumes of maps, prospectuses, and incidentals, amount to £26 3s. 2d. There are, however, no debts owing ; but in the prosecution of the undertaking there will be further expenses incurred, and those members of the Woolhope Club who have not already subscribed, are respectfully invited to do so.

"It ought here to be mentioned that in a letter received from the Assistant Secretary of the Society of Antiquaries it is stated that the President of that

Society was of opinion, that a single map, on a small scale, with all the proposed symbols would be far too crowded ; he therefore recommended that there should be two maps, one to match that of Kent, already published, and the other purely mediæval ; and that if the earlier map were prepared to match that of Kent, and the prefatory remarks and index communicated, the Society of Antiquaries would bear the expense of preparing the map and setting the index, etc., in type, and the Woolhope Club could have what copies were wanted at the mere expense of print and paper.

"J. O. BEVAN,
"JAMES DAVIES,
"Honorary Secretaries of Herefordshire
Archæological Map Committee."

With the object of making the members of our Club more acquainted with the conditions of the Geological specimens in the Museum, and calling their attention especially to the meagre collection of fossils of the Woolhope Limestone, we present a copy of the

REPORT OF THE REV. J. D. La TOUCHE.

(One of the Hon. Curators of the Geological Department.)

To the Committee of the Hereford Free Library and Museum.

The Committee of the Hereford Free Library and Museum having requested the Rev. Prebendary Elliot, Mr. G. H. Piper, and myself, to undertake the arrangement of a number of Geological specimens which had been presented to the Museum by several collectors, and had accumulated from time to time; assisted by my son Tom D. La Touche, Mr. H. C. Moore, and others, who rendered valuable aid, we proceeded last July to make a selection from the miscellaneous materials placed at our disposal, and to distribute the specimens in a row of cases in the centre of the room in such a manner as to afford to visitors to the Museum a tolerably instructive lesson on the sequence of life in palæozoic times.

Since the Geology of the County of Hereford (if we except the comparatively small but extremely interesting area of the valley of Woolhope) is confined almost exclusively to the Old Red or Devonian system, it was hardly to be expected that the Silurian Fauna should be so fully or typically represented in these collections as the former. Accordingly while we found a very large assortment of the cartilaginous fishes, Pteraspis, Cephalaspis, &c., &c., derived from Old Red Strata, the varied and far more abundant life of the previous Silurian epoch was but meagrely represented in comparison. A sufficient number of specimens, however, were found to enable us to form a fairly typical series, so that the student will now see as he proceeds from case to case, with a few gaps which it may be hoped future collectors may fill up, examples of the chief genera and species in ascending order from the Ordovician to the Old Red.

I shall here make a few brief remarks on each of the members of this collection, with a view of calling attention to the points in which it appears to me most weak and deficient.

The Tremadoc or Arenig formations which occur at the base of the Silurian system appear to be here unrepresented; but of the Llandeilo which succeeds them there are some fairly good specimens presented by Mr. Lightbody.

The collection of Caradoc sandstone fossils, though including some fair specimens of the Brachiopoda and Heteropoda might be better than it is, considering that the localities in Shropshire where they are to be found in abundance are very accessible. Of the Trilobites of the Llandovery there are no specimens, and its fine characteristic Brachiopod, Pentamerus oblongus, makes but a poor show here. I am much surprised to find that the Limestone band that takes its name from Woolhope, the happy hunting ground of our distinguished

Club, is only represented by some five or six very imperfect fragments, among which the grand Bumastus Barriensis, which is certainly to be had in the great quarries that abound there, is conspicuous by its entire absence. I venture to suggest that an effort should be made not only to obtain from collectors, or by original research, the characteristic fossils of that local and very interesting stratum, but those of the whole Woolhope district, which is one that has become classic in Geological literature.

In the succeeding strata of the Wenlock shale the collection includes a few fair Brachiopods, as well as some fragments of the well known Trilobite, Phacops longicaudatus, and there are a few corals from the Wenlock limestone.

In the Lower Ludlow the labours of Messrs. Lightbody and Crouch have supplied the Museum with some fair examples of Star-fish from Church Hill. There are a few good specimens of Lamellibranchs and Brachiopods, a moderate display of Gasteropods, while there is a superabundance of Cephalopods, limited, however, to a few species. Altogether the very abundant and varied fauna of the Lower Ludlow epoch is but imperfectly represented.

The characteristic Pentamerus Knightii of the Aymestry Limestone is plentiful, but many other forms belonging to that stratum are absent.

The Upper Ludlow is pretty well represented; and, lastly, there are a tolerably good number of specimens from the beds which constitute the transition to the over-lying Old Red Sandstone. With these our task of arrangement terminated.

A large case full of specimens of fishes belonging to the family Cephalaspidæ remains yet to be classified and named. Many of these are extremely good, but it might be desirable to exchange many of them with other Museums, where their acquisition would be highly appreciated; and thus, some of the blanks that still exist in this collection might be filled up. The Committees of the Ludlow, Shrewsbury, and other Natural History Societies would probably be found willing to co-operate in this, making their own collections as complete and representative as possible.

In conclusion, the Hereford Museum may be congratulated on possessing, if not a perfect series of examples of Palæozoic fossils, at any rate, one which affords a fair idea of the succession of animal life in the remote and highly interesting epoch to which they belong.

J. D. La TOUCHE.

Stokesay, Craven Arms,
19th March, 1892.

RETIRING ADDRESS BY THE PRESIDENT,

Rev. Sir George H. Cornewall, Bart.

It has always been held to be the duty of the President of this Club, on completing his year of office, to give some account of the work which has been done during the period in which he has occupied that responsible position. It was very gratifying to me, being one of the oldest members of the Woolhope Club, and having occupied the post of Honorary Secretary for many years in times gone by, to be chosen to guide during the past year the fortunes of a Society which has done much in its day to foster that agreeable intercourse of thought which those in this neighbourhood, making a study of natural science, have always been glad to impart the one to the other in our Field Meetings. It is much to live in a county abounding in beautiful scenery. The contemplation of that scenery derives additional pleasure from the study of the rich fauna and flora which our county contains, as well as the exploration of the various phenomena presented to us in the geological structure of rocks of this locality. To those of us who have not leisure to search deeply into the treasures which natural history contains, it is a pleasure to listen to accounts of the successful researches of others, and a distinct gain as regards our intellectual advancement and the elevating influences thereby brought to bear upon us. But I may claim for this Club, not only the advantages which our social gatherings, as I have endeavoured to indicate, may possess; but I may point to the work done by this Club, as a very important contribution to the record of facts relating to natural science, which it is desirable that those interested in the county of Hereford should possess. We have numberless papers on the geological phenomena about us, and these should be placed in the forefront of our achievements, for it is from the remarkable exhibition of stratified rocks at Woolhope that the Club takes its name; we have now, thanks to our excellent friends, Messrs. Purchas and Ley, a published Flora of Herefordshire; the county divided into districts so that the plants found in each district may be fitly tabulated and compared. We have interesting accounts of the various mansions of Herefordshire, and the remarkable trees in their parks and grounds; for these we are very much indebted to the indefatigable labours of a much honoured member, the late Dr. Bull; we have done a very important work as regards fungi; entomology has not been neglected, Dr. T. A. Chapman has, in this branch, given valuable help. Nor is it possible for me to pass over the important position given to this Club as a means of advancing science in Herefordshire by the munificence of one who has established in our city a museum of Natural History, which year by year becomes more complete and interesting, and which well deserves a visit from every member of the Club on account of the valuable work which has recently been carried through in arranging and classifying the various specimens exhibited therein; also the noble Woolhope Club Room will always be associated with his name, and if under the same roof is placed an excellent library for the use of all students, we may hope that the effect of gaining knowledge from the perusal of its literature

will be that the readers will be encouraged to mount up higher, and find in the museum means of satisfying still further their thirst for useful knowledge by the study of natural history.

I am aware that there is a certain danger in engaging in a retrospect of past labours, such as I have attempted. I have doubtless omitted many names well worthy of mention, who have done us good service in the past. It was not my intention to give with any completeness a record of the work done by the Woolhope Club; but, as a very old member, it is permitted me, I think, to point out to those who have lately joined us that while much has been done much remains to be done, and that their labours, if simplified by what has been already published, may still be exercised over a wide field, and that much useful information may still be gathered on all subjects which come within their own field of observation.

I must now glance rapidly at the successful results of the various Field Meetings which have taken place during the past year. If these "successful results" are to be measured by the attendance of members, the interest taken in the various excursions, the valuable papers we have listened to (excluding, if you please, my own contributions), then, I think, the record of the year is one of which we need not be ashamed. The weather was against us; that must be allowed, but that so many were encouraged to brave the elements, particularly the terrible downpour which greeted us at Moccas, is a proof of a gratifying zeal on the part of our members.

The First Meeting was arranged in order to explore the interesting plants of Haugh Wood; at the same time furnishing a walk abounding in as striking views as may be found in any part of our beautiful county. The season being a late one, we were botanically unsuccessful, but I do not think that those who were present will soon forget the varied beauties of that delightful walk, or the prospect when we reached Backbury Hill and gazed on the wide valley of the Wye on the one hand, and, on the other, on the interesting geological formation of the hills surrounding Woolhope, where the Rev. J. D. La Touche explained to us with his usual ability, the progress of the various changes which resulted in the remarkable configuration of that locality from which the Club derives its name. Passing down to Stoke Edith, we took carriage to Lugwardine, stopping on the way to examine the volcanic rock exhibited in a quarry at Bartestree; at Lugwardine Sir H. Croft very kindly afforded us welcome refreshment after the fatigues of the day. The weather, stormy in the morning, held up during the day, but could not be pronounced genial.

The second Meeting of the Club was held on June 30th, at Aberedw, in Radnorshire, a spot well known to those who pass by rail along the valley of the Upper Wye, for, before reaching Aberedw Station, after passing beneath the striking rock masses which rise steeply above the north bank of the Wye, a glimpse—all too slight and transient—is gained of a deep gorge through which the Edw passes; there is the cliff, partly concealed by wood, and the crawling stream below, beautiful in itself, and exciting, as regards the possible finny treasures it may contain, the hopes of the enthusiastic angler. The weather was more

promising than that at any other meeting of the Club, but it was hardly what may be called a bright summer day. The members, on alighting at the station, were conducted by the Vicar to view the remains of the Castle, almost obliterated by the construction of the railway, and thence to the ancient Church, remarkable for its large porch, very peculiar screen, and the communion plate; the fine yew trees in the churchyard must also be noticed. Still descending, after leaving the Church, we reach, almost at the level of the stream, a fishing cottage belonging to Captain Mynors, who kindly permitted us to make use of it for luncheon. The principal room commands two reaches of the river, and the eye, gazing first on the one and then on the other, can hardly decide which most truly realizes the ideal of a Welsh mountain stream. It was with this prospect before us that we assembled to listen to the able and exhaustive paper on the flora of the neighbourhood, furnished by the Rev. A. Ley, a valuable addition to the literature of the Club. It may have disappointed those who expected to reach a district rich in floral treasures, for the careful observer was not content with enumerating the plants peculiar to the locality, but also the strange absence of many a familiar favourite which might well have been thought to occur in abundance in such a favoured region. After thanking Mr. Ley for his paper, we prepared to cross the river and pursue a mountain track which in some 2½ miles would lead us to Bwchllyn Pool. On the way, we visited Llewellyn's Cave, in which that Prince is supposed to have taken refuge shortly before he was captured and put to death, notwithstanding the ingenious expedient of the reversed horse-shoes, which can never be omitted in any history of this brave but unfortunate chieftain. Near the cave was gathered in abundance the rare plant *Meconopsis cambrica*, as Mr. Ley had already pointed out in his paper. The length of the walk to Bwchllyn Pool prevented any protracted examination of its banks in search of *Ranunculus lingua*, the Bogbean, and other interesting plants, but it was not without charm to pass through a tract of country but little known to many members of the Club, and one which, if not possessing striking picturesque features, has yet a character all its own. The party were guided past Llandeilo-graban Church, to which we were permitted to pay a hasty visit, and thence by a rapid descent to Erwood Station, where we again took train for Hereford. The less active members of the party were content to follow the course of the Wye from Aberedw to Erwood, and were thus afforded an opportunity of traversing that portion beloved by the salmon fisher, where he is most certain of some reward for his piscatory labours; where also the scenery of the Upper Wye rivals the beauties of that portion, which, better known, has long attracted the attention of the travelling public.

The third Excursion made by the Club was to the Abbey of Llanthony. The party, on arriving at Llanvihangel Station, were conveyed in brakes up the picturesque valley of the Honddhu; a goodly company, the ladies having taken full advantage of the opportunity afforded to them once in the year of joining in the excursions of the Club. This noble Augustinian Abbey, with its interesting examples of Transition Norman, particularly as exhibited in the west front, the basin in which it is situated being surrounded by the various ranges generally known as the Black Mountains, cannot but have given pleasure to those who were

unacquainted with its beauties; it was indeed a spot to dream in of the past glories of ancient times; but here, it must be confessed, the cold showers that swept by, and the wind moaning among the broken arches of the nave, hindered that leisurely survey of this remarkable monument of ancient piety which we had hoped to enjoy. Luncheon was partaken of within the ruin, and without waste of time, for it was a day for a brisk walk, and not for mere lounging, the President gave very shortly particulars as to the history of the Abbey, particularly emphasizing the strange fact that a building of such large proportions, such beauty, and costliness was only for a few years able to fulfil the purposes of its founders, when, owing to the rude treatment of their Welsh neighbours, they were forced to erect another Llanthony near Gloucester, and thus the present building was suffered to fall into decay. A paper was then read by Rev. J. O. Bevan, vicar of Vowchurch, on "Certain Useful Objects of Scientific Investigation," in which members were encouraged to pursue systematically some of those various subjects of study with which the Club is identified. It is a contribution to our records which deserves careful study. He also urged the desirability of framing an Archæological map for Herefordshire, on which I will not further enter, as no doubt we shall to-day receive a report of the labours of the Committee. Having completed the tour of the Abbey and the monastic building, a considerable number expressed a wish not to return in the carriages to Llanvihangel, but, breasting the mountain, to descend into the Monnow Valley at Pandy. The labour was well repaid; the view from the top of the mountain was magnificent, and while it was no doubt fatiguing to the ladies who took part in it, particularly towards the close, when passing Trewyn, and declining General Gillespie's hospitable invitation, the party, almost at a run, reached the Station but a few minutes before the departure of the train, yet I feel sure that by many the walk will not be soon forgotten, both the grand swelling moorland, which walls in the south side of our favoured county, and the rich valleys of Wye and Monnow spread beneath, broken by the various ranges of hills surrounding the city, which we know so well.

The fourth Field Meeting took place at Moccas, when the President had the satisfaction of welcoming the Club, not for the first time. They began by inspecting the gardens, in which the botanists were pleased to express their pleasure at the collection of herbaceous plants, on which the President must confess that he has devoted much time and from which he has derived much satisfaction; thence to the Church, of which he may be content to speak warmly as being one of the oldest and most interesting in the county. He read a short paper on its history, and after luncheon had been partaken of by a very large number of friends (who, considering the weather, had shown great boldness in facing it) the President read a paper on Travertine, the stone of which the Church is built, and he was able to show to the Club in an adjoining wood the same stone in process of formation. To examine the stone in this wood and to search for certain species of bramble therein to be found, the Club proceeded without undue delay, following the course of the Wye, up to Bredwardine, where a halt was called to examine the Church. Its peculiar features were explained by the

President, who also read a paper contributed by Mr. Williamson on the SS. Collar, a recumbent figure in the Church being so adorned; then, crossing Bredwardine Bridge and taking the road to the small village of Brobury, the river Wye was again reached at that spot, so very characteristic of our Old Red Sandstone formation, called Brobury Scaur. This rock, on which the rare *Geranium sanguineum* grows in, perhaps fortunately, inaccessible abundance, commands an extensive view, the winding Wye flows beneath, and the range of woodland commencing at Bacho and passing Tyberton, Moccas, and Bredwardine to Meerbach, is spread out before the eye. Sad to say, on this occasion it was partly veiled by persistent rain, which however damped but slightly the enthusiasm of the party. Leaving the wood of Monnington, the party rejoined in about half a mile the carriages waiting for them in Monnington walk, an avenue of Scotch firs, which probably dates from the latter part of the eighteenth century. It is not for the President to comment on the success or otherwise of the expedition, unfortunate as it proved in point of weather, but he shrewdly suspects that as regards examining various points of interest, and enjoying an interesting walk, the majority were not disappointed.

The concluding Meeting was the Fungus Foray held in the neighbourhood of Pontrilas, Mr. Attwood Mathews extending his well-known hospitality to the members. I was unable to be present, but have heard that while success in obtaining rare fungi was limited, nevertheless, by the kindness of Mrs. Attwood Mathews, the meeting could by no means be reckoned the least enjoyable of the series.

I have thus rapidly touched upon the work of our Club in the field, and must add that more detailed descriptions of the various Field Days have been made with great care and completeness by the Honorary Secretary, to whom the Club owes so much, and who has done his utmost that all the various arrangements for the comfort of the members, and their pleasure, should be planned beforehand, and successfully carried out. To attain this result, the labour of the Assistant Secretary has contributed no small share. I trust that I have been able to show that the Woolhope Club has during the past year maintained its reputation by affording its members many interesting excursions, and subjects for thought.

Having said so much as to the past, a past not forgotten (for many pleasant memories of our converse still remain), time permits me to say but little as regards the future. And yet I would wish to inspire the younger members with the desire to play their part in maintaining the ancient reputation of this Club. I have often heard the project discussed of concluding and completing our county history. The late Mr. Archer Clive was active in the matter, but, it was felt by any person who examined the question carefully, that the labour was greater than one man could undertake; it was more reasonable to permit separate workers following out different branches of the undertaking to make and record their own researches. If a county history be ever written—and in speaking of the matter I must not forget that *Duncumb's History* has been supplemented by that excellent antiquary and genealogist, Mr. W. H. Cooke, that Mr. Robinson has described

the Castles and Manor Houses of Herefordshire, and that the memorials of this ancient city have not been neglected—then I make no doubt that the materials collected in the *Transactions* of the Woolhope Club will be utilised very largely. The Flora of Herefordshire is there, and an excellent introduction by the late Mr. Symonds on the Geology of the various botanical districts of the county. It might be possible to follow out at greater length that which was by him sketched out as an introduction to the Flora, so as to give a complete manual to the students of Geology in Herefordshire. In these days of technical instruction, a capable botanist might be found to study the grasses of Herefordshire with an eye to their agricultural value. We might welcome further information as regards the Wye; the changes wrought in its bed by the action of floods, the variations in the volume of water passing our city. We should be glad to know the source whence our celebrated breed of cattle took its origin. Our Museum suggests a catalogue which might be more than a dry list of contents, but a guide to the young scientific inquirer. Behind all these suggestions of possible investigations dealing with subjects quite within the scope of a Naturalists' Club, there remains the larger question of possible work in the domain of archæology, and architecture has never been pronounced to be beyond the scope of the Club, though admitted, as I may almost say, on sufferance, and having no recognized status. No doubt papers on the peculiarities of our local architecture, as shown in our churches and other buildings, would be interesting. It might be worth while for a Committee to examine how far such study might be promoted without overshadowing our main enterprise, which is the study of Nature. At the same time we have welcomed this year the project of setting forth an Archæological map of Herefordshire, perhaps under the persuasion that no other body in the county would be willing to take it successfully in hand. The grand memorials of the past are subject to decay; even our flowers are ruthlessly uprooted till the rarer species become yearly yet more rare; it rests with us to place on record all that is valuable to the local inquirer, that those who come after us may see that we were not insensible to the various treasures which lie about us, which Time's unsparing hand may soon obliterate. It must rest with the younger members of this Club to carry on its old traditions; they must furnish the staff of geologists, botanists, and other investigators which we need; and in thus entering on a field which may be new to many of them, I am sure that they will have no cause to regret their determination, for, in the study of Nature every object they meet with, every walk they take, every careful observation they make, will awaken an interest in the works of the Great Creator, which, once undertaken, will afford alike pleasure and instruction, and will prove a mine to be eagerly explored, but never to be exhausted.

Woolhope Naturalists' Field Club.

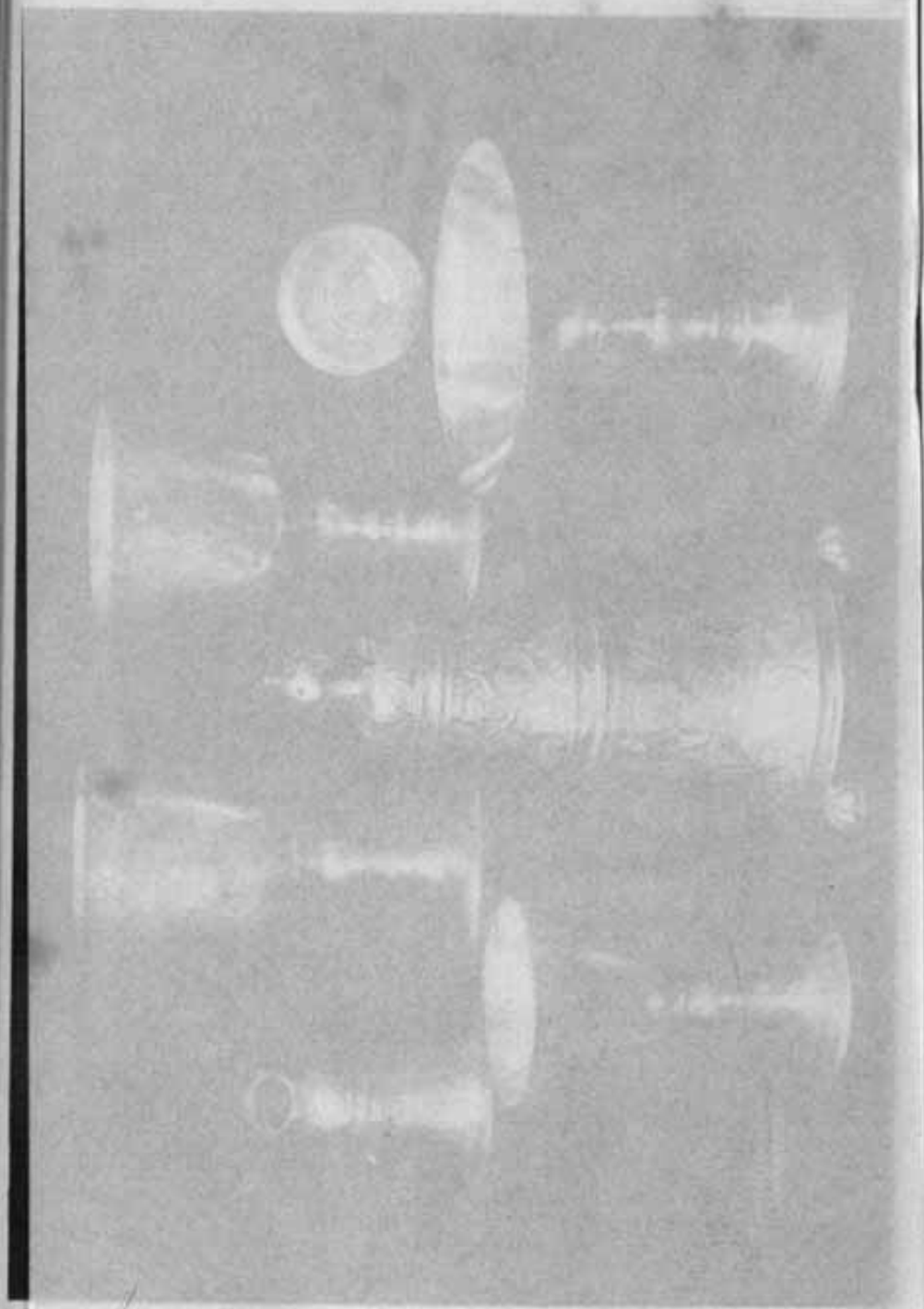
MAY 31ST, 1892.

ON Tuesday, May 31st, this Club held its First Field Meeting of the year. The following members and visitors attended the Meeting:—The President (Mr. Wm. Henry Barneby), Vice-President (Rev. Sir George H. Cornewall), the Revs. J. Barker, J. O. Bevan, E. R. Firmstone, J. E. Grasett, E. J. Holloway, W. Ireland, W. H. Lambert, and F. S. Stooke-Vaughan, Deputy Surgeon-General W. Perry, Drs. T. A. Chapman, J. B. Fitzsimons, and J. H. Wood, Messrs. H. C. Beddoe, C. G. Blathwayt, J. Carless, R. Clarke, G. Cresswell, J. Davies, M. J. Ellwood, C. Fortey, W. Hebb, T. Hutchinson, Peyton Levason, J. W. Lloyd, T. C. Paris, W. Pilley, A. J. Purchas, H. C. Moore (Honorary Secretary), and J. B. Pilley (Assistant Secretary), with the following visitors:—Colonel J. C. Little, Rev. P. J. Oliver Minos, Messrs. E. J. Barker, G. Cornewall, Lacon Lambe, R. Lewis, H. M. Purchas, H. A. Wadworth, P. B. Walmsley, and H. Wilmot.

The members having assembled at Leominster, proceeded without delay to the Board-room of the Union, to hear a paper read by the Vicar, the Rev. A. G. Edouart, on the history of the Priory Church. First referring to its early history—as minutely detailed in the Rev. G. F. Townsend's "The Town and Borough of Leominster," in a pamphlet by the Vicar himself, entitled, "History, Past and Present, of the Priory Church of Leominster," in the report of Mr. George Gilbert Scott, dated July 24th, 1862, in another report of Sir George Gilbert Scott, dated July, 1875, in a valuable paper by Mr. E. Roberts on page 438 of *The Journal of The British Archæological Association* for the year 1871, Vol. xxvii.—the Vicar proceeded with an account of the various restorations which he had seen carried out during his incumbency of thirty years, terminating with the recent restoration of the tower. He then exhibited the parish registers, dating from A.D. 1549, beautifully transcribed, and in a remarkably excellent state of preservation. Those from 1604 to 1669 are unfortunately missing. The chalice of the 15th century, sharing with the one at Bacton the honours of mediæval antiquity and beauty of workmanship, was also exhibited. There is a drawing of it in the above-mentioned pamphlet by the Vicar; whilst notes on the Bacton chalice, read by Mr. E. W. Colt, on the occasion of the visit of the Woolhope Club to the Golden Valley on June 28th, 1888, are to be found recorded in the *Transactions* of that year on page 230, with an excellent photograph of chalice and paten.

The Rev. Canon Phillott, in thanking the Vicar for his paper, bore witness to the vastly improved character of the Church, due to the much needed restorations, but as regarded the derivation of the name of Leominster, he saw no reason to search for any other source beyond its foundation by Leofric, the great Earl of


T.H.WINTERBOURN,
LEOMINSTER.



the Mercians, and husband of Lady Godiva. In Domesday it is called Leof Mynster, and is said to have belonged to the Queen of Edward the Confessor. Between 1123 and 1130, the "ruined monastery of Leominster" was annexed by Henry I. as a cell to Reading Abbey. As regards the still earlier history of this site, it was originally founded in the 7th century, possibly as a nunnery, and was plundered and destroyed, probably by the Danes, who overran the country in 874. In the 11th century it was re-founded by Leofric, and, as Mr. Roberts adds, certainly for nuns on this occasion; and, as a nunnery, it disappears from history with the carrying off of the Abbess Eadgifu in 1046, by Swegen, the eldest son of the Earl of Godwin.

TREASURE TROVE.

Mr. C. E. Moore, County Coroner, next exhibited the seven silver vessels lately found in a rabbit hole in the parish of Stoke Prior, as reported in the *Hereford Times* of December 19th, and more fully in the issue of December 26th, 1891. The oldest vessel is a chalice with the hall mark of 1578—1579, height 5⅝in., diameter 5¼in., weight 12oz. A tall, elegant vessel with a perforated cover, tapered like a pepper box, containing two compartments for the holy oil, *chrysom*, with the letter F. above, and E. A. underneath, on a shield, and a wolf on another shield, has the hall mark 1594—1595, weight 13½oz.; and a somewhat similar but smaller vessel has the hall mark 1596—1597, weight 2oz. Three cups with a wolf's head on two of them, are of the date 1637—1638. Of the three silver cups one is 6⅝in., one 6¼in., and the third 5¼ inches high, and a small paten three-quarters of an inch high, with a diameter of two inches and a half, has the hall mark 1639—1640, weight 1½oz. These vessels are awaiting a coroner's inquest as to their legitimate owner, and ultimate destination.*

The members, after inspecting the walls of the Union building, three feet thick, on the northern and eastern sides, exhibiting in the east wall an Early English lancet window on the ground floor, and a Perpendicular window on the upper floor, with both Perpendicular and Decorated windows on the south, observed the diversion of the brook Pinsley, probably for the purpose of a mill, running in a well-built Early arched culvert underneath the ancient monastic building, and under the entire length of the modern building. The site of the fishponds, filled up within the memory of some still living, occupied the ground on the north side. The foundations of the Saxon Church, exposed some years ago at the east end of the present Norman nave, with its high altar, procession path, semi-circular apse, semi-circular side chapels, and four very ancient stone coffins still *in situ* were visited; after which followed an inspection of the interior of the Church, under the guidance of the Vicar. A paper by

*After numerous inquests the Court of Chancery determined that this Treasure Trove was the property of the Crown. Application for it to the Hon. H. Cuffe, Solicitor to the Treasury, was made by our County Museum Authorities. The application was not granted, and the vessels were all sent, by order of the Treasury, to South Kensington Museum, where they now may be seen.

Mr. F. R. Kempson on the recent restoration of the tower was read, and a specimen exhibited of the cement, (of which no less than nearly forty tons, in a liquid condition, was poured into cracks in the tower) proved of remarkable hardness.

Before twelve o'clock, in accordance with the programme, seats were taken in the carriages. One carriage of entomologists was filled for Grantsfield, where they were treated to an undisturbed and deliberate examination of the private collection of Lepidoptera in the family of the Rev. T. Hutchinson, vicar of Kimbolton with Middleton-on-the-Hill, of which we have records occasionally in our *Transactions*, dating so far back as 1866, p. 307. The county record, as recently published by Mr. Thomas Hutchinson, much assisted by Dr. J. H. Wood and Dr. T. A. Chapman, now stands corrected up to date as follows:—

Macros—			
Diurni	... 44	out of a total of	65
Nocturni...	... 65	,,	112
Geometræ	... 198	,,	283
Cuspidatæ	... 24	,,	33
Noctuæ	... 195	,,	318
Total ...	... 526		811
Micros—			
Deltoides and Aventiæ ...	... 9	,,	15
Pyralides	... 42	,,	77
Crambites	... 35	,,	83
Tortrices	... 213	,,	335
Tineæ	... 424	,,	716
Pterophori	... 16	,,	36
Total ...	... 739		1262
Or Grand Total ...	1265		2073

The above is a summary of the Macros and Micros compiled since Mr. Thos. Hutchinson read his paper at Mitcheldean, published on page 104 of the *Transactions*, 1887. This corrected summary appeared amongst the Errata and Addenda of the volume of *Transactions*, 1886—1889, but is here repeated because it is well known how frequently readers omit to refer to Errata and Addenda.

The remainder of the party proceeded in carriages until their first halt at Kimbolton Church, conspicuously built upon a commanding situation. This Church, dedicated to St. James, consists of nave, chancel, a Lady Chapel on the south side of the nave, south porch, and massive Early tower at the west end of the nave, terminating in a lofty shingle spire. There is a small Norman window in the east end of the chancel, and several Early English windows in the Church. There is a walled up doorway in the western side of the Lady Chapel. The President discovered a mural slab on the south wall of the chancel connected with his family, as follows:—"Heare lyeth the body of Joyce Hibbyns, late wief of John Hibbyns, gentleman, eldest daughter of Richard Barneby, Esquier. Shee

deceased the 29 of April, 1614." The chancel arch, and also the arch between the nave and Lady Chapel, are both modern, the Church having undergone restoration in 1875. The Parish Registers commence in 1565.

The next halting place (with the kind permission of the owner, Mr. Edmunds), was Moor Abbey, now a farmhouse, containing some Elizabethan features in a picturesque brick chimney, and traces of greater antiquity in the lower masonry building, with remains of a moat in close contiguity to the house, two old fishponds in a field to the north-east, and the site of a chapel still a little further in the same direction. In the farm buildings is a picturesque gabled dovecot or pigeon house, forming portion of the farm granaries, with its floor formed of tile stones, over a store-room below, whose walls bore traces of having been cemented. The employment of tile stones for roofing and flooring in this locality ceased to surprise the visitors when they had proceeded a mile further towards Laysters, where the occurrence of Red Sandstone tile stones was conspicuous in almost every building. Some of them, of extensive superficial area, are used for roofing, walling, porch jambs, and lintels. The occurrence of Red Sandstone tiles for this purpose must at least be considered rare, although we hear of similar tile stones being found in a quarry in the parish of Vowchurch.

The party arrived at Laysters Church just in time to take refuge during a thunderstorm. This place is also spelled Leysters, and in *Domesday* it appears as Last. The Church is dedicated to St. Andrew. It consists of a nave, chancel of the same width, without any chancel arch, a new vestry and organ chamber on the north, a tower at west end of nave, and a south porch. The roof over the nave and chancel are late 14th century. The Norman font, rescued from a farm building at Puddleston, is a large and plain bowl, like an inverted cone, mounted on a modern base. The porch doorway is Norman, having a square-headed lintel under a plain semi-circular tympanum. In the tower are some Early lancet windows and three bells, two of them being pre-Reformation bells, the third bearing the inscription "T. Rudhall fecit, 1804."

In a field adjoining the churchyard on the southern side there is a low circular tumulus, with a diameter of about ninety feet at its base. The field slopes from west to east, the height from the enclosing entrenchment, which is ten feet wide, being about six feet on the west side and twelve feet on the east. The Rev. E. S. Hewitt, son of the former vicar of Laysters, who had told us all that could be learnt respecting the Church, informed us that about thirty or forty years ago explorations had been conducted into this tumulus with the result of finding ashes, charcoal, and an accumulation of rough stones, but nothing in the shape of pottery or coin was found, nor could any definite form of stone structure be determined. The irregular shape of the tumulus upon its eastern side is thus accounted for. Mr. Hewitt showed a flint arrow head, which had been picked up in a field on Laysters Farm, about a quarter of a mile east of the vicarage, and the Honorary Secretary exhibited two or three others which had been found in a field a little south of Little Laysters farmhouse, some fragments of ancient pottery, and a neolithic implement of flint, the property of Miss Callow, of Little Laysters. All these are probably the same which were shown to the Club at

Grantsfield in 1884, and are said on page 173 of the *Transactions* of that year to have been discovered whilst digging a drain on the Heath Farm at Laysters.

Mr. Moore here made some observations upon the subject of barrows or tumuli, first drawing attention to the fact of their frequent propinquity to Churches. If the tumulus were erected first, a natural reverence for the monuments of the departed might attract worshippers to build a Church in the vicinity; whilst the selection of a commanding and conspicuous situation would apply equally to the Church and to the tumulus. That a prominent site was preferred for the tumulus we learn from the translation by Mr. J. H. Kemble, 1837, of the Anglo-Saxon poem of Beowulf, whose dying request was that his people should raise a mound "on the place of his funeral pile" proportionate to the celebrity of the hero's deeds. The same poem throws light upon the ceremonies accompanying the act of burial.

Command the war-chiefs
to make a mound
bright after the funeral fire
upon the nose of the promontory;
which shall for a memorial
to my people
rise high aloft
on Hronesness;
that the sea-sailors
may afterwards call it
Beowulf's barrow,
when the Brentings
over the darkness of the floods
shall sail afar.
BEOWULF, line 5599.

They accordingly raised a mighty funeral pile to burn his corpse; it was

hung round with helmets
with boards of war (*shields*)
and with bright brynies (*coats of mail*),
as he had requested.
Then the heroes, weeping
laid down in the midst
the famous chieftain
their dear lord.
Then begun on the hill,
the warriors, to awake
the mightiest of funeral fires;
the wood-smoke rose aloft,
dark from the fire,
noisily it went,
mingled with weeping.

After the burning of the body had been completed, Beowulf's people proceeded to raise

a mound over the sea;
it was high and broad,
by the sailors' wrath waves
to be seen afar.
And they built up
during ten days
the beacon of the war renowned.

They surrounded it with a wall
in the most honourable manner
that wise men could desire.
They put into the mound
rings and bright gems,
all such ornaments
as before from the hoard
the fierce-minded men
had taken;
they suffered the earth to hold
the treasure of warriors,
gold on the sand,
where it yet remains
as useless to men
as it was of old.
BEOWULF, line 6268.

"This mound or barrow, synonymous with the Latin word *tumulus*, eventually became a *low* or meeting place for the people, a term still used in Derbyshire, derived from *hlæw*, a hillock, and retained in such names as [Ludlow,] Arborlow in Derbyshire, where there is a circle of mounds, Bartlow, in the parish of Ashdon, Essex, where there is a group of Roman tumuli, Eastlow Hill, at Rougham, in Suffolk, where a body was found entire, which had not undergone cremation, Hounslow, &c. Barrŏw (*beorg*, *beorh*, *bearw*), the technical term adopted for all these ancient sepulchral mounds, appears to be still retained in Sussex and elsewhere in the name *burgh*."*

Looking round our own county, we find tumuli at King's Caple, St. Weonard's, Thruxton, Kingsland, Eardisland, Aston, and probably several others might be mentioned, in close vicinity to the Church. The tumulus at St. Weonard's was opened by Mr. Thomas Wright in 1855, and therein were found ashes, mixed with charcoal and fragments of human bones, vaulted over with large rough stones, conclusively proving that it was a sepulchral monument. The tumulus at Thruxton has also been opened but with no satisfactory result, probably due to the absence of supervision of experienced explorers. Mr. Moore exhibited a drawing of the explorations upon the five tumuli on the Ludlow race-course, of which an account from the pen of Mr. Charles Fortey is printed in *Archæologia Cambrensis*, 1887, and Mr. Fortey, being present, took up the cue and personally explained the proceedings and the many discoveries there made. Mr. Moore next proceeded to point out how, by the exploration of tumuli, much light had been thrown upon the domestic surroundings, not only of the Anglo-Saxons, but of the Romans, and of the early Britons, owing to the custom of interment of almost every conceivable article of dress, of ornament, and of domestic use, together with the body, and in case of the Romans, a coin, *obolus*, to propitiate Charon and to pay the passage in his boat, carefully noting the exception that warlike weapons are never found in Roman graves. Reference was made to the erroneous title of Celt given indiscriminately to every implement which resembled an axe or axe-head, whether it were made of flint or any other hard rock, of bronze, or of any other material, as misleading; this name should only be applied to the smaller instruments, such as chisels, from *Celtis*, a chisel.

* From the *The Celt, the Roman, and the Saxon*, by Thomas Wright, 5th edition, 1892.

For the very early use of knives and flints, reference was made to Joshua v., verse 2, and to Exodus iv., verse 25, best read in the revised version of the Bible. In conclusion Mr. Moore insisted that no attempt to open a tumulus should ever be initiated without a consultation through our delegate, Rev. J. O. Bevan, with the Committee of Aid of experts appointed by the British Association for the advancement of science.

From Laysters Church the members walked to what is known as the Poet's Stone, a massive piece of local Red Sandstone, formerly six feet long by four feet broad, and two feet deep, now split in twain, probably in the process of removal from the opposite side of the road where it was originally situated in the time of Wordsworth. The stone is about a quarter of a mile east of the Church, on the right-hand side of the road leading from Church House to Tenbury, and commands an extensive and charming view much appreciated by the late poet, overlooking Tenbury in the foreground below, and on the horizon the Clee Hills, High Vinnals, Black Mountains, and other heights. The initials of the poet W.W. over those of his wife M.W., with the date October 22nd, 1845, are inscribed upon the stone. In the Sunny Bank Dingle, just below the stone, may be observed the process of the formation of travertine by the incrustations of carbonate of lime, dissolved from the cornstones of the locality, redeposited upon mosses and other vegetation.

Upon resuming their seats in the carriages, the members commenced the return journey by the conspicuous Poplar trees at Leysters, on an elevation of 714 feet, gradually descending towards the Church called Middleton-on-the-Hill, where a bench mark on the north-west angle of the Church showed, by the Ordnance Map, an elevation of 414 feet. Here the Members were met by the Vicar, Mr. Hutchinson, and the party from Grantsfield. The Curate, the Rev. P. J. Oliver Minos, took great pains in pointing out the architectural features, though it must be confessed, with all gratitude for his painstaking, that the visitors did not agree with his views as regarded the Saxon work. The Church dedicated to St. Mary is a very fine Norman building, consisting of nave, with a fine tower of later date at the west end. The chancel is divided from the nave by a massive Norman arch, which is pierced above by a round-headed opening. There are two Norman doorways: one on the north, walled up; the other on the south, with a wooden porch, as we see in many Churches of the period in Herefordshire, even smaller than the one now under consideration. Each has the Norman zigzag pattern around the arches, with plain tympanum. On the south side of the chancel there is a priest's doorway of Norman character. The tower arch is very massive, and slightly Pointed, apparently Transitional. There are some small beautiful Norman lights on both sides of the nave and chancel. There is an Early Decorated window in the east end of the chancel, forming a triplet. In the south wall an Early English window has been inserted at a later period, some of the Norman arch coinciding with the one opposite still existing, although the Pointed character has been slightly introduced in the process of alteration. In the north wall of the chancel the Norman light with original arch, and finely splayed sides, has not been interfered with. The tower is very massive, rising in three stages;

the lower part six feet thick, is lighted by long narrow lancets; the upper storey is of later architecture, and the windows are very much wider. The font, early Norman, has a circular bowl with simple Norman enrichments, and stands on a circular shaft without any basement. In the chancel wall on the south side is a double piscina under one arch, and there is a small plain aumbry in both the north and south walls.

From Middleton Church the members returned to Leominster, re-entering the main road near Ashton Camp, which was visited by the Club on June 19th, 1884 (see *Transactions*, page 174). The trees, the greenery, the beautiful floral display of the May trees in the park of Berrington Hall, formed a beautiful picture, whilst fauna of many species gave animation to the scene. A Heron flew over-head from the large heronry preserved by Lord Rodney. The only other heronry in Herefordshire is at Letton Court. The dinner at the Royal Oak Hotel gave much satisfaction. It was followed by a paper read by the Rev. Joseph Barker on "The pre-Reformation Bells of the Churches visited during the day," and some extracts bearing on "Lemster ore" were read by the Rev. Sir George H. Cornewall, from an original copy of Michael Drayton's "Polyolbion."

THE PRIORY CHURCH OF LEOMINSTER.

