
WOOLHOPE NATURALISTS' FIELD CLUB
1851

TRANSACTIONS

OF THE

WOOLHOPE

NATURALISTS' FIELD CLUB.

[ESTABLISHED 1851.]

1895, 1896, 1897.

"HOPE ON"

"HOPE EVER"

HEREFORD:

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

ISSUED DECEMBER, 1898.

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Mr. Alfred Watkins.

Editorial Committee :—The President.
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Honorary Treasurer :—Mr. H. C. Beddoe.

Honorary Auditor :—Mr. James Davies.

Joint Honorary Secretaries :—Mr. Thomas Hutchinson.
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List of Members.

1897.

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de Winton, Captain R. H., Graftonbury, Hereford.
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Morgan, Rev. W. E. T., Llanigon, Hay, R.S.O.
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Parker, Mr. H. J., Tarrington, Ledbury.
Paris, Mr. T. C., Hampton Lodge, Hereford.
Parry, Mr. J. H., Harewood Park, Ross.
Perry, Deputy-Surgeon-General, W., Hinton Cottage, Hereford.
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Phillott, Mr. G. H., Plâs Trevor, The Park, Cheltenham.
Phillpott, Rev. F. O., M.A., Little Marcle, Ledbury.
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Pilley, Mr. Walter, Barton Villas, Hereford.
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Pope, Rev. A., Upton Bishop Vicarage, Ross.
Powell, Rev. T. Prosser, M.A., Dorstone, Hereford.
Powell, Scudamore, M.D., Fairfield, Peterchurch.
Prescot, Mr. Charles Warre, Kings Pyon House, Weobley, R.S.O.
Price, Wm. Elliott, M.B., Chepstow House, Ross.
Probert, Mr. John, High View, Hereford.
Pulley, Sir Joseph, Bart., Lower Eaton, Hereford, and Green Park Chambers, 90, Piccadilly, W.
Pulley, Colonel Charles, Ferndale, Hereford.
Pumphrey, Mr. Henry, High Street, Bromyard.
Purchas, Mr. Alfred J., Chasedale, Ross.
Purchas, Mr. H. Maurice, 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.

Robinson, Mr. Stephen, Lynhales, Kington.
Rootes, Mr. Charles, St. Owen Street, Hereford.
Scobie, Colonel, M. J. G., Armadale, Hereford.
Seaton, Rev. Preb. Douglas, Goodrich, Ross.
Severn, Mr. J. P., The Hall, Penybont.
Shackleton, Rev. Thomas, M.A., Broomy Hill, Hereford.
Shepherd, Rev. W. R., Preston-on-Wye, Hereford.
Sinclair, Mr. G. Robertson, The Close, Hereford.
Southall, Mr. Henry, F.R. Met. Soc., The Graig, Ashfield, Ross.
Stanhope, The Ven. The Hon. B. L. S., M.A., Byford, Archdeacon of Hereford.
Stephens, Mr. Edwin, Bridge Street, Hereford.
Steward, Mr. Walter H., Pontrilas, R.S.O., Herefordshire.
Stooke, Mr. Edwin, Palace Yard, Hereford,
Sturges, Rev. H. C., Bodenham, Leominster.
Sturt, Col. Napier G., Llanvihangel Court, Abergavenny.
Sugden, Mr. J. P., The Cottage, Ledbury.
Swainson, Capt. E. A., The Woodlands, Brecon.
Symonds, Mr. J. F., Broomy Hill, Hereford.
Symonds, Mr. J. Reginald, 15, Bridge Street, Hereford.
Thomas, Lieut.-Colonel Evan, Frogmore, Ross.
Thorpe, Mr. William, Ross.
Trafford, Mr. Guy R., Michaelchurch Court, Hereford.
Turner, Mr. Thomas, F.R.C.S., St. Owen Street, Hereford.
Vaughan, Rev. F. S. Stooke, M.A., Wellington Heath, Ledbury.
Vevers, Mr. Henry, Highmore House, Hereford.
Wadworth, Mr. H. A., Breinton Court, Hereford.
Wallis, Mr. E. L., Hampton Park, Hereford.
Warner, Rev. R. Hyett, M.A., Almeley, Eardisley, R.S.O.
Watkins, Mr. Alfred, Hampton Park, Hereford.
Watkins, Rev. Morgan G., M.A., Kentchurch, Hereford.
Wegg-Prosser, Mr. F. R., Lake Cottage, Belmont, Hereford.
Weyman, Mr. Arthur, 54, Mill Street, Ludlow.
Wheeler, Mr. G. W., Shrub Hill Villas, Tupsley, Hereford.
Williamson, Rev. H. Trevor, Bredwardine, Hereford.
Wood, J. H., M.B., Tarrington, Ledbury.
Wood, Rev. R., Colley Batch, Tenbury.
Woodward, Mr. Ernest T., Daffaluke, Ross.

Members Elected.

1895.

Du Buisson, Mr. Edward, Hereford.
Haverfield, Mr. F., M.A., F.S.A., Christ Church, Oxford
Marshall, Mr. H. J., Gayton Hall, Ross.
Money-Kyrle, Rev. R. T. A., Merrivale Place, Ross.
Probert, Mr. John, High View, Hereford.
Sturges, Rev. H. C., Bodenham, Leominster.
Symonds, Mr. J. Reginald, 15, Bridge Street, Hereford.
White, Mr. Frederick M., Broomy Hill, Hereford.

1896.

Boycott, Mr. Arthur E., The Grange, Broomy Hill, Hereford.
Evans, Mr. R. H., Eyton Hall, Leominster.
Hall, Benjamin, M.D., Bodenham, Leominster.
Haywood, Mr. W. H., Westfield House, Hereford.
Hewitt, Mr. Harold, Hope End, Ledbury.
Holmes, Mr. James, Penyworlod, Llanigon, Hay.
Leigh, The Hon. The Very Rev. J. W., D.D., The Dean of Hereford.
Lloyd, Mr. W. G., Bodenham Road, Hereford.
Moore, Mr. Charles E. A., Fairlawn, Leominster.
Morrison, Mr. C. S., Fairbank, Hereford.
Pope, Rev. A., Upton Bishop Vicarage, Ross.
Price, Wm. Elliott, M.B., Chepstow House, Ross.
Pumphrey, Mr. Henry, Bromyard.
Pulley, Col. Charles, Ferndale, Hereford.
Stooke, Mr. Edwin, Palace Yard, Hereford.
Thomas, Lieut.-Col. Evan, Frogmore, Ross.
Woodward, Mr. Ernest T., Daffaluke, Ross.

1897.

Bamford, Mr. R. L., Gloucester House, Hampton Park, Hereford.
Baylis, Mr. Wm. Mortimer, The Wood, Whitney-on-Wye.
Bellerby, Mr. E., Capital and Counties Bank, Hereford.
Brierley, Mr. George M., The Old House, Burghill.
Caddick, Mr. Ed. Whitehouse, Caradoc, Ross.
Evans, Rev. R., Eyton Hall, Leominster.
Harrison, J. M., M.B., Orchardleigh, Ledbury.

OBITUARY.

1895.

May 21.—Cleasby, P. C.
Dec. 14.—Morris, J. G.
,, 15.—Phillott, Rev. Canon H. W.

1896.

Oct. 16.—Merriman, J. J.

1897.

Jan. 4.—Rootes. W. Rudge.
July 28.—North, Rev. H.
Aug. 26.—Piper, Geo. H., F.G.S.

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 and Archæology 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 and Archæology 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 Annual Subscription is twelve months in arrear, shall not be entitled to any of the rights and privileges of Membership; and that any Member whose Annual Subscriptions are two years in arrear may be removed from the Club by the Central Committee.

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.

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. George H., F.G.S.
1884 Burrough, Rev. Charles.
1885 Martin, Mr. C. G.
1886 Piper, Mr. George H., F.G.S.
1887 Elliot, Rev. William.
1888 Elliot, Rev. William.
1889 Southall, Mr. H., F.R. Met. Soc.
1890 Croft, Sir Herbert, Bart.
1891 Cornewall, Rev. Sir George H., Bart.
1892 Barneby, Mr. William Henry.
1893 Lambert, Rev. Preb. William H.
1894 Davies, Mr. James.
1895 Watkins, Rev. M. G.
1896 Moore, Mr. H. Cecil.
1897 Moore, Mr. H. Cecil.