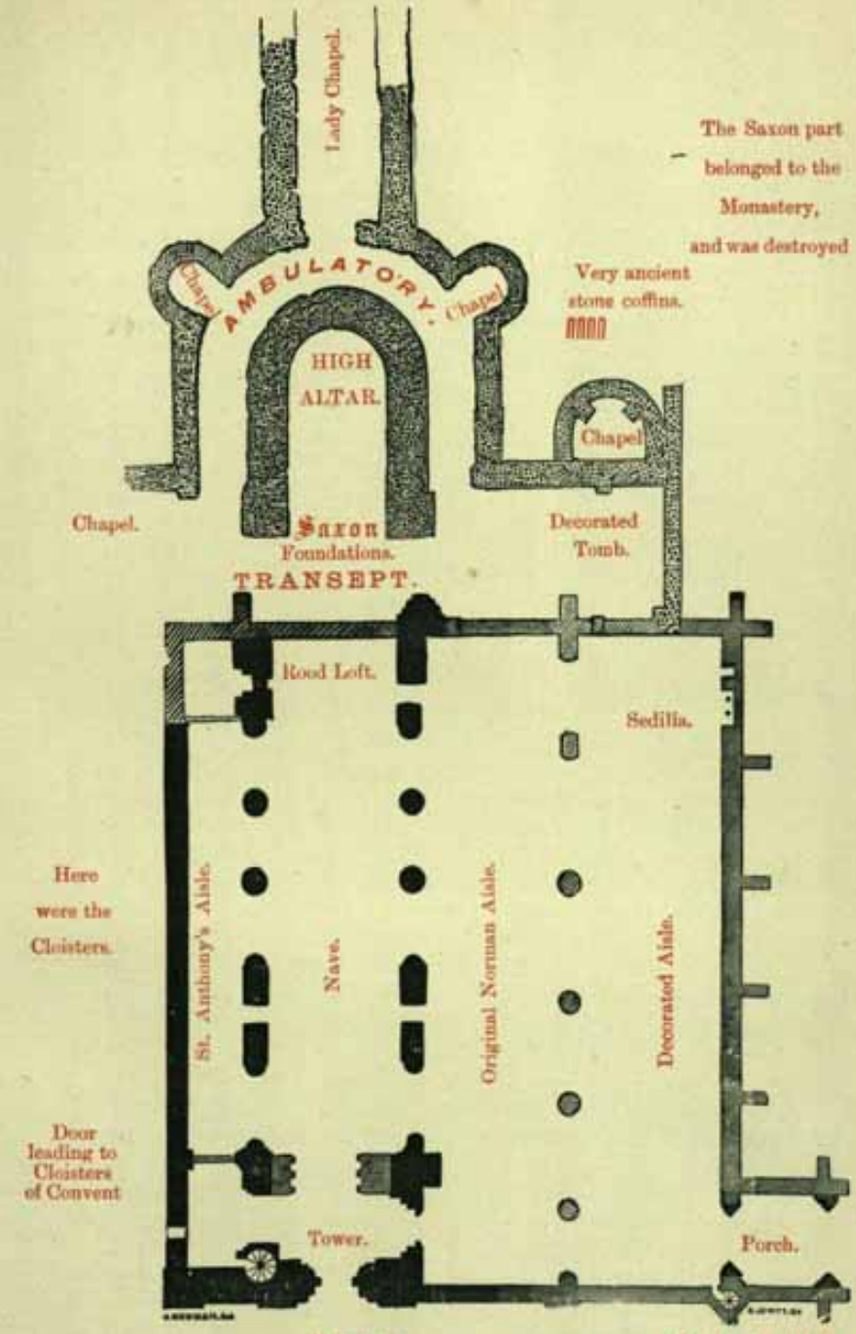
By Rev. A. G. Edgcart, M.A., Vicar of Leominster.

Read before the Members of the Woolhope Naturalists' Field Club on the occasion of their visiting the Church on May 31st, 1892.

Ladies and Gentlemen, by way of introduction to the subject of the Paper I am about to read to you, I would observe that not only hallowed and personal, but historical associations entwine themselves around our ancient Parish Churches, of which the venerable Priory Church of Leominster is one. They are identified, I may say, with the history of the Christian Church from the beginning. In these consecrated houses of God have assembled for generations and ages past the professing children of God, the members of Christ's visible body. Their history, lost in antiquity, unites us in communion with the early Christians and with Apostolic times. Often in the very spots, sometimes in parts of the very walls of churches still standing, faithful Christians have worshipped their God a thousand or twelve hundred years ago, or it may be even much further back than this. These remarks are singularly applicable to the noble Church your society has this day come to visit, which on account of its great antiquity is by no means devoid of historical associations and interest.

The Priory Church of Leominster originally belonged to the Monastery founded by Leofric, Earl of Mercia, who largely endowed it, and is unquestionably of very early date. Leland, the old historian, says it was built before the Norman Conquest, and assuming the late Sir Gilbert G. Scott to be correct in his opinion that the Inscription which encircles the remarkable Fresco of the Wheel of Time in S. Anthony's Chapel, the present Baptistry, supposed to be the only one of its kind discovered or to be found in England, is in Saxon characters, there is good reason for believing that Leland is not far wrong, and that the Norman portion of the Church at least was standing before the Conquest. Anyway, the gable-roofed windows in the North Aisle are in the style of architecture which existed prior to the commencement of the Saxon Heptarchy. Be this as it may, it is certain that the Priory Church of Leominster existed many years before the foundation of Hereford Cathedral was laid, and is said to have been the Mother Church of the whole district. In point of antiquity it undoubtedly ranks with the oldest Church now existing in this kingdom.

It is, however, more probable that the Norman Nave, which forms a part of the present Church, and is 125 feet long, was built during the first half of the 12th century, or possibly in part towards the end of the 11th century. It was originally a cruciform structure with central tower; its choir was apsidal with a continuous aisle or ambulatory round its eastern end, from which branched out three Chapels, one of which was dedicated to St. Mary, another to the Holy Trinity, and the third to Our Lady of Pity, to each of which was assigned a Priest; each of these Chapels was also separately endowed. To the eastern side



GROUND PLAN OF LEOMINSTER CHURCH, AND ANCIENT SAXON FOUNDATIONS.

Saxon Foundations, dotted.
Norman work, marked black.

of each Transept were also two apsidal Chapels or Chauntries; close to the one on the south side, and almost parallel with it, are four stone coffins. One of these Chauntries was possibly dedicated to S. Anne. At the extreme north-west corner of the Norman Nave was another Chapel dedicated to S. Anthony.

Many Altars dedicated to particular saints are supposed to have been in this Church; the following only, however, are recorded in the Priory and Church records; the Altars of S. Peter, S. Mary Magdalene, and S. Katherine.

The Church in its entirety, before it fell into the despoiling and sacrilegious hands of Henry VIII., about 1539, must have formed a grand and imposing edifice, of which its magnificent Norman Doorway, with its extremely beautiful arched mouldings, was not the least prominent feature. Indeed, before that period it ranked in point of size and beauty of architecture with the largest in the kingdom, and at this present day the Norman Nave is considered one of the finest specimens of Norman architecture in existence.

It would appear, as was frequently the case, that the Nave was used as the Parish Church; but the inhabitants, falling foul of the Monks during the 13th century, were not allowed to worship in it, and for their accommodation a stupendous South Nave was erected in the place of the old Norman South Aisle. This Nave was of the same height and of about the same width as the original Norman Nave, the Triforium and Clerestory of which are consequently enclosed within it, and was fitted up with Collegiate Stalls.

Early in the 14th century, this second Nave proving insufficient for the Parish, a third was added exactly equal in every way to the second, but a magnificent specimen of the altered style of this more advanced period. At the east end of this Nave was situated the Lady Chapel, now the Organ Chamber; its Sedilia and Piscina yet remain, and are in an excellent state of preservation.

At the Dissolution, the Choir and Transepts with the Chapels or Chauntries were ruthlessly swept away, the foundations of which were in 1853 excavated; the grand central Tower also shared the same fate, a smaller Tower being built over the western bay of the Norman Nave.

Leominster Priory Church did not during the Commonwealth escape the vandalism of the Roundheads or Puritans, who demolished its beautiful stained glass windows, with many ancient relics.

On Monday, March the 18th, 1699, a disastrous fire broke out, through the carelessness of plumbers, while soldering the leaden roof, destroying the roofs and the arcade separating the Central and South Naves, in fact, the whole of the interior of the Church, with its beautiful Collegiate Stalls. The Church was restored at a cost of £16,500, the original estimate being for £14,540 18s. 1d., and was re-opened for Divine worship on Whitsun Day, May 26th, 1705.

And now we will take a glance at the Priory Church as I found it upon my appointment to the living in 1861. The portion of the Church at that time used for public worship, the Central and South Naves, the original Parish Church, was filled with pews of a form not inappropriately said to resemble an omnibus, the occupants being seated face to face, one half consequently with their backs to the holy Altar, making the Mayor and Corporation conspicuous for their irreverence.

This state of things was a prolific source of squabbling and bad temper. Nor were the other interior arrangements of the Church in better keeping. The Organ was most extraordinarily and in the worst possible taste placed right over the Altar, entirely obscuring the East Window, and a lofty three-decker was perched against the centre of the northern wall, immediately against what was originally the Processional Arch; while the beautiful Norman Nave was shut out of sight and was in total disuse, presenting a most dismal aspect of dilapidation.

By the gradual accumulation of soil thrown out from the vaults, the floor was raised some height up the shafts of the massive Norman columns, entirely burying their bases and responds. The Arcade on the south side of the Norman Nave was built up with rubble masonry, and curtained wooden boxes or galleries fitted up under each arch, approached by staircases, protruded into the Nave. The roof was a lean-to one, and of a very rude description; and in order to bring the pitch to correspond with a later portion of the structure, the walls of the nave were lowered, and in some places the crowns of the Clerestory arches cut away and wall plates laid across them to support the beams of the roof. The capitals of several of the columns were barbarously cut away to allow of the introduction of timbers for the support of the galleries and for the insertion of mural monuments. The bases of the columns upon being unearthed were found to be shamefully mutilated, while some of the shafts had been seriously injured by the fire of 1699. The whole interior, moreover, was besmeared with thick coats of whitewash, and the walls were disfigured with memorials of departed parishioners, a monument to the memory of the Rev. H. Vaughan, one of the Vicars of the Parish, being actually let into one of the Norman columns.

Such was the condition of the Church before I started the work of restoration in 1862. The Norman Nave was selected as the first section of the important work, being by far the most interesting part of the Church, and was restored under the supervision of the late Sir G. G. Scott, at a cost of £3,017 11s. 6d. In 1876 the restoration of the second section of the Church, namely the Central Nave, with its grand West Window was taken in hand, the Committee engaging the services of the same eminent Architect, the cost being £4,799 6s. 11d. In the north-east end wall of this Nave is part of the old stone stairs leading to the Rood Loft, in a most excellent state of preservation, up to that time bricked up. Eight years later, in 1884, the South Nave and Porch were restored at a cost of £1,536 9s. 3d.

The Priory Church dedicated to S. Peter, and the Parish Church to S. Paul, now form but one Church of grand and Cathedral dimensions, consisting of a Norman Nave with its low massive pillars and arcades, its Triforium and Clerestory; on the north of this a low and narrow Aisle, and on the south a second Nave in the Early Pointed, and a third Nave in the Decorated or Middle Pointed, style.

The Tower has also been recently restored, the contract for which with extras, exclusive of architect's charges, amounted to £1,726 3s. 2d.

The whole sum expended during the past 30 years in the restoration of this noble and venerable Priory Church of Leominster may be approximately estimated at £10,323 13s. 1d.

I have confined my remarks so far to the fabric of the Church; there are one or two objects of extreme interest connected with it, to which at the risk of being thought tedious I must make a passing allusion.

Upon opening the Arch immediately under the Great West Window, the fresco of an encircled nondescript cross was discovered on the plastered wall at the back, of which I had a careful tracing taken, the plaster being in so perishable a condition that the wall was obliged to be re-plastered, an exact copy of the cross from the tracing, being at the same time painted on the precise spot of the original one. The history of this cross, according to the late Sir Gilbert G. Scott's version, is that it was placed there at the time of the Consecration of the Church, and was (as was usual in those days) blessed by the Bishop. Underneath, is a pavement of ancient encaustic tiles found in the Norman Nave, probably part of the High Altar.

The Altar Piece in the Norman Nave, a copy of "The Last Supper" by Rubens, painted by Mr. Lock, a townsman, and presented by him to the Church in 1724, is not without interest.

Of stained glass windows the Church can boast of but few specimens. The subjects of the Central compartment of the Great West Window, filled in with Munich Glass in 1878, are, Christ the Good Shepherd, Christ at Gethsemane, and the Conversion of S. Paul. In 1890 I presented the Window in the Baptistry, representing the Baptism of Christ, in commemoration of the fiftieth year of my ministry and the twenty-ninth of my incumbency of this Parish; and in the same year the late Miss Elrington placed a Memorial Window to her family, the subject of which is the Adoration of the Magi.

The fine Oak Screen which shuts in the Organ Chamber was erected at the joint cost of myself and Mr. Charles Edwards, the Contractor, on the occasion of the Queen's Jubilee.

Mr. E. W. Colt read an interesting Paper before the members of the Woolhope Naturalists' Field Club on July 29th, 1888, on our fine old Chalice of pre-Reformation date, probably of 15th century, and, I may observe, of world-wide renown, so that I see no occasion to expatiate upon it here, merely adding that it is supposed to have been left with the Priory Church sometime about 1552, in compliance with a Commission issued by King Edward VI. enacting that in any Parish Church or Chapel shall be "left one or more chalices according to the multitude of the people."*

The Parish Registers of this Church are of special interest. The practice of registering Baptisms, Burials, and Marriages, as appears from Lord Chief Baron Gilbert's "Law of Evidence," commenced in 1538, but an earlier date, 1523, is given by Jacob in his "Law Dictionary," published in 1806. There is one peculiarity connected with the Registers of this Parish, a practice, I presume, universally common at that early date but not, I believe, very generally known: that up to 1677 the year commenced on April 1st, from 1678 to 1753 on March 25th,

*A full account of this notable Chalice is given in Townsend's *History of Leominster*, and in a short sketch of the Church written by the Rev. A. G. Edouart, to be had at the Church at one shilling each.

from which date up to the present on January 1st. Notice to the Churchwardens or Sidesmen of the Burial of Bodies in Woollen required by Act of Parliament passed in the reign of Charles II. for the encouragement of the woollen trade, were also entered in the Parish Registers, and note is made in our Register of Burials for the year 1713-14 that no less than four bodies were interred in contravention of this most unpopular Act; and it is a somewhat singular coincidence that the last corpse interred in woollen in this Parish was that of the Vicar, the Rev H. Vaughan, on March 15th, 1762.

THE RESTORATION OF THE TOWER OF THE PRIORY CHURCH, LEOMINSTER.

By F. R. Kempson, F.R.I.B.A.

When our Hon. Secretary asked me to write a paper on Leominster Priory Church, he explained to me that the Vicar would describe its history, and refer to various papers which have already been written on the subject, and suggested that I should confine my remarks chiefly to the tower. The construction of the tower has some great peculiarities, inasmuch as the western bay of the old nave has the basis of its piers set at a somewhat lower level than the other nave piers, and its arches (unlike the remainder of the nave arches) are slightly pointed. The stairs and upper side arches of the western bay indicate that there were probably western chambers over the western bay of the nave and aisles, communicating with the choir by means of upper aisles or side passages (perhaps dormitories) over the aisles of the Norman Church. The construction of the west end of the Church clearly indicates that the Normans did not contemplate a western tower. The Parish Church, which is in point of fact a south aisle to the Norman Church, was the first great addition to the Norman work. It demolished the original south Norman aisle, which was like the present north aisle. The next great addition was the second south aisle, with its magnificent 14th century or late 13th century windows. When this work was built the want of a west tower was felt, and in order to make a foundation for one, and at the same time to retain the grand west entrance and the great Norman window over it, piers and arches were constructed within the bay of the nave, without taking down any of the Norman arches except perhaps one which was probably across the nave between the east piers of the painted side arches, which form the western bay of the Norman nave arcade. The 14th century piers and arches were carried up within, and partly upon, the Norman work, but not incorporated into it; and when the structure was brought up above the Norman work, the upper part of the tower, viz., the two top stages, were built partly on the 14th century piers and arches, and partly on the old Norman work, with the result that the new work subsided a little, whereas the old work could not subside, and therefore became bulged and cracked. The south-east pier seems then to have settled, but there are no indications of recent movement in it. The upper stages of the tower were built with a very friable stone, which became much decayed, particularly on the east, south, and west sides, including the upper part of the stair turret, the window mullions, tracery, jambs, sills, the string courses, parapet, and pinnacles. There were some cracks in the interior of the stair turret, also over the heads of the tower windows in the interior angles behind the buttresses, and in the ringing loft. The butttresses themselves were never properly bonded into the walls. They became detached in places, and consequently were bound up to the walls by iron bands. They thus became a source of weakness, instead of strength, to the tower.

The iron bands gave way, and the stonework became loose and dangerous. The buttresses have, therefore, been rebuilt, the utmost care having been taken to obtain a proper bond with the stonework of the tower walls. The parapet, window mullions, tracery, jambs, sills, and strings have been re-set and partly renewed. The cracks in the tower over the windows and elsewhere have been opened and carefully strengthened by the introduction of hard, flat bedded bonding stones across the openings and cracks, set and well filled up with strong liquid cement. Some idea of the dangerous condition that the tower was in before these repairs were undertaken may be imagined when I tell you that, after washing out the cracks, nearly 40 tons of a specially prepared mixture of liquid cement was poured into the interior of the walls, some of which percolated down as much as 20 feet and 30 feet below the point where it was poured in. I have here a specimen of the material used. It has been lying about in the churchyard, exposed to the weather, for eighteen months. The stone which has been used throughout the recent repairs is from the celebrated quarries at Luston, which is similar to the stone used by the Norman builders at Leominster, Shobdon, and other neighbouring places. The bells are at present a source of danger to the tower, or would be so if rung. Knowing the weak points in the structure, I carefully considered the question of rehanging, and also obtained advice from Messrs. Taylor, of Loughborough. The Church Building Committee, through their Hon. Secretary, courteously thanked me for my exhaustive report, and have, I understand, proceeded to make their own arrangements, for which I can, of course accept no responsibility

ANCIENT CHURCH BELLS.

By the Rev. Joseph Barker.

Among the many objects of interest to be seen in the Churches of St. Andrew's, Laysters, and St. Mary's, Middleton-on-the-Hill, not the least worthy of special notice are the bells in the several towers. I do not know whether there are any members of the Club present to-day who pay particular attention to Church bells, but should there be, and they are adventurous enough to climb the ladders leading to the top chambers in the towers, and do not mind encountering the dust which has accumulated for years, I can promise they will not be disappointed with what they see of the bells and their frame-work, or "cage," as it is called, and above all with the inscriptions on them. I have myself more than once paid visits to the bell chambers of Laysters and Middleton, and though the ascents are attended with some difficulty and one needs a brushing up after the return is over, yet the inspection of the bells well repays for the trouble. May I just say, in passing, and I feel sure brother incumbents and any churchwardens here to-day will forgive me for the suggestion, that a day's clean out in most of our Church towers is, like the restoration of discipline, "a thing much to be wished," and I cannot think a man's day's wages, or at least the respectable shilling, will ever be grudged for such a good purpose. The chief interest attaching to the bells of Laysters and Middleton is that out of the six in the two towers no less than five are ancient bells, or as they are sometimes called, "pre-Reformation" bells. It is not, I think, usual to find so many ancient bells in one area of a few miles; still, if other churches in this neighbourhood were visited, more might probably be found. At Kimbolton Church, indeed, which we passed on our way, there is one ancient bell out of the ring of four. In the Rev. William C. Lukis' "Account of Church Bells," though he gives lists of bell inscriptions in many other counties, he does not supply one of Herefordshire, so I presume he never visited any of our Church towers. It is not unlikely, however, that this county may be more rich than others in ancient bells. To show that they are not very commonly met with, Mr. Lukis says, page 29, "In the Archdeaconry of Wilts there are one hundred and eight churches, of which I have examined the bells of eighty-eight, with an aggregate of 406 bells, and of this number only 23 are clearly of a date prior to 1500, ten of the 16th century, and 164 belong to the 17th century." And in a newspaper report I have lately seen of a paper read by the Rev. H. T. Tilley at the Midland Institute, Birmingham, in February last year, it is stated that in 95 Church towers in Warwickshire which he had visited there were only 16 ancient bells—a very small percentage indeed—while in the 120 towers in the same county dealt with in a former paper there were as many as 40. But this only gives 56 ancient bells in 215 towers.

Church bells were, it is supposed, first introduced during the 6th and 7th centuries. With respect to England, the Venerable Bede, A.D. 680, speaks of the

sound of a bell as a well-known summons to prayer, for at the death of the Abbess S. Hilda, he tells us (Book iv., chap. 23) that one of the sisters of a disant monastery, as she was sleeping, thought she heard the well-known sound of that bell, which called them to prayer, when any of them had departed this life. "Hæc tunc in Dormitorio sororum pausans exaudivit subito in aere notum campanæ sonum, quo ad orationes excitari vel convocari solebant, cum quis eorum de seculo fuisset evocatus." "This nun, being then in the dormitory of the sisters, on a sudden heard the well-known sound of a bell in the air, which used to awake and call them to prayers, when anyone of them was taken out of this world" (page 215). S. Dunstan, who died in 988, is said to have founded and made donations of bells for many churches in Somersetshire, and Mr. Ellacombe, in his *History of Devonshire Bells*, quotes from an ancient source that three bells, or two at the least, are allowed to an ordinary Parish Church, seven to a Cathedral or Abbey Church; and he classes 434 bells into three divisions—mediæval bells, with or without inscriptions; bells cast between 1530 and 1600; and modern bells, 1600 to present time. The earliest inscriptions on bells are in single capitals placed widely apart. *Ecclesiologist*, No. cxliv., June, 1861. Gradually, as they became larger, the letters were grouped into words with an ornamental stop between each, and in the 15th century the single capital letter type gave way to what is usually called Black letter. The letters generally had fine illuminated initials enclosing human heads and figures of birds and beasts; in other examples each capital is crowned. The crosses at the beginning of the inscriptions are of great beauty and variety.

On the ancient bells of Laysters and Middleton there are, so far as I have been able to trace, no initials or marks to show at what time or in what place they were founded, but they may be assigned to the 14th century, or earlier. They may possibly have been cast at Leominster, for a bell foundry formerly existed there, as we learn from Dingley's *History from Marble*. "The bells," he writes, "belonging to this Cathedral (Hereford) carry these circumscriptions." The fifth bell, otherwise called St. Richard's bell, hath "Wilhelmus Warwirc construxit me in Sanctæ Trinitatis Honorem." ✠ The sixth bell hath ✠ "Sancte Cuthberte ora pro nobis." The treble to the sixth bell, ✠ "Sum Rosa Pulsata Mundi Katherina Vocata." Another (bell), the fourth, has "Laudate Deo in simbalis sonoris, MDCXXII. I.P. God send me to sing Gulⁱᵐ Stephan me fecit." St. John's bell, cast at Leominster town in this county, is circumscribed "Soli Deo Immortali Sit Gloria." Another "Gloria Deo in Excelsis." So we have in our Cathedral a bell cast in Leominster town, and probably others from the same foundry may have gone to other churches in the diocese.

In the preface to Mr. Lukis' *Church Bells*, he says, "It is certain the bells were sometimes cast in monasteries and sometimes by clerics," and among others he instances "Sir William Corvehill (who died in 1546), priest of the service of our Lady at Wenlock, Shropshire, as a good bell-founder and maker of frames." Wenlock Abbey would not be so very far away from these churches. But there were also itinerant bell-founders, and much has yet to be done in elucidating the history of bells.

Bells of Laysters Church. The Church is dedicated to St. Andrew, and was virtually a chapel to Tenbury, and was appropriated to the Priory of Sheen by Henry V. (*Mansions and Manors of Herefordshire*, p. 166). Of the three bells two have inscriptions in ancient type, the other in Roman letters:—"I. J. Rudhall fecit, 1804. II. Sante Petre ora pro nobis. III. Sante Paule ora pro nobis." There is a strange tradition that one of the Layster bells was inscribed with the name of Julius Cæsar, and referring to this Mr. Price in his *Leominster Guide* (p. 326), 1808, says:—"In the Church of Laisters, about five miles from Leominster, on the Tenbury road, is suspended a huge bell, having on it the words "Julius Cæsar," which the parishioners boast to be co-equal with the illustrious Roman of that name, who made Britian once ring with the fame of his military achievements. It is, however shrewdly suspected, by those who envy the exclusive possession of a relic of such remote antiquity, that an error has insensibly obtruded itself into the chronological computation of these honest, but unscientific farmers." Had such an inscription been verified, it would have set at rest the question, which is the most ancient bell in England; but after the most careful examination, no trace can be found of such inscription, traditionally said to be on one of the Layster bells. An old dame when told of this Julius Cæsar inscription, well remarked, "He must have been a very old churchwarden."

The Church of Middleton-on-the-hill is dedicated to St. Mary, and, therefore, as might be expected, the inscription on the first bell is:—✠ "Sancte Maria ora pro nobis. II. ✠ Missi de celis habeo nomen Gabrielis." III. ✠ Eternis annis resonet campana Iohannis." The notes are C (bass), E, G (treble). It will be noticed that the two last inscriptions are Latin hexameters. And here we have a true ring of ancient bells, hanging to a frame which with them may have stood "the battle and the breeze" of five hundred years and more. Shall we not wish that they may still hang on in the old tower of St. Mary's, Middleton, as many years again—and more, still bearing their part with the other Church bells of our land in the joys and sorrows of our "Ringing Island?"

> "Melodious tones! continue yet!
> Sound on, thou sweet and heavenly strain."

Much more, of course, might be said about ancient Church bells, and I wish a more able hand would undertake the subject. I have read this—I fear very imperfect paper—only with a desire to draw the attention of the members of our Woolhope Club to the study of the Church bells in their several localities. Much has yet to be learned with respect to bells of an early date, as they are connected with a very important portion of English history; and very few parish records of the 15th century remain to assist the investigation. A careful examination of the shapes, inscriptions, forms of letters, ornaments, stops, and other devices of bells, especially shields, which sometimes occur, will help much to elucidate their history. It would be well, too, if members would assist in making a list much needed at present, of the bell inscriptions of Herefordshire.

Leominster bells:—"These bells were recast, and increased from six to eight, A.D. 1756, by a Mr. William Evans, of Chepstow, at a cost of £216 16s."

They bear no inscription beyond the names of the parish officers for the time being; and one of them rings out, "Prosperity to the Church of England." The weight of the tenor bell is 25 cwt., and the key note is E flat. It is four feet across the sound bow.—*The Rev. G. F. Townsend's Town and Borough of Leominster*, p. 247.*

* From page 46 of the pamphlet published in 1873, at *Hereford Times* Office by Mr. John Lloyd, being "Papers relating to the Navigation of the Rivers Wye and Lug," we find the interesting fact recorded that "in the year 1750 the bells of the Parish Church at Leominster, on the occasion of their being recast, were conveyed to and from Chepstow the whole way by water along the Lug and Wye, though, it is said, with various mishaps, and in the face of many difficulties."—Ed.

MIDDLETON-ON-THE-HILL CHURCH.

By Rev. P. J. Oliver Minos, M.R.A.S., F.E.I.S.

This Church is dedicated to St. Mary the Virgin. It is of early foundation, the nave being originally Saxon, with Early Norman restorations and additions. The square chancel is Early Norman of the 11th or 12th century, and the square tower is of 13th century Norman architecture, with additions above of a later period. The nave is forty-five feet long, each side of the square chancel is twenty-two feet, and each side of the square tower twenty-five feet nine inches. The tower is fifty-five feet high. The walls of the chancel are three feet, those of the nave five feet, and those of the tower six feet, thick. The nave is the oldest part of the Church. Evidences of Saxon architecture are exhibited in the south doorway, the font, and perhaps the chancel-arch, and the small narrow, round-headed windows. With reference to the south doorway, the ornaments on the arch are projecting, not carved flat on the surface of the stone. Can such an ornament as here exists be strictly called "zigzag," or would it be Early Norman? In the Science and Art Museum, Edinburgh, a similar ornament is labelled, if I remember correctly, Roman, in the example of a model of a Church in Kent. Observe the absence of hemispherical decorations on the highest rim of the arch; also the absence of continuous decorations under the arch. There are here no triplets separated by broad grooves. The mouldings on the side are unique, and indicate their Saxon origin. This so-called "pellet" moulding is found rarely on pure Saxon (or Saxon Norman) works, and they differ totally from those on the north doorway, which is Early Norman. The font is massive and plain, thirty-six inches high, the bowl having a circumference of ninety inches, and a depth of sixteen inches. It stands on an un-ornamented round pedestal. A line is cut round the upper part of the bowl, a round moulding surrounds its base, above which is a three-fold Saxon ornamentation representing "cloven tongues of fire." Mr. E. P. Loftus Brock, F.S.A., in a letter, says, "The font which you have drawn is probably of Saxon work, although it may be Norman. The form is a very Early one." The double chancel-arch is semi-circular, with a span of eight feet and a height of ten feet eleven inches, and has a narrow, round-headed niche just above the centre. The arch is free from ornament; the piers have carved mouldings, which have not been carried out over the whole length, but terminate abruptly. The following is an extract from a letter from the Hon. Secretary of the British Archæological Association:—"You sketch a very Early chancel-arch. With so much ornament elsewhere, it is curious that none is found on the arch, where ordinarily some amount of decoration was bestowed. This may be portion of an earlier fabric. The little niche once probably contained a statue or bas-relief of a single figure." The chancel-arch is double, that is to say, a narrow arch of twenty-four inches within a wider arch of thirty-six inches. Such arches are to be found in Lillebonn Castle, in Normandy, where William the Conqueror decided

upon the invasion of England. This coincidence need not astonish us when we call to mind the person of Edward the Confessor, who had been educated in the Court of Normandy, and who was Norman in all his tastes and predilections. He brought with him to England many natives of Normandy, who undoubtedly leavened all foundations of learning before the Norman Conquest. Church-building received an impetus under him, he being more of the priest than the King; consequently its architecture inclined towards the Norman style owing to the influence of the age and the superintendence of Norman priests. Hence we may account for Saxon arches (before the Conquest) resembling Early Norman arches. The small, narrow, round-headed windows in the nave, with external dimensions of thirty-six inches by eight inches, are at a height of ten feet eight inches from the ground. Internally the jambs splay deeply. Only four of these windows are now to be seen; probably they were originally six in number. The smallest window, twenty-eight inches by six inches, in the chancel, was discovered in 1890. Mr. E. P. Loftus Brock says:—"The small narrow windows with round heads are also usual in Norman works, but I have just come from a Church in Kent, which I am having repaired (in my capacity of architect), where we have found a similar window cut through by an Early Norman arch, showing that the window is of earlier date still." This establishes two things, namely, (1) that small narrow round-headed windows are Saxon, and (2) that these Saxon windows were placed very high in the wall. The north doorway is a beautiful example of architecture, with ornaments clearly Early Norman. Observe the well-finished "zig-zag" lines and grooves, the use of hemispherical ornaments at the upper and lower ends of the arch, the triple zigzag separated by broad grooves, and the design carved under neath the arch. The mouldings are of the well-known and curious "star" pattern and they correspond in form with the chancel mouldings, with the exception that they are single instead of double. In the chancel the only evidence of Early Norman architecture is in the recently discovered smallest narrow round-headed window. This window is lower than those of the nave, being externally at a height of 8ft. 8in. and internally 5ft. 8in. from the ground. Observe the beautiful lotus-shaped double piscina in the south wall, also the rudely-formed oblong opening resembling a cabinet, its base and roof each formed by a flat stone slab, and a similar cavity on the opposite wall. With reference to the massive square tower, apparently out of proportion, from the external view, to the nave and chancel, observe that the first and second storeys have lancet windows, and the third storey has broad pointed-arch windows. The interesting parts of the tower are—1, thickness of basement walls, 6 feet; 2, lancet windows, 54 or 60 inches by 6 inches; and 3, inserted figures on the south outside wall of the second storey. Of these two figures one is headless; the other looks like a maneless lion. These may have been targets for the archers. The lancet windows are of the 13th century, temp. Henry III. During this reign civil war between the king and the barons raged fiercely; rivalry of the Earls of Leicester and Gloucester divided the barons, and their partisans took up arms. The Earl of March renewed the war in Wales. Doubtless, these were very troublous times. Being in an exposed part of the country, and between the fires

of contending parties, would it be unreasonable to suppose that the tower was built as a defence? Such things have happened elsewhere. If this view be correct, it would account for its massive proportions and its narrow lancet windows. In more peaceful times the third storey was added for the three pre-Reformation bells. I cannot leave the tower without drawing your attention to the old ivy trunk over ten feet in circumference. Botanists give an average increase of one foot in circumference of an ivy trunk in fifty years; upon this estimate the trunk would be about 500 years old; that is to say, about the age of the older portion of the tower. Lastly, I will ask you to look at the buttresses. Knowing the walls to be thick and strong, these flat buttresses (slightly inclining upwards) would be ornaments. There were no buttresses in Saxon times; only very flat ones in Norman buildings.

Silver Chalice and Paten of 1721, and they were probably made by S. Paulin (information supplied by the Department of Science and Art, S. Kensington, S.W., on 5th Sept., 1892). Weight of Chalice, 9¼ oz., Paten, 3 oz.

Parish Register containing affidavits of burials in wool in compliance with an Act (30 Car. ii., cap. 3) passed in 1679.

Parish Charities of over £30. Now called by "Unknown Donors," but the *stone* with *names* of donors is locally said to have been buried by a churchwarden.

Since writing the above paper the Rev. P. J. Oliver Minos has supplied the following notes:—

Consecration Mark.—On Wednesdays and Fridays, before and after the hours of prayer, I am in the habit of scrutinising the architecture, &c., of the Church. About three weeks ago I accidentally noticed the *form* of a chalice on the north wall under the chancel arch. I had previously noticed vermillion marks of fresco on the north and south walls under the arch, but these were so imperfect and faint (through hurried removal of plaster in course of restoration) that I never sought for forms or designs. Watching the said form under different lights, I was convinced that it was that of a chalice; however, as a test, I showed it to parishioners and visitors, who unanimously pronounced it "chalice form." Very near it is to be seen another form resembling a sacramental wafer. Knowing that to consecrate a Church without a celebration of the Holy Eucharist is to sacrifice much of the impressiveness and beauty of such a service, the Christians of an earlier day were wont to commemorate the event by either engraving or painting the form of a chalice or of a cross in a circle (representing a sacramental wafer magnified). Such a mark the chalice form discovered in Middleton-on-the-Hill Church probably is. The wafer is more likely to be *part* of the fresco design than a consecration mark, seeing that it is so *near* the chalice. The form of the chalice (7in. high) is unique in simplicity.

Originally fresco, now appearing as wall-painting.—In December, 1892, I discovered on the right pier of (or wall under) the Chancel-arch, higher than the consecration mark and on the highest left-hand stone facing the observer, two croziers (pastoral staves) addorsed under one mitre. This I took as an Episcopal Emblem; however, on a subsequent study of the (private) coat-of-arms of the Bishops of Hereford, I find that Bishop Spofford's exactly corresponds to the

aforesaid design (see Havergal's *Fasti*). This coat-of-arms of Bishop Spofford is to be seen in the Stanbury Chantry. His arms also appear on the vaulting of the south transept which would be his work. The said Bishop Spofford, the 56th Bishop of Hereford, was consecrated in 1422; the Stanbury Chantry is called after Bishop Stanbury consec., 1453. The above dates correspond with the date of the belfry and bells (15th century). Possibly the Middleton-on-the-Hill device was to commemorate the visit of Bishop Spofford, on the occasion of the dedication (or blessing) of the three pre-Reformation bells.

Apropos, the device of two croziers addorsed under three mitres is the coat-of-arms of the Bishop of Llandaff; two croziers addorsed under one mitre is that of the Bishop of Argyle.

Two doors to the Nave.—I was told by two women, aged respectively 80 and 92, that both the doors were made use of in their childhood, and that they were known as "Marriage door" and "Funeral door." I did not take much notice of this at the time. On visiting Aymestry I find the same tradition, viz., one door was reserved for marriage, baptism, and attending services on Sundays, &c., and another reserved only for funerals. This would account for two doors in all ancient churches—small or large. The S. door now in use in Middleton-on-the-Hill would be the funeral door as it faces the funeral gate and the yew trees in the churchyard; the N. door blocked up would be the marriage door, as it certainly faces away from the funeral gate.

Name of Parish.—Middleton-on-the-Hill. These descriptive words are added to distinguish it from another Middleton in Wolfsby Hundred (formerly called Dirty Middleton or Middleton-in-the-Mud) near Little Hereford; the words "on-the-Hill" simply mean "on rising ground," which is actually the case.

Pre-Norman Church.—We all know that Danish Kings ruled in England between the lines of early and late Saxon Kings. The first of the late Saxon was educated in Normandy, spoke Norman-French; in fact, was in every way a Norman rather than Saxon. This monarch was surrounded by Normans, who were frequently promoted to high offices in Church and in State. Moreover, Hereford played a prominent part between 1042 and 1066, history informs us. Is it a wonder, then, that Church buildings of this period should show signs of Norman influence with marked rudeness and simplicity of architecture? Why should we not associate the *two* features of such churches with the *double* characteristics (Saxon and Norman) of the reign of Edward the Confessor? Why need we hesitate to distinguish the two periods of Saxons (450-1016, 1042-1066), knowing their widely different characteristics? Surely rude Norman-like churches are more likely to be late Saxon than Celtic or Early Norman! Middleton-on-the-Hill Church with her plain chancel-arch with no pretence of pillars, &c., points to a pre-Norman date, *i.e.* to Edward the Confessor's reign (1042-66 A.D.)

MOOR ABBEY.

By the Rev. P. J. Oliver Minos.

This Abbey is situated in the parish of Middleton-on-the-Hill (Midatuna). It was not a Benedictine or Augustinian Abbey, but was probably Cistercian or Carthusian. I can find no record of it in the Domesday-book, nor in the Charter of Henry I. Evidently it was of later date, and may have been under foreign jurisdiction.

The name "Moor" suggests a Spanish order; and it may have been one of the religious houses established in England in the reign of Henry VII., and after the marriage of Prince Arthur and Princess Catherine of Arragon. This suggestion is borne out by the older portions of the present residence showing Tudor architecture. The Abbey, perhaps, was suppressed in the reign of Henry VIII., and its history may be found among that of the Lesser Monasteries.

The said Abbey contained chapel, residence, and out-offices of a farm. The chapel stood a short distance from the residence, in the present hopyard. It was Tau (old cross) shape, having chancel and nave. The chancel was 38ft. 6in. by 12 ft.; the nave 41ft. by 27ft., with two doorways 4ft. wide. The chapel did not stand due east and west: it stood north-east and south-west; the doors south-east and north-west. In 1809, the walls, still standing about 8ft. high, were demolished; also the earth-bank round the chapel levelled. Now nothing remains *above* ground to mark the sacred spot. Probably the original foundations are still deep underground, although the whole field is turned into a hopyard. The ground-plan is in the possession of the present owner, Mr. Thos. Edmunds.

The present residence is modern on older foundations: here and there Tudor architecture is to be noticed in chimneys, doorways, and mantelpieces. The original Abbey-house was surrounded by a moat about 6ft. from the walls, and about 45ft. wide. Opposite the main entrance there was a bridge, which was removed, and the greater part of the moat filled up, in 1805.

The estate of Moor Abbey has been in the possession of the Edmunds family since 1763. Previously it was in the Waldron or Walderon family, whose monument is to be seen on the parish Church wall. The Walderons bought the estate from the Pitts or Pytts, who bought it from the Duke of Buckingham in 1663. In the reign of James I., Leominster, with four of its dependent manors, was vested in his Queen, Anne, Princess of Denmark, as parcel of her jointure. These estates were afterwards granted by James I. to his favourite, the Duke of Buckingham. Of course, during the Commonwealth this estate changed hands; but after the Restoration, the whole of the extensive manor was restored to the Duke of Buckingham, who sold a considerable part of it in 1662—1663.

Woolhope Naturalists' Field Club.

JUNE 30TH, 1892.

ON Thursday, June 30th, the Woolhope Club journeyed by rail to Leominster, where they were met by brakes from the "Royal Oak" which conveyed them to Bredenbury Court, the residence of the President, Mr. W. Henry Barneby. Thence the party travelled through Bromyard to Sapey Common, with the object of visiting "the largest mass of Travertine existing in Great Britain," known as the Southstone Rock. This rock is situated in the county of Worcester, a few hundred yards east of the boundary line of that county and Herefordshire. The north-eastern extremity of Herefordshire is so difficult of access in a day's journey that probably it would have continued a *terra incognita* to the Club, had not the President drawn out the well-conceived plan which the Club successfully executed. The difficulties of getting over so extensive a tract of country were overcome by a change of horses and carriages from Mr. Warner's "Belle Vue" stables at Great Malvern, meeting the party at Whitbourne Court, whence a drive of twelve miles conveyed them to Great Malvern, to return to Hereford by the evening express, after a drive of thirty-nine miles. The few members who attended from the northern division of the county returned to Leominster in the "Royal Oak" carriages, after accomplishing a drive of forty-five miles. Rest and refreshment for both men and horses were secured by the hospitality of the President, who entertained the members with an early luncheon at his residence, the gratifying rest at Whitbourne Court being principally occupied in partaking of a cold collation kindly provided by Sir Richard Harington, Bart.

The journey from Leominster was along the Worcester, Oxford, and London road, passing Humber on the right, and on the same side the present terminus at Steens' Bridge of the railway shortly to be extended to Bromyard. Docklow Church, which has recently been neatly restored, is close to the road about five miles distant from Leominster. In this locality Mr. H. Southall in vain looked for the *Rosa spinosissima*, which is known to grow on the right-hand side of the road. Between the seventh and eighth milestone Grendon Bishop is passed, also on the right-hand, and shortly after Bredenbury Church on the left is reached. Here the President, with a party of ten members who had been sharing hospitality under his roof, met the Club and conducted them over the Church. The Church has a nave, chancel, south porch, and a tower at the west end. The reredos and pulpit are of alabaster, the niches being filled in with beautifully carved figures. Other objects of interest are the Jubilee memorial windows in the chancel, and in the nave a memorial window to the late Major Meysey Clive, and another to the late Rev. Philip Stanhope—both of whom had been fellow travellers with the President

at different times in America. This Church, for the united parishes of Bredenbury and Wacton, built in 1876, replaces the former Church which occupied a site in the grounds of Bredenbury Court. The Court, charmingly situated on an elevation of more than seven hundred feet, with commanding views of the Shropshire and Worcestershire hills, has its grounds tastefully laid out and judiciously planted with a pleasing variety of evergreens, Conifers, and shrubs, affording protection and a coloured landscape even in winter. At the present season the luxuriant display of the golden Yews attracted particular observation. The designs of the planting were carried out by Mr. Edward Milner, of Sydenham, under the direction of the present proprietor. Mrs. Barneby having received the guests, soon summoned them to early luncheon spread in the American Bowling Saloon, the walls of which were covered with trophies collected by the President in his travels, heads of buffaloes, reindeer, etc.

After luncheon the business of the Club was transacted. The nine gentlemen balloted for were all elected. Five names were proposed to be balloted for at the next meeting. The handsome presentation of a photograph of the Bacton chalice, by Mr. E. W. Colt, at a cost to him of £5, for the forthcoming volume of *Transactions* for 1886, 1887, 1888, and 1889 was acknowledged with full appreciation. In accordance with Rule VII. a resolution was passed that the remainder of the illustrations should be defrayed out of the Club funds. Thanks having been accorded, on behalf of the Club by Sir George Cornewall, to Mr. and Mrs. Barneby for their kind reception, the party, now augmented by the President's friends, resumed their journey through Bromyard, distant three miles, to Sapey Common, a further distance of eight miles.

Upon arrival at Sapey Common, the Rev. T. Simcox Lea, assuming direction of the party, led the way to Southstone Rock, situated less than half a mile east of the halting place. The *fons et origo* was first pointed out, this being a spring with a copious volume of water, holding bicarbonate of lime in solution, flowing over mosses and other vegetation, incrusting them with a deposit of carbonate of lime from its supersaturated solution. The aggregation of calcareous matter here displayed and daily increasing is the growth of centuries. In the absence of correct details of measurements, it may be stated that the exposure varies from twenty to thirty feet in height, and covers an area upon which stands a cottage with an enviable allotment of garden. This soil is highly favourable to the growth of the monkey plant, *Mimulus*, judging from the large area carpeted with a profusion of its golden blossoms. It formed a very picturesque feature in the foreground. The wild wallflower also grows on the rock.

The Rev. T. Simcox Lea read a paper on "The Physiography and Geology of the Dingle of Sapey Brook," which was followed by a few comments of the Rev. J. D. La Touche on the results of denudation, read by the Honorary Secretary. Mr. La Touche's observations induce him to ascribe a far longer period for the results achieved in this locality than Mr. Lea's speculations had suggested. A short, but interesting, paper on the Place-names of the district and other features of Tedstone Dingle was read by the Rev. Phipps Onslow, rector of Upper Sapey.

The forward journey was resumed through the picturesque village of Clifton-on-Teme, situated on a cliff, as its name denotes.

Stanford Court, the seat of Sir Richard Winnington is in this neighbourhood. The former fine Elizabethan mansion was burnt down on December 5th, 1882. Several portraits of the family were destroyed, besides those of Henry VII., Henry VIII., Edward IV. The Household Book of Joyce Jeffries during the Civil Wars, and the account of yearly expenses, which, under the title of "The Roll of Michael Swinfield, Bishop of Hereford, A.D. 1289," was translated and published by the late Rev. T. W. Webb, perished in the flames.

It was reported that a magnificent Cedar tree, planted in 1747, measuring 18 feet in girth at its base was in the gardens.

Whitbourne Court, the seat of Sir Richard Harington, was reached shortly after 4 o'clock. This mansion has been enlarged and rebuilt on the site of the old manor house, in earlier days the residence of the Bishops of Hereford. Remains of the old building are retained in the foundations of the northern wing, and in the solid column of masonry in the same wing of the house, which, when a wide passage had been tunnelled through it for a length of eighteen feet, revealed a small chamber, traditionally the hiding place of Colonel Birch. An oak mediæval-framed roof, which probably extended throughout the house, has several circular framed arches and struts remaining *in situ*. During the alterations, a Jacobean chimney-piece, with coats of arms, was discovered, of which more might have been said had not the horn sounded the "assembly." Nevertheless, we were assured that the coats of arms were those of Colonel Birch. The moat is a fine sheet of water extending from the south walls of the house in a quadrangular form, enclosing an extensive lawn on the east front of the house, with Ankerdine Hill in the background. The entrenchments of the outer ward on the north side are high and well-defined. The moat at present terminates at the stabling and outhouses on the north, and a portion of its now dry prolongations form a cellar. The approach by the carriage drive on the west probably occupies the site of the ancient drawbridge over the moat which, there is no doubt, originally surrounded the building. It should be mentioned that the moat is kept healthy by a supply of water which enters at its southern extremity. The Rev. E. J. Holloway obtained some *Polyzoa* from it which contained many a specimen of *Plumatella repens*, and of *Stentor*.

Whitbourne Church adjoins the grounds of the Court. It comprises a nave, south aisle, chancel, transept, and tower at the west. The font, carved all round the bowl, standing on a circular pillar, is a very interesting example of Norman work. An ancient cope, which from the exquisite richness of its embroidered orphreys, suggests its having been a vestment worn by former Bishops of Hereford—possibly prior to the Reformation—is treasured here, having been in use as an altar cloth. The orphreys are composed of a series of half figures of saints, &c., about the size of the hand, the features to this day being very plain and distinct.

Time, inexorable time, was too limited to take more than a cursory glance at all the surroundings. The members, having, on the motion of the President, accorded a vote of thanks to Sir Richard and Lady Harington for their hospitality,

took seats respectively in their carriages, some to Great Malvern, thence by rail to Hereford and elsewhere; the contingent from the northern parts of the county returned home in the carriages viâ Leominster.

The party, fifty-eight in number, was composed of the President, Mr. W. Henry Barneby; Vice-President, Rev. Sir George H. Cornewall, Bart., Sir Richard Harington, Bart., who to-day was elected a member; the following members: His Honour Judge Ingham, His Honour Judge Lea, Revs. G. E. Ashley, T. M. Beavan, J. O. Bevan, H. Bennett, C. Black, W. K. Brodribb, C. Burrough, A. J. Capel, Wm. Elliot, E. R. Firmstone, J. E. Grasett, E. J. Holloway, W. Ireland, T. S. Lea, W. H. Lambert, H. B. D. Marshall, D. Seaton, and M. G. Watkins; Dr. Paul Chapman, Messrs. C. D. Andrews, W. Bankes, R. Clarke, G. Cresswell, James Davies, C. Fortey, G. H. Hadfield, W. Hebb, W. J. Humfrys, P. Levason, J. W. Lloyd, T. C. Paris, W. Pilley, G. H. Piper, A. J. Purchas, O. Shellard, H. G. Sugden, J. P. Sugden, H. Southall, H. A. Wadworth, and H. C. Moore, Honorary Secretary; and the following visitors: Revs. J. Charlesworth, J. H. Lambert, and A. W. Tudball, and Messrs. E. J. Baker, W. T. Carless, Wm. Davis, James Nott, and James Trevor Trevor.

The following extract from a paper by the late Sir Roderick Murchison, Vice-President Geological Society, is taken from *Proceedings of the Geological Society of London*, No. 36, Vol. II., page 78, 1833—1834.

"Two remarkable cases of a modern Travertine five and eight miles East of Tenbury are then cited, the one near the Spouthouse Farm, the other the Southstone Rock, both of which have been accumulated in narrow dells which intersect transversely promontories of the Old Red Sandstone. At the former the Travertine is associated with much sandy marl. The latter is a cavernous rock of about 50 feet in height, and has a superficies of more than a quarter of an acre, having on its surface a small house and garden. In both cases the Travertine incloses *Helices* of existing species, and has been occasionally quarried for purposes of building and burning to lime.

"These modern rocks are shown to have been formed by small springs which issue from the Calcareous or Cornstone strata of Old Red Sandstone, and still encrust the leaves and grasses over which they flow, a process which the author (judging from the size of the rocks produced) supposes to have been in undisturbed action during the whole period of history."

THE PHYSIOGRAPHY AND GEOLOGY OF THE DINGLE OF SAPEY BROOK.

By the Rev. T. S. Lea.

A paper on the Travertine of Southstone Rock and elsewhere has already been read before this Club by Sir George H. Cornewall. Under these circumstances there is not much more to be said to-day on that subject, unless indeed I call the attention of the Club to two other calcareous mosses, *Eucladium verticillatum*, which occupies a somewhat drier region of the rock than *Hypnum commutatum*; and *Hypnum falcatum*, possibly its variety *virescens*, which may be noted in the stream itself. I propose therefore to deal with the soil and rock of the region which we shall traverse, especially with that part of the country which lies eastward of the Bromyard and Stanford road, and west of the Teme; and I intend to be somewhat speculative, knowing that I write for men whose scientific habits of thought will enable them to distinguish at once between what I ask them to recognise as fact, and what I put forward as theory and hypothesis.

The aspect of the country I have indicated will at once suggest to the most moderately-experienced eye that it is a table-land broken up by water-worn valleys of the most obvious type. And on examination the strata of limestone gravel and sandstone rock will be seen to be perfectly level. The formation is that of the Old Red Sandstone of Herefordshire, but I would point out that on crossing the Bromyard and Stanford road the drainage is that of the Teme and Severn, and not that of the Frome and Wye. The fall is more rapid and the valleys are deeper. But the table-land ends abruptly in a hill which is steep enough to have given a name to Clifton-upon-Teme, and though the red soil may be seen on the other side, the higher hills are Wenlock limestone, strongly inclined upon a ridge which is clearly a continuation of the Malvern chain in the direction of the Clee Hills. The cuttings on the Bromyard Railway show the strata of the Old Red Sandstone inclined against the western side of that range, and a quarry on the Ridge Hill, near Martley, shows the limestone inclined against its eastern side. I think I shall be able to show that the position of the Teme Valley has been determined by this range, and that the inclined rocks of the Old Red Sandstone have perished from causes that will be apparent to those who are here to-day.

The key to the geological situation is to be found at Knightwick, where the Teme breaks through the limestone at a place where, for once in a way, the New Red Sandstone appears on the western side of the range. It may be that a break occurs here in the direct course of the line of upheaval, as the position of the Suckley Hills might indicate; but the cuttings at Knightwick show:—(1) the Old Red Sandstone inclined against the eastern side of the range, (2) a block of limestone, (3) a mass of New Red Sandstone, (4) a vertical bed of grey clay (which gave the engineers some trouble by slipping), (5) the Old Red Sandstone, vertical

at first and afterwards inclined at a less angle against the western side of the range. Now, if the limestone of the range was here at its lowest, as it seems to be in fact, the drainage of this country would find its way eastwards at that point. The Cradley Brook, after a northerly course from Colwall, finds its way through the range at a point a little to the south, and the watershed of that stream and the Teme, which affords a gradient for the Bromyard Railway, contains also the inclined strata of the Old Red Sandstone, which elsewhere have disappeared along the whole stretch of valley from Malvern to Stanford. Both the Cradley Brook and the Teme have taken a course which causes them to divide the two formations. Westward are the level strata of the Old Red Sandstone. Eastward lies this continuation of the Malvern Range. This is not accidental, and is due to the nature of the limestone gravel. Hard as its interbedded rock when *in situ*, it rapidly breaks up when exposed to the weather, so rapidly that vegetation can hardly establish itself on a bank where that gravel is exposed. Witness the cuttings on the Bromyard line, now nearly fifteen years old, and almost as bare as when first made. The frost splits up the soil, which falls in angular fragments as a sort of talus until the rain can convert it into mud. Even the sides of a cart road are liable to this form of denudation, and the outflow of a field drain will often create a considerable gully. When the limestone gravel is thus worn away the harder sandstone overhangs and finally falls, and this process goes on at the sides of every dingle until a slope is attained which is sufficiently gentle to support soil and vegetation. When this is reached there is still the tendency of the brook to undermine its banks in the usual way, and thus the valley becomes gradually wider, until a point is reached at which the denudation is not perceptibly greater than the average of the district. But meanwhile the dingle is being worked out backwards, until either so great a height is reached that the slope becomes too gentle to form a stream, or the dingle itself so nearly approaches the water-shed that there is no collecting ground behind it. Completed dingles, (if I may use the expression), of both these kinds may be met with, but there are others which must eventually become far deeper than they are at present. In fact this earlier process of valley-making is not yet at an end in the valley of Sapey Brook. I could point to instances where agricultural drainage has actually started afresh the work of excavation, after its natural term had been reached, but my impression is that the valley of Sapey Brook has deepened at a rate which must be geologically regarded as extremely rapid, and I attribute this rapidity to the exceptionally easy work which the Teme has had in destroying the inclined beds of Old Red Sandstone. For, once let the edges of such strata as the limestone gravel be exposed to such a scour as the bed of a rapid stream would make, they must give way rapidly, and carry with them the harder rock as well. Such a scour would open the mouth of Sapey Brook and deepen the dingles. And if it be possible to show that any check or choke in the valley existed, such as there may well have been at Knightwick, if this were overcome at all suddenly, the deepening of the valley might have been very rapid. There is near Clifton-on-Teme a bed of river gravel (as I opine) at about 200 feet above the present meadow level. It contains rounded pebbles, and, apparently, peaty matter. Some of these pebbles are, I think, decomposed Dhu-

stone. Anyhow, they have been there for some time. When the Teme was there, there must have been a large quantity of inclined sandstone to the east, and this must have slipped into the valley as the stream got under its lower edges. Thus, either the time must have been enormously long or the denudation exceedingly rapid at some period. For, a river running through meadows can scarcely lower its valley more than a few inches in the century, and that is exceptional. At least this is clear, that the bulk of the Teme valley area at the spot lies to the east, the western bank, with the gravel on it, being very much steeper.

But as a set-off to this, the amount of solid matter carried down the streams in solution must be noted. A sample of the water of Sapey Brook, taken April 11th, 1892, after a fortnight's drought, yielded 142 grains per cubic foot, or 22·82 grains per gallon. That is to say, that in every ton of water there is three-quarters of a pound of solid, exclusive of suspended matter. This proportion would probably be less after heavy rain, but some idea of the amount of solid transported in this way may be gathered from the following simple calculation:—At this rate, a brook carrying an average of two tons of water a minute in dry weather will take some 356 tons of soluble solids to the sea in the course of a year. That, at the rate of 14 cubic feet to a ton of chalk, is about 5,000 cubic feet. Two tons a minute may be a very low estimate for Sapey Brook, but I have no means of measuring the volume of water. We have, however, a large amount of denudation going on within the hills, which must tend to lower them by bringing their substance away in the waters of calcareous springs.

I now come to the nature of the soil itself, its present condition, and its possible origin. From an analysis made for me by Mr. William Ray, F.C.S., F.I.C., &c., Science Master at the Kidderminster and District School of Science and Art, I have, besides what I have already quoted, the following results:—(1) Sample of sandstone, 5·4% soluble; (2) sample of limestone gravel, 65·8% soluble. The insoluble residue of (1) consists apparently chiefly of quartz coloured with iron. The insoluble residue of (2) consists of precisely the same materials, though the size of the individual grains is smaller, and the proportion of minute grains much higher than in (1). My microscope shows that the two deposits have a common origin, and only differ in mode of deposition. In estimating the age, and speculating on the origin, of such a massive formation as the Old Red Sandstone, one might be tempted to rely on fossils. Unfortunately for this method, there are (in this district at least) no fossils, and the soil seems peculiarly destructive of everything organic. For instance, when a new grave is dug in Tedstone Delamere Churchyard, very little is ever found to indicate previous interments except the iron coffin-handles. But even if this were not so, one could not expect any very large deposit of fossils, unless one was prepared to assign an enormously prolonged period for the deposition of the matrix which embedded them.

We must bear in mind that we are now warned that the period which can be allowed for the deposition of the whole series of sedimentary rocks is limited, and I think it possible that in this Old Red Sandstone we may have an example of how a huge thickness of strata may have been laid down during a comparatively

brief period. For I have seen the process which I intend to describe, and know that the results are similar to what is now beneath our feet. But first, the facts which led me to my guess. The rounded appearance of the larger grains of the insoluble residue of the rock suggested blown sand. The level stratification demands water. But the occurrence of beds of highly calcareous sand in nodular lumps, alternating with a nearly pure sandstone, does not look either like a shore deposit or a delta, and is certainly not pelagic. But I have seen the barren peaks of the Flinders Range wasting beneath the strong winds and hot sun of a South Australian summer. I have seen the storms of dust and sand sweep across the huge saltpans, where the water of creeks which never reach the sea deposits its soluble solids. I have seen how a saltpan can fill up and become like the surrounding plain, and I have little doubt that East and West Australia have been connected into one continent chiefly by this means. The soil there reminded me of ours. The lime and sand are both there, and the same red colour. Can this have been the former state of Herefordshire? Possibly, perhaps probably. For the existence of salt deposits in England shows that once at least a dry climate prevailed. Nor is it unlikely that in days of warm polar regions the desert zones which now lie north of the tropic of Cancer and south of the tropic of Capricorn, may have extended into more northerly and southerly latitudes. At any rate, if I venture to attribute the formation of the limestone gravel to evaporating lakes receiving a certain proportion of sand and especially fine dust, while referring the sandstone either to parts near the margins of such pans, or to later epochs in the process of filling up which they undergo, I shall be able to justify myself by saying that I am arguing from the known to the unknown, from the effect to the cause, by a legitimate method of induction.

The Rev. J. D. La Touche much regretted his unavoidable absence, and his being unable to listen to Mr. Lea's paper. Having, however, since that date, heard something of Mr. Lea's observations, he remarks that in his ignorance of the geology of the locality alluded to, he is unable to offer any useful criticism, and can only say in a general way that it appears to him very difficult to show that the changes referred to did not occupy an enormous lapse of time. Mr. Lea has to account, not only for the time taken up in deposition of strata, but for that consumed in their upheaval, and after that, in their denudation.

Continuing, Mr. La Touche says: The quantity of matter carried down by rivers both in solution and (as shown by my observations on the Onny) in suspension, is indeed enormous, and, fixing attention on this fact, we are apt greatly to exaggerate the rapidity with which deposits would be formed; yet if we remember that it is estimated, on a very moderate average, that 40,000 millions of cubic feet of mud are carried annually into the Bay of Bengal by the Ganges, and consider the small effect it has annually in altering its depth, or affecting it in any way, I think we may well be slow in concluding that the comparative few tons of matter in solution spoken of by Mr. Lea is any indication that geological change has been rapid.

As the result of my observations I found that in high floods as much as 1400 tons of sediment were carried down the Onny (a very small stream), in suspension in 24 hours, and that the denudation arising from *annual* wear and tear would amount to one inch in 400 years, over the whole basin that supplies it with water.

May I add that while the hypothesis of blown sand, referred to by Mr. Lea, may well apply to the New Red Sandstone, and account for the false bedding so characteristic of it, it can hardly do so to the Old Red, with its numerous beds of conglomerate filled with large water-worn pebbles. Besides, the salt deposits connected with the former are absent in the latter.

PLACE NAMES OF THE NEIGHBOURHOOD.

By the Rev. Phipps Onslow, Rector of Upper Sapey.

Your President has honoured me by a request to put together a few notes on the localities of your place of meeting.

If you will, I shall gladly tell you all I know, and, if you will have patience with the guesses of an unscientific old man, a good deal that I think may reasonably be conjectured, always remembering that these notes are put together with an eye to brevity rather than completeness. First about the Southstone. Of course Southstone Rock is as clearly a reduplication as Branksea Island. You will note that it probably gave its name to the parish in which it is situate. Stan-ford—the ford of the Stane, while the little farmhouse you see below you is "The Sandwiches," *i.e.*, the Stane-Wyk, the cottage of the Stane. Probably, the Stane was a well-known place of worship in pre-historic times. It was almost inevitable that it should be so. Its peculiar formation, its situation, looking straight to the east through a cleft in a low range of hills, so admirably adapted to the Sun worship which seems to be at the root of the great majority of ancient faiths, could scarcely fail to attract the attention of the priesthood, while the fact that it was afterwards occupied, either as a hermitage, or by a cluster of cenobites, or as a cell from a larger monastery, points the same way. It is well-known that the early Christians habitually sought to invest with the sanctity of a higher faith places which already had previous ideas of sanctity connected with them. The ruins of the little chapel were in existence not many years ago.

I may note that the next house to "The Sandwiches" is named "The Furnace," clearly a relic of the times when the oak that clothed these hills was utilized for smelting purposes. It may tend in the same direction to note that a deep pit hollow on your right is called "Hell Hole," clearly, I think, "Hela's Hole." But why the Southstone? South of what? The only guess I can make is to note that about two miles due west, in my own parish, is a place called "Whistlewood," probably a corruption of West Hill *Wood*, or *Wode*. Possibly the two may have been tribal boundaries, for which their situation seems adapted.

I may note that I find in a scientific description of the scene in Worcestershire, over which we are looking, that there is a basaltic dyke rising abruptly from the eastern side of the Old Red Sandstone range, in the parish of Shelsley Beauchamp, entirely unconnected with any of the same formation, and with no rock of the same formation nearer than the Clee Hills. That dyke is nearly opposite, among a clump of trees which you may see, but, unfortunately for exploration, the river lies between.

The neighbourhood is rather rich in examples of place-names. The two hills opposite, "The Berrow" and "Woodbury," are evidently from the word meaning a "mound," whether artificial as a burying place, or natural as a hill. But Tenbury, not far off, must be from *burh*, a borough, probably the town on the

Teme. While the neighbouring East-Ham, the rich valley meadow land, is joined by Hanley, evidently, as a glance at the locality will show, bits of grazing pasture among the woods. Next to Hanley comes an equally expressive word, Tenbury Broad Heath. Clearly so named, not from its product, but from its situation, the Broad Height, equivalent to what we call "a table-land." This is peculiarly expressive of the place. You mount up a steep hill to it from at least three sides, and then are on a more or less level space, reaching by a neck with a moderate fall to Bromyard. It must have been a grand promontory, between the valleys of the Teme and the Frome, in pre-historic times.

Then comes my own parish, Upper Sapey, about which the most interesting thing is the name. Is it a place-name, or derived from ownership? The first patrons of whom I have a note were Sir Richard de Petronilla de Sapey, and John de Sapey. From them it passed to the Bishop of Hereford, from him to Roger Mortimer, but then again to a John Sapey, Kt. In a country where De La Haye is known as Dallow, it would be easy to corrupt such a name as, for instance, St. Pre, into Sapey. But I am inclined to think that it is a place-name; scarcely, perhaps, derived from the brook. As far as I can find, in the few dictionaries I possess, the word Sapey signifies a moist place—the moisture rising and falling like sap—rather than an actual brook. Therefore I make this guess. There was, undoubtedly, an old pack road running through it. It must pretty certainly have crossed the Teme at Eastham Ford, and, I think, has left its traces as if it ran in a straight line towards Whitbourne. If so, it must have run, after climbing to Tenbury Broad Height, along the shallow trough, or depression, which marks the course of the brook, so that the track must have been perpetually liable to inundation. Anyone who is familiar with the locality will see how the traveller, mounting the Tenbury Broad Height, would have come to a track for some miles, intermittently boggy and inundated, quite sufficiently so at least to impress itself on him and give a name to the locality. In this case, the locality gave the name to the brook, rather than the brook to the locality. Probably Sapey was a more important place when the knightly family of the De Sapeys resided there. There are traces of fish pools near the Church, and the ground round the Rectory shows traces, in the abundance of fragments of hewn stone that turn up by digging, that there was once a mansion of considerable size upon the site.

I may add that you will pass a very good specimen of a portion of an old Roman camp on your way to Clifton, and that I believe I know of a part of another. Also, if Mr. Lea has not noticed it, there is little doubt that the "Leopard's bane," Doronicum Pardalianches, grows, or used to grow, on the banks of the Teme just below the Rock. Miss Hill, who gave me the plant, brought it, I am nearly sure, into the Shelsley Garden from the river bank.

NOTES ON THE PARISH OF EDVIN (NOT EDWIN) RALPH.

By James Nott, author of "History of the Church and Monastery of Moche Malverne."

At Domesday survey the parish in question bore the name of "Gedefin." This afterwards became transformed into "Yedefin." It is easy to see how Yedefin might become "Edvin," or "Yedfin," as it is still vulgarly pronounced in the locality. The "Testa de Nevil Survey," compiled near the close of the reign of Edward II., has the following entry: "Rãds de Yedefin tenet in Yedefin et Buterl' de veti feoff feodũ unius militis de Epᵒ Hereford! Sed nesciunt de quo idem Epis, tenet feodũ illud in Capite" (quoted from Townsend's history of Leominster, page 9). This "Rãds de Yedefin" was a juror of the Leominster Court. Freely translated, the extract means that Ralph Yedefin held Yedefin and Butterley by an ancient feofment of feudal service of one Knight to the Bishop of Hereford, but that they did not know of what tenure the Bishop acquired that feudal right. "Gede" and "Yede" are Saxon terms of like signification, meaning to go. "Fin" is also of Saxon origin, whence we get the words "fine," "finery," etc.

This clearly shows that there is no authority for the modern term of "Edwin," attempted, with some success, recently to be foisted upon us. Remove not our ancient landmarks!

Woolhope Naturalists' Field Club.

LADIES' DAY—FRIDAY, JULY 29TH, 1892.

Rouse from thy slumber, pleasure calls, arise!
Come to the proof; with us the breeze inhale.
Renounce despair, and come to Severn's vale,
And where the Cotswold Hills are stretch'd along,
Seek our green dell, as yet unknown to song:
Start hence with us, and trace, with raptured eye,
The wild meanderings of the beauteous Wye.

The Banks of the Wye.—BLOOMFIELD.

In reply, a large company came with lady visitors; it was a subject for congratulation that horses and carriage conveyance were not required! The resources of the Great Western Railway were equal to the occasion; their carriages conveyed the party from Hereford through Ross to Grange Court, thence skirting for a distance of from ten to fifteen miles the right bank of the river Severn, here presenting an expanse of water in some places more than a mile in width, for, fortunately, it was high water, and the river Severn washed here and there the very base of the railway embankment, until, after it had been hidden from view for a few miles by the grounds of Sedbury Park, extending towards Beachley Point, the river Wye was crossed over Brunel's strange bridge, and the company was safely landed on the platform at Chepstow.

And shall we e'er forget the day
When first we hail'd, and moor'd beside
Rock-founded Chepstow's mouldering pride?
Where that strange bridge, light, trembling, high,
Strides like a spider o'er the Wye;
When, for the joys the morn had giv'n,
Our thankful hearts were raised to Heaven?
Never:—that moment shall be dear,
While hills can charm, or sunbeams cheer."

and if there was ever any regret mingled with our

"Spirits high,
Sound health, bright hopes, and cloudless sky,"

it was for those staying at home who failed to share with us the beauties of nature, here so lavish in her charms of wild forest scenery 'twixt the Severn and the Wye, huge rocks, channel, rivers, hills, valleys, and green meadows, plains, heights, and abysses, so agreeably blended that one would need to travel far to find their counterpart.

We now give the names of those who attended as near as we could ascertain them:—Members: Mr. W. Henry Barneby (President), Sir Herbert Croft (Vice-President), Captain R. H. de Winton, Major J. E. R. Campbell, Captain E. Dansey Oldham, Count Louis Lubienski, Surgeon-General W. Perry, the Revs. H. K. Brodribb, J. E. Grasett, M. Hopton, A. W. Horton, A. G. Jones, H. B. D. Marshall, H. North, W. R. Shepherd, and R. H. Warner, and Messrs. H. G. Apperley, E. J. Baker, H. C. Beddoe, R. Clarke, James Davies, Luther Davis, Dr. C. H. East, H. S. Hall, R. Lewis, J. W. Lloyd, T. C. Paris, H. G. Sugden, J. P. Sugden, H. C. Moore (Honorary Secretary), and James B. Pilley (Assistant Secretary). Visitors. Lady Croft, Mesdames W. H. Barneby, Campbell, Dillow, C. H. East, Wm. B. Giles, H. S. Hall, H. C. Moore, H. North, W. Perry, H. F. Smallman, Sugden, W. R. Shepherd, Thistle, R. H. Warner, Mademoiselles Atlay, Apperley, Baker, Beddoe, Barneby (2), Baskerville, Carless (2), Croft, Davis (2), Durrant, Eva Giles, Harvey, Herbert, W. Herbert, M. Hopton, Horton, Frederica Jones, Minnie Jones, Kitsell, Lloyd, Martin, Marshall (2), Pilley, Shepherd, Williams, also Revs.—Sylvester and T. Thistle, and Messrs. Apperley, W. Carless, Chave, Croft, Thornton Power, J. Probert, H. F. Smallman, Stooke, Stooke, jun., and Wyndham. To these must be added our local guests, Rev. E. J. Hensley, Vicar of Chepstow, and Mr. F. H. Worsley-Benison, who both gave the Club the advantage of their local knowledge.

Mixed with nature's charms were seen triumphs of man's art in the elegant iron road bridge at Chepstow, the quaint tubular suspension railway bridge of Brunel at the same town, and the more gigantic bridge of twenty-two spans (the two widest of which are 327 feet long), conducting the Severn and Wye Valley Railway from Lydney to Sharpness for a length of 4,162 feet over the river Severn. But reserving these engineering works for our more calculating moments, let us turn aside for awhile to the consideration of the most remarkable phenomena of tidal waves in our British Isles, as exhibited in the Wye and the Severn. The estuary of the Bristol Channel is common to both rivers. The great tidal wave entering the Bristol Channel from the expanse of the Atlantic is separated at Beachley Point. The configuration of the coasts, the devious channels, and the various currents formed, produce a high rise of water in the Wye, and a "bore" in the Severn.

THE TIDAL WAVE IN THE WYE AND SEVERN.

By H. C. Moore.

The height of the tidal wave in the river Wye has been so variously stated, and warmly disputed in both hemispheres, owing to the conflicting statements that have been published, that it is considered that it would prove of interest to many to place upon record, for the sake of comparison, some of the older as well as the more recent observations upon the subject.

The tidal wave up the Wye is so high that I have never yet heard any contradiction of the statement that, with the sole exception of that in the Bay of Fundy in Nova Scotia, it is the highest in the world. I am informed that Sir Charles Lyell represented it as reaching so high as 70 feet, but whether that was the result of his own observations or given upon the authority of some unnamed old local guide book from which the present guide books cull the same statement without vouching for its accuracy, I know not. The statement on record is to the following effect:—

"In January, 1768 it rose 70 feet." However much we may be inclined to doubt this, we must nevertheless admit its possibility, because, independently of tidal action, it might have been influenced by earthquake action. Sir Henry De La Beche informs us that the Cornwall coast was affected at the great earthquake of Lisbon in 1755 with a rise of eight to ten feet of tide, and so recently as 1866, the lighthouse keeper at Skerryvore reported a sudden wave more than twenty feet in height occurring at low water on a bright autumn morning.*

In Beattie's "Castles and Abbeys" we read that "in March, 1815, the tide rose from low water mark to the remarkable height of 51 feet 2 inches."

At the Meeting of our Club at Tintern Abbey on July 27th, 1880, Dr. Yeats informed us that the highest tide he had known was 44 feet. Again in his address to the members of the British Medical Association on August 1st, 1885, on their excursion from Cardiff, he informed them that the statements in *Nature*, 1879, April 3rd and 10th, were reliable and that the height of 44 feet was allowed as the highest tide in regulating the point of suspension for the Great Western Railway Tubular Bridge in 1846—1847.

It is very satisfactory to learn that since the period of our visit to Chepstow, and we may claim due to our visit, this subject has received careful attention under the hands of Mr. F. H. Worsley-Benison, of Livingstone House, Chepstow.

On September 8th he was engaged with Mr. Atkins, the town Surveyor, and Mr. George Sargent in testing and proving the actual height of the tide in the Wye at Chepstow. They took the height, at the Bridge, between lowest water, the lowest tide of the month, and the mark made in Mr. Sargent's Coalyard to which the tide rose on October, 1883, and found it to be 52 feet 5 inches. On further testing the average springtides they found them as near as possible 50 feet.

* At the period of the earthquakes which affected Wales and the West of England on August 18th and on August 22nd, 1892, a remarkable tidal wave occurred in the river Dart on August 17th and recurred several times on the 19th.—(August 28th, 1893.)

The 1883 October tide is, with one exception, the highest ever known. That exception was 6 inches higher. Mr. Worsley-Benison writes to me as follows:—"At the 'Anchor' Inn, Tintern, an inn close to the landing place, the 1883 tidal mark is distinctly shown about 5 feet up the kitchen wall. The late owner who had lived there all his life, as also his father before him, has told me on more than one occasion that the tide of last century was 6 inches higher up the wall." Mr. Worsley-Benison has brought the matter before the Local Board of Chepstow with the suggestion that a plate recording the height of the October, 1883, tide should be fixed on the Bridge, and also the height of high spring tides:—

The following correspondence has been taken from *The Chepstow Advertiser* of October 14th, 1892.

Livingstone House, October 8th, 1892.

Dear Sir,—Allow me to submit the enclosed letter respecting the tide of the Wye to the notice of the Local Board, and to suggest that under their sanction a plate of some suitable metal be fixed on the bridge bearing a record of the height of the October, 1883, tide, and a deeply cut line indicating the level to which it rose. The height of the high spring tides should also be named. I think the fact that the October, 1883, tide being one of the highest known, and the Wye being the highest tide with one exception in the world makes the event extremely interesting, and well worthy a permanent record. The subject of the tide is always an interesting one to visitors. It is doubted by some that the October, 1883, tide rose sufficiently high in the Anchor Inn at Tintern to float the stone filter off the kitchen table. I had the statement on more than one occasion direct from the late Mr. Bowen himself, and he has often pointed out the beading of the panelling as the exact point to which the water reached. It must be remembered that the amount of "fresh" in the river at that time was very exceptional. The depth of water in the Bridge Inn on that occasion was just 22 inches.

Believe me, Sir, yours faithfully,

F. H. Worsley-Benison.

To Mr. S. Jones, Chairman of the Chepstow Local Board.

Following is the letter above referred to:—

"To the Editor of *The Standard*."

Sir,—The height of the tide in the river Wye has always been, I believe, an undecided question. The subject is an exceedingly interesting one, from the fact that this tide is the highest but one in the world, Fundy Bay being the highest. Through the assistance of Mr. Atkins, the town surveyor, and Mr. George Sargent, I am enabled to send you notes of the measurement of the average spring tides, and also of one of the highest tides on record—that, namely, of October, 1883. The level of that tide was marked in one or two places. Dropping a surveyor's chain over Chepstow bridge on the afternoon of the 8th inst., the distance between the surface of lowest ebb tide and the marks of October, 1883, was found, after very careful levelling and measuring, to be 52 feet 5 inches. This tide, aided by an exceptional amount of 'fresh' in the river, rose sufficiently high at Tintern, twelve miles from the Wye mouth, to float a stone filter off the kitchen table in the 'Anchor' Inn. Another exceptional tide occurred last century,

which was 6 inches higher. Probably the greatest ever known happened in 1606. On the wall of the chancel of Goldcliff Church, near Newport, is a brass plate, bearing the following inscription (exactly copied) :—

"1606.

"On the xx day of January, even as it came to pas, it pleased God the flud did flow to the edge of this same bras, and in this parish theare was lost 5,000 and od pounds, besides xxii people was in this parish drownd—Goldcliff.

"John Wilkins, of Pilrew, and

"William Tap, Churchwardens.

"1609."

Of course these tides are phenomenal. The average high spring tides at Chepstow reach, but do not exceed, 50 feet.

I am, sir, your obedient servant,

F. H. WORSLEY-BENISON.

Livingstone House, Chepstow, September 27th, 1892.

Thus far had this our present volume of *Transactions* of 1892 been printed when, in order to make doubly sure of having all correct up to date, I fortunately referred this subject once more to Mr. F. H. Worsley-Benison. I was unaware of the matter being otherwise than at rest for at least another century. An explanation of the *status quo* will be more briefly rendered by publishing the correspondence which has taken place on the subject since Mr. Worsley Benison's letter of September 27th, 1892, to the *Standard*. An additional reason for publishing the correspondence is because every line of the letter of Mr. James G. Wood is stamped with a character of much accuracy in detail, and because the information gleaned from it, being based upon the sound experience of extended observation, is more valuable than such loose statments as—"some old man told me," or "it is reported that,"—such as we often have to be satisfied with.

TIDES IN THE WYE.

"To the Editor of *The Standard*."

SIR,—The question of the true height of these tides (undoubtedly the highest in the British Isles) is of far more than local interest, and I therefore trust you can afford me space for a few remarks on Mr. Worsley-Benison's letter in *The Standard* of September 29th, 1892, which my then distance from books and papers prevented my dealing with before.

I regret that I cannot accept Mr. Benison's figures, or his deduction that "the average high spring tides reach, but do not exceed, 50 ft." From 1845 to 1853 the tide in the Wye was under the daily observation of the engineers then in charge of the construction of the great railway bridge over the river. A letter now before me from one of these gentlemen, dated 1st October, 1869, says:—"I took the level of the great flood in January, 1846, at the doorstep of a shop at the corner of Bridge-street and St. Ann's-lane. The height of that doorstep is 46·84 ft.

above low water of spring-tides; and the flood of January, 1846, was 0·26 ft. above it, making 47·10 ft. as the extreme height of that unusual tide. Thomas Waters, aged 80 in 1849, remembered rowing a boat up to this step in or about 1799; then the water was about one foot above this doorstep, which would be a rise of 47·84 ft. The doorstep of the Bridge Inn is 45·42 ft. above the datum of low water, and there is a mark in the kitchen of the inn, representing the flood of 1846, which is 1¼ in. higher than my own well-authenticated marks."

This shows that, during the first half of this century, what Mr. Benison treats as the average was never reached. The places mentioned still exist, one two hundred feet from the other, close to the Road Bridge. If in October, 1883, the tide rose as Mr. Benison says, 52 ft. 5 in., it must have risen seven feet above the inn doorstep, and 5·58 ft. above the shop doorstep, and wrecked all the lower part of the town. I know from information received at the time that it did not.

The piers of the Road Bridge rise forty-six feet above the bed of the river, the point from which this measurement is taken being thirteen feet below the edge of the foundation on the Monmouthshire side. The point in Bridge Street to which I know the water flowed on the 17th of October, 1883, is (by Ordnance levelling) 6·55 ft. above the piers; or 52·55 ft. above the bed. Mr. Benison's figures would require that the river ran dry at ebb. There is never less than four feet or five feet over the bed at the point in question. Besides, he says that at the time there was a great deal of fresh water coming down.

For many years I marked every high spring-tide at Chepstow. Of the twenty-six spring-tides in a year nearly all would cover the piers. A few would rise 3 ft. or 3 ft. 6 in. over them, in some years 4 ft. or 5 ft. would be reached, but I never knew the level of 1846 to be afterwards reached. The tide of October 17th, 1883, to which Mr. Benison refers was anomalous.

The late Mr. Thomas Walker, in his work on the Severn Tunnel, says that the water in the Severn Tunnel rose ten feet above its calculated height, "and it must have come on as a solid wall of water of five feet or six feet high," and speaks of it as a "great tidal wave." Such a phenomenon is due to causes other than those which produce tides; and its effects, whatever they may have been in the Wye, should not be taken into consideration in determining the height of extraordinary tides in the latter river. Even, therefore, if Mr. Benison's figures be right, they do not help to the solution of the problem.

In any case, it is not accurate to compare the height of the tidal wave of 1883 with the lowest ebb of 1892 (as he professes to do), and treat the difference as a measure of the tide-flow. Text books have asserted, and some still assert, that the Wye has a tide of sixty feet or even seventy feet. I have yet to be convinced that fifty feet above the ebb level has ever been reached, tidal wave or no.

I am, Sir, your obedient Servant,

JAMES G. WOOD

Lincoln's Inn, October 13th, 1892.

THE TIDE OF THE WYE.

"To the Editor of *The Standard*."

SIR,—The interesting letter in *The Standard* of yesterday September 29th, on this subject brings to my recollection the elaborate and beautiful drawings and details of this bridge prepared by my friend Mr. Samuel Hughes, Civil Engineer, about fifty years ago, for which the most careful measurements and levels were then taken.

I have now in my library the book, in four volumes, in which these were published by Weale, entitled "Bridges, Construction and Theory," with treatises by Professors Hann and Hosking. The rise of the tide there shown is 44 ft. 5 in. from ordinary ebb to ordinary spring-tide level, or 8 ft. below the exceptionally high tide of October, 1883. As this tide would be at least 2 ft. above the top of the iron palisading on each abutment of the bridge it would be well to know what the results of this flood were in the houses on the Monmouthshire side, which stand very considerably below that level.

I am, Sir, your obedient servant,

THOMAS D. BARRY, Civil Engineer.

Liverpool, September 30th, 1892."

These letters have caused a re-examination by Mr. Worsley-Benison and his party of their previously recorded heights—and have resulted in the discovery that they had made an error in excess.

We may now consider this question finally settled by publishing the following letter to the Editor of *The Standard*, which appeared in that paper in its issue of Friday, September 8th, 1893:—

HEIGHT OF THE WYE TIDE.

SIR,—In September of last year I sent a letter to *The Standard*, purporting to give a correct statement of the height of the tide in the river Wye. The correctness of the figures given was challenged in a reply letter from Mr. James G. Wood. I now find, through an unaccountable error made in taking the measurements I relied on, that my figures were wrong, and those given in Mr. Wood's letter correct. I am sorry it has been impossible for me to rectify the error at an earlier date. It was only on the 29th ult. I was enabled to verify Mr. Wood's statement that "The doorstep of the 'Bridge' Inn is 45·42 ft. above the datum of low water"—the point to which the high-spring tides reach.

Our recent measurements are practically the same; but if they were to be made when the tide is absolutely at its lowest—say, the lowest ebb of an October spring-tide—then the distance between the two extreme levels would be fully 46 ft. The question may now, I think, finally rest with complete reliability at 46 ft. as the rise of the highest spring-tides in the Wye at Chepstow. The October, 1883, abnormal tide was 22 inches above spring-tide limit. I shall feel obliged to

those Editors of scientific and general papers who will publish a reprint of this letter, and thereby assist me in making an important correction respecting a very interesting but much disputed subject.

I am, Sir, your obedient servant,

F. H. WORSLEY-BENISON.

Livingstone House, Chepstow, September 7th, 1893.

The best method of examining the cause, and tracing the course, of this gigantic tidal wave is obtained by placing oneself in front of a large scale map of our South-western coast, such as you will find in the Official Time Tables Book of the Great Western Railway, or better still on the walls of any of their important stations. Commencing at the opening of the Bristol Channel, the mouth of the funnel from St. Ives' Bay in Cornwall to the Pembrokeshire coast presents an opening of about 100 miles. From St. Ives' Bay to Ilfracombe, north of Bideford or Barnstaple Bay, the coast line extends from seventy to eighty miles in a north-easterly direction, whilst the direct distance eastwards from St. Govan's Head on the Pembrokeshire coast to the Gower Coast line south of Swansea is only forty miles, the width of the funnel from this coast to Ilfracombe is already reduced to twenty-five miles; still proceeding another forty miles eastwards up channel, it has contracted to ten miles between the coast line below Cardiff to Weston Super Mare; a third measurement eastwards of forty miles terminates at the Old Passage from Aust to Beachley Point from 1 to 1½ miles wide, and the mouth of the Wye from Beachley Point to the Monmouthshire coast at Mathern is but little more than half-a-mile wide.

It will be observed from the configuration of the channel that a large volume of the tidal wave must be deflected from its much longer southern side by currents impinging upon its northern coast, and if measured in a direct line along the shorter northern shores the tidal wave has, in the distance of one hundred and twenty miles, become narrowed from one hundred miles to less than two miles, or to a width of but little more than half-a-mile at the mouth of the Wye. The rocks at Aust on the southern side of the channel and the rocks at Beachley Point, (where formerly stood a chapel dedicated to St. Tecla, said to have been erected in A.D. 47 and existing in Leland's time, temp.* Henry VIII.) protrude far into the Severn, by their obstruction deflecting the current and impelling the flow with increased velocity up the Wye, whose mouth has suddenly to receive a large volume of water. The numerous horse-shoe bends of the first ten miles and the contraction near Chepstow to a width of little more than a hundred yards, all tend to retard its progress and to raise the waters into a heap, thus accounting for the very high tidal wave at Chepstow.

In the Bay of Fundy the tide comes in from nine to twelve feet high, and vessels not anchored with their heads to it are smashed to atoms. In the *Historical School Geography* by Dr. Morrison (1888) the rise of the tide in Fundy Bay is given as 70 feet, and at Chepstow 60 feet. In the next edition we hope to see the latter revised to 46 feet.

*"The Fery from Auste to a village on the farther ripe of Severn not far from S. Tereadacas Chapel yn the mouth of Wy river is iii myles over."

Let us now trace the tidal wave as it sweeps up the river Severn.

THE BORE OF THE SEVERN.

The width of the Severn at the "New Passage"—from Aust to Portskewet, superseded in 1886 by the Severn Tunnel, is 2½ miles. The width at the "Old Passage" from Aust Cliff to Beachley Point is 1½ miles. At Sharpness the width is about three-quarters of a mile. Above Sharpness where the banks rapidly converge at the bend which is crossed by the Severn Bridge, the tidal wave rushes up the river at the rate of twelve miles an hour, creating, at spring-tides, the curling wave of the "bore," stretching as a wall, crested with white foam, right across the channel, here three-quarters of a mile in width. The height of the bore depends upon the phase of the moon, and only occasionally appears at its grandest, being highest at what are called the "palm tides" in the month of March.

The height of the bore also varies with the width of the river, running up at Newnham, where the river is about one mile wide, with a wave six feet high, and on some occasions, very much higher; moreover, it is increased in size if the wind, south-west, be blowing in the direction of the channel currents, which may be impressed upon the recollection by the remark of Mr. Frank Buckland's facetious friend, "You may always expect a good 'Bore' if it is accompanied by a *Sou'-wester*." It is in some places succeeded by a second, and even by a third bore.

The cliff, about seventy feet high on which the Church of Newnham on Severn is built, presents a good locality whence to view this phenomenon as it curves along the horse-shoe bend of the river. Another excellent spot is near Oakle Street Railway Station much nearer to Gloucester, where the river has become much narrowed and can be readily reached by a short walk from the Station.

I have known visitors from Hereford who, becoming aware of the early hour of the tide's occurrence, have started by the 6.30 a.m. train for Gloucester, having obtained permission from the Railway authorities to be set down at Oakle Street Station. They have been enabled to witness the phenomenon of the crested wave with sometimes an accompanying precipice of water on each side, and (after breakfasting at the local inn) to reach home on their return before eleven o'clock.

The roar created by the bore, "the voice of many waters," can be heard, especially in the stillness of night, at a long distance,

"And rapid Severn's hoarse applause resounds;"

notwithstanding which, the watchword "Flood, oh!" is, upon its approach, passed on from bargeman to bargeman.

Mr. Frank Buckland in his *Log Book of a Fisherman and Zoologist*, page 300, gives the report of Mr. James Miller, junior, of the Salmon Fishery, Newnham, upon the Severn bore. He says: "When it happens that the low water lies round the Frampton side and the Noose sand is high, so that the tide has a long roundabout course to go, then there is always a very big "bore" at Newnham in spring-tides. I think it is mainly caused by the great body of water being for a time kept back by the Noose sands, till, rising higher, it suddenly bounds over,

and joins the current on the Frampton side at a place called Hock Cut, both currents, after meeting in wild confusion, sweeping up the river with renewed vengeance. Should there be a low-water channel through the Noose sands, close to the Awre side, then there is rarely a "bore" of any size at Newnham, the tide having a straight course upward. It is always in a freshet season that the channel cuts down the Frampton side; and in a dry summer the up flood tide cuts a low way in the Awre shore through the Noose. No "bore" takes place in the Severn below Sharpness Point (except on very rare occasions), and it is not of much size till it gets up in the Frampton Channel . . . . The rise of the tide in the Bristol Channel is so extraordinarily fast that it will have begun ebbing at Kingroad before it reaches Newnham; and, as it only flows one hour and twenty minutes at Newnham, where the river is about three quarters of a mile wide, and rises sometimes nearly twenty feet, you can have some idea of the strength of the tide" . . . . "That same tide, after passing Newnham, may flow nearly to Worcester, a distance little short of forty miles, going over the Tewkesbury weir, and expending itself at Diglis, just below Worcester."