THE WOOLHOPE CLUB.

Dr. *The Account of Henry Child Beddoe, Hon. Treasurer, for the year ended 31st December, 1895.* **Cr.**

1895.	£	s.	d.
To Balance in hand from last account	8	11	11
,, Entrance Fees	6	10	0
,, Subscriptions received for 1895 ...	101	10	0
,, Arrears of Subscriptions	5	0	0
,, Six Volumes of *Transactions* sold ...	3	0	0
	£124	11	11

	£	s.	d
July 5th—By paid Mr. H. St. John Hope. Subscription to Archæological Societies' Congress for 1895	1	0	0
,, Ditto for 610 copies of Index of Archæological Papers—published in 1892 and 1893	3	16	3
Sep. 16th. Mr. Joseph Jones for Stationery ...	1	10	3
,, ,, Messrs. Jakeman & Carver for Printing and Stationery	15	4	6
Dec. 21st. ,, Mr. H. C. Moore, Honorary Secretary, for Postages, Editorial Expenses, &c., &c.	5	17	6
,, Mr. James B. Pilley, Assistant Secretary, for Postages and Sundry Expenses at Field Meetings	6	6	9
,, Assistant Secretary—Salary for 1895 ...	10	0	0
	43	15	3
Balance in hands of Treasurer	80	16	8
	£124	11	11

To Balance in hand brought down, £80 16s. 8d.

Examined and found correct this 21st day of April, 1896.

O. SHELLARD, *Auditor.*

The Woolhope Club.

The Account of Henry Child Beddoe, Honorary Treasurer, for the year ended 31st December, 1896.

1896.	ASSETS.	£	s.	d.
To	Balance in hand brought from last Account ...	80	16	8
,,	Entrance Fees	5	0	0
,,	Subscriptions received for 1896	101	10	0
,,	Arrears of Subscriptions	4	0	0
,,	Six Volumes of *Transactions* sold	3	0	0
,,	Balance on Railway Fares to Rhayader	1	3	4
,,	Excess of Subscriptions	0	1	0
		£195	11	0

1896.	EXPENDITURE.	£	s.	d.
June 11th—	By paid Mr. Jas. Townsend, Exeter, Lithographs	2	0	9
July 13th.	,, Ralph Nevill, Esq., for 350 copies of Index of Archæological Papers ...	2	3	9
Nov. 24th.	,, Joseph Jones, Stationery Account ...	1	10	3
,,	,, Jakeman and Carver, for Printing *Transactions*	115	17	6
Dec. 22nd.	,, on account of General Account ...	35	0	0
,,	,, J. B. Pilley, for Postages and sundry expenses at Field Meetings £6 8 0			
,,	,, Ditto, as Assist. Secretary, Salary for 1896 ... ... 10 0 0	16	8	0
,,	,, Mr. H. C. Moore, Honorary Secretary, for Postages, Editorial Expenses, &c.	6	12	0
		£179	12	3
	,, Balance in hands of Treasurer	15	18	9
		£195	11	0

	ASSETS.	£	s.	d.
To	Balance in hands of Treasurer brought down ...	15	18	9
,,	Arrears of Subscriptions	9	0	0
,,	Ditto Entrance Fees	1	0	0
		£25	18	9

	LIABILITIES.	£	s.	d.
By	Jakeman and Carver, Stationers, &c., Hereford, balance due on their General Account ...	11	9	6
,,	Edward Stanford (London), for 350 copies of Archæological Map of Herefordshire	4	4	0
,,	Nicholls and Sons, for 350 copies of Archæological Survey of Herefordshire	4	10	6
,,	Balance in favour of Club	5	14	9
		£25	18	9

April 23rd, 1897.

H. CECIL MOORE, *President.*

The Woolhope Club.

The Account of Henry Child Beddoe, Hon. Treasurer, for the year ended 31st December, 1897.