Another interesting phenomenon at Chepstow is

A WELL INTERMITTING INVERSELY WITH THE EBB AND THE FLOW OF THE TIDE.

This intermitting well which fills with the ebb, and sinks with the flow, of tide is situated close down by the bridge in the garden of Woodfield House. Its depth is given as 32 ft., and it is said to contain often as much as 14 ft. of water. It is recorded in every guide book appertaining to Chepstow, and although the truth of what is stated has often been questioned, no one has any longer any reasons for entertaining the least suspicion of doubt. With the object of testing the accuracy of its intermittent properties inversely with the tide, by pre-arrangement Mr. Sargent has stood upon the base stones at its very bottom awaiting the signal from a friend above, to be given upon the movement of the turn of the full high tide. Upon the signal being given, Mr. Sargent observed the clear perfectly fresh water commencing to cover the basement stones. As the tide continued to ebb so did the water in the well continue to rise. When the tide is completely out, the well is full—and inversely, when the tide has risen full, the well is empty!

It is well-known by African travellers that natives of desert regions often find water by digging in the soil with their hands alone, such water being the accumulation of the water-fall during the rainy season upon neighbouring elevations. I will now give evidence of a parallel case of fresh water accumulated in a basin fluctuating inversely with the tide, which I would not have believed had I not witnessed it daily.

During the years 1858—1861 I was engaged, in the capacity of Lieutenant of Engineers, in building the fortified lighthouse and several other works on the island of Perim, in the Straits of Bab-el mandeb, at the mouth of the Red Sea. On January 8th, 1861, the Arab Contractor, Hassan Ali Rijib Ali, reported to me that the existence of drinking water on the island was known to the fishermen

who occasionally brought their canoes over from the Arabian coast. Somewhat incredulous I visited the reported site at the north-west extremity of the island, and by simply digging with my hands in the sands near the sea coast I saw, obtained, and tasted, some water which to my intense astonishment was drinkable.

On the following morning, January 9th, I took about fifty of the company of Bombay Sappers and Miners accoutred with shovels, and directed the sinking of numerous very shallow wells varying from three feet to ten feet in diameter. In the course of a few hours at least a thousand gallons of water were exposed to view, which, if it could not be reported thoroughly free from saline constituents, was at least drinkable. On the evening of the same day I took my colleague Lieut. Mortimer, (now Colonel), of the Bombay Artillery, to the spot, with the promise of showing him this great discovery. Imagine my intense disappointment at finding all the wells empty! On the next day more wells were made with the same favourable results, and on visiting them in the evening they were again found empty. The water occupied a basin extending for about 200 yards along the sea-coast, at a distance of only 20 yards to 100 yards from the reach of the high-water mark. The fresh water in this basin flowed and ebbed *inversely* with the tide. This was an extraordinary find in an island where, upon the average, rain fell once in three years! It could not be due to anything else but the accumulation of rain-water from the last shower of rainfall.

Considering the fact that several thousand rupees had been spent in a fruitless search for drinking water by well-sinking, etc.—ever since the occupation of the island five years previously, I looked upon this discovery much in the light of the discovery of a gold mine, and reported it officially to the acting Political Resident at Aden, Colonel R. L. Playfair, R.A., taking care at the same time to report the transitory condition of the properties of the water as fit for drinking purposes, namely that it daily became more and more saline in character, such salinity being accelerated by the salt sea sand from the beach falling into it or being blown into it. Nevertheless the extraordinary fact remains that *fresh* water in these wells fluctuated *inversely* with the tide, floating, as it were in a basin, on a bed of *salt* water, and that on any day fairly drinkable water in large quantities could be obtained at least temporarily by digging on the sea beach.

It will be apparent that the fluctuation *inversely* intermittent with the tide can only be due to the period required for filtration through the bed of sand.

POSTSCRIPT.

By James G. Wood, M.A., F.G.S., F.R.Met. Soc.

Having through the courtesy of Mr. Moore being favoured with an early perusal of his paper, I have further to acknowledge my indebtedness to him for being allowed to supplement it with a few observations.

To get rid at once of the personal element, and to justify my having appeared to speak as if with some authority, I may say that my acquaintance with the Wye began in 1852; that from 1854 to 1864 the windows of my old home overlooked Chepstow Bridge; and during those and many subsequent years my aquatic pursuits led me to observe the tides with much precision; and later on until recent years I was a constant visitor to the place, and kept closely in touch with everything of interest that occurred there.

1.—THE HEIGHT OF WYE TIDES.

In my letter to the *Standard* I avoided, as much as possible, reference to local details which would be unintelligible, or uninteresting, to the general reader. Lest, however, this question should hereafter be mooted again, it will be desirable to place on permanent record the data on which I based my conclusions.

I fixed my datum-line at a point 9 feet below the top edge of the pile sheeting of the "starling" of the pier on the Monmouthshire (or South) side of the centre arch of the Road Bridge, under the centre line of the Bridge. I once (and only once) saw the water down to the level of that point, leaving only 3 feet of water in the deepest part of the channel under the Bridge, where it is naturally washed out by the scour deeper than elsewhere. This was so exceptional an occurrence that I am not surprised that Mr. F. W. Dibbin (the engineer referred to in my letter), fixed his average low water 1·29 feet above my datum; and Mr. Hughes (mentioned in Mr. Barry's letter), fixed it 3 feet above my datum.

Starting from this datum-line the following are the measurements of the important points, taken partly from Mr. Dibbin's record; partly from Mr. Hughes' scaled drawings; and partly from the Ordnance Survey. I have tested them in every possible way; and can find no discrepancy between the various measurements.

	Feet above datum-line.
Datum-line (3 feet above deepest point of river bed, and 9 feet below edge of starling)	0·00
Dibbin's average low water	1·29
Hughes' do: do.	3·00
Edge of starling under centre line of bridge, south side of centre arch	9·00
Top of piers of bridge (23·45 feet above Ordnance datum) ...	42·00
Doorstep and kitchen floor of Bridge Inn	46·71
Doorstep of shop at corner of Bridge Street and St. Ann's Lane ...	48·13

	Feet above datum-line.
Tide of January, 1846	48·39
Tide of October, 1883—also the level of under-side of spans of land arches (30 feet above Ordnance datum)	48·55
Tide of 1799	49·13
Crown of intermediate arches (under-side of spans)	53·00
Crown of centre arch (do. do.)	56·00

It thus remains that the highest tide of which we have any authentic record was 49·13 feet above the lowest point of ebb that I ever saw; 47·84 feet above Mr. Dibbin's low water line; and 46·13 feet above Mr. Hughes' low water line. If any one should hereafter see the water lower than my datum, or more than 7 feet 1½ inches above the piers, he will "please note."

At the same time it must be remembered that the true measure of the range of a tide is the difference between the levels of high and low water of that particular tide, so that probably no tide has achieved a range equal to the above figures. This is the more probable because exceptional tides seem to have been concurrent with land floods. In January, 1768, when the big tide referred to below occurred, there were great floods at Hereford, Ross, and Wilton. In January, 1846, there were great floods in the upper Wye and the Lugg, "none such since 1795, when Hay Bridge was washed away"; and the tide of 17th October, 1883, occurred after a very wet September, and a few days after some exceptional rains in the Wye Valley. The ebb on such occasions would not go down to within 7 feet of my datum.

It would be interesting if the original error could be run to earth. It probably began with the tide of 1768, to which Lyell referred, as quoted by Mr. Moore. Cliffe's *South Wales* (1848) says:—"The tide (at Chepstow) rose in January, 1768, to an altitude of 70 feet to the injury of the old wooden bridge." Lyell, in *Principles of Geology*, Vol. 2, p. 26 (1840) says:—"At Chepstow [the tides] reach 50 and sometimes 69 and even 72 feet," and gives as his authority Captain Beaufort, R.N.; and Norie's *Epitome of Navigation* (1835) gives 70 feet as the average height.

These "authorities" must have proceeded upon one common source, without an attempt at verification. A tide of 70 feet would have covered the old bridge by about 20 feet, as will be readily seen from old engravings of it; and would have wrecked all the shipbuilding yards and warehouses which made the town then a place of importance, and swamped half of the then town also; but there is no record of such a catastrophe. The damage to the bridge was probably caused more by the flood above mentioned than by the tide.

It occurs to me that probably on that occasion a survey was made; and the surveyor measured the tide as 72 *links*, equal to just 47 feet 6 inches, or very nearly what we now know to be the maximum range. This measurement may have been afterwards spoken of as 72 *feet*; and hence the mischief began; and went on till the railway engineers took the matter in hand.

To prevent any misapprehension hereafter, I would point out that Mr. Barry's inference, that the tide of 1883 covered the iron palisading of the bridge, was based on the assumption of the accuracy of the figures which have now been

disproved. The tide, as a fact, was much below the top of the palisading at its lowest point.

I said in my letter that "tidal waves" were due to causes other than those which produce tides. I had in my mind the tidal waves in the Dart to which Mr. Moore has referred. Some notes on these from information obtained by me at Totnes at the time will be found in the *Meteorological Magazine*, Vol. 27, p. 115.

2.—VARIATIONS OF ABSOLUTE LEVEL OF HIGH WATER AT DIFFERENT POINTS.

It will be well worth while to institute a series of observations, at points along the estuary of Severn and its tributaries, of the relative heights of maximum tides referred to Ordnance datum. At present I can only offer the following:—

Mr. Worsley-Benison has set out a copy of the brass in Goldcliff Church. The flood there mentioned was no doubt due to tide and not to land water; for the tide on the evening of 20th January, 1606 (O.S.) will be found (making due allowance for change of style, &c.), to have been the fifth after the full moon; which would make it "the top of the springs."

The brass is 24 feet above Ordnance datum; or 9 inches only above the Piers of Chepstow Bridge. Assuming, therefore, that the tide of 1606 was no less than the tide of 1799 (and it was possibly greater), we have a difference of at least 6 feet 4½ inches in a shore distance of about 16 miles.

I have it also on the authority of Mr. Dibbin, that all exceptional tides were marked on a brass plate in the kitchen of the Dog Inn, at Over, near Gloucester. If that is still extant, and its relation to Ordnance datum be ascertained, very useful information may be gained.

Such comparisons may teach us a good deal as to the effect on tides of the contours of shore lines; and may lead also to other considerations. Geologists have noticed on the shores of estuaries, and notably in the Gulf of St. Lawrence, ancient "raised beaches," the level of which gradually inclines upward toward the sea; and have explained the fact on the hypothesis that the elevation, which left the beach high and dry, has been more marked at the mouth than at the head of the estuary. It may be that the true explanation is to be found in some such variation of tide level (under the then conditions of the estuary) as I have shewn to exist now between Goldcliff and Chepstow.

From a report of Mr. Bunt, the observer of the Tide Gauge at Bristol, quoted in Cliffe's *South Wales*, it appears that the level of high water at the Hotwells is one foot above that at King Road. He also notes that the tide of 29th January, 1846, was the highest registered by him; its height being 38 feet 8 inches above the sill of Cumberland Basin.

3.—THE BORE IN SEVERN.

I have nothing to add to Mr. Moore's description, or Mr. Miller's explanation, of the phenomenon.

Locally it was called the "higre," or "hygre"; and this has been fancifully derived from "eau-guerre." It is really a corruption of "eagre" the English equivalent of the Scandinavian "Bore." It is derived from the A.S. ęgor=sea,

or water. Professor Skeat quotes from Dryden, "But like an eagre rode in triumph o'er the tide."

Just below Sharpness lies the "Sanager" sand. This is probably a corruption of *sæs* (imp. of sinnan A.S.)=*be mindful of*, and *ágor=the flood*. The spot would naturally be that where the cry "Flood, oh"! or its Saxon equivalent, arose on such an occasion.

4.—THE BORE IN THE WYE.

I am glad to be able to add a note on this; as it seems to be generally unknown. I have found even fishermen and boatmen entirely ignorant of it.

It commences a little more than half-a-mile above the Chepstow Road Bridge, at a point a few yards above the old Roman crossing beneath the Alcove in the Piercefield Woods. Its course extends upwards for just a mile, through the straight reach called "Longhope" reach, or "The Hope."

About 250 yards above Chepstow Bridge the river takes a very sharp bend (the second half of an "S" curve) northward under the Castle. At low water, the channel is immediately under the Castle rock, on the Monmouthshire (or concave) side. On the Gloucestershire (or convex) side the bank, of alluvial clay, slopes somewhat steeply; but at low water there stretches out from it an extensive "spit" of firmer ground, forming a flattened beach, which very much narrows in the channel, and in no part rises to any considerable height above low water mark.

Except a few stones opposite the Bridge Quarry, and the starlings of the bridge, this spit is the first serious obstacle which the flood tide meets after it enters the Wye.

The similarity of this spit to the "Noose" in Severn mentioned in Mr. Moore's paper is very remarkable; only it is on a smaller scale, and the direction of the bend is reversed.

Above the spit, to the place where the Bore forms, the banks are somewhat steep; that on the Monmouthshire side being rocky. Soon after passing the Roman crossing the river bed presents a narrower section at low water level, with the banks at lower angles.

The phenomenon may be best observed from the summit of the Penmoyle cliffs which command the whole of the "Hope." The time to observe is at the making of the flood on the fifth tide after new or full moon; and preferably at the St. David's tide in the beginning of March; or at the latter end of September.

If, however, much fresh water is coming down, so that the "spit" is not laid bare, there will be no bore.

The explanation is similar to that given of the Severn Bore. The flood tide, rushing up through the bridge, is backed and ponded up by the spit; just as the Severn tide is by the Noose. At length the spit is covered; possibly some of its top layer also gives way; the body of water rushes on, and, at the narrowing in again of the channel, mounts up and spreads out at the same time over the flattened banks. It advances up the Hope with a head of about 2 feet, and a roar plainly heard on the cliffs above. As it passes, the ebb, which immediately

before was making down, is turned back, and the flood is seen to be strongly making up.

I never saw it pass round the bend at the north end of the Hope; but it dies out opposite the upper Llancaut Quarry where a 'weir' shows at low water.

5.—THE INTERMITTING WELLS AT CHEPSTOW.

Within a few yards to the north of the well mentioned in Mr. Moore's paper is another well sunk in the cellar of Gwy House, in Bridge Street. Of the action of the former well I know nothing. The latter I know very well, having been a frequent visitor at the house.

I could never satisfy myself that the water actually receded from this well on the rising of the tide. But this is certain that at high water the well could readily be pumped dry; and no more water would come in until the tide went down. It is possible that on such occasions the Gwy House pump may have drained the neighbouring well; and so have given rise to the belief that the water receded.

I have on several occasions, (perhaps four or five), known the water to rise up in the well and flood the cellar to a depth of about 18 inches; which (speaking from memory here) would be about 1 foot below the 1883 level. This would happen after very heavy rainfall, accompanied by an exceptional tide.

The well is 400 feet from the river bank; but on no occasion, and under no circumstances, is the water brackish. It is strongly impregnated with lime salts.

On reference to Sheet 35 of the Geological Survey a fault (which for distinction I call the main fault), will be seen starting a little south east of the bridge and going north for one and three quarter miles cutting the river bed at four points.

The wells in question are sunk either on or very slightly to the westward of this main fault.

I doubt if the whole length of the fault is shown on the Survey. I think it probably extends to, and is cut off by, a cross fault visible (but overlaid by "dolomitic conglomerate") in the quarry at the Railway Station; and is also cut off, at the north end, by another cross fault (not shown on the Survey) starting 100 yards south west of the Cockshut, crossing the river, and passing a little south of the Livecoaks Farm.

On the west of the main fault the dip is eastward; or against the fault. About half-a-mile north of the bridge, in Chapel House Grove, is a considerable area of Farewell rock (not shown on the Survey), pitching east 33° against the fault. This indicates by comparison with Tidenham Chase a downthrow west of 460 feet.

The conditions are therefore favourable for the inclusion between these faults of a large body of water, entering at the outcrops of carboniferous limestone to the west of the Wye Valley, and of the area of Farewell rock just mentioned.

The explanation I have to offer is, that the wells are fed by the fault; and that the water, under certain conditions (that is when unaffected by heavy rainfall) comes under the river along the fault; and that, under the pressure of a tide with a vertical head of 40 feet, the passage along the fault (which has a considerable dip)

closes, and the passage of water is prevented until the pressure is relieved by the tide going down.

Under an unusual condition of level, underground water may find its way by other fissures to the well; and under these conditions the tide pressure may prevent the water passing away to lower strata; and so co-operate towards the filling up of the well. This would require that in this case the water would not pass under the river, but come from sources southward of the castle while in ordinary times it came from the north. That this is not improbable is evidenced by the fact that in rainy seasons a considerable quantity of fresh water issues from the Castle rock, from a point higher than the wells, through a fissure which at other times either is quite dry or sends a small trickle.

I admit that there are difficulties in this solution; but the purity of the water excludes any theory of infiltration. The difficulty is to account for two apparently inconsistent phenomena.

I do not for a moment question Mr. Moore's explanation of the action of the Perim well; and I may mention as having some bearing on the question that Mr. Dibbin informed me that in sinking the columns of the Railway Bridge through the river bed a stratum of running sand was intersected with a stream of clear pure water. Whether or not this is an element in the case, and whether (if so) it points to Mr. Moore's solution or mine, is a matter for further enquiry.

J. G. W.

ADDENDUM.

Readily rejecting, in this case, the theory of infiltration, I have no hesitation in adopting the explanation given by Mr. James G. Wood, based as it is upon known geological conditions, which I hope, will be further explored.

With reference to Perim island, the formation is Basaltic. The rock is similar, in texture and colour, to our Dhu Stone from the Titterstone Clee Hills, and the elevations, the highest only 213 feet, are covered with enormous boulders, as if ejected from a volcano. The distance from the coast of Arabia is a mile and a half. The lower grounds in the bays, and the bed of the harbour, are Coral.

I was far too busy with other important works to devote more attention to the very shallow wells, sunk only from a few inches to one foot in depth, and I left the island shortly after the discovery of the shallow basin of fresh water intermitting *inversely* with the tide.

H. C. Moore.

We must now return to the proceedings of the day.

Upon arrival at Chepstow railway station, the walk to St. Mary's Church was commenced without delay, and when there assembled, the members had the pleasure of listening to the following paper on

CHEPSTOW CHURCH.

By the Rev. E. J. Hensley, Vicar.

Two years ago the statement of Mr. Freeman in *Archæologia Cambrensis*, that "there exists in Chepstow Church the nearly perfect nave of no contemptible Norman Minster," would have been received by a chance visitor with some incredulity. The proportions of the nave and its arches, dwarfed by being filled up 3 feet 6 inches above the original level, the triforium arches and main arch opening upon the belfry walled up and covered with plaster, and the body of the church nearly filled with a low and disfiguring gallery, gave to the building an appearance of neglect and unsightliness, from which it was difficult to extract any ideas of interest or of beauty. Now, happily, some judicious excavation and re-building has revealed a church, fragmentary indeed, but still possessed of several points of interest, and of a certain simple grandeur of proportion. The history of so old a building is naturally to a great extent a matter of conjecture.

The Church is of Norman date, and may very probably have been founded by William Fitz Osborne, lord of the Castle at the time of the Domesday survey, or perhaps by his son. The earliest name is the Church of Striguil, and there is no doubt that it was attached to the Benedictine Abbey of Cormeilles in Normandy. The western front is very similar to that of St. George's, Boscherville, in Normandy, the date of which is assigned to A.D. 1050—1100, so that it may be reasonable to place that of Chepstow Church about the commencement of the 12th century. Upon a fragment of plaster, which has unfortunately perished, was part of a fresco with the banners of the knights templars surrounding a domed building, and no doubt the proximity of the Castle would connect the history of the Church with that of the early crusades. Traces of the Puritan period were also found in fragments of inscriptions upon the old plaster; one, in black letters, having been found fairly perfect (Matthew xxiii., 15: "When he is made, ye make him twofold more the child of hell than yourselves,") and it is known that about A.D. 1620, a vicar, named Blinman, a Puritan, left Chepstow, and took a large party to America, settling at Springfield and Gloucester in Massachusetts. Up to the time of the Reformation Chepstow Church was attached to the Priory which stood by its side, and at the dissolution of monasteries was served by three monks, and valued at £32 a year. There were also attached to it four chapelries in different parts of the town—St. Thomas, St. Ewen, St. Ann, and on the other side of the bridge, St. David's, scarcely any remains of which, however, now exist.

The registers of the Church commence in 1595 and are nearly perfect, except for about 15 years during the Commonwealth. During the Civil wars there are several interesting entries connected with the burial of soldiers killed in battle and at the siege of the Castle.

There are but three monuments of any interest, namely, those of Henry, second Earl of Worcester, and his Countess (A.D. 1549), a very quaint one of the Shipman and Clayton family (1604), and the stone which formerly covered the grave of Henry Marten the regicide.

In modern times destruction has been the order of the day. The central tower is said to have fallen about 1700, and the west tower was built about that time above the extreme western bay of the nave. Apparently the nave at some time or other was partly ruined, and the old font (15th century) has certainly been exposed to the weather. The crowning act of destruction has been reserved for the present century when, by the joint efforts of Bishop Copleston and Wyatt the architect, in 1841, the eastern bay of the nave, together with the side aisles, were destroyed, and the incongruous transepts and galleries added, while the whole of the walls were covered by a thick coating of plaster. It is to be hoped that posterity will pass a more favourable judgment on the work now being done under the supervision of Messrs. Seddon and Carter.

Architecturally the church is of some interest, and in one respect almost unique. As originally planned, it consisted of a nave of six bays, a central tower, transepts, and choir, and perhaps additional chapels. The five western bays of the nave, with the rich western front, are all that now remain. The nave is one of the few Norman buildings in England originally designed to be vaulted. The arcades consist of massive square piers, with a small engaged column or pilaster on each face, those facing the nave carried up to support the proposed vaulting ribs. A very perfect example of this style of architecture is to be found in Mayence Cathedral. The triforium differs considerably on the two sides. That in the north side is pierced by plain semi-circular arched openings, but that on the south by coupled arches of two orders, with quarter columns, having rude caps and bases to the jambs. The whole interior was faced with dressed ashlar stone work, covered with a thin coat of plaster, and decorated with a large and simple pattern in red and white. Over the western entrance is a tower built about 1711, which is a curious patchwork of old materials mixed with details of Renaissance character. In removing the earth to continue the floor level of the nave to the chancel steps, the base of one of the west piers of the central tower was laid bare to the height of about 2 feet 6 inches. It has been left *in situ* and serves as a foundation for the shaft supporting the arches across the transepts. No attempt is being made to imitate the old Norman work in the new building. The chancel, transepts, and aisles have still to be built at an estimated cost of £6,000, and, unless the hand of the despoiler is laid upon the church and its belongings during the next few years, it is hoped that Chepstow Church will be completed, and stand for centuries to come as a good example both of the old and new architecture.

Thanks having been accorded to the Vicar, the party repaired to lunch at the Beaufort Arms, and adjourned afterwards to the Castle.

They took the opportunity of examining the Walnut Tree in the first Court. At 5 feet from the ground it has a girth of 10 feet. Its beauty is displayed in its three magnificently spreading enormous arms; that extending towards Marten's Tower reached as far as 45 feet from the stem.

From the Castle ramparts the site of the old Roman road, Julia Via, ascribed to Julius Frontinus A.D. 72, was pointed out, indicated by an oblique line

conspicuous in the woods on the Monmouthshire side a little higher up the river. The traditional site of the old Roman bridge occupies what has for ages been called the "Eddis" Bridge, indicated by two rows of posts said to be visible at low water. Its situation is below the "Alcove" in Piercefield Park.

In the dwelling of the Curator is an enormous Eagle-Owl—a magnificent specimen. It belongs to Mr. Ball and was supposed, when it was shot, to have escaped from a place of private captivity.

Another natural phenomenon in this district must be recorded. We are informed by Mr. James G. Wood that in the Wye, at the point where the "Northern cross fault" (noticed in the seventh paragraph of his paper on "The intermitting wells at Chepstow") cuts the bed, there is a spring, uncovered at low water, but from which when covered many feet by the tide, he has often (when rowing up towards Tintern) drank as the water, clear and fresh, rose up through the surrounding muddy and salt water. A parallel case is found in the Persian Gulf, where the natives, diving down in the salt water with their empty bottles, or water-skins, return to the surface with the same filled with pure drinking water.

When the exploration of the Castle and grounds had been made, the members and visitors assembled in the Banqueting Hall to listen to a paper on the political history of the district by Mr. James Davies.

The Vicar, from his acquaintance with the locality, has been able to glean his information from the best sources, and notably it must be acknowledged from so excellent an authority as that of the Bristol and Gloucestershire Archæological Society, to whom their county and our nation is indebted for most valuable and reliable additions to its history. We, in our turn, thank the Vicar for supplying us with the following notes:—

NOTES ON CHEPSTOW CASTLE.

By the Rev. E. J. Hensley.

The reason for the existence of Chepstow Castle is tolerably obvious. The valley of the Wye must always have been a sharply marked boundary line, and even in times earlier than the Roman invasion a British Camp was constructed for its defence, about a mile nearer the mouth of the river. The remains of this Camp still exist near Hardwick House. Its existence is interesting in that it furnished the earliest known name for Chepstow and its Castle, which was still known as Striguil at the times of the Domesday Survey—Ys Tnigyl *i.e.*, the Castle of the crooks of the Wye. The fortress seems next to have been used by the Romans as an outpost to their great station Caer Gwent, or Venta Silurum, their great western encampment, situated about five miles from Chepstow upon the Newport road. The great roads from Gloucester and Bath united not far from Beachley at Wye mouth and then passed over the river at a ford below Piercefield Woods; the line which it took being plainly marked through the wood. It is probable that at this time the fort was moved nearer to the road than the old encampment had been, and the rocky promontory on which the Castle now stands was naturally selected. As to the date at which the name of Chepstow was adopted no authority exists. The best received explanation is that the flat meadows on the Gloucestershire side of the Wye formed a kind of no man's land, or neutral ground, on which the contending tribes met for purposes of merchandize. This in time became known as the Chepe, or market, and the neighbouring hamlet as Chepstow, or the market town. At the time of the Conquest, the Castle appears to have been part of the domain of William Fitz Osborne. It is mentioned in Domesday as one of three Castles in Gloucestershire, with Ness (*i.e.*, Berkeley), and Gloucester. "Castellum de Estrighoiel fecit Willielmus Comes, et ejus tempore reddebat XL. solidos, tantum de navibus in silvam euntibus. Tempore vero Rogeri filii ejus reddidit ipsa villa XVI. libros et medietatem habebat Radulphus de Limesi; modo habet Rex inde XII. libros." Fitz Osborne died Earl of Hereford in 1070. In 1170 Richard de Clare, Earl of Pembroke, generally known as Strongbow, is called Earl of Striguil. (He is the hero of much romance in connection with Ireland and his marriage with King Dermot MacMurrough's daughter.) His heiress married William Mareschal, who also held Goderich and died in 1219. Five earls succeeded as owners of Striguil. After passing by marriage to Hugh Bigot, it reverted to the Crown. Edward II. found a temporary refuge here from the pursuit of his Queen Isabella and Mortimer, the Castle at that time being in the possession of his brother Thomas, Earl of Norfolk. After many vicissitudes the Castle was granted to the Herberts, temp. Edward IV., one of whom married Charles Somerset, Earl of Worcester, from whom it descended to the Dukes of Beaufort. No doub it played an important part in the border wars, but the pacification of Wales by the Plantagenets made the frontier fortresses of less importance than hitherto,

and Chepstow does not appear to have figured very prominently until the time of Cromwell. It was then twice besieged—first by Waller, who took it for the Parliamentary party in 1644-45, and secondly by Colonel Ewer in 1648. In the interval it had been recovered for the Royalists for a time by Sir Nicholas Kemys, famed for his enormous strength. The fact of Cromwell himself being for some time present during the second siege leads to the inference that some importance must have been attached to the Castle. After the Civil Wars it ceased to be of any military importance, but has, at times, been used as barracks, and various small industries such as glass works have been carried on within its walls. During the Civil War it was used as a place of imprisonment for two noteworthy prisoners, Jeremy Taylor having been confined there for a short time in 1656, and Henry Marten, the regicide, was there imprisoned for upwards of twenty years. Architecturally the Castle, although picturesque, is not remarkable. In length it extends about 750 feet, and is divided into four wards or courts, each capable of separate defence. The most important ruin is that of the keep, situated between the second and third court. It apparently was built, and additions made to it, at different periods. The lowest story is built of large rough stones, similar to those in the keep, where King John held court at St. Briavels. In the later Plantagenet times, other buildings were made, and the banqueting hall, with private apartments, built over the original wall. Some few courses of Roman brick, possibly brought hither from Caerwent, are observable in the walls. The chapel was probably at the side of the first court, and there is the ruin of a small oratory in Martin's Tower. A vaulted chamber is also noteworthy, with a hatch opening towards the river for the purpose of lowering and raising stores.

From the Castle buildings the party proceeded to meet the carriages in the Monmouth road, at the extremity of the Castle Dingle, the more active portion preferring the walk to Piercefield Park, the grounds of which had been kindly opened by their owner, Mr. Henry Clay, for the enjoyment of the three miles of sylvan walks along the summit of the cliffs leading to the base of the Wyndcliff. The alternations of scenery viewed by occasional peeps between the curtains of foliage from the Alcove, the Platform, the Camp, the Double View, and the Halfway Seat on the summit of the Apostles' rocks, where

> Pleased Vaga, echoing through its winding bounds,

coursed in the deep ravine below, were all admired, and so was a fine Beech tree between the Halfway Seat and the grounds of the mansion, and some very fine Yew trees indigenous here. It has been remarked by the author of *A Week's Holiday in the Forest of Dean*, on page 62 of his book, when writing of the conspicuous lines of Yew trees as seen from the heights of St. Briavels, that the Yew trees follow in a remarkable manner, and by their presence mark out the lines of the out-crop of the iron ore, "the mine" as it is technically called here, the term being applied to the whole series of iron-bearing beds.

Some few managed to extend their walk along the summit of the cliffs, passing the Pleasant View, the Giant's Cave, the Lover's Leap, and the Temple, to the northern exit into the main road, thence onwards by the Moss Cottage to Tintern, distant 5½ miles from Chepstow.

The majority of the party, adhering to the programme of the day, returned to Chepstow, and, after a refreshing afternoon tea at the Beaufort Arms, resumed their seats in the special railway carriages for the return journey home along the bank of the Severn which river was now viewed under its aspect of low water.

Bloomfield in his "Banks of Wye" thus refers to the walks upon, and views from, the summits of the precipitous cliffs between Chepstow and Tintern :—

"No loitering here lone walks to steal.
Yet shrink from the abyss below;
Her echoing precipices roar.
As youthful ardour shouts before,
Here a sweet paradise shall rise
At once to greet poetic eyes.

* * * *

Beneath impenetrable green
Down, 'midst the hazel stems, was seen
The turbid stream, with all that past;
The lime-white deck, the gliding mast;
Or skiff with gazers darting by,
Who raised their hands in ecstasy,
Impending cliffs hung overhead;
The rock-path sounded to the tread
Where twisted roots, in many a fold,
Through moss, disputed room for hold.

* * * *

The stranger who thus steals one hour
To trace thy walks from bower to bower,
The noble cliffs, thy wildwood joys,
Nature's own work that never cloys,
Who, while reflection bids him roam
Calls not this paradise his home,
Can ne'er, with dull unconscious eye
Leave them behind without a sigh.

Banks of the Wye.—BLOOMFIELD.

Wordsworth thus records his impressions of this spot—the "Righi" o the Wye :—

"Once again
Do I behold these steep and lofty cliffs,
That on a wild secluded scene impress
Thoughts of more deep seclusion, and connect
The landscape with the quiet of the sky.

"How oft,
In darkness, and amid the many shapes
Of joyless daylight, when the fretful stir
Unprofitable, and the fever of the world,
Have hung upon the beatings of my heart—
How oft, in spirit, have I turned to thee
O sylvan Wye! thou wanderer through the woods,
How often has my spirit turned to thee!

WORDSWORTH.—July 13, 1798.

A FEW ROUGH NOTES ON THE EARLY HISTORY OF THE NEIGHBOURHOOD AND SURROUNDING DISTRICTS OF CHEPSTOW.

By Mr. JAMES DAVIES, of Hereford.

THE neighbourhood and surrounding country of Chepstow, from the river Severn, with the Forest of Dean, on the east, to the river Usk, with the Monmouthshire and Glamorganshire hills on the west, have in connexion with the geography of Ancient Britain an early history with many peculiar and interesting features which are worthy of note. The two districts, eastward and westward of the river Wye, lay within the Roman Province of Britannia Secunda, and included the towns or stations of Caerleon and Caerwent, Burrium (Usk), Gobannium (Abergavenny), Blestium (Monmouth), on the western side of the Wye, as well as a station near Lydney, on the eastern side, the name of which is not recorded, but it is noticed by that eminent antiquary, Sir Richard Colt Hoare, in his map of Ancient Wales, before and after the invasion of the Romans.

These Roman stations were naturally connected by roads for necessary military and commercial intercourse, and two very important roads (of the seven which were ultimately constructed in the Province of Britannia Secunda) passed through a portion of this district. The first was the Via Julia Maritima (probably named after Julius Frontinus, the conqueror of the Silures, the ancient British inhabitants of those parts). This road commenced at Aquæ Solis (Bath), (or Aquæ Sulis, as modern antiquaries have discovered its nomenclature to be), and crossing the river Severn, a little above Chepstow, led to Caerwent, and thence to Caerleon, whence it proceeded to Tibia Amnis (Cardiff), Bovium (near Ewenny), Nidum (Neath), Leucarum, (Lwchwr), Maridunum (Carmarthen), Advicesimum (Castle Fleming), and finally ended at Menapia (St. David's.) This road appears to have been constructed upon the site of an ancient British Trackway, known as the British Akeman Street, and, as will be perceived, ran pretty much upon the same line as the present Great Western Railway through South Wales. This road is described by Richard of Cirencester, who gives the exact mileage between each station; and it is curious, as well as important, in the identity of the several places. It is as follows :—

	M.P.*
From Aquæ Solis to Abona (Sea Mills, Bristol)	VI.
To Sabrina (on Severn)	VI.
The Passage of Severn...	III.
To Venta Silurum (Caerwent)	VIII.
To Isca Colonia (Caerleon)	IX.
To Tibia Amnis (Cardiff)	VIII.

*M.P. signifies mille passus—one thousand paces, from which Roman measurement we have deduced our mile of 1760 yards.

	M P.
To Bovium (Ewenny)	XX.
To Nidum (Neath)	XV.
To Leucarum (Lwchwr)	XV.
To Ad Vigesimum (supposed Adviceimum of Antoninus) (Castle Fleming) ...	XX.
To Menapia	XIX.
Total	CXXIX.

Another important road, the Via Orientalis, commenced at Caerleon, and passing Burrium (Usk), Gobannium, (Abergavenny), entered Herefordshire, and crossing the river Wye near The Old Weir, to Magna Castra (Kenchester), led to Bravinium, near Leintwardine, and ended at Uriconium (Wroxeter). This Iter is recorded both by Antoninus and Richard of Cirencester, with a difference of only one mile in the distance. According to Antoninus the respective distances are as follows :—

	M.P.
From Caerleon to Burrium*	IX.
To Gobannium	XII.
To Magna	XXII.
To Bravinium	XXIV.
To Uriconium	XXVII.
Total	XCIV.

*Richard gives VIII.

On the eastern side of the river Wye there does not appear to have been much Roman occupation. There was the unknown (at least in name) station at Lydney, and a road is indicated in Sir Richard Colt Hoare's map as leading from this station through the Forest of Dean to Ariconium, near Ross, in Herefordshire. There was probably also a vicinal road to Glevum (Gloucester). It is noticeable that the Romans worked for iron and coal in the Forest of Dean; but, in consequence of its woods affording a protection in barbarous days, the native inhabitants were so addicted to outrage people residing on the outskirts of the Forest that its recesses were not much penetrated.

At a period antecedent to, and concurrent with, and subject to, the Imperial Power in this country, there was the ancient British rule; and the district westward of the river Wye in earlier times was inhabited by the Silures, a war-like race, to whom Tacitus, in his Life of Agricola, refers, when he mentions that the swarthy complexions and curled hair of the Silures, and the contiguity of Britain to Spain establish a probability that the Ancient Iberi crossed over and took possession of those settlements. But it is to be feared that we cannot place much reliance upon the details of Tacitus, who does not appear to have been in Britain, but gathered his information of this country and its people from the only available source of soldiers and travellers.

After the Imperial Power in this country ceased, and the Britains alone ruled, the district westward of the Wye obtained the name of Gwent. Amongst the Records of the Lives of the Cambro-British Saints it is stated, in that of the life of St. Cadoc, who lived about the latter part of the sixth century, that there reigned formerly on the borders of Britain called Dyfed—Latin, Demetæ, or South Wales,—a certain Regulus named Glywys, from whom all the country in that district was called Glywysig, and who is said to have had ten children, the eldest of whom was called Gwynlliw, from whose name the country which he governed was called Gwynllwg, or Wentlog, and hence the name of Gwent. An incident worthy of notice with respect to this district is that, according to the Archæologia Britannica of Edward Llwyd, there was a separate Welsh dialect, known as the Gwentish British, which was spoken in Gwent, and parts of Glamorganshire and Breconshire, as well as in the Southern parts of Herefordshire.

The late eminent antiquary, Dr. Ormerod, of Sedbury Park, was of opinion that certain earthworks on the east side of the river Wye opposite Tintern were remains of Offa's Dyke, as the name had been traditionally handed down, and again, that certain earthworks running across from the Wye to the Severn were also remains of this dyke. This dyke is stated by the older authorities to have terminated near Bridge Sollars in Herefordshire; but after all there is much uncertainty about this earthwork. It was evidently a boundary at some early period, but from the circumstance of its being cut through by Roman roads in five places in North Wales, a doubt has been cast upon its later construction. However, if existing in the time of the extension of Offa's dominions, he may have adopted it as a recognised line of demarcation. Offa's dominions are described by old writers as extending from sea to sea, *i.e.*, from the mouth of the river Dee to that of the Severn, but as the river Wye formed such a favourable boundary from the junction of the dyke at Bridge Sollars, it may be urged that there was no necessity for any further line running parallel with the Wye.

Upon consulting the Ordnance Map, it will be seen that nearly all the names of the parishes and places in the Forest of Dean are of Anglo-Saxon formation; indeed, the name of "dene," which may be rendered a valley, a wood or forest, or secluded place, is Anglo-Saxon, and very descriptive of its physical characteristics; so that there appears to have been an English occupancy concurrent with British,—as in all parts bordering on Wales—whereas the names on the Monmouthshire side are mostly of Welsh origin. I have not met with any speculative opinion as to the derivation of "Chepstow," but it appears to mean "the market." The term "chapman," *i.e.*, one who buys and sells—a merchant—will best explain the interpretation, as will also the well-known street in London called "Cheapside." This town, situated on the boundary of the two districts, was the place where each people found a mart for the sale of their produce and commodities, and the Anglo-Saxon words "Cepe," or "Chepe," which means "business," and "stow" a "place," indicate the locality of the market place. The Rev. Jonathan Williams, in his *History of Radnorshire*, in a casual allusion to the name of the district between the Severn and Wye, states that "Ffer-llys" is a compound word signifying a country copious in grass, which Virgil would

have Latinized by the word "herbosa," and perhaps Homer would have rendered into his sonorous tongue by the epithet "λχερσόν." This etymology, he adds, strikingly accords with the character and quality of the soil of that country which lies between the rivers Severn and Wye, agreeably to the old distich—

"Blessed is the eye
Betwixt the Severn and the Wye,"

and with the more detailed and beautiful description given it in the Shakespearean language of Lear, a British Sovereign,

With shadowy forests, and with champaigns riched,
With plenteous rivers, and wide-skirted meads.

In allusion to the funeral of Ethelbert in Hereford Cathedral, the author gives the following lines from the hymn, or elegy, sung at the funeral, and afterwards on the annual obit of that Anglo-Saxon Prince, who was assassinated by Offa when he came, invited, to treat with him for the marriage of his daughter—

Corpus tandem est delatum
In Fferleiâ tumulatum;

and which he anglicises thus—

The princely corpse from thence at length conveyed
With funeral pomp in Fferley's church was laid.

This hymn will be found in full in the Hereford Use—for the service on the 13th Calends of June—the 19th of May. The country between the rivers Severn and Wye formed the Welsh fifth Royal Tribe District. In the *History of the Royal Tribes of Wales*, by Philip Yorke, it is stated that Athelstan Glodrydd, who lived in the early part of the 10th century, was the founder of this tribe, and that the district was anciently called Fferlys or Fferregs, and that it was independent of the jurisdiction of the Princes of South Wales. He was the son of Cyhelyn ap Ivor, who married the daughter and heiress of Grono ap Tewdwr Trevor, and through his mother he inherited the Earldom of Hereford. He was god-son to the Anglo-Saxon King Athelstan, who marched an army against Hereford, and imposed on the country a yearly tribute of £20 in gold, £300 in silver, 2,500 cattle, with a number of hounds and hawks. The founder of the fourth Royal Tribe of Glamorgan was Jestyn ap Gwrgant, who was descended in the 29th generation from the well-known Caractacus, the son of Bran, a Regulus of Siluria. The remaining names are Gruffydd ap Cynan, in North Wales; Rhys ap Tewdwr, South Wales; and Bleddyn ap Cynfyn, Powys. It will be remembered that Cadwalader, who lived in the 7th century, was the last King of Britain, upon the inroads of the Anglo-Saxons, after which the title was limited to the Princes of Wales; and that Roderick the Great, in the latter part of the 9th century, divided the Principality amongst his three sons, who became Princes of North and South Wales and Powys—Glamorgan with Gwent and Fferlys appearing to remain independent until the Norman Conquest, when the Lords Marchers began to control and govern their acquired districts.

After the establishment of the Lords Marchers the inhabitants of the Forest of Dean were guilty of predatory incursions upon their English neighbours, particularly on the borders of the Severn, and it was found necessary to restrain them by legal enactments. Although these statutory provisions do not contain much local information, still they show that the country between the Severn and Wye, towards the Forest of Dean, and then forming a portion of the Marches, was a locality where Welsh animosity lingered to the detriment of the English traders between the Cities of Bristol and Gloucester and Worcester, who were unmercifully plundered and ill-treated by their lawless Welsh neighbours who inhabited this district. By Statute 9, Henry VI., c. 5, after setting forth that the rivern Severn was common to all the King's liege people trading between Bristol, Gloucester, and Worcester, and that Welshmen dwelling near the River Severn had there lately assembled in great numbers, and taken the boats of such traders, and ill-used the people in such boats, it was provided that if anybody were in future disturbed of his free passage he should have his remedy by an action at law. In the nineteenth year of Henry VII. a similar Act was again passed upon the complaint that the merchants on the Severn were vexed and interrupted by divers misruled persons inhabiting the Forest of Dean. By Statute 23, Henry VIII. ch. 12, after setting forth that the king's subjects were interrupted along the paths of the Severn, it was enacted that if any person interrupted he should be liable to a penalty of forty shillings. By another Statute (26, Henry VIII., ch. 5), after reciting that divers felonies, robberies, and murders were committed in the counties of Gloucester and Somerset, in the parts adjoining the Severn, and that the perpetrators conveyed themselves at divers passages or ferries by night into South Wales and the Forest of Dean, it was enacted that if any person who kept any of the ferries at Aust, Newnham, and other places, conveyed over any boat with horses, oxen, or other cattle before the time of sunrising and after sunset, he should be liable to fine and imprisonment. In the same year another Statute (26, Henry VIII., ch. 6) was passed for the better administration of justice, and, to put an end to the animosities between the Welsh people and Lords Marchers, it set forth that the people of Wales and the Marches, not fearing the good and wholesome laws of the realm, had persevered in the commission of divers thefts, murders, rebellions, wilful burning of houses, and other abominable malefacts; whilst the next section, which applied to the Lords Marchers, stated that they had unlawfully exacted of the king's subjects, and committed them to prison upon light causes and extortiously compelled them to pay fines for their redemption contrary to law. The Statute 27, Henry VIII., ch. 26, put an end to these grievances by incorporating Wales with England, and completing the formation of the twelve Welsh Counties as well as forming the additional English County of Monmouth. This Statute declared that certain lordships and parishes, practically the whole of the present county, should constitute the shire of Monmouth, so that this part of the March district which had been historically and physically a portion of Wales, then became legally one of the forty counties of England and was ultimately added to the Oxford Circuit. The portions in the Forest of Dean annexed to Gloucestershire

are defined as the lordships, towns, and parishes, of Wollaston, Tidenham, and Beckley, and all honours, lordships, castles, manors, lands, tenements and hereditaments, lying or being between Chepstow Bridge, in the said Marches of Wales and Gloucestershire. Thus all legal distinction of race ceased: and it cannot be doubted that from a national point of view it was an advantage to the inhabitants of these districts, whether of Celtic or Teutonic extraction, that they should be placed under one Government, and enjoy the same rights and liberties, without reference to local distinctions, and thus be upon an equality under the same Crown; so that both peoples may now unitedly and cordially join in the daily prayer, "Duw a gadwo'r Frenhines," "God save the Queen."