1897.	RECEIPTS.	£	s.	d.
To	Balance in hand brought from last Account	15	18	9
,,	Entrance Fees	5	10	0
,,	Subscriptions received for 1897	99	0	0
,,	Arrears of Subscriptions	4	10	0
,,	96 Copies of Survey of Herefordshire sold	12	0	0
,,	Volumes of *Transactions* sold...	4	11	6
,,	In excess of Subscription (Rev. Custos Duncombe)	0	0	6
		£141	10	9

	EXPENDITURE.	£	s.	d.
Jan. 22nd—	By paid Mr. Edwd. Stanford for Archæological Survey Map of Herefordshire (350 copies)	4	4	0
Feb. 3rd.	,, Messrs. Nicholls & Son, Westminster, for printing 350 copies of text of Archæological Survey	4	10	6
Apr. 6th.	,, Messrs. Jakeman and Carver, Balance of Account (General)	11	9	6
May 5th.	,, Ralph Nevill, Esq., Congress of Archæological Societies Subscription for 1896-7, £1, and for 310 copies of Index of 1895, £1 15s. 9d.	2	15	9
,, 29th.	,, B. Quaritch, for copy of Survey of Cumberland, Hertfordshire, Kent and Lancashire	1	0	0
June 19th.	,, J. W. Arrowsmith, printing 310 copies of "Hoard of Coins"	2	1	0
Sep. 14th.	,, E. Hartland, *re* Illustrations of Mrs. Bagnall Oakley's Paper on Roman Coins	1	1	10
Dec. 8th.	,, Joseph Jones, for Stationery	1	14	6
,,	,, Jakeman and Carver, for Printing Circulars, Note Paper, &c.	9	3	0
,,	,, Assist. Secretary, 1 year's Salary for 1897	10	0	0
,,	,, ,, for Postages and sundry Expenses at Field Meetings	5	11	6
,,	,, Honorary Secretary, for Postages, Incidental and Editorial Expenses, &c. ...	4	11	0
,,	,, Ralph Nevill, Esq., Subscription to Congress of Archæological Societies, £1, and for 320 copies of Index of Papers, for 1896, £2...	3	0	0
		£61	2	7
	Balance in hands of Treasurer ...	80	8	2
		£141	10	9

Audited and found correct this 21st day of February, 1898.

JAMES DAVIES, *Hon. Auditor.*

Illustrations.

TRANSACTIONS FOR THE YEARS 1895, 1896, 1897.

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Transactions of the Woolhope Club

FOR 1893-94.

The following review of the Volume 1893-1894 appeared in *The Hereford Journal* of October 10th, 1896.

Two years ago we had the pleasure of putting together a lengthy review of the *Transactions* of the Woolhope Club for 1890, 91-92. We now have equal pleasure in reviewing the volume for 1893-4. This volume is particularly worthy of notice, as it is the sixth edited by Mr. Henry Cecil Moore, the President of the Club for this year (1896). These six volumes cover no fewer than 18 years. Not many editors have such a record, and we venture to hope that Mr. Moore will live to edit many other volumes, and that his connection with the Club, to which he has generously devoted so many thousand valuable and laborious hours, will end only with his life, and *that* we trust will not be for many long years.

The present volume is large, and full of valuable matter. It contains 260 closely-printed pages of reports and articles, besides 89 pages of "Additions to the Flora of Herefordshire" from the pen of that distinguished and accurate observer, the Rev. Augustin Ley, of Sellack. There are also two long but invaluable indexes of the archæological papers published in England in 1893 and 1894.

We should be doing scant justice to the editor were we not to congratulate him on the careful editing of this large and well-printed volume. The labour he has faced so cheerfully is enormous, while the correspondence it has entailed is very trying; a single article may mean the thought and research of many months. Careful editing is not the least claim the present volume has on the reader's attention. Reading proofs, though mere child's play to the practised writer, especially should he, like the author of this review, have contributed hundreds of long articles to quarterlies and magazines, is not easy to the beginner. The literary tyro may have a dozen flagrant misprints staring him full in the face, but he passes them over unheeded, whereas the practised proof reader pounces upon them like the hawk on her quarry. We took up the *Transactions* of a far larger and more aristocratic club than the Woolhope; the editor is a barrister, a Master of Arts, and heir to an earldom; the president is even more aristocratic, while the treasurer is an M.A. and F.R.S. Well, we turned to a paper on Art by a Master of Arts of eminence, and we found Zurburan instead of Zurbaran; Velaspez in the next line for Velasquez; Georgione for Giorgione; Rafael for Raphael or Raffaelle; Duke Arbino for, we presume, the Duke d'Urbino; Georgione again lower down, and Sansorine for Sansovino, while, quite as horrible, there stared at us Annibal