THE GREAT FROSTS OF 1890-91.

By Mr. H. Southall, F.R.Met. Soc.

The writer proposes to consider the period, duration, continuity, and intensity of the cold, and to compare it in these respects with other frosts of the century. The effects of the low temperature on vegetation, in freezing over our largest rivers, as well as some other meteorological phenomena which were noticed previously to, as well as during, the actual continuance of the frost, may prove interesting in connection with its consideration. The month of January, 1890, was a very warm one. February and the first week of March were cold; the rest of March was warm. April was cool. May was very fine and warm until the 26th, there having been no frosts at four feet above ground, and only two very slight ones on surface of grass on the first and second of the month. From May 26th until September 26th the weather was cold, with no hot and very few warm days, July and August being both very showery months, although no great depth of rain fell—the two largest amounts in twenty-four hours being on July 2nd (1·10 in.), and again 0·53 in. on the 27th. In fact, the extraordinarily dry period which commenced on June 2nd, 1889, continued practically unbroken until May 15th, 1891, or for a period of nearly two years. September was a particularly fine month, the fifth dry one in succession, although generally the wettest month in the year; and the wheat crop in Herefordshire was said to be the best since the year 1863. The first frost of the winter occurred on the night of October 18th, when the dahlias, French beans, and other tender plants, which up to this time had been in full luxuriance, were much blackened and injured, rather more than four degrees of frost having been registered on the mornings of the 19th and 20th. The first real indications of winter, however, were on the 27th and 28th of the same month (October), the thermometer at Greenwich falling to 24·7 in the air and 20·6 on surface of grass, or about five degrees lower than with us. The mean temperature of the 28th was also the lowest ever registered at Greenwich on that day. There is only one record since 1814 in October lower, viz., October 29th, 1836, caused by a heavy fall of snow at that date. Warm weather again set in on November 12th, and continued until the 23rd. On the 19th and 20th the maximum readings at Ross were 60·3 and 60·2 respectively, the mean for the 20th at Ross being 54·8 and at Greenwich 54·9 on the 23rd, these temperatures being unusually high for so late in the year. Two days later an extraordinary change took place. The mean temperature of the 28th was only 21·8, being 19·1 below the average and more than 33 lower than on the 23rd, the greatest heat by day being 26·9, against 58·2, or 32·7 lower; and the greatest cold at night 18·3 against, 49·0, or 30·7 less than the mean. On this date Greenwich was about four degrees colder than Ross. The coldest day previously recorded in November was 23·4 on the 24th in 1816, so that 1890 was nearly two degrees below previous record. This proved to be the commencement of one of the most protracted and severe frosts of recent times. From the 25th November, 1890, to the 23rd January,

1891, inclusive, the frost was continuous, with the exception of three days, when the lowest temperatures were as follows :—

December 2nd	... ...	33·9
,, 5th	... ...	33·8
,, 6th	... ...	33·2

in each case it will be seen only just above the freezing point. From December 7th to January 21st, or for 46 consecutive days, there was sharp frost every night at four feet above ground in a Stevenson screen, and with properly attested instruments. This is, I believe, entirely unprecedented. At any rate I can find nothing like it in records going back for more than a century—it certainly is so in my own experience of more than fifty years. During this period of eight weeks snow fell on 12 days, the amount, when melted, yielding 1·18 inch of water, or reckoning one inch of water to a foot of snow, this would be equivalent to a depth of about fourteen inches on the level. Rain fell also on five days, yielding 1·37 in the gauge. At Ross the thermometer in screen fell to 20 eleven times, and on the surface of the grass eighteen times.

		degs.	
1890. Dec. 14	... ...	19·6	min. 4 ft.
15	... ...	17·4	
22	... ...	10·5	
23	... ...	19·6	
31	... ...	19·5	
1891. Jan. 7	... ...	15·6	
8	... ...	16·7	
11	... ...	14·9	
18	... ...	9·8	
*19	.. ..	7·3	On ground 4·9°
20	... ...	12·8	

At the same time the low temperature by day has been more abnormal than that by night, the thermometer having on many previous occasions descended lower than it has done this winter, as the following list will show :—

December 25, 1860	... ...	0·0 zero
,, 31, 1870	... ..	2·0 above zero
,, 31, 1874	... ...	4·0 ,, ,,
January 21, 1881	... ...	2·9 ,, ,,

On January 20, 1838, and February 18, 1855, it was also very little above zero. On December 24, 1878, the reading was 9·8 degrees; January 12, 1879, 7·0 degs. ; but in the great frost of 1879-80 the lowest registered was 13·8 degs. on December 7th. The average temperature by day and night, and also the mean of the two for the eight weeks, November 26th to January 20th inclusive, is as under :—

	Max.	Min.	Mean.
Greenwich Observatory	33·4	24·7	29·05
Ross (The Graig)...	34·8	24·5	29·65
Hereford (Burghill)	34·8	24·6	29·70

* Coldest night.

This amounts to a daily deficiency extending over the whole period of 11·8 degrees. It will be seen that Greenwich has a rather lower maximum than Herefordshire on account of the sun being more obscured by fog at the former place. It was in fact the coldest December since 1788, as the following list will show :—

		M.T.	Departure from average.
December Mean Temperature,	1788	29·0	11·5
	1796	30·4	10·1
	1799	32·8	7·7
	1840	33·3	7·2
	1844	33·0	7·5
	1846	32·9	7·6
	1870	33·6	6·9
	1874	33·2	7·3
	1878	33·7	6·8
	1879	32·4	8·1
	1890	29·8	10·7

The average maximum at Ross in December, 1890, 33·5, was 3·8 degs. less than the previous coldest in 1870, and 10·8 degs. below average of 30 years, and no less than 17·6 degs. colder than December, 1868. At Greenwich the maximum was 33·3 degs., also 10·8 degs. below the average of 40 years, and 18·5 degs. below that of 1852 ; the next coldest being 37·4 degs. in 1878 and 1879.

The following table, furnished by Mr. Ellis, Superintendent of the Meteorological Department, Greenwich, shows periods of early winter since systematic attention has been paid to meteorology at that observatory, *i.e.*, 50 years ago :—

Began.	Lasted days.	Mean daily temperature.	Below mean degs.	Greatest.	Days 10 degs. or more below.
1853. Dec. 11	... .. 27	30·9	7·1	13·2	5
1855. Nov. 13	..... 40	35·6	5·5	18·5	8
1870. Dec. 21	..... 44	31·2	5·9	17·0	10
1874. Dec. 9	..... 24	31·1	7·9	16·4	6
1878. Nov. 26	..... 30	32·1	9·1	17·3	12
1879. Nov. 20	..... 38	31·3	9·8	19·2	15
1890. Nov. 25	..... 48	29·3	10·8	20·7	29

The 1890-91 period is considerably longer and colder than the others. There were two severe frosts not included in the above list which occurred later in the year. That of 1844-45, when the Wye is reported to have been frozen over at Ross no less than three distinct times in the same winter, in December, February, and March ; it set in at the close of November, and lasted till Christmas, the temperature of the four weeks being about 9 degrees below average. After a month's interval of warm weather the frost set in again at the end of January and continued till the 21st March, these eight weeks being eight degrees below usual average, extraordinarily low temperatures having occurred on February 11th and

March 13th. In the latter case the temperature at noon was only 23 degrees, and a thermometer in long grass descended at night to —0·2 or slightly below zero! This is well remembered by those who attended Ross Spring Fair, when long icicles hung from the animals' mouths! What is called the "Crimean" winter was also a remarkable one. The frost continued unbroken for six weeks and began on January 14th, the weather having been mild at Christmas and for three weeks afterwards. The frost was so intense that a waggon crossed the Wye over the ice at Hoarwithy, and the defect of temperature averaged more than eleven degrees for the six weeks, the intensity of the frost being somewhat greater, but the duration two weeks less than that of last winter. We now come to the winters more than fifty years since. Although tables have been published giving statistics of the weather since 1771, still the figures are not sufficiently reliable to found any very accurate comparative calculation upon them, the error being caused not so much by any defect in the instruments used or of accurate observation, as from want of uniformity in the position of the instruments and the differences of situation and exposure not being sufficiently allowed for. At the close of the last century there were several notable frosts. January, 1776, was so on account of the great fall of snow which lay on the roofs of London houses for 26 days. 1784 was a very cold year, with severe frosts in January and again in December. On the last day of January the frost returned and continued to the middle of March, accompanied and followed by a severe and destructive drought. I have previously referred to the intense cold of January, 1795, when the ice on the Wye, when the frost broke up in the beginning of February, was said by an old man who remembered it well to have measured 18 inches thick. The flood which followed the thaw, which broke so many bridges, and whose height is recorded at so many places on the Wye and Severn, has not since been equalled on the Wye. The twelve weeks' frost of 1813-14 notable for the great depth of snow, as well as that of 1829-30, very severe but not quite so protracted, have been also previously described in our *Transactions*. In the winter 1890-91 the snow continued on the ground for five weeks, but never exceeded seven inches in depth in this part of Herefordshire. On its breaking up, under the influence of a strong south-west wind, the thaw was very rapid. The ice on the river Wye broke up at Hereford at four a.m. on the morning of the 21st, and six hours later at Ross, some twenty-eight miles lower down, the river rose five feet in one hour, the height of the flood being nine feet above summer level at one p.m., and ten feet at four p.m. the same day. For ten hours great blocks of ice from ten to fourteen inches thick rushed down with the stream, breaking off in many cases, and barking and stripping, the trees and other plants on the river banks, so as to leave for months afterwards marks of its course, the sight being a very grand one while it lasted. The last twelve days of January were warm and wet—1·59 of rain falling during that period. February was absolutely rainless, and the driest month in Herefordshire probably since June, 1826, or July, 1800. This was the sixth dry February in succession, curiously enough following seven consecutive wet ones; the means being 0·77 inches and 3·79 inches respectively. It was warmer than usual, although frosts occurred on 15 out of the 28 days in the month, and in the latter

part of it. March, 1891, was principally remarkable for the blizzard which occurred on the evening of the 9th, bringing with it a snowfall of some ten inches deep, blocking many of the roads, and resembling, though not quite equalling in severity, that of January 18th, 1881. In Somerset drifts of snow were reported ten feet deep. The weather continued very cold and dry in April, wind being north or east most of the month. May was cold till the 10th, very hot from 11th to 14th, afterwards cold, stormy, and showery. The contrast in temperature between the 13th, when the thermometer reached 79·8, and that of the 19th, when about five degrees of frost were registered, was very unusual even for May, and particularly destructive to fruit and early vegetables, some accounts describing it as the worst May on record. The rainfall which succeeded the breaking-up of the long-continued drought on May 15th, was, as usual in such cases, much in excess of average. Thus the seven months ending December 14th, 1891, had 27·18 inches of rain, the largest quantity in any similar period since 1852, October being the wettest since 1818, and the only wetter Augusts being those of 1878 and 1879, at the close of the month scarcely any corn being gathered, and much hay being still out. On the contrary, only three drier Septembers occurred in thirty-three years, the 10th, 11th, and 12th had each a maximum temperature exceeding 80°.

I have only now to notice three violent gales, which occurred in the autumn months. That of October 13th and 14th was preceded by a rapid fall of the barometer to 28·724 at 3.5 p.m. This gale was accompanied by torrents of rain, about 1¾ inches falling in two days—the river rose ten feet and trees were blown down in all directions; large elms being torn up by the roots, and blocking the roads in many parts. In consequence of the warm and windy weather this month dahlias and other tender plants were not injured till October 31st, or thirteen days later than in 1890. Extremely violent gales occurred on October 14th in 1877, and in 1881. The first was described at the time as a "tremendous gale doing immense damage both to buildings and trees," and as "a great hurricane or cyclone" causing "remarkable blasting of foliage," while that of October 14th, 1881, as "a most terrific hurricane causing immense loss at sea, and also great destruction of property on land." In this neighbourhood all the three storms were about equally violent and destructive. It would appear that the middle of October is specially subject to such visitations. The idea that gales are particularly prevalent at the equinoxes has however been proved to be an erroneous one.

The neighbourhood of Ross which more particularly came under the author's observation presented a very singular appearance after the passage of the storm. Specially so in exposed parts like Ross churchyard where large limbs were torn off the elms, and also in the valley where the conformation of the ground caused an outlet to the pent up fury of the gale.

On November 11th, 1891, there was another violent south-west gale, accompanied by an unusually low reading of the barometer, 28·176 (uncorrected) at 9.45 a.m., the greatest violence occurring about one to two p.m., during the exceedingly rapid rise of ·743 inch in 7½ hours. Many trees, which had stood the pressure of the previous gale, succumbed to this, rooks' nests being blown clean

out of the trees, and fir trees browned by sea spray at a distance of twelve miles from the coast. But we have not yet completed the tale of disasters in this remarkable year.

On December 7th, there was a tornado at Peterstow, near Ross, causing great destruction in a limited track of some three or four hundred yards wide, and, perhaps, a mile long, the roar of which was distinctly heard as it was approaching. In this somewhat limited district the orchard and forest trees fell before the gale like ninepins.

Again, in December, there was a great storm of wind from the 10th to the 13th, scarcely inferior in effects to that of October. The *Hereford Times* of December 19th, 1891, thus describes the gale of Sunday, December 13th :—"The gale on Sunday caused much damage in Hereford and district. As in the case of the October storm, trees were the principal sufferers, a large number having been uprooted. A small tree growing on the Hereford Castle Green bank by the side of the Castle Pool was blown down, and the branches from another tree close by were broken off. In order to remove the fallen timber it has been found necessary to drain the pool. A portion of a large elm tree standing at the rear of a cottage occupied by Mr. George Minton, gardener, Whitecross Road, Hereford, was blown down. The limb fell on the roof and very much damaged it. Luckily no one was injured. At the Green Crize, ten of the large elm trees were on Sunday morning blown down within twenty minutes. They fell across the road, and it was not until Tuesday evening that all of them were removed. The trees in this avenue are about 85 years of age, and the average height of those which were levelled to the ground would be about 100 feet. A large tree was also blown down on the railway near Redhill junction. Fortunately it was quickly observed, and was removed before any further accident could result. During Sunday, the high wind was accompanied by heavy rains, and on Monday morning large tracts of land were covered. The Lugg was very much swollen, and the Wye registered 15 feet, which is about a foot more than in October."

A similar succession of fierce gales occurred in the autumn and winter of 1859-60, commencing with what has been called the "Royal Charter" gale of October 25th, 1859, and ending with that of February 28th, 1860, which was the most violent one of that stormy season, and probably, the most so since the memorable one of January, 1839.

I have not yet alluded to the effects of these exceptional climatic conditions on vegetation. There is not time to enter fully into the subject. Suffice it to say that while many plants were completely overcome by the great frosts of 1890, it is by no means clear that quite as much permanent injury has not been done by the cold springs which have been the rule now for several past years. It has, however, afforded proof of the great recuperative powers of nature. It is hardly to be expected that New Zealand, Californian, or Mediterranean plants, to say nothing of some tropical species, should not resent the severe changes we have experienced. Gardeners will now perhaps know better how to protect or preserve the more delicate subjects, so that our gardens may still be beautified by the most striking plants which travellers can collect from distant parts of the world.

Woolhope Naturalists' Field Club.

AUGUST 25TH, 1892.

THE Brecon Beacons were visited on Thursday, August 25th, under the most favourable conditions. Owing to the peculiarly rarefied state of the atmosphere, objects on the distant horizon could be discerned with remarkable distinctness, insomuch that those who ascended the two rival summits had cause to congratulate themselves on being favoured for once in a lifetime with such an unusual atmospheric phenomenon. These conditions of atmosphere are rare, and would surpass belief if not faithfully recorded. We have notes, for instance, of a similar rarefaction of atmosphere which prevailed on Monday, July 8th, 1888, to such an extraordinary degree in the English Channel that every prominent object along the French coast could be picked out from Dover and Folkestone; the lighthouse at Cape Grisnez, Calais, and the dome of the Cathedral and Napoleon's column at Boulogne, could be distinctly seen with the naked eye. The distance from Dover to Boulogne, as the crow flies, is 28 miles, and the column is about two miles further inland.

For the benefit of posterity it is considered advisable to leave on record how best the ascent of the Beacons can be managed in one day from Hereford. Having guaranteed a party of say fifty members, you must request the Midland Railway Company to make arrangements with the Brecon and Merthyr Railway Company to give you a special train along their line from Talyllyn Junction to Torpantau. Proceeding along this latter line, the first station from Talyllyn is Talybont, a pretty village near the junction of the River Cafanog with the Usk. From Talybont the line ascends along the shoulder of one of the hills for a distance of seven miles to the next station, Torpantau, overlooking upon the right hand the valley, seven miles in length, of Glyn Collwng, presenting only for a short interval occasionally a glimpse of one or other of the three angular summits of the Beacons in the background, as they peep out between the intermediate heights. The scenery upon the left of this line having been already described on page 82, on the occasion of the visit of the Club on August 26th, 1890, it is unnecessary here to repeat it. On reaching the summit of the seven miles ascent, the train enters a tunnel, immediately on emergence from which the traveller finds himself landed on the platform of the railway station at Torpantau, at an elevation of 1,314 feet above the sea. There is no refreshment room at the station, nor are any to be found on the Beacons, you will therefore act wisely in soliciting the assistance of the gude-wife of the station master to prepare a good fire, hot water, and other creature comforts, in event of your return to Torpantau in preference to making the descent over the Beacons to Brecon.

For the ascent of the Beacons you cannot do better than follow the latest

Instructions for the Ascent.

At the railway station take the main mountain road on the right hand. At the distance of about a mile and a half a farmhouse on the left hand will be passed, and shortly beyond it a road is seen bearing to the left, which leads to the uppermost dam of the Dowlais reservoir; avoid that road and bear to the right continuing the easy ascent of the main road for a further distance of nearly two miles, until you arrive at the Pass between the hills. Halt here awhile to admire the views in all directions.

From this Pass the walk into Brecon is considered to be about seven miles.

If the ascent of the Beacons be desired, it should be commenced from this Pass by gradually ascending along the southern flank (that is to say, upon its Torpantau side) of the rounded elevation (Y-Fan-big) upon your right-hand as you face the summit of the Beacons, thence over the Pass between it and the next succeeding beacon, which must be gradually ascended along its shoulder until you find yourself in a narrow Pass between the two rival summits, Pen-y-Fan, and Y-Fan-Corn Ddû, whence, by a short and somewhat steeper climb towards the furthest of the two you will find yourself on the top of Pen-y-Fan, the head of the summit, 2,910 feet, only 19 feet lower than Cader Idris; unless by the recent Ordnance Survey Cader Idris has been found other than 2,929 feet high, or Pen-y-Fan less than 2,910 feet.

The descent may be made either back by the same route to Torpantau, or by a footpath along the very steep inclined slope of the first-climbed rival, overlooking the Cwm Serré Valley (where the most interesting plants have been found). This footpath leads to Pont Cynedydd, whence a road leads into Brecon, the total distance of the whole descent being about six miles.

If there is plenty of time and you have good legs, the return to Torpantau may be varied by descending into the valley, where the stream Taf-fechan collects the waterflow from the Beacons, but it is advisable to keep on the Torpantau side of the stream, the opposite side being, although practicable in fair weather, much rougher ground, and riddled with ravines, impassable after heavy rains.

The heights of the principal mountain ranges in the immediately neighbouring district of the Brecon Beacons are :—

	Feet.
The Beacons (Pen-y-Fan)	2,910
Y-Fan Brycheiniog (Carmarthenshire Beacons), 12 miles west ...	2,631
Pen-y-Cader Vawr (in Breconshire), 14 miles north-east ...	2,630
Y-Fan Dwigarth, in the Great Forest of Brecon	2,410
Y-Fan Gihirach ditto	2,382
Cribarth ditto	2,000

The chain of hills on the west merge into the Carmarthenshire Vans, of which the highest peaks are Fan Vawr, 2,631, Talsarn, 2,596, and Capellante, 2,382 feet high. Northwards are the Epynt (sloping) hills, in Breconshire, of which the highest, Dwggan, near Builth, 2,071 feet high, is about 25 miles distant. All the distances given represent only the horizontal distances as the crow flies.

All of the North Wales guide books give the height of Cader Idris as 2,929 feet, only 19 feet higher than the Brecon Beacons, with the exception of

Black's Guide to North Wales, edition of 1886, which, whilst giving on page 188 this same altitude, 2,929 feet, adds the information that, according to the Ordnance Survey, its height is 3,100 feet. Again, in *Baddeley and Ward's North Wales*, 1887, we have on page 125 the height given 2,949, and on page xi., 2,929 feet: where the error is we know not.

The following objects are visible upon the clearest day from the summit of Pen-y-Fan :—On the north, nestling in the valley along which the silvery Usk threads its way is the town of Brecon, and on the distant horizon the Epynt hills; on the east, Llangorse Lake, and the long, comparatively level, plateau of the Black Mountains terminating in the Hatteral Hills of Herefordshire, and in the Sugar Loaf near Abergavenny; on the west, only 400 feet below is the lake Llyncwm-llwch; beyond it is the farm of Tymawr, the highest on the mountain, and in the distance are the Carmarthenshire hills; in the north-east the outline of the Malvern hills may be seen, and occasionally a peep may be had of Cader Idris in the north-west; looking southwards, a stupendous range of numerous mountains surrounding the mineral wealth of the iron works of Dowlais and Merthyr Tydvil, with the Bristol Channel in the extreme distance, the ships in which appear as mere specks, the locality of steamers distinguishable by their smoke, over which may be seen the Mendip Hills in north Somersetshire and situated still further west the range of hills constituting a portion of the general Exmoor highlands from Minehead inland, of which Chapman Burrows on the west reaches 1,540 feet, and Dunkery Beacon on the east, the highest of the range, attains 1,708 feet.

Yes Tor, 2,030 feet high, recently deposed by the Ordnance Survey in favour of its more elevated neighbour, High Willays, 2,039·4 feet high, situated nearly half a mile south, at the north-western extremity of the Dartmoor range, would be from 30 to 40 miles further south, and lies west of the Exmoor range. We are not prepared to say that it was visible in the unusually clear atmosphere of our excursion day, not being sufficiently acquainted with the outlines of these heights; but we learn from J. Ll. Warden Page's *An Exploration of Exmoor and the Hill Country of West Somerset*, pages 150, 151, published 1890 by Seeley & Co., that the panorama visible from Dunkery Beacon as a centre extends southwards to Brown Willy, 1,400 feet high, the highest of the moors in Cornwall, to the Brecon Beacons in the north, and to Malvern hills in the north-east, the total distance from north to south of these objects being one hundred miles or more. We must therefore be prepared to allow a far greater distance from the greater elevation of the Brecon Beacons, whilst the horizontal circuit must embrace several hundred miles. Allowing for the rotundity of the earth's surface and 4,000 miles for its radius, we find that a line drawn from a man's eye, say five feet high, on the top of Pen-y-fan, 2,910 feet, or from a height of 2,915 feet would cut the sea horizon in the Bristol Channel at the distance of about 66 miles, 810 yards.

We remember calculating the tangent to the earth's surface from Shumsan the highest point in Aden, 1,760 feet, at 51 miles 1,127 yards. A man's eye on the earth's surface cuts the horizon at 2¾ miles. From the deck of a first-class steamer the smoke of another steamer may be visible at a distance of more than

40 miles. The distance visible from the Peak of Teneraiff, 12,182 feet high, to the horizon is generally given as 150 miles.*

How these distances sink into insignificance compared with Mr. W. M. Conway's explorations in the Hindu Kush, given in the telegram from Calcutta, dated September 26th, 1892! Humboldt and Bompland in June, 1802, ascended a height of 19,400 feet. Schlagintweit's highest authentically recorded height in Nepaul was 22,230 feet. Mr. Conway's greatest ascent, the Pioneer Peak, was reported in the telegram of the *Times* of September 27th, 1892, to be over 23,000 feet, but after comparison of his barometer with the Standard at Leh, the height was reduced to a maximum of 22,500 feet as given in the *Fortnightly Review* for September, 1893, page 345. He and his artist companion, McCormick, from this altitude, with the inaccessible "Golden Throne" towering above them, commanded a prospect in the direction of Hunza, that is to the north-west, computed at 200 miles, which at such an altitude and in that clear air of diminished pressure is quite to be believed.

The members separated in about two equal divisions, half of them visiting Brecon. Those who returned to Torpantau sat down to afternoon tea prepared by the wife of the station-master, and when the divided forces were re-united at Talyllyn Junction on the Midland Railway for return to Hereford all congratulated themselves on the memorable day, which for distant views due to the unusually rarefied atmosphere had, in their opinion, never been equalled, and could never be surpassed.

Botany.—The Botany of this district has been already given by the Rev. Augustin Ley, see pages *ante* 86 to 97, connected with the visit by the Club in August, 1890. Nor have we anything to day to add to the record.

Geology.—As regards the Geology, we cannot do better than transcribe from the published programme of the day:—These peaks are the highest Old Red Sandstone summits in the Kingdom; both the southern peaks are extremely steep on their northern aspects, and the central Beacon has on its north-east side, near its summit, a terrific precipice, apparently nearly perpendicular, of about 600 feet. The whole district is generally barren of fossils, although occasionally very imperfect fish scales have been found. Everywhere around the hills are vast masses of angular local drift, swept down by land-ice and snow, and it is said that Arenig and other boulders have been found in patches of clay near Van-big, leading from Torpantau to Brecon. The Rev. William Symonds informs us in *The Records of the Rocks* (page 246) that "the rocks of the summit consist of the Brownstone series of the Old Red Sandstone dipping to the south under the Old Red Conglomerate and the Carboniferous limestone of the South Wales coalfield. The strata on the summit are the same as those capping the Carmarthenshire Beacons on the west, and the Gadir Vawr on the north-east above Talgarth, and

* The tangent from a man's eye (say 5 feet) at an elevation of 12,182 feet, would cut the sea-horizon at the distance of nearly 136 miles.

Note.—These calculations are approximate, being based upon taking the diameter of the earth, roughly, at 8,000 miles instead of 7,926 miles. The range of vision to the sea-horizon would consequently be a little *less* than those given. But it must be taken also into consideration that Terrestrial Refraction would *increase* the actual range of vision.

they underlie the isolated outlier of Carboniferous rocks at Pen-Cerrig-Calch above Crickhowell." He tells us that "the marly Conglomerate on the summits here is similar to that on the Scyrrid; these said marly Conglomerates being the basement beds of the quartzose Conglomerates which underlie the Yellow Sandstone and the lower limestone shales of the Carboniferous rocks."

Ornithology.—Mr. James Pilley reported having viewed a little below the summit as many as four Ravens. Although this bird has become extinct from many localities we rejoice to hear from Mr. E. Cambridge Phillips that it is fairly common about the Brecon Beacons, where it breeds every year, and may be seen on most days.

The following attended the Meeting:—The President, Mr. W. H. Barneby; Vice-Presidents, Rev. Sir George H. Cornwall, Bart., Sir Herbert Croft, Bart., Rev. Augustin Ley. Members: Rev. C. S. Hagreen, Rev. E. J. Holloway, Rev. A. W. Horton, Rev. A. G. Jones, Rev. Preb. W. H. Lambert, Rev. H. B. D. Marshall, Rev. H. North, Rev. the Ven. the Hon. B. L. S. Stanhope, Rev. Morgan G. Watkins, Rev. R. Wood, Mr. E. J. Baker, Mr. C. G. Blathwayt, Mr. Cecil Butler, Mr. Charles Fortey, Mr. T. C. Paris, Mr. H. G. Sugden, Mr. J. P. Sugden, Mr. H. A. Wadworth, Mr. A. Watkins, Mr. Arthur W. Weyman. Hon. Sec., Mr. H. C. Moore; Assistant Secretary, Mr. James B. Pilley. Visitors: Canon W. Lathom Bevan, Rev. C. H. Binstead, Rev. A. C. Ranger, Rev. Bransby Roberts, Mr. Barneby (junior), Mr. J. R. Beaven, Mr. F. L. Blathwayt, Mr. H. W. Blathwayt, Mr. J. Goss, Mr. R. C. Horton, Mr. G. Jones, Mr. A. E. Jones, Mr. E. A. Jones, Mr. John Probert, Mr. Bransby Roberts, and Mr. M. J. G. Scobie.

A FEW NOTES ON THE EARTHQUAKE OF AUGUST 18TH, 1892.

By H. C. Moore.

Happily for us in Great Britain we are certainly free from a frequency of panics owing to earthquakes, nevertheless we have on record between three and four hundred notices of more or less sensible tremors since A.D. 204. Of these, however, six only may have equalled or exceeded in intensity that of the East Anglian earthquake of April 22nd, 1884, the most serious one in our island during the present century. That of October 6th, 1863, which is reported on page 115 of *Transactions*, No. 5, was one of the undulatory movements of a more harmless nature, although, on the authority of Mr. Clement Ley, some houses at Sellack were somewhat injured. Of that earthquake Herefordshire was apparently the Epicentrum, or that part of the crust of the earth vertically over the focus or centrum, the "seismic vertical" of the older seismologists.

The six earthquakes above referred to occurred in the years 1185, 1246, 1248, 1275, 1382, and 1480.

I have been in expectation of receiving a short paper for our Club on the subject of the earthquake of this year from the pen of Mr. Charles Davison, who wrote to me from 38, Charlotte Road, Birmingham, and to whom I sent as many particulars from our own county as I could gather together. Owing to stress of occupation and other engagements, Mr. Davison, who now writes to me from 373, Gillott Road, Birmingham, informs me that his paper will not be ready before next November. Rather than that the event should be unnoticed in this volume, I pen these few notes in the hopes of publishing a better report hereafter.

The earthquake of August 18th occurred about 12.27 a.m. There are reports that further slight tremors occurred a few hours afterwards, but the times given are so conflicting that I have been unable satisfactorily to fix the precise periods when they took place. That the tremors were but slight is evidenced by the few who were sensible of their occurrence. The first report of the earthquake was notified to me as early as eight o'clock, during breakfast, by my niece, who, from a residence in the North-West Provinces of India, is familiar with the accompaniments of earthquake action. She, a light sleeper, stated that she was awakened by an earthquake, that her bed was apparently lifted up from her side so as to apparently (not really) propel her against her sister who was lying at her left-side in the same bed. She awoke her sister and told her there was an earthquake. The windows rattled at the same time. She got out of bed, opened the window, and looked out. All was most perfectly still, not a breath of air stirring. Her bed is situated due north and south, her head being at the south end—the apparent oscillation would thus be from east to

west. All the remaining seven persons in my house at 26, Broad Street, Hereford, slept comfortably in total ignorance of the event.

Mr. John G. Leigh, Editor of the *Hereford Times*, also familiar, from his residence abroad, with the tremor sensations accompanying an earthquake, states that his bed was rocked as if a heavy vehicle had passed near by, that his windows rattled, and that his house, No. 137, Widemarsh Street, appeared for the moment to tremble.

Dr. F. Bainbridge was awake, and testifies to a distinct tremor of his house, Gattonside, Hampton Park, agitating objects on the dressing table, and a pair of scissors on a tray; he adds that distinct and characteristic sounds accompanied the vibratory movements.

Mr. Alfred Watkins, residing at The Croft, Hampton Park, distinctly felt the shock which he considered lasted for four or five seconds. All these three give the time between 12.25 and 12.30 a.m.

I have received more details of the shock from Mr. Thomas Bailey, railway signalman, writing from Rose Cottage, Wharton, near Leominster. He was seated on a chair on the first floor, ten feet above ground. He gives the time 12.27 a.m., the shock was continual (not varying) for the duration of five or six seconds. He describes it as a trembling motion which came suddenly and passed gradually away, having an intensity strong enough to make windows and doors rattle and to shake his chair. He compares the accompanying sound to the rumbling of distant heavy thunder in the earth itself and not above the earth. After the shaking of his cabin he ceased to hear any rumbling noise. He telegraphed to the signalman in charge at Ford Bridge, asking him if he felt the shock, and the reply was that he did. At Leominster cabin station nothing was felt or heard. Leominster is about three miles north, and Ford Bridge is about one mile south, of the signalman's position. Thomas Bailey gave the direction of the shock as proceeding from the south, thence travelling in a north-westerly course.

From reports in the newspapers the greatest intensity of this earthquake was felt in Pembrokeshire. It was felt in the counties of Pembroke, Carmarthen, Cardigan, Glamorgan, Monmouth, Somerset, Cornwall, Gloucester, Hereford, Radnor, and Salop. It extended as far east as Taunton, and as far west as Penzance. Moreover, the newspapers report that a double shock was felt at Greystones, near Dublin, of sufficient intensity to shake houses and to alarm inhabitants so much as to cause some of them to leave their beds.

A remarkable tidal wave occurred in the river Dart on Wednesday, August 17th, and recurred several times on the following day, 18th, presumably due to the earthquake.

We have the opinion of Sir Robert Ball, the Astronomer Royal for Ireland, that earthquakes may be due to steam generated by the percolation of water through fissures within the earth's crust coming in contact with the molten mass underneath this crust. However they may be caused, that they are closely allied to volcanoes is known from the facts that:—

1. Earth tremors occur most frequently in volcanic districts.
2. Earth tremors often precede volcanic outbursts.
3. Earth tremors of a district often suddenly cease on the outburst of a neighbouring volcano, the opening of the crater apparently acting as a safety-valve.

A systematic collection of reports from various places is to be recommended. The time, particularly to the very minute or second, if possible, is of importance. The duration of the shock, the direction it came from and that of its course should be especially noted.

In order that members may be prepared with a set of questions to be answered and forwarded to the Honorary Secretary in the event of another visitation of an earthquake, I subjoin below a copy furnished by Mr. Davison.

1. *Name of the Place* where the shock was felt.
2. *Situation of the Observer:* (*a.*) Whether indoors (and on which floor of the house) or in the open air. (*b.*) How occupied at the moment of the shock.
3. *Time* at which the shock was felt, if possible, to the nearest minute.
4. *Nature of the Shock:* (*a.*) Was any tremulous motion felt before the principal vibrations, and for how many seconds? (*b.*) How many principal or prominent vibrations were felt, and for how many seconds did they last? (*c.*) Was any tremulous motion felt after the principal vibrations, and for how many seconds? (*d.*) Did the movement gradually increase in intensity and then die away, or were there several maxima of intensity? (*e.*) Were the principal vibrations strongest near the beginning, the middle, or the end, of the series? *(f.)* Was any vertical motion perceptible, and, if so, was the movement first upward and then downward, or *vice versâ*?
5. *Duration of the Shock* in seconds, not including that of the accompanying sound.
6. *Intensity of Shock:* Was it strong enough: (*a.*) To make windows, doors, fire-irons, &c., rattle? (*b.*) To cause the chair or bed on which the observer was resting to be perceptibly raised or moved; (*c.*) To make chandeliers, pictures, &c., swing, or to stop clocks; (*d.*) To overthrow ornaments, vases, &c., or cause plaster to fall from the ceiling; (*e.*) To throw down chimneys, or make cracks in the walls of buildings?
7. *Sound Phenomena*: (*a.*) Was any unusual rumbling sound heard at the time of the shock, and, if so, what did it resemble? (*b.*) Did the beginning of the sound precede, coincide with, or follow, the beginning of the shock, and by how many seconds? (*c.*) Did the end of the sound precede, coincide with, or follow the end of the shock, and by how many seconds? (*d.*) Did the sound become gradually louder and then die away? (*e.*) Were the principal vibrations felt before, at, or after the instant when the sound was loudest? *(f.)* Could any estimate be formed of the intensity of the sound when loudest by comparison with that of some well-known sound at a given distance?

8. *The Names of any other Places* where the earthquake was noticed would be most useful, together with answers for each place (if possible) to the following questions. (*a.*) Was the shock felt? (*b.*) Was it strong enough to make doors, windows, fire-irons, &c., rattle? (*c.*) Was any unusual rumbling sound heard at the time of the shock?

	a.	*b.*	*c.*

9. *If any slight Shocks were felt* before or after the principal shock, a list of them with their times of occurrence would be most useful, together with answers for each shock to any of the above questions, especially to Nos. 4, 6, and 7.

Woolhope Naturalists' Field Club.

FUNGUS FORAY.

The Fungus Foray of 1892, notwithstanding the unfavourable wet weather with which it was accompanied, contributed as many as seventeen species new to the county, including one entirely new to any country, which has been named *Agaricus* (Omphalia) *alutaceus, Cke & Mass.* Dr. Cooke, as usual, daily made out the list of the finds, and the additions will be recorded in the "Flora of Herefordshire" when the authors of that work are in a position to publish their supplementary list of the other branches of botany. This season the Club combined with the Fungus Foray a search for Rubi, under the direction of the Rev. Augustin Ley, with the result that some few species have to be added to the ninety already recorded in the "Flora," and in the course of the rambles after Rubi, Mr. Ley discovered a station in Herefordshire for *Erythræa pulchella*, and one for *Epilobium Lamyi*. A curious accidental feature in this new departure presented itself in the fact that the first specimen of fungus which found its way to the exhibition was a *Marasmius ramealis* on a decayed branch of Rubus. The persistent rain on Tuesday much interfered with the operation of exploring the Whitcliff woods, near Ludlow, and on Wednesday the abandonment of the visit to Haywood Forest was attributed to the same cause. These disappointments, however, were lightened by advantageously occupying the period of imprisonment in the classification of the local collection, which was augmented by the contents of a hamper from Guildford, sent by Mr. Howse, and another from Longwitton Hall, Morpeth, sent by Mr. Cecil Sp. Perceval, which contained various *Lactarii*, the egg stage of *Cynophallus caninus*, *Polyporus melanopus*, *Russula drimeia*, and most interesting of all, *Ag. Clitocybe monstrosus*, which appears annually in the same locality on the hard ground bordering a road. This classification was carried on chiefly under the superintendence of Mr. Carleton Rae and Mr. John Rose, both of whom are members of the Worcester Naturalists' Field Club, whose presence will be gladly welcomed at future mycological meetings of the Hereford Club. Mr. William Phillips joined the party at Ludlow, and Mr. T. B. Acton and the Rev. J. E. Vize accompanied the party on Thursday, when, under a more genial sky, the foray was carried out over the woods at Dinmore.

On the exhibition table were displayed numerous publications on mycological subjects, including Cooke's *Illustrations of British Fungi*. Upon a large screen were affixed the coloured diagrams from Helsingfors, Finland; and with the object of popularizing the knowledge of the edible fungi, Dr. Cooke's popular

work, *British Edible Fungi*, published in 1891, was placed within the reach of the student, and a tray, in which more than a dozen species were shown, was specially reserved for their exhibition.

At the Annual Meeting of the Club, the Rev. Preb. W. H. Lambert, rector of Stoke Edith, was elected President for 1893. A volume of more than four hundred pages of the *Transactions of the Woolhope Club* from 1886 to 1889, was presented, with the gratifying announcement that the next succeeding volume of *Transactions* from 1890 to 1892, already in progress, might be expected in 1893, thus bringing all arrears up to date.

The Geological Photographs Committee has, at the recommendation of Mr. George H. Piper, F.G.S., suggested the following geological exposures as deserving of being represented by photographs, with the view of being brought before the notice of the Committee in connection with the British Association for the Advancement of Science. It is hoped that the members of the Hereford Amateur Photograph Committee may render assistance by supplying some negatives:—1. The Passage Beds from the Old Red Sandstone into the upper Silurian at Ledbury Railway Station; 2. The Ballast-hole at the same station, exhibiting Aymestry limestone and Lower Ludlow formation; 3. The Commos Quarry, at Ledbury, of Lower Ludlow lying conformably upon Wenlock limestone; 4. The Cockshoot, at Woolhope, of Aymestry limestone; 5. The Dormington Quarries of Wenlock limestone; 6. Martin's Quarry, the Pear-tree walk at Ledbury, of Wenlock limestone; 7. Worcester-road, Ledbury, the exposure of Wenlock limestone; 8. Eastnor, the drift at Clencher's Mill; 9. Lowe's Hill, or Loose Hill, Quarry, near the back of Bartestree Convent, exhibiting an upthrust of Diorite. And the following localities and strata connected with the Malvern range of hills; 10. White-leaved Oak, old Gneiss, &c.; 11. Holly Bush Pass, Diorite, Hornblende, &c.; 12. Holly Bush, Eastnor, Cambrian Sandstone; 13. Winds Point, Diorite, Hornblende, Gneiss, &c.; 14. The same exposure at North Malvern.

After dinner, at the Green Dragon Hotel, Mr. Cambridge Phillips exhibited what he supposed to be a hybrid of the Red Grouse cock and the Partridge hen, which had been shot near Brecon by Mr. Rees Williams.

Next followed a review of the subject of

FUNGI, PAST, PRESENT, AND FUTURE,

By Dr. Cooke,

Who, after some personal and local allusions and remarks, went on to draw comparisons between the position of the study of mycology twenty-five years ago and at the present day:—At that time, say 1865, books on this subject for the use of students were few and inefficient. The *Handbook of British Fungi*, did not make its appearance until six years later. This was a sort of "middle ages" for mycology. Those who pursued it were persecuted, and pestered with the inquiry of "What good is it?" "Will it put money in your purse?" The only possible answer was, that it enabled a person to distinguish good from bad, as esculents, and that as a means of acquiring knowledge it would ultimately secure its own reward, in addition to the pleasure it gave to all lovers of nature to explore her mysteries, without regard to whether it was profitable or not.

The first explicit knowledge of the modes of reproduction, and the life history of the *Peronosporeæ*, those destructive parasites of field and garden plants, was not expounded until 1863. It was some time after this that the result of the investigations was even known, much less appreciated in this country. The same may be said of the *Uredineæ*. It was but a faint and obscure knowledge that we had of the resting nature of the *Teleutospores* in *Puccinia* and *Uromyces*, and the promycelial spores were scarcely taken into account as important elements in the diffusion of these fungi. If we revert to the current knowledge of the processes of fermentation, we shall discover that it was extremely meagre, for Pasteur did not commence his researches until 1857, and it was slow progress which his views on yeast fungi made at the commencement; and even Tulsane's splendid work on the *Pyrenomycetes* was not completed until the year 1865, so that we may regard that date as the very commencement of a new era in the study of fungi.

Certainly it was not suspected, at that time, that those minute bodies called "microbes" were performing such an important part in epidemic diseases of man, animals, and plants. It was only in 1863 that Pasteur turned his attention in this direction, and although the microbe of "glanders" had been seen in 1868, it was not in any way associated with the disease. About 1873 Pasteur commenced his experiments upon splenic fever, which he continued until at length his experiments in vaccination were proceeded with on such a large scale that in 1882 he had vaccinated 130,000 sheep and 2,000 oxen, with astounding results. In 1878 the bacillus of swine fever was discovered, in 1881 the microbe of the typhoid fever of horses, and in 1884 Pasteur succeeded in inoculation for "rabies." Thus it will be seen that in quadrupeds first, and in humanity afterwards, the germ theory of disease made steady progress. The principal events associated with epidemic diseases in the human subject were the investigations into typhoid fever in 1871 and diphtheria in 1873. These were followed by researches into marsh fever, or malarial fevers in 1879, measles in 1880 and pneumonia in 1882. All the rest is matter of modern history, such as the comma bacillus of cholera in 1883, and Dr. Koch's more recent announcements as to tuberculosis. We do not pretend

to claim for all these the same amount of unequivocal success. A fungus hunter is not perhaps a competent judge in diseases which have baffled the wisest and shrewdest of professional men, but we can claim to have admitted an immense amount of light into the darkest corners of medical practice, and to have diverted investigation into a new and apparently the most feasible and important channel. It is not fashionable now, in the face of such success, to sneer at the mycologist as a useless member of society, or to enquire concerning his hobby, "of what use is it?"

This brings us from the study of fungi in the *past* to inquire of its position in the *present*, and this can be summed up in a few words, as an unexampled success. It has been successful in moulding sanitary operations upon a scientific basis. It has been successful in checking some of the most fearful destroyers of human and animal life, such as typhoid fever, rabies, and anthrax. It has been successful in extending widely the radius of human inquiry and human knowledge. It has been successful, through a cognizance of their life history, to simplify and render more effectual the labour of the cultivator in combating the diseases of useful plants. It has been successful in some countries in the establishment of experimental stations, of departments of agriculture with a scientific staff, and it is now creating a public opinion in favour of systematic and scientific treatment in opposition to the old "rule of thumb."

Finally, what is its *future?* This must depend upon a variety of circumstances, but most of all upon the acquisition of knowledge, upon the wide diffusion of knowledge, and that is the only *power* upon which we can rely with confidence. When our County Councils awake to the necessity of diffusing through the country, especially amongst the rural population, scientific information on the diseases of animals and plants, and the best modes of encountering them, we may hope for further success. The signs of the times indicate a very close analogy between the diseases of animal and vegetable organisms. The inferences are strongly in favour of the hypothesis that many of the obscure diseases of plants have in microbes an efficient cause. Researches into a vine disease in California, a melon disease in some parts of the United States, and the very prevalent "peach yellows" almost establish the fact that microbes are present in large numbers, and are, hypothetically, the cause of the disease. Average humanity is very apt to appreciate an appeal to the pocket, and this is a prominent element in any calculation of future success. It has been demonstrated already that increased knowledge of ferments and fermentation, mainly due to the researches of De Bary and Pasteur, have had a most important result in brewing operations, and some Englishmen love a "drop of good beer." Undoubtedly the successes of Pasteur's method of dealing with anthrax are converting cattle growers, because of the lives that are saved. The application of fungicides to infected plants is no longer regarded as a fanatical dream. Hence, it is a reasonable inference that the future of mycology is assured, and that the quarter of a century to come, if only as prolific as the quarter of a century which is past, will render obsolete the old query—"What good is it?"

The following report of the Fungus Foray is from the pen of Dr. Cooke, and appeared in the *Gardener's Chronicle*, October 22nd, 1892:—

THE FUNGUS FORAYS, 1892.

In bygone days the reports of Fungus Forays were long and enthusiastic, not wholly lacking in adventure, nor wanting in interest. Of late years, the record has been written under a feeling of depression and disappointment. Those of us who remember the excursions of twenty years, or even of ten years ago, cannot fail to recognise in the Field Days of the past three or four years only the ghosts and shadows of the "long ago." It is a question of fact, and not of feeling, that an immense change has taken place. First and foremost is the great dearth of the larger fungi, those of the Mushroom kind, everywhere. To whatever causes we may attribute this, the fact still remains, that woods which in the days of our remembrance, literally swarmed with toadstools, are now comparatively bare. Then it was impossible to carry away in our baskets one-half of the good things met with, and the baskets were big ones, to adorn the tables for the annual exhibition. Now, it becomes incumbent to secure everything that is met with, good, bad, or indifferent, in order to make up an exhibition at all. Then it was that tables to the length of 150 feet could be closely packed with the spoils of two or three days; but now, a table of 10 or 12 feet in length is all-sufficient. When we are compelled to confess that, in excursions extending over ten days, we only saw one juvenile specimen of the ubiquitous *Agaricus melleus*, it will be sufficient to astonish the old marauders of 1872 to 1882, and to justify us in our lament for the good old times.

The Yorkshire Naturalists' Union held a Fungus Foray in the neighbourhood of Malton on September 13th, 14th, and 15th, in localities to which, under ordinary conditions, no exception could be taken; but, unfortunately, although there was no lack of walking, the results were far from adequate, common species were conspicuously absent, and, in all cases, the number of individuals was remarkably small. It is not unusual, in such cases to meet with one or two individuals of rare species, or at least of species having considerable interest, and such was the case on the present occasion. We were surprised to see that splendid edible *Agaric*, which has hitherto been confined to about three British localities, *Agaricus* (Psalliota) *elvensis*, in Yorkshire, and also some few others which had not previously been recorded for the county, including a large species of the sub-genus *Inocybe*, allied to *Agaricus scaber*, which could not be referred to any described species, or, at any rate, only tentatively to a species described by Britzelmayr, and not previously known in Britain. There was considerable local interest in the fungus-hunt, and it was unfortunate that the exhibition could not be made more worthy of the occasion, notwithstanding the praiseworthy efforts of the several local naturalists who, many of them, undertook considerable journeys to be present.

In the following week, the Woolhope Field Club held their Annual Meetings at Hereford. Tuesday, September 20th, was devoted to the Whitcliff Woods, near Ludlow, an old hunting-ground of the Club; but on this occasion the persistent downpour of rain throughout the day rendered the gathering of fungi beneath the shelter of umbrellas an unenviable occupation, and entailed subsequent results not quite pleasurable to such as were not impervious. The Thursday's excursion in the woods of Dinmore was favoured with fair weather, and the collection made was much better than in the same locality two years ago. Somewhere about a dozen species, not recorded before for the county of Hereford, will have to be added to the Flora of Herefordshire. One of the most noteworthy additions was *Agaricus* (Stropharia) *Percevalii*, only found previously near Morpeth. At the exhibition were to be found an interesting collection of fungi sent by H. Spencer Perceval, Esq., from the last-named locality, and a smaller collection made by T. Howse, Esq., in Surrey, amongst the latter being *Agaricus* (Tricholoma) *circumtectus*, for which only one locality had previously been known. In neither of the above cases of Fungus Forays held this year could sufficient edible fungi be collected to furnish the table with a dish, except perhaps of the Horse Mushroom (*Agaricus arvensis*), of which about six specimens were found. With such a record we, who remember better days, are apt to sigh for a return of "the good old times."

M. C. Cooke.

FLORA OF HEREFORDSHIRE.

FUNGI.

Additions in 1892.

Agaricus (Tricholoma) panæolus. *Fr.* Dinmore. Whitcliff.
" (Omphalia) fibula. *Bull. Var.* Swartzii. Whitcliff.
* " " alutaceus. *Chc. & Mass.* Whitcliff.
" (Entoloma) ameides. *B. & Br.* Whitcliff.
" (Eccilia) carneogriseus. *B. & Br.* Whitcliff.
" (Inocybe) descissus. *Fr.* Whitcliff.
" " muticus. *Fr.* Dinmore.
" (Hebeloma) nudipes. *Fr.* Dinmore.
" (Stropharia) Percevalii. *B. & Br.* Whitcliff.
Cortinarius (Telamonia) brunneus. *Fr.* Whitcliff.
" " psammocephalus. *Bull.* Whitcliff. Dinmore.
" (Dermocybe) albocyaneus. *Fr.* Whitcliff.
Lactarius subumbonatus. *Lind.* Dinmore.
Russula virescens. *Fr.* Whitcliff.
" xerampelina. *Fr.* Whitcliff.
Boletus candicans. *Fr.* Whitcliff?
Paxillus Alexandri. *Fr.* Whitcliff.

On October 15th, Mr. M. J. Ellwood forwarded for inspection a monstrous fungus which had proved so formidable an enemy to Sanitary Reform as to have secretly grown in the dark regions of an iron surface-drain pipe in one of the streets of Leominster, to such an extent as to have completely blocked the pipe, adapting itself to the internal flanges of the pipe more compactly than art of man could execute a mortise and tenon joint. Growing thus, in the absence of light, it may truly be designated a

"Monstrum horrendum, informe, ingens, cui lumen ademptum.'

It appeared penetrated with fœtid odour of the drain, which, however, passed off in a few days. Dr. Cooke named it *Fomes fraxineus*, Fr.

* A species new to any country.

FUNGOID PESTS OF THE ORCHARD

A period of seventeen years has passed since the Woolhope Club held their first exhibition of apples and pears with the object of ascertaining the correct names of the different kinds of cider, perry, cooking, and dessert fruit, and of determining the best sorts grown with the view of recommending their cultivation in the place of those of an inferior quality. Another object was soon found, to wit, their illustration in *The Herefordshire Pomona*. There is no doubt that many who were wise enough to take advantage of this excellent opportunity vastly increased their knowledge, and that others acquired a knowledge, the cultivation of which has been manifested, not only in the formation of new orchards, but in the improvement of many of the former existing orchards. Of these the fruits are an inheritance due to the enterprising spirit of the late Dr. Bull in stimulating the Herefordshire landowners to pay a business-like attention to this produce of their county. A series of exhibitions took place almost annually, the last, under the auspices of the Club, was held in 1883. Fruit growers of this county have become aroused to the importance of the subject, and are instituting another exhibition; to be followed (the hope is most seriously entertained) by the formation of a local Fruit Growers' Association, whose business it will be to impart information on the many subjects embraced in the practical and profitable management of orchards, and the formation of markets. During the last three years, especially since the circular on the subject of fruit culture issued by Lord Mayor James Whitehead, on October 5th, 1889, much information has been disseminated by the daily Press. The subjects of frosts, mildew, American blight, winter and other moths, caterpillars, removal of lichens and mosses, washing, dressing, and protection of trees, renovation or rooting up of orchards, have received a large amount of attention in the columns of the *Hereford Times*. It only remains for the local Association to bring the result of their experiences within the reach of the smaller proprietors and allotment holders by the issue, as suggested by Mr. E. F. Bulmer, of a cheap pamphlet furnishing all details in connection with fruit growing as especially applicable to the soil and climate of Herefordshire. The fungoid diseases to which fruit trees are liable, and the best treatment of the same, must not be omitted. *Apropos* of this important subject, the following paper was contributed :—

FUNGOID PESTS OF THE ORCHARD.

By M. C. Cooke, A.L.S., LL.D., &c.

It can scarcely be regarded as surprising that, in some countries at least, strenuous and persistent efforts are being made to combat the parasitical fungi which cause so much injury to growing crops. In Britain, it is true that cultivators are not yet fully alive to the injuries which they suffer, or at any rate sufficiently so to take active measures for their cure. It is but reasonable to expect that, in this county, everything which affects apple and pear trees would excite interest, but it is doubtful whether this interest does not require a little stimulus. It is well known that apple cultivation is an important industry in the United States, and yet the same terrible pest devastates the orchards which is prevalent in this country, but probably to a more alarming extent. The Commissioner of Agriculture reports that "The distribution of the disease is co-extensive with the cultivation of the fruit which it attacks, although there may be a few favoured localities in which it has not yet appeared. Throughout the Eastern and Central States one is almost certain to find it in every orchard, and on the Pacific Slope, in California, it is also frequent." In several States the extent of loss is said to amount to fully one-half of the crop, while reports from other States place the annual loss at from one-fourth to one-sixth of the crop. The Secretary of the Illinois Horticultural Society estimates the loss from this cause in his State at 20,000 bushels, which gives a loss of 4,000 dollars per county, or about 400,000 dollars for the whole State. In Missouri the loss is estimated at one-half the crop. In Kansas the annual loss is placed, one year with another, at one-fourth of the crop; and in Indiana it has been estimated at about one-sixth of the crop. The reporter from Maine says, "I call to mind one season when we lost more than half our crop, about mid-winter, by rotting. The apples began rotting under the "scab" spots, and eventually the fruit entirely decayed." In Australia the same pest occurs, and the same lament over the loss it causes reaches our shores.

The "apple scab" is produced by a minute fungus known to science under the name of *Fusicladium dendriticum*, and has been known to attack apple and pear trees, in this country, for very many years, in Europe certainly since 1830. It occurs on the leaves in dark olive patches, and similarly on the fruit; in the latter case the cuticle ruptures around the spots, the fruits are distorted, cracked, and unsaleable. The mycelium, or rooting portion of the mould, flourishes between the cuticle and the epidermis, destroying the epidermal layer. The external development of the mould consists of short erect threads, which arise direct from the mycelium, and bear at the tips oval or pear-shaped, or almost spindle-shaped, darkish spores, which are occasionally septate. These spores germinate rapidly in water, or upon a damp surface, and thus cause the disease to spread vigorously. It must be noted here that experiment has demonstrated that a solution of one-fourth of one per cent. of sulphate of copper prevents the germination of the spores.

Much care and perseverance is required to get rid of this pest, which can be combated most effectually in early spring, before the buds have commenced to expand, at which time the trees may be sprayed with a solution of sulphate of iron, using one pound of the sulphate to every gallon of water. The process can be repeated when the fruit has set, and again two or three weeks afterwards. It has been found that simple solutions of sulphate of copper should not be employed during the growing season, as their use is almost certain to injure the foliage. The Bordeaux mixture is the fungicide usually employed in the United States, for which the following is the formula:—Dissolve six pounds of sulphate of copper in sixteen gallons of water; in another vessel slake four pounds of lime in six gallons of water. When the latter mixture has cooled, pour it slowly into the copper solution, care being taken to mix the fluids thoroughly by constant stirring. The use of mechanical sprayers for its application is universal in the United States. It must be remembered that the dark mould of the leaves, and young twigs, is the same as the scab mould of the fruit, and that therefore every diminution or destruction of the leaf mould tends to the preservation of the fruit.

Although this is the most injurious of the pests of the apple tree, it is by no means the only one. In early spring, when the shoots are young and the leaves soft and green, it is not uncommon to see them suddenly covered with a white mealiness, as if dusted with flour or powdered chalk. Under the microscope this mealiness is found to be caused by a parasitic fungus, composed of elliptical conidia, attached end to end like a string of beads. The name applied to it is *Oidium farinosum*, and it affects the young twigs and unfolding leaves. It is one of those fungi which establish themselves upon the surface, and are practically superficial like the hop mildew, but, up to now, no more advanced or complete stage of development has been discovered, in which respect it resembles the oidium of the grape vine. That it is injurious to the tree goes without saying, and a sorry appearance it gives to the trees which it attacks. The only check or cure to its ravages is the system of dusting with sulphur, as adopted for the hop mildew. As the mould is superficial its destruction permits the tree to resume its vigour, as the tissues remain uninjured, whilst if it remains unopposed it will soon extend to other trees, and ultimately monopolize the orchard. It has been suggested, but not proven, that this mould is the conidial stage of an ascigerous fungus, called *Podosphæra Kunzei*.

A form of spot is very common upon mature or fading leaves of apple and pear, but it does not cause any alarm, as it does not affect the fruit-bearing functions of the tree. The spots are produced on the upper surface and are greyish white, with a brown border, and mostly orbicular in form. Scattered over the surface of these spots are minute black dots, like pin points, which indicate the little perithecia, or receptacles enclosing the sporules, which latter are long and thread-like, escaping when mature through a pore at the apex of the receptacle. This is the *Septoria pyricola* of botanists. The life-history of this fungus is unknown, but it is suspected to be only an early, or imperfect stage, of some more highly-developed species.

The fruit of both apple and pear are liable to the attack of a parasite which

seems to be very destructive in its character, and according to the Transatlantic authority, is capable of being transferred from apples to grapes, or from grapes to apples and pears. It has not become of serious moment in this country, since the pears have usually been decayed already, when the parasite was observed. It is still open to question whether the decay may not have been caused by the mycelium of the fungus. The pustules are arranged circularly in a cluster, of a dirty rose colour, splitting at the apex or opening with a pore. The conidia, or sporules, are cylindrical, sometimes curved, granular within, but uncoloured. First described by Berkeley as *Glœosporium fructigenum*. In the United States the disease goes by the name of the "Bitter rot of apples," from the bitterness which it imparts to the fruit. It is causing no little alarm in America, and one fruit-grower has reported that for three years the disease had so steadily increased, that in 1887 his old orchard of seventy-five trees would not yield twenty-five bushels of sound apples; and, moreover, that he had visited fine orchards of hundreds of trees, but in no case did he find the fruit perfect; all were more or less diseased.

We may allude here to the canker in pear and apple trees, which a German authority has pronounced to be caused by a fungus, often found on the diseased spots. He says that the disease is produced by a sphœriaceous fungus, resembling those clusters of a red *Nectria* which flourish so freely on dead currant twigs, but smaller, and with a different name, *Nectria ditissima*. There are some people who consider a name to be everything, and if a fungus can but have a name given to it it is sure to be all right. The German in question claims to have demonstrated that canker may be produced on various kinds of pear trees by sowing the conidia, or ascospores, and further, that the ascospores of the *Nectria* on apple trees would produce canker on beech and sycamore, and back again from these trees to the apple. Another authority contends that the fungus enters the diseased trees through wounds caused by hail, or the puncture of an insect. They say that the best remedy is to cut out the diseased tissues and anoint carefully with warm coal tar.

We have seen living twigs of the apple, not uncommonly of old trees, exhibiting in cracks of the bark clusters of black spherical perithecia, like the heads of black pins, which it is presumed have been produced beneath the bark, and split it open by their growth. This fungus was enumerated in the *Handbook of British Fungi* under the name of *Dothiora pyrenophora*, but known in latter days as *Botryodiplodia pyrenophora*. The perithecia contain elliptical brown spores, divided across the centre into two cells, but the fungus itself has not at present proved to be mischievous.

There is nevertheless a fungus which is not uncommon on pear leaves, and must be generally well-known, which has a singular reputation. This is the *Roestelia cancellata*. The parasite occurs on living leaves, causing large orange orbicular spots, the substance of the leaf being thickened at the spots by the internal growth of the mycelium. Upon these are produced, externally, small clusters of flask-shaped pale-brown bodies called peridia, which split longitudinally nearly to the base into thread-like filaments, united for some time at the apex.

The contents of these flask-shaped receptacles are the spores or œcidiospores, which are nearly globose and warted on the surface. They are produced attached to each other in chains, but readily separate. The spots on the opposite side of the leaves to the clusters of peridia turn reddish, especially in the centre, and are sprinkled with blackish dots, indicating cells containing minute hyaline sporules or spermatia. Their particular function in the life-history of the fungus has not been demonstrated. It has always been recommended that these diseased pear leaves should be gathered and burnt as soon as they appear. It is recorded in *Hooker's British Flora* that when young pear trees are planted near old trees suffering from the *Roestelia*, the young trees have been observed to become much injured by the fungus, and Mr. Knight sowed pear seeds in soil infested with *Roestelia*, when the very youngest of the seedlings showed the disease.

The reputation to which we have alluded is the theory that another, and a gelatinous sort of fungus, which grows upon the Savin is the cause of the *Roestelia* on pear leaves, and that the pear-leaf fungus is capable of producing the gelatinous fungus on the Savin. It all seems to depend upon circumstances, or the necessities of the argument. This theory originated in a paper by Œrsted in 1865, which was directed to prove that the *Gymnosporangium* of the Savin was one condition of the pear-leaf fungus. The professor says that he had learned that gardeners were of opinion that the pear fungus was never seen except after the appearance of the fungus on Savin. Stevenson records that the Savin fungus is found in Scotland, but that the supposed secondary stage, or pear-leaf fungus, is not a Scottish plant. All the advice which is given by the theorists to gardeners on this subject is to destroy all Savin trees, root and branch, and save the pear trees. Writing on this subject, the late Rev. M. J. Berkeley said "The matter is of theoretical rather than practical importance in this country. The Savin is by no means so universally grown as to make it an object of fear, were its neighbourhood really as dangerous as is supposed, and we have the pest itself (the *Roestelia*) in such abundance where no Savin exists, that our efforts need not be directed to the destruction of Savin bushes, like those of the remorseless farmers, who, in their ignorance and fears for their wheat crops, have rooted up, in some districts, one of the greatest ornaments of our hedgerows. If picking the leaves off carefully and burning them will not do, we may feel secure that an onslaught against the poor Savin will not avail us." It is unnecessary to discuss the question here, but the theorists are horrified at the existence of Savin bushes, and Berberry shrubs; mad as a bull at the sight of a red rag.

The pear-leaf blister is another of the pests with which the cultivators of pears have to contend. It is now called *Exoascus bullatus*, but was at first, when imperfectly known, called *Oidium*. It is similar in appearance, as well as in structure, to the "curl" of peach leaves. In some cases the blisters form two parallel lines, on either side of the mid-rib; but at other times, especially when larger, are irregularly scattered over the leaf. "In some cases the blistered part becomes black, and in others the portion of the leaf which protrudes falls out, so as to leave a regularly defined aperture. On inspecting the underside of the blistered leaves the cavities are found to be lined with a thin white stratum,

consisting of myriads of confluent white specks, of a waxy rather than a powdery appearance, and in an early stage of growth covered with the cuticle which is loose, and more or less ruptured, showing the subjacent organisms through the fissures." Closer examination shows that the stratum is composed of naked cylindrical asci, standing erect side by side, each containing eight ovate uncoloured spores. The only course open to be adopted with this fungus is to pick off the diseased leaves as soon as they appear, and burn them. Up to now no external application has been successful.

There are some other fungi, of less note or importance, which attack the apple and pear, but we have enumerated the most important. Our present object is to excite interest, on the part of orchard cultivators, in the diseases to which their plants are subject, with a view to their remedy. Surely they are pecuniarily interested in such a subject, and the orchardist may rest assured that the more intimately he knows the insidious foes he has to contend against, the greater the chance of success.

We have avoided reference to the diseases of other fruit trees, deeming those of the apple and pear as of the greatest importance in the county of Hereford.

The following review of *British Fungus Flora; a classified text-book of Mycology*, by George Massee, in 3 vols., Vol. I. (Bell & Sons), appeared in the *Gardener's Chronicle*, October 22nd, 1892:—We are pleased to announce the commencement of the publication of a new work on British fungi, which proposes to do for these peculiar plants what Cooke's *Handbook of British Fungi* did for them twenty-one years ago; that is, consolidate all the species in one work, and give description of all the known British genera and species up to date, with illustrations of the several genera. The *Handbook* has been so long out of print, and the number of recorded species has so much increased, that the need of such a book has long made itself felt, apart from all the modifications and limitations of genera, and other improvements suggested by the advancement of science, and better methods of study. The work in question is proposed to occupy three volumes, of which the first is published. We fear the author is far too sanguine in his hopes of comprising *all* the species within the limits of three such volumes. The first includes a portion only of the *Basidiomycetes*, commencing with the *Gastromycetes*, and working backwards through the latter position of the *Hymenomycetes*, of the *Handbook*, to the commencement of the *Agaricini*. We confess our inability to appreciate the grave reasons which induced our author to depart from the orthodox sequence, and invert the order of succession. Without some good reason, which does not appear upon the surface, we submit that such a departure is an error of judgment, inasmuch as it tends to the confusion of students, and increases the difficulty of referring back to, and comparison with, previous authors, without any corresponding advantage.

The book is neatly and clearly printed, and the cuts sufficient for the purpose, whilst the characters of genera and species seem to be all that could be desired, not prolix, but ample and "up to date;" including spore measurements,

which is a somewhat recent innovation, liable to abuse in practice, if applied too inflexibly.

The best test of a work of this nature lies in its practical use, and we doubt not that experience will confirm our impression that it is workmanlike in character, and careful in execution, although we had rather not have had occasion to express dissent from the method of arrangement, or taken exception to the elevation of the subgenera of *Agaricus* to the rank of genera. We cannot conclude this brief notice without a special commendation of the fulness of the descriptions and illustrative notes under each species. It is clearly manifest throughout that our author is in sympathy with the student, and is doing his best to give him all the help he can in the discrimination of species. The study of fungi has somewhat declined of late in this country, and British mycologists, ever few in number, have sensibly diminished; but we hope that these volumes, when completed, will inaugurate a new era of activity, and revive once more a useful and interesting study.

M. C. Cooke.

THE TURRET SPIDER, THE MOUSE-EATING SPIDER, AND THE TRAP-DOOR SPIDER.

By the Rev. J. E. Vize, F.R.M.S.

The following remarks may be considered as supplementary to my paper on "Spiders British and Foreign" which has already appeared in the *Woolhope Transactions* for 1888, p. 291 to p. 310.

"The *Tarantula arenicola* (Turret spider) is a very interesting creature. I have never been fortunate enough to see one alive or dead. But its life history is ascertainable, and I purpose to give it from the period of its youngest state. The parent produces a number of eggs, which she carries at the extremity of her body for a considerable time. They are enclosed in a light case, as frequently happens amongst the spider tribe. This case is attached to the parent by means of a few threads spun by her, and it can be detached, if necessary. But sooner than lose the contents of it, the mother will undergo any amount of anxiety, and she will rather forfeit her life in defence of her progeny therein than abandon it. In due process of time, the eggs become hatched, and as they increase in size a very busy scene they present. Parasites stick to many of our insects, such as the dor-beetle, bees, &c., and they adhere very tenaciously, because if they become detached there is death before them, unless they migrate direct to another host. Not so this minute *Tarantula*. Its general position is on the body of the parent, but not always. It can take a short journey on its own account to some near distance, or even precede the mother into the nest for safety during the night, or on a signal. Of course it keeps on growing, and becomes more and more troublesome. Still the infested parent does not allow herself to be excessively incommoded. Nature tells them and her what is to be done in the emergency. The time is near when a separation is to take place. By degrees the little ones may be tossed off by her, or, as is generally the case, they start life on their own account perhaps on grass which may be near, or by taking a flight like some spiders do, as was mentioned in a previous paper.* At all events, in about a month's time from birth, the mother and her brood have relaxed all care for each other, and have separate existences independent of one another. It is not long before the little creatures take to building turrets for themselves, counterparts of what their parents built, only much smaller, as they do not at first need such large residences. As they become older, they increase the size of their homes.

Let me now tell you how their dwellings are made, and it will then be seen why they are called 'turret' spiders. Here I quote Dr. MacCook's words, as given to him by a friend, who says:—'They make a burrow about two inches deep in the ground when the spider begins her tower. A stick is placed at the edge of the tube, and lashed down with a strong thread. Another is laid in similar position until the margin is surrounded by a four or five-sided foundation.

* *Transactions*, 1888, page 303.

The builder then descends to the bottom of her tube and brings up pellets of earth, which she places atop, and on the inside, of the sticks, pressing them down with her body as she passes around the circle. Then follow other layers of sticks alternated with pellets of earth, until the tower is raised sometimes as high as two and a half inches above the ground. The inner surface is smoothed and lined with silk, and the turret is complete. While excavating the burrow, the bits of clay as they are bitten loose are compressed within the mandibles into small balls, carried to the top and shot off from the walls with sufficient force to carry them a foot distant.' Such are the words of an eye-witness of these singular spiders. They were kept in confinement so that their habits might be watched and correctly ascertained. The singular part to my mind consists in the tower and its position above the level of the earth. It has its advantages unquestionably for the spider, which can take a survey of all that occurs within a moderate distance, and which would consequently be well able to get extra food. She sits in the nest a great part of her time. Her body is an inch long, hence she is no mean creature. Possibly, also, she may find her turret of service in keeping off the effects of more rain than usual, but she certainly is not so free from floods as her distant relative the 'trap-door' spider. Nor is she so prudent, one would think, because she is nothing like so guarded in securing safety for herself, inasmuch as she gives a mark, even the turret, to show where she is.

The *Mygale avicularia*, or Mouse-eating spider, is a spider of very formidable size, and is noted far and wide as a destructive creature. Its specific name *avicularia* implies its connection in some|way or other with birds. The way in which the relationship is obtained arises from the certainty that the creature attacks and preys upon birds as a part of its food. Of course it cannot kill the larger winged animals—only those of a size sufficient for it to master and conquer. Amongst these would be the humming birds. It is by no means unusual for one of these spiders to take the life of one of these little beauties. They frequent trees. Trees are common to both. The birds settle therein and lay their eggs in the nests. The *Mygale* haunts the cavities of hollow stumps, or watches an opportunity of darting upon its victims from beneath a large branch or even leaf. Hence, if perchance a bird happened to settle for rest on a spot near the spider, the latter could very easily sting, and so paralyse by means of its poison fangs anything that would be food for it. Many spiders jump great distances compared to the springs which we give them credit for making. I mentioned particularly in a former contribution* to the Woolhope Club the astonishing agility of some of these creatures and the distances they will take in their aerial voyages. If we notice the legs of some of our British species they are well adapted for bounding. For a tropical spider to cover a considerable space in getting his food is therefore readily imagined by us. It is all very well to go to the Zoological Gardens and see the bird-eating spiders there since their importation in the summer of 1880, but the sight gives a very puny idea of what the creatures are in a state of nature amongst their own haunts and feeding grounds. The motions and actions of a horse bridled and curbed and put between shafts are very poor compared to the

* *Transactions*, 1888, page 304.

elegance of the same creature in his sports when turned out loose on the grass. The sloth is called a sloth because he looks the most arrantly incapable lump of flesh for quick march as he hangs head downwards on an isolated dead tree. See him at home in the forest. Fun, frolic, activity, noise, happiness accompany all he does. A more incorrect title than sloth could scarcely be. So with the spiders. Our Zoological Garden spider must not be the standard for the *Mygale* of the tropics. Besides, the food given to this creature in our country is not always the right thing at the right time. Sometimes it may get the same or nearly the same as abroad. Mice, for instance, supposing that the Brazil mice are the same as ours. All mice are not the same. When in France last year, I stayed for a month at a chaplain's house, where the tails of those that infested the parsonage were quite double the length of those of our English species. We had good opportunities of detecting their differences, for by day and night they felt much more at home with us in our rooms than we liked. At night they did not hesitate to want to look at our features as we lay in bed. Perhaps English people were recognized by them as foreigners. At all events, so frequent were they, that not satisfied with a little water to drink, they took too much in our washing basins, and committed suicide there. No inquest was held on them, but we did observe their tails, which in proportion to the length of their bodies were long enough for prehensile monkeys.

As to the size of the Mouse-eating spider, which is the name given to the *Mygale avicularia* of which we are speaking, it is about three inches long in the body itself. Hence we can form an estimate of its dimensions when we take its proportions, gathered from the addition of its legs. It would very nicely go into a dinner plate. Indeed the bottom of a soup plate would be an admirable lair from which it could make a bound upon its prey. These creatures, it need hardly be said, may be seen in our museums inflated to the natural size, and are quite as well examined dead as alive. It is not necessary to go to the Brazils to inspect these hairy, unpleasant looking things, although notwithstanding the repugnance felt by many people in seeing them, they have as much right to live as we have.

The Trap-door spider (*Mygale cæmentaria*), is a very compact creature to look at. He is sturdy, and business-like, quite prepared to take flight from danger, imaginary or real, at a moment's notice. His legs are short, so is his body, although the latter is more sturdy than the former. In our country, in which by-the-bye he is not indigenous, he is more reverenced and given greater privilege in our minds than perhaps any other spider on earth. His sudden disappearance on any alarm makes him a sort of acrobat or conjurer. To be gone, utterly and hopelessly, whereas he was assuredly seen just now, creates a sort of inquisitiveness to ascertain more about him and his movements, where he is gone to, whether he will return again, and what he is doing with himself during his absence. If we look at the identical spot where we saw him we get no nearer the solution of our puzzle than before. He was there, he may return, but will he? What can he be doing? We are amazed, and intensely interested. Let us notice first the place of his retreat. He is underground, in one of the dryest homes possible. No need of plasterers and plumbers for him. Leakages of wet do not affect him in the least. Man's houses may have them to any extent, not so the

spider's. He may exist surrounded by porous sand, but so impervious to moisture are the walls of his home that the thunderstorm will not do him any damage. Talk of walls being dry, his are always so. If our houses could be made as sound as the spider's, how many fevers, agues, colds, and cases of rheumatism would be avoided? Then, again, the roof is as secure as the sides are. No broken tiles, no slates off just at the very time a deluge of rain finds out the weak places. Truly enough, there is a roundish opening at the very top, a circular door indeed, but so secure that buckets of water will not cause a leakage. Everything is water-tight. As for the internal ornamentation of the spider's house, it is glossy to a degree. Wall paper is not wanted. It is surpassed by a mass of silken threads spun together with a density so great as to be always dry. These threads are held together with a mucus which the creature produces at the time of building, which hardens almost instantly on being deposited. Hence comes the strength of the whole building, and its resistance to moisture.*

Reference has been made to the roof of the spider's house, in other words to the trap-door. It is this ingenious structure which makes the interest in this species of spider so greatly in excess of that in others. There is a movement about it which is so enchanting. The home itself consists of a hole several inches deep extending into the ground, surmounted by the moveable trap-door. If this door be examined, it will be found to be composed of whatever materials may be surrounding it. If gravel pure and simple be the only material at hand, pure gravel will form the lid. If, in addition, there be fragments of sticks, moss, lichens, and so on, they will also retain their exact and accustomed place, for the spider never alters the component parts of the lid; it would not do, because his home will then easily be discovered. He cements them together having cut the shape of his door, and they remain as truly as if nature itself placed them. But the entrance is capable of being lifted up for the spider's exit, and falls back into place when he disappears. This is done by means of an elastic hinge made of the same web as the lining of the spider's home. Instinct has taught the creature to leave the lid open for his return, as it would be very imprudent to close his castle against himself. On re-entering his nest no doubt he breaks the old thread which was used on exit, and the lid then may fall back into its shut position by the hinge returning into place, or the spider may also, by an instantaneous process, discharge new threads, and so make his roof safe and sound again. In my previous paper,† remarks were made upon the singular position of the spider when within the dwelling, namely, that he goes in head downwards on alarm and so remains, being for safety's sake attached by threads of his web to the lid, thus increasing his security. The depth of the nest may be as much as a foot. It may ramify or not. Very often one of these shafts may be found larger than another near it; the inference being that as the spider grew in size it needed more room than formerly. If to these particulars as to the structure of the nest we add the prudence shown by the spider in not expending his labour uselessly in making the

* In the Ludlow Museum there is a collection of Trap-door Spider's Nests. They are worthy of careful examination.—Edit.

† *Transactions*, 1888, page 302.

outside wall of his home too massive, but tempering it according to its needs, and so making it amply strong, although not quite so strong and well lined as externally, we may well be taught skill and honesty in our houses. No jerry built residence will suit the spider, and no jerry built house ought to suit man. Man is not honest to himself, his neighbour, and posterity in building badly. The sooner we learn even from so small a thing as the little spider that honesty is the best policy, the better for us. I have done, almost. Three, only three spiders have been considered. They have shown differences in the structure of their homes, their manner of life, and other points. May the few minutes we have spent have been interesting to us all.

A SUPPOSED HYBRID GROUSE.

By E. Cambridge Phillips, F.L.S., &c.

The bird which I have the pleasure of producing to the Club this evening was killed in the latter end of August, 1891, on the Friddyllt Grouse Hill, Merthyr Cynog, by Mr. Rees Williams, of Brecon. It was by itself, and Mr. Williams informed me that during its flight the under parts of the wings were white. At first sight the bird gives one the idea of being merely a curiously coloured Grouse, but a closer investigation will, I think, convince anyone that it is a Hybrid, particularly its length of wing and tail which are quite unlike a Grouse, especially the curiously buff colouring of the former. Having come to the conclusion that it is a Hybrid, the next thing is to determine what Hybrid it is, and in arriving at this I fear opinion must go a long way. It was stuffed by Mr. Ashdown, naturalist, of Hereford, and he pronounced it a cross between a Partridge and a Grouse. I am not aware what the sex was, but I cannot agree with him, as there is not a trace of a horseshoe on the breast, and its size is the only point in favour of that cross. Although everyone must see that the principal part of the bird is Grouse, yet I myself am of opinion (but in this I am open to conviction) that the bird is a cross between the Pheasant and Grouse, for the following reasons:—The colour of the head nearly approaches that of the hen Pheasant; the red colour of the breast is often found in what are called Mule Pheasants, especially in old hens, which sometimes assume the male plumage. I have one stuffed which has the very same tint on its breast. The wings (to which part I wish particularly to draw your attention) are long and pointed, and very unlike those of a Grouse or a Partridge, which are more rounded at the ends, but nearer those of a Pheasant, as they are in colour, although not barred as far as I can see. The tail is also long and pointed, totally different from that of a Grouse or a Partridge, being more like the tail of a young Pheasant though of course considerably shorter. The legs are feathered as in Grouse, and it must not be forgotten that the bird is only about three parts grown.

There is an account in the *Zoologist* for 1885, p. 26, of a Hybrid between the Black Grouse and Pheasant killed at The Grove, Craven Arms, which states that broadly speaking it may be described as being most like a Black Grouse in the head, neck, and breast, and like a Pheasant in the wings, tail, and legs. And it further states that there is a figure on page 311 of *Yarrell's Birds*, 1st edition, of a Hybrid killed in 1839, by Lord Howick, near Felton, in Northumberland, which is almost an exact representation of the one described in the *Zoologist*. I think if we apply this description to the Hybrid before us we shall find that it fits exactly, except as regards the legs, it being very like a Red Grouse in head, neck, and part of the breast, and like a Pheasant in wings and tail. We must, however, remember that the Hybrids mentioned in the *Zoologist* were between Black Game and Pheasant, whilst this one is between Red Grouse and (probably) Pheasant. I

know the locality where it was killed very well, and think that the female parent was a Grouse, it being an excellent hill for them, and the male parent a Pheasant, although I have never seen one on the hill. Probably, in this instance it was a strayed bird from Sir John Llewellyn's covers less than three miles off.

The subject of wild-bred Hybrids is most interesting. I believe them to be extremely rare, and generally, if not always, produced through either one or the other of the parent birds being unable to obtain a proper mate of its own species. Nature runs strictly in her own allotted grooves, and it is only when she is unable to do so (as in the present case) that the survivor seeks for a mate usually allied as nearly as possible to his or her own species, and the result is Hybrids incapable of breeding *inter se*.

Still so little is known of wild-bred Hybrids that I have thought that the production of the bird this evening, coupled with the few remarks I have made on it, may be of some little interest to the Club, and I hope to be favoured with some of your views on the suppposed rare Hybrid, as after all I feel that there can be no absolute certainty as to its parentage, and opinion must necessarily go a long way.

Since these remarks were made, the bird has been produced before the Linnæan Society in London, and the Ornithologists present pronounced it to be, in their opinion, between Black Game and Grouse. I myself cannot discover any trace even of Black Game, and I see no reason to alter the opinion above expressed.

Mr. W. C. Ashdown, F.Z.S., reviews Mr. Phillips' paper in the columns of the *Hereford Times*, of January 14th, 1893, in the following letter:—

In reviewing the paper by Mr. E. Cambridge Phillips, F.L.S., I cannot help thinking that the supposition, reserve, and uncertainty which characterized it unite to confirm my past and present judgment as to the correct identity of the bird. To my mind, the presence of Pheasant in this unique and very interesting Hybrid is almost as vague and obscure as that of the Black Game. Indeed, I am amazed at the verdict of the Linnæan Society's meeting (which must have been a very small one) where the specimen was designated a cross between Black Game and Red Grouse, when not the slightest vestige of the former, either in formation or colour, can anywhere be seen.

It is somewhat unfortunate that this Hybrid was hit rather hard internally, thus rendering the discovery of sex hopeless, while the plumage for the most part was wiry and undeveloped—no small impediment to the taxidermical art.

The carcase very closely resembled that of the Red-legged Partridge, the flesh being white and quite unlike Grouse, while, on the other hand, externally the bill, feet, and breast are unmistakeably true Grouse.

My conviction that the bird is a cross between the male Red Grouse and female Common Partridge, and my objections to the Pheasant theory are based upon the following observations arising from, 1st, positive size; 2nd, negative colour.

1st, general size. I cannot accept Mr. Phillips's opinion as to the extreme rarity of wild bred Hybrids. During my long connection with the late Henry Shaw, of Shrewsbury, wild Hybrids, shot, but unchronicled in any sporting column, came in for preservation; one, two, or three, almost every year. Sometimes, Capercailzie and Black Game, or the latter and Pheasant, or, again, the latter with Red Grouse; but invariably the Hybrid was larger than the smaller, and smaller than the greater parent bird. An example, belonging to Mr. W. E. de Winton, of Graftonbury, is now before me, where the specimen is much larger than the Blackcock, but smaller than the Capercailzie. Three of these Hybrids came in some two years ago during the same season.

Now the Breconshire example is, if anything, smaller (certainly not larger) than the Male Red Grouse. Had it been crossed with Pheasant, it would have assumed at least the dimensions of a Grey hen.

2. Length of wings and tail. The length of the wing primaries corresponds with the Grouse. It must not be forgotten that the scapulars and greater wing coverts are dwarfed and stunted to the extent of quite three quarters of an inch; hence the wings appear to be longer than they really are. The same thing applies to the tail feathers; the upper and lesser coverts are thin, wiry and short in the extreme. There is not the faintest tendency to any elongation in the central tail feathers, even as in the young hen Pheasant. It is undoubtedly Grouse.

3. Colour. In every Hybrid that has come under my inspection, where the Pheasant parentage is manifest, I have always noticed a partial red colouring on the face. In the present instance this is absent, but the most important omission is that of any bronze tint on the feathers whatsoever. I maintain that there would have been a perfect suffusion of bronze on this Hybrid had the parent been a male Pheasant, as already stated.

Referring to the absence of any horseshoe on the breast, it is well-known that a large proportion of immature Partridge, especially hen birds, exhibit no trace of the dark crescent at all.

Both the Red Grouse and Partridge are subject to all kinds of variation, and examples have frequently appeared where the adult female Partridge displays the speckled appearance on the head and neck, identical with the markings of the Breconshire Hybrid.

The colour of the flesh is a most favourable point for the existence of Partridge in this cross. The dark Grouse colour is always maintained in the Tetraonidæ, even in the most extreme albinism; therefore, I dismissed the idea of a Grouse variety when I first saw the bird. The mistakes and erroneous ideas which have for years existed in this district concerning our Fauna, impel me to hold strong views as to the clear and definite distinction of our British birds; hence I have given my observations on the above, not for the sake of mere controversy, or simply as a matter of opinion, but in order to emphasize facts and principles already laid down in Ornithological study and research.

WILLIAM CHARLES ASHDOWN, F.Z.S.

CONCLUSION.

As considerable doubt still existed as to this curiously marked bird, I sent it in February last year, 1893, to Professor Newton, who stated that it was in his opinion "an abnormally coloured Red Grouse," and he further said, "that he failed to detect any trace of hybridity in its appearance, although he was aware you may have Hybrids which are wholly unlike either of their parents."

It was afterwards sent to Lord Lilford (President of the British Ornithologist's Union), who wrote me, "Although it was of course quite impossible to pronounce positively on a *stuffed* bird, he had very little hesitation in saying that this bird was no Hybrid at all, but merely a variety of Red Grouse, very possibly *conceived* by the female parent within sight or hearing of a Cock Pheasant, but with no other blood in its veins than that of *Lagopus Scoticus*."

After two such opinions from two of the greatest Ornithologists in this country it would be presumption on my part to say anything more. Still I hope this discussion has not been without interest, and I may add that the "supposition, reserve, and uncertainty" which Mr. Ashdown states characterized my paper seem to have been only too well founded.

Brecon, February 19th, 1894.

E. CAMBRIDGE PHILLIPS.

As the concluding pages of the *Transactions* are passing through the printer's hands, we are able to give the most important additions to our Local Ornithology during the last few years, compiled from private MSS. by Mr. W. C. Ashdown, F.Z.S., Naturalist, 29, Commercial Road, Hereford.

ORNITHOLOGY IN HEREFORDSHIRE FROM 1889 TO 1893.

By W. C. ASHDOWN, F.Z.S.

THE following observations are based entirely upon the varied species, sent in to the writer for identification or preservation, from different parts of the county during the last four years, hence they may be relied upon for genuineness and accuracy. While considerable doubt exists as to the legitimate insertion of several rare birds, already numbered in the County Lists, the appearance of others altogether new, and duly noted in the local press, will be of value and interest to every lover of bird life. The latter include, the Fulmar Petrel, Black-throated Diver, Ruddy Sheldrake, Garganey, Scoter, and Red-breasted Merganser.