Coracci for Annibale Carracci. There are other misprints in quotations and titles, we fancy, but we are not sure, as we have not the original documents before us; pretty well this on one page of large type. We wrote a polite little note to the reverend F.R.S., but he was quite indignant, and replied that he had not heard any other complaints, and the author of the paper was not annoyed, he believed.

Mr. H. Cecil Moore has so long been recognised as a leading authority on the County of Hereford, and his local information is so vast and curious that it is a great pleasure to find that many of the best articles, included in the present handsome volume, bear his signature, and one may be sure that anything from his pen is accurate and carefully put together, while he has means of getting information and clearing up obscure matters, which few other people possess. Among the best papers from Mr. Moore's pen are one on the "Homend Oak," and another on the "Few Traces found in Great Britain of Saxon Architecture." We believe, too, that all the reports of the Field Club meetings and excursions are from his pen, and these show most conscientious writing and constant reference to original authorities.

We are glad to see a capital report of the Annual Meeting on April 12th, 1894, when a testimonial was presented to Mr. H. Cecil Moore as some sort of recognition of many years' faithful, unpaid, service to the best interests of the club. Never was testimonial better earned, and seldom indeed could the subscribers to this modern form of acknowledgment have been better pleased to show their appreciation of one of the best Honorary Secretaries a Field Club has ever had.

The engravings are very numerous; they are well done, and reach the highest standard of the best class of such work of the present day. The sketches accompanying the paper on the "Abutments of a bridge, supposed to be Roman, at the New Weir, Kenchester," are from photographs by Mr. Robert Clarke. The neat sketch of the ancient font, at Castle Frome Church, is from the pencil of Miss Piper, and the very clear maps of the geological strata, dipping westward from the end of the Malvern Chain, were separately painted by Miss Gertrude Moore. It would be unpardonable not to compliment her on the great patience she has displayed in doing them.

Mr. Ley deserves great credit for his "Additions to the Flora of Herefordshire." His name is a guarantee of accurate and original research, and we cannot do him too much honour. At the best, long records of observations and lists of names seem to represent little time and less trouble, but anyone who has tried to do such work accurately soon learns that the labour involved is enormous, and only a trained observer can fully appreciate the enthusiasm and devotion implied. Dr. T. A. Chapman contributes an article of enormous length on "The Genus Acronycta and its Allies," he has illustrated it with nine pages of exquisite plates. The author must have devoted an immense amount of time to this paper, which reaches 40,000 words—equivalent to 90 or 100 pages of a quarterly. The Rev. J. O. Bevan, formerly vicar of Vowchurch, has a charming and popular paper on Cardiff, Mr. Bevan, who has now left the Golden Valley, is a most able and incisive writer and this paper of his is no exception to the rule.