A brief sketch is appended of the rarer birds sent from the adjacent counties of Breconshire and Radnorshire.

Peregrine Falcon (*Falco peregrinus*).—In the year 1889, a fine female was preserved and set up, suspended with wings open on a Lapwing as prey, forwarded per Mr. W. Blake for Mr. Matthews, chemist, of Ross.

I purchased a very good male in the autumn of 1890, shot in the Lugg Meadows, and sold it afterwards to the late F. Evans, Esq., of Fownhope.

Another example, a female, was sent to me in September, 1891, from Weobley, belonging to Dr. Walker, J.P.

Hobby (*Falco subbuteo*).—Two local specimens have been received in full adult plumage, one in the winter of 1890, shot by Mr. Bellamy, at Hampton Bishop, the other by Mr. Thompson, at Dinedor, in November, 1892. These were both females.

A specimen was killed near Ross in the spring of 1893.

Merlin (*Falco Æsalon*).—This pretty little Hawk has occurred at intervals in various parts of the county; three were killed in the latter part of 1890, another in the spring of 1892, another in the early part of 1893; the latter from Kingsland, the 1892 example from Dorstone, a local bird belonging to W. E. de Winton, Esq. (a beautiful male) is now on loan in the City Museum; another male is in my own collection.

In December, 1893, Mr. Price, of Winforton, sent one, a fully adult female.

Buzzard (*Buteo vulgaris*).—In September, 1890, several Buzzards passed over Graftonbury, and a fortnight later Mr. Andrews (now of Much Birch) sent me a good female for preservation; a little later in the year, a very interesting immature bird was given me by a stranger.

Long Eared Owl (*Asio otus*).—A fully adult pair was brought to me by Mr. Seal, of Upper Dinmore, killed there in November, 1892.

Short Eared Owl (*Asio accipitrinus*)—One in the possession of Mr. Hutchinson, Solicitor, Aylestone Hill, a very handsome female, caught near Ross in 1890.

Another in the City Museum.

One shot by Mr. Garstone, at Belmont, in 1890.

In November, 1893, I purchased a good female here.

Spotted Flycatcher (*Muscicapa grisola*).—One of the most curious specimens recently added to the collection in the public local Museum is a small albino bird, presented by the Rev. Baskerville Mynors, which I have identified as the Spotted Flycatcher.—*Hereford Times*, October 29th, 1892.

Song Thrush (*Turdus musicus*).—A male buff coloured variety was caught recently at Kingsland.—*Hereford Times*, January 14th, 1893.

Hawfinch (*Coccothraustes vulgaris*).—During the winter of 1890-91 this species was abundant in the county, over a score of specimens being sent for preservation.

Red-Backed Shrike (*Lanius collurio*).—This bird is not so rare in Herefordshire as is generally supposed. I have seen both eggs and young birds brought from Bullingham, while adult specimens have been taken with other birds.

Lesser Redpole (*Linota rufescens*).—Four or five specimens shot close to the city were received in the winter of 1892.

Hooded Crow (*Corvus corniz*).—A specimen was trapped at Upper Dinmore in 1891, and is now in the possession of the Rev. H. F. St. John.

Hoopoe (*Upupa epops*).—The Hoopoe has been taken close to the city.—*Hereford Times*, September 24th, 1892.

This bird was killed in a meadow at Warham, and was preserved for Mr. Powell of that place.

Quail (*Coturnix communis*).—Two examples were killed at a double shot by Mr. F. Webster, Tram Inn, last week.—*Hereford Times*, September 24th, 1892.

On the night of October 14th, a fluttering sound in Commercial Road attracted the attention of a pedestrian. The sound came from a live Quail. The bird (a female) was easily caught, and is now in the possession of Mr. W. Davies who is trying to feed and keep it.—*Hereford Times*, October 29th, 1892.

Several specimens were sent in to me during October and November, 1893.

Golden Plover (*Charadrius pluvialis*).—A local specimen (female), taken in June, 1890, with the characteristic dark breast (summer plumage) is on view at the City Museum, belonging to W. E. de Winton, Esq. This species undoubtedly breeds sparingly in the county, two or three specimens in summer dress having passed through my hands, all killed within a narrow radius, and a noble bird assuming the winter plumage is now before me, taken at Dinmore early in September, 1893, the property of the Rev. H. F. St. John, Dinmore Manor.

Curlew (*Numenius arquata*).—A fine old Curlew has just been taken at Madley and is now in my hands for preservation; the owner, a local gentleman, is fortunate in securing a bird so well developed, the markings being exceptionally clear.—*Hereford Times*, December 10th, 1892.

Green Sandpiper (*Totanus ochropus*).—In November, 1889, I bought a pair of the above (male and female), shot at Lower Eaton; they are in the City Museum.

A female was sent to me, killed at Holme Lacy in October, 1893, by Mr. Oliverson.

The Green Sandpiper has been taken in the county quite recently, F. Wood, Esq., of Fownhope, securing an unusually large female on November 28th, 1893; length across the wings from tip to tip, 17¼in.; from tip of bill to end of tail, 9⅝in.; weight, 3¼oz. This species visits the county but sparingly, and definite proof of its nidification here is wanting; unlike other Sandpipers it nests in the deserted home of the rook, hawk, or magpie in a tree.—*Hereford Times*, December 9th, 1893.

The Editor of *The Field* remarks in the issue December 9th, p. 901:—"The Green Sandpiper is a Spring and Autumn visitor, passing through the country twice a year on its way to and from its breeding haunts; as a rule it makes its appearance on its return journey about the end of July or early in August, and after a stay of a few weeks passes on southward for the winter. November 28th, therefore, is a late date at which to find it here, though examples have occasionally been met with much later.

Grey Phalarope (*Phalaropus fulicarius*).—In 1889 a boy brought in to me a perfect Grey Phalarope, caught under his cap in a meadow near Broomy Hill, Hereford; this was purchased by the City Museum Committee.

During the months of September and October, 1890, six specimens were sent to me from Tenbury, Three Cocks, Lugwardine, and the suburbs of Hereford.

Common Tern (*Sterna fluviatilis*).—Every winter two or three specimens, generally immature, reach me from various parts of the county.

Black-headed Gull (*Larus ridibundus*).—Occasionally forwarded during the winter season.

Common Gull (*Larus canus*).—Five or six of this species have been killed in the County during the last three years.

Two from Ross in January, 1892, mistaken for the Kittiwake Gull.

Kittiwake (*Rissa tridactyla*).—By far the most numerous of the Gulls seen in Herefordshire. I have purchased local birds in almost every stage of plumage.

Lesser Black Backed Gull (*Larus fuscus*).—The only local specimen that has come under my notice was a very mature one (a female), shot by Mr. Thompson, of Dinedor, in the early part of 1892.

W. E. de Winton, Esq., of Graftonbury, informed me that one or two very large Gulls, presumably the Greater Black Back, had been observed through the glass, at Graftonbury, in the late summer of 1893. They were flying in large circles, viz., falling away with the wind.

Manx Shearwater (*Puffinus anglorum*).—In September, 1891, a specimen was picked up, dead, at Withington. It has been preserved.

Another, killed by boys with a stick, near the Wye Bridge in the autumn of 1890, is in my private collection.

Fulmar Petrel (*Fulmarus glacialis*).—The only recorded example is the immature bird, which a labourer captured alive near Pontrilas, and brought to me in October, 1889; it was afterwards purchased by the City Museum Committee, and is, in my humble opinion, one of the most valuable specimens taken locally in the collection.

Puffin (*Fratercula arctica*).—Another scarce visitor is the Puffin, brought in to me alive by Mr. Flower, of Aconbury; discovered on the highway, half disabled by the storm, it presented a most comical appearance. We found that it would readily eat bread, &c., but owing to its injured condition no possibility existed of keeping it alive for any length of time; this bird is a young male.—*Hereford Times*, November 22nd, 1893.

The eyes of the above were flat and dark coloured, and the legs and toes had a delicate pink tint, quite differing from the adult bird with its curious grey eyes and orange coloured feet.

Black-throated Diver (*Colymbus arcticus*).—In the winter of 1891 an example was caught alive by some choir boys at Kynnersley; it was purchased by the Rev. F. Andrews, the Rector, and added to his collection.

Great Crested Grebe (*Podiceps cristatus*).—One was sent per Mr. W. Blake in the early part of 1893.

Shag (*Phalacrocorax graculus*).—One sent in by Mr. W. Blake, killed near Ross in January, 1892; this example (immature) is in the City Museum.

Heron (*Ardea cinerea*).—This noble bird is ruthlessly shot down on every hand, numbers of immature specimens reaching me every winter.

A remarkably clear Heron, at least six or seven years old, was shot early in the year 1892 by Paul Broustet, Esq., at Grosmont.

White-fronted Goose (*Anser albifrons*).—A male was shot by Mr. Bellamy at Hampton Bishop in January, 1890.

Several wild geese were taken during the same month in the county, but were eaten and never identified.

Bewick's Swan (*Cygnus Bewickii*).—Two specimens were obtained in January, 1891, near Ross, one was preserved for R. Pashley, Esq., of Kerne Lodge, the other was purchased for the City Museum; both were immature.

Sheldrake (*Sadorna cornuta*)—One killed near Dinedor in November, 1889, by Mr. Lydiatt.

A female shot near Pontrilas by P. Broustet, Esq., in 1891.

Ruddy Sheldrake (*Tadorna casarca*)—Mr. Elliott, of Holme Lacy, shot the only recorded example in the county (one of a pair) in August, 1892, this was a true specimen, and much smaller than the bird contained in the City collection, which is undoubtedly an exotic.

Shoveller (*Spatula clypeata*).—One specimen killed by Captain E. H. Heygate, November 22nd, on the pond at Buckland, Leominster. This bird is a very rare visitor to the county; the present example would at first sight appear be a female, but close inspection, aided by the never failing description given by Mr. H. Seebohm, F.Z.S., etc., etc., proves it to be an immature male.—*Hereford Times*, November 25th, 1893.

Garganey Teal (*Querquedula circia*).—A pair of the above was seen on a pool near Leominster, in the spring of 1893: the male, a very choice bird, was set up for Mr. Henry Griffiths, of Birley.

Pochard (*Fuligula ferina*).—Appears almost every winter.

Scaup (*Fuligula marila*).—A female shot by W. Merewether in December, 1890, near Hereford.

Another female killed by Mr. Turner, of Lugwardine, in January, 1892.

Golden Eye (*Clangula glaucion*).—Frequently taken in the frosty season.

In January, 1892, a fully adult female, Golden Eye, was shot at Moccas, and by a curious coincidence the adult male was killed in January, 1893, at the same place: both have been set up in one case for the Rev. Sir George Cornewall, Bart., of Moccas Court.

Common Scoter (*Œdemia nigra*).—A beautiful specimen, killed at Goodrich, was sent by Mr. Blake, of Ross, and was purchased by the Museum Committee in 1891.

Red-breasted Merganser (*Mergus serrator*).—A female was shot on the Wye by Sir Edward Cockburn's son, at Fawley, in the year 1890.

Supplementary to the foregoing observations, within the last three or four years, unusually good examples of the Bittern, Bean Goose, and adult Smew (male) have been shot by A. Crawshay, Esq., at Llansaintfraed, near Brecon, and have been carefully preserved.

A very interesting Hybrid, Pheasant and Blackgame was also sent for preservation by that gentleman, in which both Grouse and Pheasant are discernible, the former in the suffusion of bronze colouring on the whole of the neck and breast—the characteristic white feathers which partly overlap the wing scapulars, and the half feathered tarsus,—the latter seen in the light-colouring behind the eyes, the greyish brown variegation of the interscapulars, running down to the tail coverts, and the middle rectrices in tail, as well as the entire wings. This is the brightest coloured example that has come under my notice, two or three which passed through my hands some ten or twelve years ago being much darker and more Grouse-like.—*The Field*, also *The Hereford Times*, December 9th, 1893.

The Editor of *The Field* remarks, page 901, above issue, "Hybrids of this kind have been frequently reported. One such was figured nearly a century ago in one of the earlier editions of White's Selborne." See page 274 of the New Edition published by Nathaniel Cooke, 1853.

Captain. R. Sandeman obtained a wild Raven killed by a keeper in mistake at dusk, near Crickhowell; also a Redshank from the same locality in 1892.

Captain Hotchkis secured a Red-throated Diver on the borders of Radnorshire some three years ago. Two specimens of the Black Tern were shot on Llangorse Lake by Mr. C. J. P. Nash, in the year 1889, and were preserved.

A pair of Ruffs, in winter dress, were killed in September, 1890, at Colwall, near Malvern, by Mr. Ballard, and were forwarded to me for identification.

In the early part of 1891, I purchased a Night Heron, set up in a case at a sale here; this was sent over from Leominster, the bird had been preserved by a local man, and a local paper dating back some fifteen years, was discovered under the mounting. I strongly suspect this to be a bird taken in the county.

ARCHÆOLOGICAL MAP OF HEREFORDSHIRE.

At our Field Club Meeting at Llanthony Abbey, on July 28th, 1891 (see page 211), it was resolved to execute an Archæological Map of our County. The first annual Report of the Committee will be found on page 268 of this volume, and below is appended a copy of the Prospectus, of which about one thousand copies have been circulated. As we are closing the publication of our *Transactions*, 1892, during the commencement of the year 1894, we are glad to report that the Map is progressing most pleasantly near its completion, and we owe a deep debt of gratitude to the Honorary Secretaries of the Committee, namely, Rev. J. O. Bevan, and Mr. James Davies, for so long a devotion of their time, labour, and expense towards the execution of this Map and Index.

Woolhope Naturalists' Field Club.

ARCHÆOLOGICAL SECTION.

It is proposed to compile an Index of Antiquities and Archæological Map of the County of Hereford. The assistance of the Members of the Club, and of all who take an interest in Antiquarian subjects, is solicited in order to render the work complete.

GENERAL SCHEME OF THE WORK.

A Set of Maps of the 6-in. Ordnance Survey is kept at the Rooms of the Committee—provisionally, at 132, Widemarsh Street, Hereford. On this it is proposed to mark all objects of Archæological interest in the County. When the Map is complete, a reduced copy of the Map and Index of Sites will be published with the Transactions of the Club.

It is proposed to divide the work into four sections or periods, viz.:

(1) Pre-Roman:

(a) Early British Trackways and Camps, Earthworks and Tumuli, Beacons and Fords.

(b) Megalithic Remains, Cists, Palæolithic and Neolithic Implements, Bronze Objects, Celts, Palstaves, Spearheads, Sepulchral Relics, etc.

(2) Roman:

Cemeteries, Interments, Tombs and Sepulchral Relics, Foundations, Camps, Roads, Forges, Hoards of Coins, Pottery, Glass, Personal Ornaments, Sites of Early Churches and other Ecclesiastical Remains.

(3) Anglo-Saxon:

Barrows, Cemeteries, Interments and Sepulchral Relics, Coins, Glass Objects, Personal Ornaments, Arms, etc., Sites of Churches, and Ecclesiastical Structures.

(4) Norman:

Churches and Ecclesiastical Buildings, Sites of Castles, Battles, etc.

Finds of Single Coins, etc., whether Roman, Early British, or Anglo-Saxon, may be noticed and recorded, but need not be entered on the Maps. The exact locality of such discoveries should always be given, together with the date of discovery, and a reference to any published account.

Printed Tabular Forms, similar to the enclosed, can be obtained from the Honorary Secretaries.

Any friends willing to assist, either by personal investigation, or by reading and giving reference to the various books relating to the County, are requested to communicate with the Honorary Secretaries, and to prevent confusion and double labour, they are invited to notify the share they are willing to take.

Members of the Club and Contributors can render much assistance by purchasing the single sheets of the Ordnance Survey for their own districts, and filling them up at home, but in all cases the Tabular Form also should be used. Single sheets of the 6-inch Ordnance Survey can be purchased direct from E. Stanford, Cockspur Street, Charing Cross, S.W., or through Messrs. Jakeman and Carver, Hereford, at a cost of 1s. 3d. each, and a skeleton map, showing the divisions of the County, can be obtained for 3d. (including postage in both cases).

Names of Fields are most important, especially those occurring in charters, court rolls, parish or tithe maps, rate books, terriers, etc. Names appearing to bear special significance should be marked on the return, and such as cannot be identified should be recorded under the head of the parish to which they belong, together with full particulars of their occurrence. Much information on these points can often be obtained from the maps and plans issued in Auctioneers' catalogues on the sale of estates. Members are requested to send sale catalogues of any estate in their neighbourhood to the Honorary Secretaries.

Correspondents should note that in a County such as Herefordshire, bordering on Wales, there occur Anglicised corruptions of Welsh names, with historical or topographical indications that may be worthy of record.

JAMES DAVIES, 132, Widemarsh Street, Hereford.
J. O. BEVAN, The Vicarage, Vowchurch.
} Honorary Secretaries of the Archæological Map Committee.

Woolhope Club Room, Free Library,
Hereford,
7th August, 1891.

The before-mentioned Tabular Form is now appended below; in order to serve as a guide to members reporting any discoveries in the future:—

WOOLHOPE NATURALISTS' FIELD CLUB.

Archæological Map and Index of Antiquities of the County of Hereford.

When filled in to be returned with as little delay as possible to

THE HON. SECS.,
ARCHÆOLOGICAL MAP COMMITTEE,
132, WIDEMARSH STREET,
HEREFORD.

Name and Address of Contributor making return:

Date _____

LOCALITY. Give name of town, village, or parish, and if known, exact position of site or field.	PERIOD. Say whether Pre-Roman, Roman, Anglo-Saxon, or Norman.	NATURE OF DISCOVERY. Whether tumulus, earth-work, cemetery, urns, coins, vessels, etc. Site of church, castle, etc.	WHERE RECORDED. Full reference to any book, pamphlet, etc., or if from personal knowledge, enter as such.
			DATE OF DISCOVERY—IF KNOWN.

N.B.—Not more than one entry to be made on each form.
All applications for forms to be made to the Hon. Secs. as above.

REMINISCENCES OF THE DOWNTON SANDSTONE.

By the late R. W. Banks, Esq.

Under date April 22nd, 1890.

At a recent meeting of the Woolhope Field Club in the neighbourhood of Kington, I was asked to prepare a paper on the Geology of the country around. My answer to the Rev. W. Elliot, who then so ably presided over the Club, was, that anything which I might write would be merely a repetition of my paper read before the Geological Society in 1855, and of my address in 1861, as retiring President of the Club; for I had nothing fresh to communicate, and had given but little attention to Geology for the last twenty-five years. I mentioned that I had in my possession a correspondence with Sir Roderick Murchison and others, from which letters of interest might be culled, affording an account of the work of myself and others in the neighbourhood of Kington. Mr. Elliot wrote in reply that the Club would be glad to have the advantage of recording the letters which I might select. Mr. Moore, the Hon. Secretary, has since suggested that they might be incorporated with the early *Transactions* of the Club, which were about to be re-published. I therefore venture again to tread on old ground, and comply with the request, prefacing the letters with a few remarks.

My attention was directed to Geology as a diversion during the intervals of business nearly forty years ago. Residing on the border of the Old Red and Ludlow Rocks my first instruction was derived from "The Silurian System," especially the chapter describing the rocks near Kington, and in Radnorshire. With the aid of the figures which illustrated Murchison's great work I found many of the *Mollusca* and other remains in the Lower and Upper Ludlow, and in the Bone Bed in Newton Lane. Searching for a fresh field for my work I fortunately read with much delight and interest Hugh Miller's "Old Red Sandstone," and longed to discover what were the contents of the beds of Old Red in my own neighbourhood, in the hope that I might, like Dr. Lloyd of Ludlow, be able to find there some of the Old Red fishes. A quarry of Downton Sandstone was open and worked for building stones on Bradnor Hill; the site forms a tongue-like projection of red colour into the adjoining deep blue of Ludlow Rock, and is marked "Tilestones," in the Geological Map of the Ordnance Survey. Ascending Newton Lane to the hill, the Bone Bed, which runs upward on a level a little above the roadway, appeared to be succeeded by an occasional layer of Downton Sandstone. A prospect, therefore, appeared to be opened to me of finding some of the organisms of the Old Red in the quarry. Several fruitless visits were made to it; but one day in passing up Newton Lane I saw on the ground a piece of sandstone with a slightly raised fragment tinged with oxide of iron on which were large scale-like markings weathered by exposure, which at once satisfied me that I had found a portion of the *Scraphim* of the Forfarshire quarrymen, so graphically described by Hugh Miller. I felt that I was not far from the object which I had

in view, and with redoubled interest renewed my search in the quarry. The old spoil heaps outside the quarry revealed fresh organisms much weathered. After many fruitless searches in the hard stone of the quarry I discovered that two layers, the lower varying from three to six inches in thickness, ran between the hard beds of building stone on the western side from the entrance, gradually growing less and thinning out as they reached the deeper beds of stone. The layers were composed of a dried mud, or sediment, readily decomposed in water, which from the remains of carbonized seaweed that they contained assumed a blackish grey tinge. These waybeds proved very prolific in organic remains, which were in a more perfect state than those occasionally found in the sandstone, and retained their dermal covering, often glossy when first disinterred. My visits in the afternoon to the quarry were very frequent in 1853 and 1854. Each visit generally disclosed a fragment of a *Crustacean* or a *cephalic buckler*, which had a resemblance to *Pteraspis Lloydii*, although it wanted the bony enamelled covering of the latter, and had symmetrical striæ from back to front. The heads of the small *Crustacean*, afterwards named after me, and of *Eurypterus*, were the most frequent finds. Segments of the body of a large *Crustacean*, with scale-like markings varying with the position of each in the body, came out entire from the layer and in their original form undistorted by pressure, with fragments of jaw, feet, and limbs, in juxta-position, and occurred in the same layer on the outer margin of the quarry; but each segment lay separate and unconnected with its fellow. Another puzzle was a form like the heart on a pack of cards, always alone, which was identified afterwards by Mr. Salter with the metastoma, or covering of the mouth, continually occurring. A fresh interest was raised by each successive find to search for additional portions and arrive by comparison of them at a notion of the form of the *Crustacean* of which they had formed parts. The occurrence of scattered fragments led to the consideration how it was that I failed to find any one organism entire. I could arrive at no other conclusion than that these grey layers, judging from their contents, were the muddy sediment gradually deposited between high and low water mark on a shore, and that each ebb and flow of the tide brought up with the seaweed the dead animal, gradually disjointing it, and leaving the fragments embedded in the fine silt before it was overlaid with the coarser and heavier deposits of sand. A comparison of the different segments enabled me to arrange them in some order, but a head and tail-joint for the large *Crustacean* were long wanted to identify the species, as will appear hereafter.

My kind friends, the Rev. W. S. Symonds, and the Rev. J. F. Crouch, took much interest in my discoveries, and the former encouraged me to draw up an account and submit it, with the drawings which I had made, to Sir Roderick Murchison. I availed myself of his advice. The result will appear in the correspondence which follows. Others followed me, and obtained good specimens of the crustaceans and fishes of Bradnor quarry; in particular our late indefatigable member, Mr. Lightbody, whose labours in the Passage Beds at Ludlow and elsewhere are recorded in our *Transactions*, and in the monograph on *Pterygotus*, published by the Ordnance Survey. But I believe that their finds in the Bradnor beds did not add a fresh species to those discovered there by me. As the working

of the quarry proceeded the waybeds disappeared, and successive beds of hard stone down to the Ludlow rock lay one on the other. The finds became less frequent, and it is now difficult to meet with any of the organisms which were so abundant when I was at work there. I think that there is still a field for further discoveries wherever the Downton Sandstone beds occur; but they will be made only by a resident near the quarry who will steadily devote himself day after day to the work, and will not be discouraged by frequent failure to find anything. The *Transactions* of our Club give an account of what has been done in the Downton beds at Purton near Stoke Edith, and Rowlestone. I may mention another field within reach of our members who may be desirous of further investigations in the beds of stone which occur on the banks of the river Tarrell, between Brecon and Libanus. Judging from the traces of small crustaceans which I have noticed in the building stone by the roadside, and a plate of *Pterygotus* too much weathered for exact identification which I found on an old wall near Cwmclyn farmhouse (but apparently a different species), I have but little doubt that any workings of stone in the valley will lay bare the Passage Beds between the Old Red, and Ludlow, rocks.

I may add, that, many years ago, Mr. Symonds took charge of my chief *Pterygotus*, and other finds, and deposited them by my wish in a safe place—the Museum of Malvern College.

From Sir R. Murchison to R. W. Banks, July 18th, 1855.

I gladly accept your proposal, and will communicate your memoir to the Geological Society in November when the Meetings recommence. In the meantime I should like to see the specimens here. As to the two supposed heads of fishes I suggest that you should send them immediately by post to Sir Philip Grey Egerton, Bart., M.P., Oulton Park, Tarporley, Cheshire, for his examination. He is the only authority on whom we can rely in the case of *Icthyolites*, and he is going soon to the Highlands. I therefore wish him to see your specimens before he goes; and then your Memoir will be rendered more perfect. I have known the quarries on Bradnor hill since 1831, and have always regretted that they were not sufficiently worked. The Memoir and other specimens should be sent to me at this place. (Museum of Practical Geology, London.)

R. W. Banks to Sir P. Egerton, July 19th, 1855.

At the suggestion of Sir Roderick Murchison I beg to forward for your inspection five of what I imagine to be heads of fish. They were found in the Tilestone, or Downton Sandstone, beds, immediately overlying the Upper Ludlow rocks, and were accompanied by remains of *Pterygotus*, and other *Crustaceans*, probably undescribed. *Trochus Helicites* and a small *Lingula* are the only mollusca which occur in the same beds. I mention the grounds on which, however incorrectly, I came to the conclusion that they were fish heads, in order that you may the better correct any error into which I may have fallen.

1.—They have a dermal covering with longitudinal striæ, supported by granules, each of which fits into an irregular hexagon, or at any rate pentagon.

2.—In forming his opinion that *Cephalaspis Lloydii* was a fish, M. Agassiz laid much stress on the presence of a granular texture resting on laminæ.

3.—Hugh Miller in his *Footprints of the Creator*, page 43, describes much such a fish cranium as these are, and gives an illustration of *Raia clavata*. To use his words, "The cranium appears to have been covered, as in the Shark family, by skin; and all of the inferior cerebral framework which appears underneath exists simply as faint impressions of an undivided body covered by what seem to be osseous points, bony molecules it is probable, which were encrusted in the cartilage." If you will do me the favour of accepting 1a and 2, and returning to me those marked 1, 2a, 2b, and 2c, with your opinions on the whole, I shall be very much obliged.

P.S.—1. The striæ in this specimen [afterwards named *Pteraspis Banksii* R. W. B.] are more perfect than on any of the numerous specimens I possess. 1a exhibits well the general form—the lateral horns are more developed in other specimens—see in both the protuberances on either side of the snout. 2. Evidently a different species deformed by pressure; see the polygons. [This was named afterwards *P. truncatus*. R.W.B.] 2a. A portion, showing the granules. 2b shews the striæ well. 2c. The surface of the granules and part of the dermal covering; a compressed specimen.

Sir P. Egerton to R. W. Banks, August 6th, 1855.

I returned from Ireland on Saturday night, and have this morning examined your specimens. You are quite right in your conjecture as to their affinity to the objects named by Agassiz, *Cephalaspis Lloydii*, and *C. Lewisii*. What these organisms are has yet to be determined; for ten years after Agassiz first described them he remained as much in doubt as at first; as you will find at page 31 of "The Old Red Fishes." I am not without hope that your researches may settle the question, for I have seen no specimens hitherto which go so far to invalidate the icthyic relationship. One of your specimens, 2c, differs in form from the others, yet agrees in structure, and is associated with *Pterygotus*. Two others, 1 and 2b are also associated with *Pterygotus*. These were unfortunately broken in the journey, but not materially injured. This association is fair presumptive evidence of relationship. But the feature that strikes me most is the absence of that exact symmetry which ought to prevail were these the cephalic bucklers of fishes. 2c at all events could not be assigned to this position. The other specimens most resembling *C. Lloydii* are also devoid of that correspondence on either side of the median line which we find in *C. Lyellii*; and (which is the most striking point) the so-called eye tubercles do not coincide in position on either side of the head. In one specimen, 1, the left is the most forward; in another, which has lost its number, the right is the most forward to the same extent. So that, although the right and left sides of the same specimen do not agree, yet the two specimens agree with each other, and probably occupied similar positions on opposite sides of their former possessor. You kindly offer me for my collection the specimens numbered 1a and 2. The former label is wanting, having been lost in the cotton wool, but I have retained the latter specimen, for

which I am much obliged. I may add that the sculpturing of the exterior coat in these specimens evidences specific difference from *C. Lloydii* and *Lewisii*. I shall be very happy at any time to examine any further specimens you may obtain, and I hope you may be successful in clearing up this knotty point.

I will return your specimens by post to-morrow. I have just seen the last page of your letter, which I had overlooked, and by the description I make out the lost ticket, 1a. As it is the pair to 1, to which I have referred, I return it that they may be kept together. I do not detect any specific difference in No. 2.

At the Meeting of the British Association, held in August following at Glasgow, Murchison called attention to my recent discoveries in the Tilestones of Kington, and compared them with the remarkable collection, exhibited by Mr. Slimon, of *Crustaceans* occurring in the black schists rising from beneath the Lower Old Red in the parish of Lesmahago, on the banks of the Logan Water. A visit to the spot, in company with Professor Ramsay, confirmed his view that these schists were uppermost Silurian of the same age as the Downton Sandstones, and that the *Crustaceans* were closely allied to those found in the latter. The *Crustaceans* of Mr. Slimon were in many cases entire, resembling flattened casts in black sealing wax, and served for the arrangement into a whole of the scattered fragments and members of the *Crustaceans* found in the Bradnor beds at Kington. Murchison's paper on the subject was read at a Meeting of the Geological Society on November 7th. On the same day Mr. J. W. Salter, the Palæontologist of the Government Survey, read a paper on the *Crustaceans*, in which he pointed out that, although they were closely allied to *Eurypterus*, there was this essential difference, that the eyes were not placed, as in *Eurypterus*, on the surface of the head, but on the anterior margin, quite at the edge, and that the swimming feet were more thong-shaped. He gave to the new genus the name of *Himantopterus*, a name after further discoveries abandoned for *Pterygotus*, and he described six new species, including one found at Bradnor of small size (*H. Banksii*), and also gave an outline drawing of the species with its characteristic details. (*Quart. Journ. Geol. Soc.* Vol. 12). At the next Meeting of the Society, on December 6th, Sir Roderick communicated my paper on the Tilestones in the neighbourhood of Kington, accompanied by coloured drawings of the various portions of *Pterygotus*, and pen and ink drawings of the *Pteraspides* and smaller fish, and *Crustacean* remains, including *Eurypterus pygmæus*, a tail of *E. lincaris*, *H. Banksii*, and an unnamed fish head, which was, on his examination of the after discoveries at Ludlow of *Cephalaspis* and other allied species by Mr. Lightbody and Mr. Humphrey Salwey, named by Sir Philip Egerton as *Auchenaspis*. (*Quart. Journ. Geol. Soc.* Vol. 13). My paper, with a reproduction of the pen and ink drawings, will be found in Vol. 12, p. 93. In an appendix Professor Huxley and Mr. Salter gave a description of the fish heads, naming them (until Huxley had minutely examined their structure in order to determine their true relationship to *Crustaceans*, or to fishes,) *Pteraspis truncatus* and *P. Banksii*. The result of his examination is recorded in an elaborate paper "On *Cephalaspis* and *Pteraspis*" in

Vol. 14 of the *Quarterly Journal* of the Society. Perusal of it alone will explain his investigations. It may suffice to give here an extract. "No one can I think hesitate in placing *Pteraspis* among fishes. So far from its structure having no parallel among fishes, it has absolutely no parallel in any other division of the animal kingdom. I have never seen any *Molluscan*, or *Crustacean*, structure with which it could be for a moment confounded. Its relations with *Cephalaspis* on the contrary are very close." He points out the points between the two very minutely; and adds that the presence of orbits in one (*P. Banksii*) and their absence in the other (*P. truncatus* or *P. Lloydii*) indicate a wide difference between the two genera; and that there is precisely the same difference between *Pterichthys* and *Coccosteus*, which are admitted to be closely allied.

Sir R. Murchison to R. W. Banks, November 7th, 1855.

On my return from Paris this day I find your letter and interesting additional drawings. I had previously requested the President to postpone the communication till our second meeting on the 21st., on which occasion we shall have a capital evening on the same topic, i.e., the Tilestones, Bone bed, &c., the fossils of which have recently been discovered in Lanarkshire, Scotland, where I have been to verify the sections, and have ascertained that the fossils there, two species of *Eurypteri*, as well as *Pterygotus*, with small *Lingulæ*, &c., occur in black schist and flags which pass up into the Old Red Sandstone.

Sir R. Murchison to R. W. Banks, January 14th, 1856.

Finding that the Council of the Geological Society demurred to incurring the large expenditure required to lithograph your drawings of the Tilestone fossils of Kington, I undertook on my own part, as Director General of the Geological Survey, to say that I would have them engraved for a Decade of my Department in conjunction with a magnificent suite of allied genera and species from the uppermost Silurian black schists of Scotland. I hope you will be gratified by this arrangement, whereby your labours will be briefly recorded in the Journal of the Geological Society, whilst your fossils will have much more ample justice done to them on our finely engraved steel plates than they could have received if lithographed for the Geological Society. I do not wish to be importunate, but I think that, if possible, your original drawings should be in this establishment, and if you can enrich our Museum by any specimens we shall of course be very grateful.

[The Geological Society at my request transferred my paper and drawings to the Museum of Practical Geology accordingly. R.W.B.]

R. W. Banks to J. W. Salter, January 11th, 1856.

I send you in a small box addressed to you by this day's post:

1. *Pteraspis Banksii*, shewing the striæ more perfectly.
2. One of the bands of a *Crustacean* of which you suggested an enlarged drawing shewing the lines. On my other specimen, which is much larger, the lines are more distinct.

3. A small *Crustacean* of the Tilestones; perhaps a young *Himantopterus*. I have 3 or 4 specimens.
4. A head of *Eurypterus* (?); see the outline on the fourth side.
5. What I named in my paper *Theca triangularis*, which appears to me to be *Orthoceras triangularis* in the Museum. (Near, if not part of, the Bone bed, Newton lane, Bradnor).
6. A mould of apparently a section of a *Crinoid*. (Same bed).

I have no time to make an enlarged drawing of No. 2, and therefore send a specimen. You can place such of the above as you may think fit in the Museum. You will remember that you called my particular attention to Agassiz' drawing of the didactyle foot of *Pterygotus*, with a faint impression, or shadowing forth, of a foot closely resembling fig. 4 (two joints) of Plate III in my drawings. It is an interesting fact that the portion of a pincer with fringe-like tubercles (Plate II, fig. 10) lies immediately under the joint marked "a," and was only brought to light by the removal of that joint from the stone. It seems therefore to be a confirmation of your supposition that the portion faintly drawn by Agassiz represents a foot of the same pair. On the fourth side I send you a new form of *Pterygotus* to aid in your restoration of its form. It is clearly different from any of the other body segments which I have met with, as appears by the markings on the margin. The scale-like markings, which would still further serve to mark the difference, are almost entirely wanting, except on the left hand side at the top. I also send a drawing (probably *Himantopterus*) shewing one of the body segments attached to the head, and also a drawing of *Eurypterus* with one of the swimming appendages attached. I also add a rough outline of a specimen which resembles a form I saw among the Scotch fossils. One of the two specimens which I possess has scale-like markings resembling those of *Pterygotus*. Will you be good enough to let me have your opinion of 3, 5, and 6; and add any remarks which the other specimens or drawings may call for?

J. W. Salter to R. W. Banks, January 18th, 1856.

I had inadvertently overlooked your queries, or would have answered them before. Thanks for the many specimens which you have sent us, and those to illustrate, which shall be returned. I think we need not keep your *P. Banksii* unless you have plenty, for you have supplied us well. The others we will keep and be thankful. No. 3 I think is a *Leperditia*. I will hand it to Mr. Jones. 5 is certainly *Theca Forbesii*, and, if you please, I will tell the Secretary to alter your name, *T. Triangularis* as that is a Lower Silurian species. 6 is quite right—an Encrinite ring—they are not common in the Tilestones. Your drawing of the swimming foot is very interesting, as it shows the breadth of that organ. I think you have yet to find the actual tail joint of *Pterygotus*. It strikes me your figured ones [a] must be the last but one; and that the last would be as "a" (referring to the outline drawn); but this is by no means sure. Then I think you ought to find the centre part [b] of the head, wide and with pointed ends, and the prong,

a. See fig. 17 & 18, Plate ix., *Pterygotus gigas*, in Salter's monograph.
b. *Epistoma* and *labrum*, afterwards found. See Plate viii., fig. 2, *ibid.*

"b" in sketch free. The joints of antennæ are very desirable together. We have just got a very fine pincer from Scotland, 6 inches long; and hope to get Hugh Miller to lend us some specimens. I shall be glad to hear from you as you proceed. I hope to get out a figure of *Pterygotus* for the Geol. Society, shewing the parts you had discovered, and what Agassiz had made out, and the whole restored for *Himantopterus*; when I find they are willing to give a woodcut of it I will write and inform you.

Professor Rupert T. Jones (then Assistant Secretary to Geological Society) to R. W. Banks, January 25th, 1856.

Your communication enclosing the specimens demands my best thanks. The two Tilestone specimens especially are highly interesting. As soon as I have taken a drawing of No. 2 I will return it. For No. 1, and the other specimens, accept my thanks. Two specimens, similar to Nos. 1 and 2 were shewn me by Mr. Salter from the collection made by the Survey people, and I have noticed them in my paper (now printed off) for the next number of the *Annals of Natural History*. And I regret that I cannot add to, or correct, my description of the species, which I think is new, as it is now too late. I shall notice your specimens in another paper on the same subject. Mr. Salter has lent me a small fragment, something like the specimen last referred to; it has some interesting little Crustaceans on it, but they wait for further examination.

The species to which the Tilestone specimens, similar to Nos. 1 and 2, are referred in my paper, is *Leperditia marginata*.

R. W. Banks to J. W. Salter, April 26th, 1856.

You will be glad to learn that I have this afternoon met with a head of *Pterygotus* imperfect only at the posterior portion. On the same slab was part of a body ring with the scale-like sculpturing which I have hitherto considered to be *Pterygotus*. But this body ring seems too small for the head, which is nearly five inches in width, and resembles very closely the *Himantopteri* of Mr. Slimon. The eyes are perhaps larger. They lie on either side of the head, as in *Himantopterus*. The exterior margin of the head is plain and without any sculpturing. The head is probably flattened by pressure, and it exhibits no trace of scale-like markings; but it does not follow that the scale-like markings did not occur on the head, for in many instances from accidental causes they are almost wholly obliterated on the portions of *Pterygotus* which I have met with. I know your view is that the eyes occur on the *cephalic buckler* as in the *Eurypteridæ*. You have doubtless good reason for this view. If so, a doubt is thrown whether my specimens belong to *Pterygotus* rather than to *Himantopterus*. I have met with another *fucoid* since I saw you. I have also found a head of *Eurypterus pygmæus*, the margin of which has evidently a sculptured border; there is also sculpturing on the forepart of the head. I have to-day also found a beautiful jaw foot, probably of *H. Banksii*. I hope in the course of the spring and summer to be able to draw my fresh acquisitions, and send the drawings to the Museum.

J. W. Salter to R. W. Banks, April 28th, 1856.

Your find is capital indeed. Send a rough sketch of *Pterygotus* head.

R. W. Banks to J. W. Salter, May 17th, 1856.

I shall send under cover to Sir R. Murchison by to-morrow's post two more drawings of Tilestone fossils. The head of what has hitherto been called *Pterygotus* closely resembles the *Himantopteri*, and I think affords a solution to the question to what the two eyes (Plate 5, fig. 4) belong. The head is unfortunately much flattened by pressure. The presumption is that it belongs to *Pterygotus*, for no other remains have been found to which it can be so easily referred. I hope I may be fortunate enough at some future period to find a head with a body ring attached. On the same slab a small body ring of *Pterygotus* occurred. You will find that, when I sent you on a sheet of letter paper an outline of *Eurypterus pygmaeus*, I drew an outline of what appeared to be a new portion of *Pterygotus*, probably the caudal joint.

I have found a similar portion of a large size. The extremity is unfortunately wanting; otherwise it much resembles *H. acuminatus*. Pray excuse this rough notion of it (given in an outline sketch). I have also found a portion of *Pterygotus* with part of a joint attached, perhaps the basal joint of one of the palpi of a jaw foot; but, like most of the Tilestone specimens, it is too imperfect to form any certain opinion respecting it. I hope to send a good sketch with drawings of details of *Eurypterus pygmaeus*[a] and *H. Banksii* before this summer is over. I have found many interesting portions of late, which throw a further light on these animals.

J. W. Salter to R. W. Banks, June 13th, 1856.

I thought Murchison thanked you for the drawings, or I should. They are most interesting, and I fear cut up my genus *Himantopterus*, since the lateral eyes would leave me no character of importance. We have the Scotch specimens now. Look for this (outline drawing of *epistoma* and *labrum* enclosed. R.W.B.) It is the only part not yet clearly made out. We have the swimming feet from Leintwardine, and jaws with long feelers attached to them. I hope you will be at Cheltenham, and that I shall be able to come there. We must say something of *Pterygotus*.

R. Lightbody to R. W. Banks, July, 1856.

I have now to tell you of our great finds in this neighbourhood (Ludlow) which have astonished Salter and the big wigs in London. Close to Leintwardine at Church hill we have obtained six or seven new species of Star-fish, a new *Encrinite*, a new *Pterygotus* in abundance, a new fossil between *Lissalus* and the *Trilobites*, all in Lower Ludlow, and three different *Phyllopods*, one entire. Within the last few days I and my boys have been examining again the Tilestone (?) beds on the river which I shewed you, near the paper-mills, Ludford.

a. Mr. Salter's paper "On some new species of *Eurypterus*," with a plate, will be found in *Quart. Journ. Geol. Soc.*, Vol. xv., p. 229. *E. linearis*, and *E. abbreviatus* there figured, are also from Bradnor quarry.

We have been rewarded by finding several *Cephalaspis* heads and toothed spines, together with *Lingula Lewisii* and *L. cornea*, and also one plate of *Pterygotus*. At Church hill we found the entire arm and swimming paddle of *Pterygotus*, with some queer claw-like appendages, which seem attached to it, but are at present rather unintelligible. Salter is now getting up a paper on *Pterygotus*, having a fine suite of specimens from Scotland as well as yours and ours; and has made out the figure in cardboard. I expect all these treasures will bring you to this neighbourhood this summer, when I shall hope to shew you what will gratify you.

R. W. Banks to Sir R. Murchison, July 16th, 1856.

I send you four more sheets of drawings of the Tilestone fossils which I will thank you to place with the former drawings in the Museum. Although most of them are fragments, they may serve to throw a light upon, or supply portions wanting to, the Lesmahago fossils. You may perhaps remember the fish bone, which Mr. Huxley considered formed part of the jaw of a *Chimaeroid* fish. Two or three days ago I received a letter from Mr. Lightbody, who mentioned that he had recently found in the same bed at Ludlow several *Cephalaspis* heads and toothed spines, with *Lingula Lewisii* and *L. cornea*, and a plate of *Pterygotus*. The lithological composition of this bed is that of the Old Red. I do not mention this as an argument for my position that the Tilestone beds are part of the Old Red Sandstone, a position which I should not have taken if I had had a knowledge of your views on the subject, but merely for the sake of elucidating the true nature of these beds. Mr. Crouch, of Pembridge, has found varieties of *Pteraspides* in the parish of Pembridge, at the Broom, and Westonbury, thus showing that the *Pteraspides* range upwards from the Tilestones into the Cornstones. One specimen has a snout somewhat in this shape [sketch enclosed] and in other ways resembles much (except its enamelled covering) *P. truncatus*. Mr. Crouch's specimens will, I think, bring out two or three new varieties. He proposes shortly to send them to the Museum; an opportunity will thus be afforded of fully describing them.