We are glad that the editor has given full and detailed descriptions of the excursions forming so important a part of the work of the Society. It is often a complaint that Field Clubs degenerate too much into mere picnic parties, and that little real work is done. This is severe criticism. It should never be forgotten that even the hardest workers and most laborious students have their zeal quickened by the opportunities these excursions give for meeting with kindred spirits and talking over their discoveries and observations. Again, even when apparently merely chatting together on indifferent topics, the conversation will suddenly turn to scientific subjects, and the expert has opportunities, which he is not slow to seize, of enlarging upon the matters dear to his heart. The present writer is glad to put on record that he has learnt from Mr. James Pilley, of Hereford, and Mr. William Blake, of Ross, a great deal relating to the bird life of Herefordshire and Breconshire. He does not hesitate to say that his knowledge, such as it is, of archæology and natural history in large measure dates from a visit he once paid to Coventry, when little more than a lad. There he met with a laborious and enthusiastic antiquary, who fired him with zeal. He has picked up, at the many Field Club meetings he has attended in different counties, a mass of information, which he could never have got in any other way. Moreover, it not seldom happens that clubs are entertained by hosts, who do not often throw their parks and mansions open. He once visited, on such an occasion, one of the most magnificent collections of Spanish paintings in the world. He has since then passed close to the great entrance steps of that mansion scores of times, but though he knows the owner's sister and his stewards he has never again been permitted to enter the mansion to feast his eyes on treasures, which would be the glory of any museum or collection, private or public. The owner would not even permit the writer's sister-in-law, a Spanish lady of exalted rank, the daughter of a gentleman who had three times been Prime Minister and three times an Ambassador to the Court of St. James', to enter his house. He simply sent a curt refusal excusing himself on the ground that his was a private house, not a public museum or gallery. Rightly or wrongly, he boasts that there is not such another collection in Great Britain, and only two other such collections in the world—the one at the Escurial being one of them, we presume. Among other treasures there is a superb Italian ceiling—a noble work of art, said to be by Paolo Veronese, which few people have ever heard of, still fewer seen. Our strictures are not, of course, of universal application. For example, the late Lord Bath was most generous in throwing open the treasures of Longleat to the public. He himself took the present writer round and pointed out many objects of interest; while even casual visitors have before now been courteously escorted round that glorious mansion by the family, who have actually left their luncheon to do such generous kindness. Many picture galleries, gardens, and mansions would hardly ever be seen by outsiders were it not for the excursions of Field Clubs.

We must add a word more to the subject. The excursions of the Woolhope are almost invariably a success. When they are not, the weather is solely to blame. The places chosen are always interesting, the charges for trains and carriages are low, and the luncheons or early dinners are a marvel of cheapness

and good management. The Secretary generally arranges for a luncheon, which might be better called a sumptuous cold dinner, at a charge lower than that often made for a far inferior meal, while the opportunities offered for social intercourse are such that these excursions thoroughly justify their existence. We have got to know most delightful kindred spirits—Mr. Barker, of Eardisland, and Mr. H. J. Marshall, of Gayton Hall, Ross, among them. We much regret that the Autumn gathering at Hereford has been given up, not, we hope, permanently. Should it ever be revived we trust it will take place in the last week of September, that being a better time for the railway service than the first week of October.

By the way, even when field club outings take place, as they sometimes do, in towns and districts always open to the general public, it should not be forgotten that were it not for the excursions few of the members would ever find their way to the place. What people can do any day they rarely do at all. As it is, they feel that if they do not seize the opportunity offered them they may not soon have another. All the necessary arrangements are made for them—the carriages, route, meals are all ready in the nick of time. This is no small consideration, and it fully justifies Field Clubs.

The volume contains two excellent papers by Mr. Henry Southall, of Ross, so well and favourably known as an able meteorologist. The first is on the weather of March, 1893, a month remarkable for its warmth and dryness. That spring was singularly pleasant and dry (for England that is.) In the extreme south of the island, where March, April, and May are often brilliant months (indeed the writer has several times seen far more splendid weather in March and May than later in the year), the weather was finer than that of a Midland summer. April was compared by Sir Talbot Baker, of Ranston, no mean authority, to an Italian April. May was quite a summer month. The hawthorn was nearly over in some places long before May came in, and in East Dorset, on the 28th of April, the hedges were past their glory, while the rhododendrons, even in the woods, where they flower later than in the open, had done flowering some time before June began. Mr. Southall mentions that on 13 days in March the maximum reading at Ross exceeded 60°, that the mean maximum of the month was 58·5, while the range of temperature on the ground, as given by a black bulb thermometer we presume, exceeded 80°. There were twenty-two ground frosts in the month, and on twelve nights the reading of the shade thermometer was below 32°.