J. W. Salter to R. W. Banks, July 21st, 1856.

I recognize your drawings as most faithful to the species, and I hope you will not have any objection to my exhibiting a few of them at Cheltenham in connection with my own diagrams of *Pterygotus*. Many of the data for reconstructing that animal have been furnished by your accurate drawings. There seems to be a perfect mine of rich material in the Tilestones, and if the Scotch beds be not the same, it is most wonderful to find the same form repeated so exactly. Every part you have drawn from Kington has been found in Scotland, and they have the head and eyes of *P. anglicus*, tail, penultimate joint, antennæ, feelers, two pairs of jaws, everything perfect. You will, I dare say, be at Cheltenham.

Sir R. Murchison to R. W. Banks, Builth, July 24th, 1856.

I am here on a tour of inspection, and after a transit to Meifod and the Berwyn Mountains I hope to be able to pass by Kington and see the *Pterygotus*

beds with my own eyes once more, now that you have given to them a new Geological interest. I will be glad to hear from you at Welshpool, and know if you are likely to be at home, and when you will be absent. Lord Ducie, who has been accompanying me, may probably look in upon you before you get this letter.

Sir R. Murchison to R. W. Banks, Penybont, July 25th, 1856.

I wrote last night from Builth, but, as my letter did not go till to-day, and we have travelled since towards you, I send this by the mail to announce that we intend to be at Kington this evening in time, we hope, to see your quarries before dark; or, if it be too late to work the same, to-morrow morning. I am accompanied by Professor Ramsay and Mr. Aveline; Lord Ducie being also of the party till to-morrow.

The party arrived next day, and accompanied me along the line of the tramroad to Newton. In Newton lane, on the way to Bradnor quarries, Sir Roderick pointed out the course of the Bone bed. Arrived at the quarries Sir Roderick referred to the map of the Geological Survey, and directed Mr. Aveline to have the colouring in the Ordnance Geological map of the site of the quarry altered from red to dark blue as indicative of Upper Ludlow rock. It is a matter of no moment whether the Tilestone beds belong to the Ludlow, or Old Red. Further investigations induced Sir Roderick to treat them as true beds of passage from the Silurian to the Old Red. "Siluria," 5th edition, p. 260.

Sir R. Murchison to R. W. Banks, Shrewsbury, September 5th, 1856.

Having returned from Ireland I have been exploring the Stiperstones (my own Silurian Stiperstones) for the 20th time, and have, with the aid of my good collector, Gibbs, found much that is new and good. To-morrow, after visiting other places, I propose to get on to Kington, and have written to Sir G. C. Lewis to propose a visit to Harpton. I shall bring Gibbs with me to Kington, but whether we shall arrive Sunday evening or Monday morning early I cannot say. At all events I hope to find you ready for a field day early on Monday, so that I may either go on to Harpton, or journey Southwards accordingly.

On this occasion Sir Roderick visited the Bradnor quarries with Sir Cornewall Lewis and myself. He found a *Pteraspis* in the upper beds; and Gibbs, his collector, carried away, among other specimens, a swimming foot, with the fringe-like pincer, of *Pterygotus gigas*.

J. W. Salter to R. W. Banks, November 25th, 1857.

The little fossil is not a *Cheirurus* but the pretty *Lichas Bucklandii*, or *hirsutus*, a species published by Fletcher in the *Geological Journal*, which does range occasionally up to the Upper Ludlow rock at Ludlow.

[This fossil was found in the Upper Ludlow beds in Stoke Edith Park. R.W.B.] I hope the *Pterygotus* is a new species, and not "*problematicus*," a species which cannot possibly be determined, but which, if belonging to any one, must be appropriated to the one from the Ludlow Bone bed, quite a different thing. I may have to ask you for a few more specimens when we come to decide on the plates shortly, but you have sent all the chief ones.

J. W. Salter to R. W. Banks, December, 8th, 1857.

After asking for a few more specimens, the writer proceeds:—Instead of finding that your figures require correction, I am surprised how very truthful they are. It is always an advantage to have the specimen at hand, because it enables the engraver to see the points which the artist has introduced but of which the full meaning would not have struck him. What a wonderful caudal joint *P. gigas* has! Such a crest along the tail no other species possesses at all, nor does any that I know of possess such curious serrated pincers. But there must be two species, and one, I think, is the true "*problematicus*." The other "*gigas*" belongs to your great fossil, which ought to have been *Banksii*, had I not named the smallest species after you. *Himantopterus* is *Pterygotus* now; there is no difference.

J. W. Salter to R. W. Banks, January 11th, 1858.

The little *Pterygotus* (a small head with large eyes, afterwards named *P. stylops*. R.W.B.) I will take care to notice. I quite agree with you it is a distinct species, and *Pterygotus* proper.

Sir R. Murchison to R. W. Banks, February 27th, 1858.

M. Delesse, of Paris, who is well known as an able writer on metamorphic, crystalline, and igneous rocks, asked me to procure for him a specimen or two of Serpentine of Old Radnor, which lies between the trap rock and the limestone, which is much altered, as described in "The Silurian System." As an hour's ride will enable you to gather such a specimen, and as I know no person who can do the thing so well within many a mile of the locality, I hope you will be able to oblige me by acting as the collector for the French Geologist. You may say that I give you an impossible task to execute, since the Government Surveyors have been pleased to abolish Old Radnor as an igneous rock. But, whether it was ever molten or not, I shall still believe that the tract in question has been subjected to much action of heat, and outburst of the same.

Several letters passed between Mr. Salter and myself prior to the publication in the summer of 1859 of the Monograph on *Pterygotus*, the joint work of Professor Huxley and Mr. Salter. In a letter from Edinburgh in October, 1858, he says that he has found the Downton beds there.

R. Lightbody to R. W. Banks, September 22nd, 1860.

The place I mentioned to you lies in the corner of Oakly Park, where the road leads out to Lady Halton, and from here I have had several specimens of

Cephalaspis heads; but since I saw your Rodds stone at the cemetery I am inclined to think our beds are rather lower down. The *Cephalaspis* (a mould of a well-developed head found in the Cornstones, Rodd's quarry, Kington, on the boundary of Lyonshall parish. R.W.B.) seems rather different from *Lyellii*, being higher in the forehead in proportion to its breadth. The quarry lies just east of the Tin mill, near Forge Bridge, where the Old Red beds commence, about half-way between there and Ludlow. There is another quarry of the same nature east of Rye Felton, and opposite the end of the Cornstone bank of Whitbach and Hayton's Bent. You saw somewhat similar beds yourself in the new drive just cut opposite Downton Castle. But I think, though I found *Cephalaspis* heads, they are lower beds than in Oakly Park. Mr. Salter at first thought the Star-fish you mention the same as *Palaeodiscus ferox*, but soon found considerable difference. Professor Wyville Thompson, of Belfast, has had a number of specimens, and names it *Sphoeraster pomum*.

Rev. W. S. Symonds to R. W. Banks, January 16th, 1861.

I enclose you the abstract of my paper before the Geological Society. The address at Worcester next month will be a popular description of the whole line and the Geology between Worcester and Hereford. The points of principal interest are as follows. At the Malvern Wells Station Mammoth remains have been found in drift. The Syenite in the centre of the hill is traversed in every direction by thick beds and dykes of Greenstone, Diorite, and Chlorite. At the western end of the Malvern tunnel there is a fissure in the Syenite, into which Upper Llandovery limestone, with *Pentamerus oblongus*, has infiltrated. The limestone is not in the least altered. The oldest sedimentary deposit on the western flank of the hills, where the tunnel traverses, is Upper Llandovery. There is a kind of bay in the Syenite where the tunnel passes on the western side, and the Upper Silurian, Llandovery beds, and Woolhope shales, appear to have been deposited in the cleft, or bay, when the Malverns were a submarine ridge, and before any great upheaval. In the Ledbury tunnel the principal remarks we have to record are the violent faults towards the western end. The bone bed has not been detected. The Ledbury section proves beyond doubt that, where no fault intervenes, as at Ludlow, there is a true conformability between the uppermost Ludlow, Downton, and Old Red deposits. As regards the Old Red, I have a letter from Sir P. Egerton, informing me that Mr. Peach has discovered a fish, allied to *Dipterus*, in the Caithness flags, with true osseous vertebrae. Mrs. Hugh Miller has also received a letter from the Rev. Hugh Mitchell informing her he has found *Dipterus*, associated with *C. Lyellii*, in the Lower Old Red of Forfarshire. The *Dipterus* is a fish which you may remember Sir Roderick in his last edition makes typical of the Middle Old Red. If any other notes strike me I will write them down and send to you.

Rev. J. F. Crouch to R. W. Banks, January 27th, 1861.

I am very glad to find that you are contemplating what I may call something like a practical development of the objects of our Club. My specimens

are in Huxley's hands, and have been so for a long time. There were among them two or three that looked different from the rest, and Salter hesitated to name them.

He has named

Cephalaspis Lyellii. Lever Hill and Leysters.
" *Salweyi.* Lever Hill.
Pteraspis Lloydii. Lever Hill.
" *Lewisii.* "
" *rostratus.* "
" *Crouchii.* "
" *ornatus.* "

He told me that Huxley demurs to *Crouchii*. Salter however still persists in his opinion. I look forward with great interest to your list. It will give us a start, which is what we want.

David Page, F.G.S., to R. W. Banks, Edinburgh, January 31st, 1861.

I regret to say there is yet no published abstract of the paper on the Scottish Tilestones to which you refer, the whole being reserved for Mr Powrie's forthcoming Monograph on the Old Red of Forfar. I am quite familiar with your paper in the 12th Volume of the Society's Journal, and may remark that it might as well have been written for the Tilestones of Forfar, so entirely similar are they in all their organic remains. Should all go well, Mr. Powrie and I will have a large exhibition of our new discoveries in these beds at the September Meeting of the British Association. And it would be of great interest and instruction could you manage to exhibit some of your treasures at the same time. The grey fissile flagstones and Tilestones of Forfar (that is, our lowest Old Red) have very recently become unusually productive; vegetable, *Icthyic*, and *Crustacean*, remains being as thick as blackberries in one locality, and in beautiful states of preservation. The leading types are:—*Lepitodendroid* stems, *Fucoids and Zosterita*, Fernlike *(Sphenopteryx)* fragments, &c. *Pterygotus* of several species, from one foot to six feet long; *Eurypteri*, two species; *Acanthodes*; *Diplacanthus*, two species; *Climatius*, several; *Plectrodus*; *Icthyolites*, undetermined; *Cephalaspis*, &c. But no trace of *Mollusca*, corals, or other analogous remains. Taking the Forfarshire beds along with those of Lesmahago, which have yielded so many uppermost Silurian fossils, there can be no doubt of a well-marked zone about this stage; and be it called Silurian, Devonian, Passage Beds, Tilestone, or otherwise, it can little affect the true bearings of Palaeontology. But, if we must have a provisional boundary, I go in with you for the Old Red relationship of the Tilestones.

J. W. Salter to R. W. Banks, May 12th, 1865.

The best place I think to work at along Builth range is Trecoed, a small stream on the Llandrindod road. Here the *Pentamerus* beds lie on the top of black shales, full of beautiful young *Trilobites* of several kinds, and very prolific. Gilwern, near Builth, is a fine place for *Ogygia Cornubensis*. I have the pleasure of enclosing you a print from *O. Buchii* for the next Volume of the Palaeontographical Society.

You will see a new rare species, which is, I think, from Wellfield (no, from Gllwern), somewhere on the hill near Llandrindod, a famous place, *O. angustissima, mihi*. The print may be interesting to people working on the very things. By-the-bye there is a new *Calymene*, of which I enclose a figure. [*Calymene* (?) *Davisii*, near Glanwye, 3 miles N.W. of Builth, in Wenlock shale. R.W.B.] It is from the Wenlock shale, close to Builth. If I can I will send the locality enclosed. Look for it. It is the most remarkable thing turned up of late years.

I have not forgotten the tracks, and have drawings ready for the *Geol. Mag.* soon.

J. W. Salter to R. W. Banks, June 20th, 1867.

I take great shame to myself that your precious gift of the two fish tracks from Kington has only just been made public. I ought to have given them to the world long ago.

["On some tracks of *Pteraspis* (?) in the Upper Ludlow Sandstone," by J. W. Salter, F.G.S. *Quart. Journ. Geol. Soc.*, Vol. 20, 1867. R.W.B.]

The two slabs on which the tracks occur were obtained by me from a quarry on the Hill House farm, Gladestry, on the borders of the parishes of Huntington and Michaelchurch-on-Arrow, in Tilestone beds, containing a few heads of *Pteraspis*. In his paper Mr. Salter remarks that the Downton beds of Kington and the neighbourhood are "a shallow water, and in part a shore, deposit. The irregular silty character of the bed itself, the disjointed fragments of *Crustaceans* and fish, the numerous vegetable fragments, the scarcity of shells, attest this. Even the characteristic tide-wash mark is present, and figure 1 shows as good an instance of this shore character as can be shewn on the paving flags of Forfar. Fig. 1 (a slab 18 inches square) shews three undulating lines of imprints, neither parallel, nor equi-distant, nor alike in their depth, or direction; nor is the number of imprints the same in each track. Two of these imprints are the track of the same creature repeated in its double journey from water to shore, or *vice versâ*; and the third track is, I think, evidence of another advance of the same individual in a parallel direction."

After a comparison of the tracks on both slabs, Mr. Salter arrived at the conclusion that the impressions were made by the pectoral or ventral fins of a fish in the shallows struggling to regain the water, and that the fish was a *Pteraspis*.

J. W. Salter to R. W. Banks, September, 1867.

At length I have been able to examine your precious gift. The reticulated specimen is a *Dictyocaris*—new species—a most interesting thing; for the only species known of it are in the Ludlow rocks of South Scotland. I will, I hope, publish it this winter. The other you are right about; it is part of the pincer of a *Pterygotus*.

Dictyocaris is a bent shield of a great *Phyllopod*, often 18 inches long. Both were from Bradnor quarry. Salter never wrote an account, and they are lost. His letter contains a pen and ink sketch of *Dictyocaris*.

Obituary.

1890.—The obituary list of the year includes the loss of Thomas Cam, Esq., President in 1871, and Honorary Treasurer of the Club since 1876; and J. H. Knight, Esq., President in 1880. Notices of reference will be found in the minutes of the Club, and also on page 4 of this Volume.

1891.—The obituary list of this year includes, amongst five members deceased, the name of R. W. Banks, Esq. His address as retiring President on February 7th, 1861, will be found in No. 4 of *Transactions*, which was printed in 1863. Although his attention had been but little given to Geology during the last twenty-five years, his *Reminiscences of the Downton Sandstone*, see pages 390 to 404, is a contribution to the present Volume, which will be highly appreciated by all Geologists, and indicates a fragment of the great services which he has rendered to Silurian and Old Red Geology. We have also, on page 211 of *Transactions*, May, 1888, a paper from his pen on "The Four Stones, Old Radnor," illustrated.

1892.—The Club has lost by death two excellent botanists, Mr. T. Bennian Acton, of Wrexham, and Mr. Burton Watkins.

Mr. Acton has most diligently attended the Fungus Forays every year since he joined the Club, and was present at the Annual Meeting a few days before his death. He was an able botanist with a thoroughly deep knowledge of plants and plant life, and possessed the rare quality of making abstruse scientific facts plain to his listeners. "The fairy tales of science" were charming to him, and he was always most successful in communicating their charm to others.

Mr. Acton had not been in robust health for some time, this last illness, however, was of short duration.

The following Obituary of Mr. Burton Watkins is reprinted from the *Journal of Botany* for October, 1892:—

Burton Mounsher Watkins died at his residence, Treaddow, near Ross, Herefordshire, on the 30th of July. He was in his 76th year, having been born in December, 1816, in Liverpool. Very early in life his father removed to London, where young Burton Watkins received his education at a school in Mount Street, Grosvenor Square. In London his inherent love of plants first showed itself under somewhat unfavourable circumstances. He used to relate in after years how, when he was a small boy, he pushed himself with difficulty through some railings at Guy's Hospital to obtain some buttercups which were flowering inside. The recollection of his intense childish delight in possessing them did not pass away till old age. Ill-health obliged his father to migrate to Monmouth, when the subject of our notice was about fifteen years old; and in the neighbourhood of Monmouth, and the adjoining parts of Herefordshire, he spent the remainder of his life. His father, in the intervals of his business as a shoemaker, devoted himself to entomology, and is believed to have been the first to capture the Scarlet

tiger, *Hypercompa dominula*, in Monmouthshire. These expeditions first brought out young Watkins's inborn taste for Natural History, and he soon made Botany his especial study. This study he pursued with the most steady and painstaking perseverance; his botanical education being entirely self-acquired, from such books as he could borrow. His habit was to make laborious analyses of these in manuscript. About the year 1844 he began collecting plants on the Doward Hills, in Herefordshire, and in 1845 discovered there *Koleria cristata*, a grass which has only twice since that date been noted in the county. Soon after 1845, the discovery by him of *Hutchinsia petræa* upon the same hills brought Watkins under the notice of Mr. R. M. Lingwood, then residing at Lyston. He visited the Dowards in company with Mr. Watkins, and gave him much encouragement and help in various ways. Professor Babington was at this period (1847 to 1856) in the habit of visiting Mr. Lingwood at Lyston, and joined in affording help and encouragement to the young naturalist. Thus encouraged, Burton Watkins steadily pursued his favourite subject, and became before long an accurate and accomplished botanist. He proceeded to study the Mosses and Hepaticæ, and was a correspondent of Dr. Braithwaite and the late Rev. J. C. Crouch; and he gained an extensive acquaintance with the critical forms of the genus *Rosa*, and to a less extent with those of the *Rubi*. Of all these, the Hepaticæ formed his favourite study, and were the last to be relinquished when infirmity and the loss of accurate eyesight obliged him to give up work with the microscope. Watkins's discovery of *Riccia sorocarpa*, Bischoff, in 1872 upon the Dowards brought him into correspondence with Dr. Carrington and Mr. Pearson; and with the latter especially he maintained a correspondence for many years. We believe that he contributed considerably, through his careful observations, to the knowledge of the life-history of the curious *Riccia natans* L.

Mr. Watkins was too modest to bring the results of his work willingly before the public. He contributed some notes on the flowering of plants at Ross to the *Phytologist* for June, 1861 (v. 188); and published some notes on the Flora of the Frome and Bromyard districts of Herefordshire in the *Transactions of the Woolhope Field Club for* 1868 (pp. 164-7). In 1881 he was induced to put on record a summary of his work on the Doward Hills, in an able paper under the title of a "Florula of the Dowards," published by the Woolhope Naturalists' Field Club, of which he was elected an honorary member in 1886. The *Flora of Herefordshire* was published for the same Society in 1889; and the frequency with which Mr. Watkins's name occurs as an authority for records in that work attests his industry. About 1890 his health began to fail, and he was obliged to forego entirely both his field work and his microscope. This was a great blow to him; but he continued to take great interest in the work of others, and was full of a naturalist's enthusiasm even to the last. He experienced successive heart attacks, which greatly weakened him, and to which he succumbed.

A man of very retiring and modest disposition and abstemious habits, Mr. Watkins was not one to be widely known; but he was greatly valued by the few who knew him well. An extensive reader, he was also an acute observer, not only of plants, but also of men. During nearly fifty years he was employed as Relieving

Officer, and for a portion of that time as School Attendance Officer, in the neighbourhood of Ross. He performed these onerous and too often thankless duties faithfully and well, and has become in his own neighbourhood a pattern of what such officers ought to be. He gained, during their discharge, a knowledge of the poor, their sayings and their ways, possessed by very few. He was a faithful and generous friend, never thinking any trouble too much which could help another in his work.

AUGUSTIN LEY.

INDEX

TO THE

TRANSACTIONS OF THE WOOLHOPE CLUB

FROM 1883 TO 1892 INCLUSIVE.

COMPILED BY

W. H. BANKS.

—

1894.

Errata, Corrigenda, Addenda.

1877 to 1889.

Transactions, 1877, page 18, line 1, for east read west.

In *The Antiquary*, No. 157, Vol. 26, for December, 1892, page 244, an illustration is given of this Tympanum at Fownhope, and the Rev. Dr. Cox has given the following description of its carving:—"It is a rich illustration of Norman work, which bears in the convolutions of the foliage a reminiscence of Hiberno-Saxon art. Christ in glory, seated on a throne, giving the benediction with the right hand, and holding a book in the left, is a not unusual subject on Norman tympana. It is generally accompanied by adoring angels, or surrounded by the evangelistic symbols. . . . . There is a peculiarity about the Fownhope tympanum, which renders it, we think, unique in Christian art. Only two of the evangelistic symbols were introduced, the winged lion and the eagle. Our Lord is represented as small in stature, and seated on the knee of a far larger figure. This figure has been taken by some to personify the First Person of the Trinity, but the smooth face seems undoubtedly intended to represent the Blessed Virgin. Christ gives the benediction with the right hand, and holds a partly-opened roll in the left. On the subject of Christian art on Norman tympana, Mr. J. Romilly Allen's invaluable book on Early Christian Symbolism, pp. 253—263, should be consulted. It is rather singular that the noteworthy example at Fownhope does not seem to have come under his cognizance."

1877, pp. 43 to 50.—In addition to the Fungi mentioned in Mr. W. G. Smith's account, must be added *Linhladia effusa, R.*, one of the *Myxompectes*, only once before recorded in Britain, and of the others, a new species of *Peziza* on burnt soil, described in Grevillea, 1877—78, Vol. 6, p. 75, as *Peziza Woolhopei*, in honour of this occasion. The rare *Agaricus cyphellaformis*, several specimens of *Helvella elastica*, *Peziza cerea*, *Peziza succosa*, and some others of less interest.—*Ibid.* page 65.

1879, page 167.—To footnote 1869 add page 143.

" " 174, lines 21 and 22.—For though small read large.

1880 " 71, line 4.—For *G. norvegicum* read *G. margaritaceum*, Linn., on the authority of a letter from B. M. Watkins, dated August 11th, 1888.

1881, between pages 84 and 85.—A separate leaf, marked page 84a, was circulated to each member of the Club in the year 1893. This page contains all the most recent additions (up to date) to the Florula of the Dowards, and will be found on page 143 of the *Transactions* for 1890.

1882, page 248, three last lines. With reference to the "stone abutments of the Roman Bridge," Mr. H. C. Moore read a paper at Water-break-its-neck, in

July, 1893, showing that the site of the Roman Bridge was three-quarters of a mile lower down the river, in the grounds below the Old Weir; and that there never was any bridge at the site of these remains of ancient masonry abutments in the grounds of the New Weir. The paper has been published in *The Antiquary* for November, 1893, and is to be looked for in the *Transactions* of 1893, when published.

Index, page 19, in line 12, Davies, for Rev. read James, Esq.

,,	,,	13	,,	Rev. James.
,,	,,	14	,,	J. H., Esq.
,,	,,	15	,,	Rev. James.
,,	,,	16	,,	James, Esq.
,,	,,	17	,,	Rev. James.
,,	,,	18	,,	Rev. James.

1883, 1884, 1885, page 165, line 23.—The pigeon-house at Trewyn is described as follows:—"This is said to have been built by the Knights Templars, and to be similar to the one at Garway." The facts are, that the Trewyn pigeon-house is a comparatively modern structure of brick, and of a date certainly not earlier than 1700, whilst the Knights Templars were finally suppressed about 1310.

Page 208, after No. 68 insert

68a. O. Thomas Rodd, of Ross.—The Apothecaries' Arms.
R. Apothecary, 1660.—T. B. R., a rose branch between.

Probably the issuer of this token was one of the same family of Rodd as the two issuers, Hugh and John, of Hereford. See Nos. 26, 27, and 28, pp. 193—194.

Page 340.—On the subject of the Roman and Saxon occupation of the district of Risbury. In the last paragraph but one,

For Bowley's Field read Rowley's Field.
For Patty's Cross read Patty's Crose.
For Hill Hole read Hell Hole.

and which is most important,

For, This road is named in the Itinerary of Antonine, &c.,
Read, This road is not named in the Itinerary of Antonine, &c.

1886, page 35, ten lines from the bottom.—For elevation of May Hill, 965 feet, read 968·8 feet.

1886, page 42, line 13.—For best read highest.

1886, page 64, eleventh line from the bottom.—For members read memories.

1887, page 108, *Herefordshire Lepidoptera*.—The amended summary, extending the Macros from 510 to 526, and the Micros from 669 to 739, or the total from 1,179 to 1,265, is given in detail in the *Addenda* of the same volume on page 9.

1888, page 133, line 5.—After Garway Hill, 1,197 feet above the level of the sea, place an asterisk, as a footnote, as follows:—

See Ordnance Map Herefordshire, L., N.W. } Mommouthshire, part of, V. } △ Cen. 1,202·6. Sur. 1,203·1.

1888, page 134, line 26.—With reference to the effigy of Henry, Earl of Lancaster, clad in mail, etc., we must note that plate armour, superseding the mail armour, was introduced in the reign of Edward the Second, who reigned from 1307 to 1327; Henry IV. reigned 1399—1413.

1888, page 221, 5th line from the bottom.—For the Rhondda Valley substitute Cyfarthfa.

1888, page 225, line 22.—With reference to Ricardus de Brito, one of the assassins of Thomas à Becket, who dedicated a chapel at Dorstone Church, the following information may be of interest, extracted from page 249 of *Exploration of Exmoor*, by John Lloyd Warden Page:—"The vestry of the Church of Sampford Brett contains the recumbent effigy . . . . . of Richard le Bret, or de Brito. It formerly stood under a canopy, now removed, in the north transept. The Charity Chapel of Williton, about three miles south of Watchet, was built by another of Thomas à Becket's murderers, namely Robert, brother of Reginald Fitz Urse.

1889, page 349, line 8.—Another inscription is as follows:—

"My glas is roon, 'tis time 'twas gone,
For I have lived a gret space,
And I am weary of the place."

Field Meetings.

1883.

April 4th.—Annual Meeting.
May 24th.—Ledbury and Wall Hills.
June 22nd.—Oldbury and Caplar or Woldbury Camp.
July 12th.—Stratford-on-Avon (Ladies' Day).
Aug. 20th.—Caynham Camp and Titterstone, Clee Hill.
Oct. 4th.—Fungus Forays, Ludlow, Haywood Forest, and Ledbury Park.

1884.

April 24th.—Annual Meeting.
May 15th.—Black Mountain and Cwmyoy.
June 19th.—Bach Camp and Berrington.
July 15th.—Gorge of the Teme at Downton (Ladies' Day).
Aug. 25th.—Ross, for Camp on Little Doward Hill and King Arthur's Cave.
Oct. 14th.—Fungus Forays, Croft Ambery, Haywood Forest, Dinmore, and Eastnor Park.

1885.

April 16th.—Annual Meeting.
May 19th.—Llanvihangel, for Partricio and Gaer Camps.
June 18th.—Aconbury Camp, Priory, and Church.
July 10th.—Sugar Loaf Mountain (Ladies' Day).
Aug. 27th.—Risbury Camp and Blackwardine.
Oct. 8th.—Fungus Forays (Pontrilas, Haywood Forest, Dinmore and Hampton Court Park.)

1886.

April 29th.—Annual Meeting.
May 27th.— May Hill, Taynton Church, and Newent.
June 25th.—Raglan Castle (Ladies' Day).
Aug. 20th.—Geology, Perton Lane to St. Ethelbert's Camp.
Oct. 4th.—Fungus Forays, Whitfield, Belmont, and Haywood Forest.

1887.

April 25th.—Annual Meeting.
May 27th.—Mitcheldean, in the Forest of Dean.
June 30th.—Wall Hills Camp and Thornbury.
July 29th.—Kilpeck, Garway Hill, and Grosmont (Ladies' Day).
Aug. 25th.—Craven Arms, Norton Camp, and Stokesay.
Oct. 4th.—Fungus Forays, Forest of Dean, Dinmore, and Eastnor.

1888.

April 17th.—Annual Meeting.
May 24th.—Old Radnor.
June 28th.—Golden Valley.
July 17th.—Church Stretton for Plaish Hall and Caer Caradoc (Ladies Day).
Aug. 28th.—Brinsop, Wormesley, and Weobley.
Oct. 1st.—Fungus Foray, Forest of Dean, Holme Lacy, and Pontrilas.

1889.

April 9th.—Annual Meeting.
May 23rd.—Eywood, Knill, and Presteign.
June 18th.—Ross and Monmouth to Newland and St. Briavel's (Ladies' Day).
July 19th.—Clifford and Hay.
Aug. 22nd.—Ledbury and Malvern Hills.
Sept. 30th.—Fungus Foray, Downton Castle, Downton Hall, Dinmore, and Stoke Edith Park.

1890.

April 10th.—Annual Meeting.
May 30th.—Stokesay.
June 24th.—Kingsland, Eardisland, and Monkland.
July 31st.—Berkeley Castle (Ladies' Day).
Aug. 26th.—Brecon Beacons.
Sept. 29th.—Fungus Foray, Whitfield, Haywood Forest, Rotherwas, and Stoke Edith Park.

1891.

April 9th.—Annual Meeting.
May 28th.—Haugh Wood and Woolhope District.
June 30th.—Aberedw Rocks.
July 28th.—Llanthony Abbey (Ladies' Day).
Aug. 25th.—Moccas Park.
Oct. 8th.—Fungus Foray, Pontrilas.

1892.

Mar. 24th.—Annual Meeting.
May 31st.—Leominster, Laysters, Middleton-on-the-hill, and Kimbolton.
June 30th.—Bredenbury, Travertine at Southstone Rocks, and Whitbourne Court.
July 29th.—Chepstow (Ladies' Day).
Aug. 25th.—Brecon Beacons.
Sept. 20th.—Fungus Forays, Whiteliff Woods, Ludlow, and Dinmore.

List of Meetings.

(Arranged Alphabetically).

Illustrations.

Contributors of Papers and Communications.

General Index.

REPORT

ON THE

TRANSCRIPTION

AND

PUBLICATION

OF

PARISH REGISTERS, &c.

PUBLISHED UNDER THE DIRECTION OF THE CONGRESS OF ARCHÆOLOGICAL SOCIETIES IN UNION WITH THE SOCIETY OF ANTIQUARIES.

1892

Report on the Transcription and Publication of Parish Registers, etc.

The Congress of Archæological Societies in union with the Society of Antiquaries desires to call the attention of the public and especially of those interested in antiquarian research, to the extreme importance of duly preserving and rendering accessible the Registers and other Parish Records of the United Kingdom.

These contain matter of the greatest value not only to the genealogist, but also to the student of local history, and through these to the general historian; it is to be regretted that sufficient care has not been taken in the past of these documents, which have too often been thoughtlessly destroyed.

Many Registers have already been copied and published, and every year adds to the list, and the Congress is in hope that these suggestions may lead to a still greater number being undertaken.

As the older writings are in a different character from that used at the present time, they are not easily deciphered, and require careful examination, even from experts. It is extremely desirable therefore that they should be transcribed, not only to guard against possible loss or injury, but in order to render them more easily and generally accessible to the student.

The Committee appointed by the Congress of 1889 for the purpose of considering the best means of assisting the transcription and publication of Parish Registers and Records was constituted as follows:

EDWIN FRESHFIELD, LL.D., V.P.S.A., *Chairman.*

The Rev. Canon BENHAM, B.D., F.S.A.
R. S. FABER, M.A. (*Hon. Sec. Huguenot Society.*)
W. J. HARDY, F.S.A.
J. J. HOWARD, LL.D., F.S.A. (*Maltravers Herald.*)
G. W. MARSHALL, LL.D., F.S.A. (*Rouge Croix.*)
G. H. OVEREND, F.S.A. (*Public Record Office.*)
Rev. W. SPARROW SIMPSON, D.D., F.S.A. (*St. Paul's Cathedral*).
MILL STEPHENSON, B.A., F.S.A. (*Hon. Sec. Surrey Archæo. Soc.*)

RALPH NEVILL, F.S.A. (*Hon. Sec.*)

The Congress trust that the following paper of Suggestions drawn up by the Committee may prove useful to those anxious to assist in the preservation, transcription and, where possible, publication of the documents referred to.

Suggestions as to Transcription.

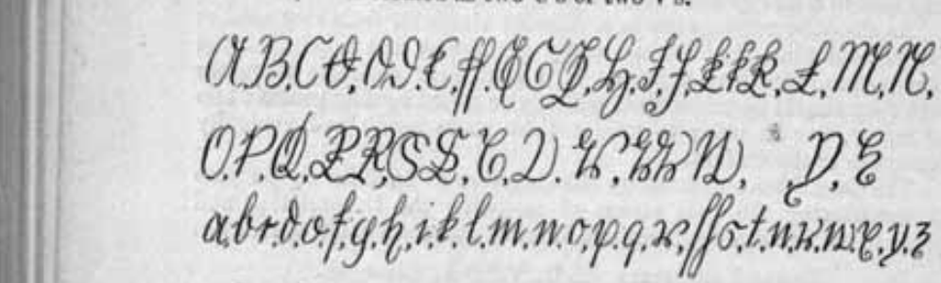
LIMITS OF DATE.

It is evident that there is most reason for transcribing the oldest Registers, but those of later date are also of great value, and it is suggested that 1812, the date of the Act of 52 Geo. III, cap. 146, is a suitable point to which copies may be taken.

CHARACTER OF WRITING.

In transcribing, great care must be used to avoid mistakes from the confusion of certain letters with modern letters of similar form.

An alphabet is adjoined giving some of the ordinary characters, but Registers vary, and the manner in which the capital letters are formed is of infinite variety. It may be noted that capital F resembles two small ff's, but there is no reason whatever for printing it in the latter way; G is a difficult letter running into C and T; K and R are formed exactly alike, except that the direction of the top loop is always reversed; W is formed as two U's or two V's.



Great help in deciphering names may be gained from a study of existing local names. It must, however, be borne in mind that the same name may be continually spelt in different ways, and may undergo considerable changes in the course of time or from the hands of different scribes.

In copying dates it must be remembered that down to 1752, the year began on the 25th of March and not on the 1st of January.

METHOD OF TRANSCRIPTION.

There can be no doubt that a *verbatim et literatim* transcription is of far more value than any other form; it is otherwise impossible to be sure that some point of interest and importance has not been overlooked; the extra trouble of making a complete transcript is small, and the result much more satisfactory. In any case the names should be given *literatim* and all remarks carefully copied, with some indication, where possible, as to the date of the remark. Other records,

such as Churchwardens' Accounts, should certainly not be transcribed and printed otherwise than in full. It is far better in both cases to do a portion thoroughly than the whole imperfectly.

REVISION AND COLLATION OF COPIES.

The decipherment of old Registers is, as already pointed out, a work of considerable difficulty, and it is therefore strongly recommended that in cases where the transcribers have no great previous experience, they should obtain the help of some competent reader to collate the transcript with the original.

It should be remembered that in many cases transcripts are preserved in the Bishops' Registries and a reference to these will often fill up a void, clear up a difficulty or supply an omission. It occasionally happens that the original Registers are preserved as well as later Transcripts; in such cases, the two should be collated and all variations noted.

PUBLICATION.

With regard to the publication of Registers, the Committee have carefully considered the question of printing in abbreviated or index form and have come to the conclusion to strongly recommend that the publication should be in full, not only for the reasons given for transcription, but because the extra trouble and expense is so small and the value so very much greater.

There seems, however, no objection, in either case, to the use of contractions of formal words of constant recurrence. A list of some of these is adjoined:

Bap.: baptized.	Bac.: bachelor.
Mar.: married.	Spin.: spinster.
Bur.: buried.	Wid.: widow or widower.

Dau.: daughter.

With regard to entries of marriage after Lord Hardwicke's Act of 1752, it is suggested that the form of entry may be simplified by the omission of formal phrases, but care should be taken not to omit any record of fact, however apparently unimportant, such for instance as the names of witnesses, ministers, occupation, etc.

It is essential in all cases that an Index should be given and that the Christian names should be given with the surnames.

It is believed that many Registers remain unprinted owing to an exaggerated idea of the cost of printing and binding. Reasonable estimates for these might, probably, often be obtained from local presses which would be interested in the publication.

No absolute rule as to size and type can be laid down, but on this and other questions the Standing Committee will always be glad to give advice. It is probable that demy octavo or foolscap quarto will be found the most convenient sizes.

A Standing Committee has been appointed by the Congress for the purpose of giving advice and distributing to the various Societies in Union such information and lists as may be of common value to all.

Societies in Union are strongly urged to form their own Committees to take steps to secure the printing of the many Transcripts that already exist unpublished, and to promote further Transcription.

By permission of G. W. Marshall, Esq., LL.D. (Rouge Croix, College of Arms), the accompanying list of Printed Registers has been prepared from the Calendar privately printed by him in 1891. A revised and augmented edition of this Calendar is in progress, and will contain full references to all known printed Registers, Transcripts and Collections, whether complete or consisting of extracts.

The Committee also issue a list of MS. Transcripts and propose to prepare and issue further lists from time to time. They therefore ask that information may be sent to them, or to the Secretaries of County Societies, of any Transcripts in private hands. The inclusive dates of Baptisms, Marriages and Burials should be given, and any complete Transcript will be calendared, although extending over a short period only, but Extracts will not be admissible.

The Committee suggest that lists of existing Transcripts, with full particulars of the location of the Transcript, should be kept by the County Societies, and where possible, in order to avoid risk of loss, it is very desirable that such Transcripts should be deposited, either temporarily or permanently, in the Libraries of the Societies.

It is believed that the publication of a series of Registers, supplemental and extra to their Transactions, would add to the attractiveness and usefulness of the Societies without being a serious burden to their funds. By combination and organization a considerable body of outside subscribers may probably be secured for such a series, and the cost of distribution of circulars, etc., may be materially reduced by such a plan as the issue, by the Central Committee, of an annual circular containing lists of Registers in course of publication. Such a circular might be distributed by the local Societies and published in their Transactions and elsewhere.

The Standing Committee will be very glad to receive suggestions from Local Committees and others.

TABLE OF CONTENTS.

No. 1.—A List of Parish Registers that have been printed as separate works.

Extracted by permission from "Parish Registers," privately printed by Geo. W. Marshall, Esq., LL.D., 1891, and continued to date.

NOTE.—Those printed at Middle Hill for Sir Thomas Phillips are very rare, and many others, such as those by Mr. Crisp, were privately printed and are scarce.

BEDS. HAYNES, 1596–1812, Wm. Briggs, M.A., pr.

BERKS. READING, St. Mary, 1538–1812, Rev. G. P. Crawfurd, 2 vols.
WELFORD, Bap. 1562, Mar. 1603, Bur. 1559–1812, Mrs. Batson Olney, 1892, 4to

BUCKS. GREAT HAMPDEN, 1557–1812, E. A. Ebblewhite 1888, fol.

CAMBRIDGESHIRE. ABINGTON PIGOTTS, 1653–1812, Rev. W. G. F. Pigott Norwich, 1890, 4to

CHESHIRE. EASTHAM, 1598–1700, F. Sanders Lond. 1891, 8vo
IAEYLAND, 1653–1710, B. T. 1622–1641, W. S. White, 1892,
PRESTBURY, 1560–1636, J. Croston 1881, 8vo

CORNWALL. MADRON, Bap. 1592–1726, Mar. 1577–1678, Bur. 1577–1681 G. B. Millett, Penzance, 1877, 4to
ST. COLUMB Major, 1539–1780, A. J. Jewers 1881, 8vo

DENBIGHSHIRE. KEGIDOG alias ST. GEORGE, 1694–1749, F. A. Crisp 1890, fol.

DERBYSHIRE. WEST HALLAM, Rev. C. W. Kerry 1887, 8vo

DORSET. ASHMORE, 1651–1820, E. W. Walsin 1891, 4to
NORTH WOOTON, Bap. 1539–1785, Mar. 1542–1760, Bur. 1698–1785, Rev. C. H. Mayo, pr. 1887, 8vo

DURHAM. Denton, 1586–1662, J. R. Walbran Ripon, 1842, 8vo
Durham, St. Oswald, 1538–1751, A. W. Headlam Durham, 1891, 8vo
Gainford, Index, Bap. 1560–1784, Mar. 1569–1761, Bur. 1569–1784, J. R. Walbran, 3 parts Lond. 1889, 8vo

ESSEX. Bobbingworth, Bap. 1559–1782, Mar. 1559–1753, Bur. 1558–1785, F. A. Crisp, pr. 1884, fol.
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WILTS. Alderbury, 1606–1669, Add. MS. 27441.

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BUCKS. Weston Underwood, 1710–1785, F. Crisp, pr. 1887, fol.

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NONCONFORMIST.

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- Coley, *see* Northowram.
- Doncaster, Friends, Mar. 1794–1865, C. H. Hatfield, Hist. Not. of Donc. Series 2.
- Keighley, Friends, Yorkshire Notes and Queries, vol. ii.
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IRELAND. Dublin, Huguenot Church, Hug. Soc., vol. vii., in press

KENT.
- Canterbury, French Church, Hug. Soc., vol. v., part i., 1891, part ii., in press
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Fribsham, Bap. 1711–1768, Mar. 1711–1720, Bur. 1721–1768, Index, Miss Thoyts.
Purley (old), Miss Thoyts.
Streatly, from 1679, the Rector.
Sulhamstead Abbots, 1603–1810, Miss E. Thoyts.
Sulhamstead Banister, 1660–1787, Miss E. Thoyts.
Upton, 1636–1736, the Rector (by Miss Thoyts).

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Chester, St. Mary-on-the-Hill, Bap. 1547–1572, Mar. 1547–1551, Bur. 1547–1553, Harl. MS. 2177.

CHESHIRE. Chester, St. Olave, Bap., Mar. and Bur. 1611–1644, and Bur. 1654–1673, Harl. MS. 2177.
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DURHAM. Denton, Bap. 1673–1714, Mar. 1673–1715, Bur. 1673–1717, Rev. J. Edleston (earlier Register printed).
Gainford, Bap. 1784–1841, Mar. 1754–1837, Bur. 1784–1852, Rev. J. Edleston (earlier Register printed).
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Leonard Stanley, Bap. 1575–1600, Mar. 1570–1613, Bur. 1571–1664, and 1773–1812, Rev. R. H. Clutterbuck, F.S.A.

HANTS. Ashe, Bap. 1607, Mar. 1606, Bur. 1618–1720), Rev. F. W. Thoyts.
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- Warrington, 1st Register Warrington Museum.

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- Ardingly, 1558–1724 (by Rev. J. H. L. Booker), The Rector, Indexed and annotated.
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- Ditchling, Bap. 1557 and Mar. and Bur. 1556–1750, Capt. Attree, R.E. Indexed.

SUSSEX. East Grinstead, Bap. 1558–1760, Mar. 1559–1760, Bur. 1574–1760, R. Payne Crawfurd.
Edburton, 1558–1673, Sussex Arch. Soc. (*see* No. 1 List).
Horsham, Bap. and Bur. 1540–1761, Mar. 1541–1753, R. Garraway Rice.
Itchingfield, Mar. 1700–1812, R. Garraway Rice.
Nuthurst, Mar. 1653–1754, R. Garraway Rice.
Nuthurst, Bap. and Bur. 1636, B. M. Ayscough, MS. 1677
Wivelsfield, Bap. and Bur. 1559–1780, Mar. 1559–1753, Capt. Attree, R.E.

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Lillington, Bap. 1540–1573, Mar. 1541–1573, Bur. 1539–1575, Rev. J. Edleston.

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Hagley, 1538–1831, (Copy of J. Noakes), J. Amphlett.
Old-Swinford, 1602–1656, W. W. King.
Pedmore, 1539–1886, Parish and W. W. King.

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Egton, Mar. 1622–1761, Bap. and Bur. 1622–1779.
Farnham, 1570—Bap. and Mar. 1721, Bur. 1720, Dr. F. Collins.
Hemsworth, 1553–1688, Rev. J. H. Bloom, M.A.
Kirby Fleetham, 1591–1718, Chester, MSS.
Kirkdale, 1580–1762, Chester, MSS.
Knaresborough, 1561—Bap. 1767, Mar. 1751, Bur. 1764, Dr. F. Collins.
Mirfield, 1559–1606, Par. Church.
Sheffield, Bap. 1559–1603, Rev. C. V. Collier.
Sheffield, Bap. by Rev. Jollie, 1681–1704, Brit. Mus. Add. MS. 24486.
Wintringham, 1558–1700, Chester, MSS.
Wragley, 1538– Rev. E. Sankey.
York, St. Martin cum Gregory, 1540–1780, Indexed to 1740, Rev. E. Bulmer.

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INDEX

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1892

CONTENTS.

INDEX OF ARCHÆOLOGICAL PAPERS PUBLISHED IN 1891.

INDEX.

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