These facts and figures, sufficiently significant to the trained observer, convey no meaning to the casual reader. There are few subjects on which the educated equally with the uneducated are more ignorant than thermometrical observations. We once read in a scientific (?) publication a statement that in Canada the shaded thermometer *all the time*, whatever that may mean, reached 140° in summer, and fell to—13° in winter. Canada is a large expression, but in 1875 at Montreal the thermometer seldom reached 75° or fell to zero; the absolute highest and lowest being 87° and—22·1; at Port Stanley, the highest, in the same year, was 81°, and the following year 90°, while there the lowest reading fell only six times below zero. At Saugeen the highest and lowest were respectively 86° and—8·1, and at Toronto the reading only once reached 88°, but

this was unusual, and it rarely exceeded 80°. A Wiltshire rector once told us that he had often known the thermometer in his parish, a few miles from Salisbury, in the summer exceed 120°, and fall in winter to zero, and he was not much pleased when his absurd statement was courteously criticised.

Mr. Southall's second paper, dealing with 1893 as a whole, is even more interesting. He mentions that at Ross the mean maximum from February to October, both inclusive, was 65·4. This was even higher than the 65·3 of 1868, while in 1879 and 1888 it was only 57·4 and 57·8 respectively. July, 1868, he gives as having a mean maximum at Ross of 80·5, and at Greenwich 82·0, with an absolute maximum of 96°. It is suggestive to compare these readings with those at Rome in an ordinary year. In the Eternal City the July mean maximum is 89°·9; Modena rejoices in 87°·3; and Avignon, in France, in 92°·1; while Madrid figures for 93°, and sometimes goes far above, even to 105° or 106°. But what are these maxima compared with those of Nubia, the Sahara, and Central Australia? Even at Armidale, in New South Wales, the mean maxima of the hottest month in 1869 were 106°, and at Wentworth, in the same colony, in 1873, they reached 100°, and at Deniliquin they reached 103°·1. What a contrast to an abnormal mean maximum of 82° or the normal one of 75° or 76°. We cannot do better than give *in extenso* some valuable figures just sent us by Mr. Southall :—

"The mean day maximum temperature quoted is for the *nine* months—February and October inclusive, for 1893. I think it would be more correct to call it 65°·4. I append the average maximum corrected at The Graig, Ross, as observed by myself for the period named in 1868 and 1893, together with the mean of the same months in 1880-9 (10 years) by which you will see in which months the greatest departures occur. I am now preparing and have nearly finished my observations for the late drought (for the Woolhope Club).

Average Temperature, Maximum, 1880-9.		Ditto, 1893.	Difference from Average.	1868 Average Max. Temp.	Difference from 1868 average.
February .	46·05	47·56	+ 1·51	49·7 +	3·65
March . .	49·20	58·79	+ 9·59	53·4 +	4·20
April ...	55·00	65·59	+10·59	60·1 +	5·10
May ..	62·48	68·81	+ 6·33	71·1 +	8·62
June ...	68·36	73·43	+ 5·07	76·5 +	8·14
July .	70·90	72·52	+ 1·62	80·5 +	9·60
August ...	70·25	75·66	+ 5·41	72·1 +	1·85
September ...	64·46	67·63	+ 3·17	68·8 +	4·34
October ..	54·78	58·46	+ 3·68	55·5 +	0·72
Average for 9 months	60·16	65·38	+ 5·22	65·3 +	5·14

It will be seen that March and April were much warmer by day in 1893 than in 1868, and, on the contrary, that May, June, and July were much warmer in 1868 than in 1893. July, 1868, being almost rainless with brilliant skies, and July, 1893, having nearly three inches of rain. The total of nine months, however, corresponds very closely, 1893 having had a mean excess over 1880-9 of + 5·22 and 1868 of + 5·14."

These admirable tables are very valuable, but what, we repeat, are even the highest monthly returns of a hot, dry, English summer? The mean temperature of many places in the Southern States of North America reaches, in July, 85° or 86°, and some get to 97°, while May at Massowah has a mean of 101° or 102°. We begin, in England, to complain when the reading for a few minutes a day, for a week or so, spproaches 80, or slightly exceeds it.

Mr. Southall gives the deficiency in seven years in the rainfall compared with the preceding seven years, as upwards of 48 inches, or 4,930 tons to the acre. This in Herefordshire alone, with an area of 550,400 acres, means a deficiency of 2,713 million tons, or 608 thousand million gallons. This would need a train one and a half million miles long, or 60 times the earth's circumference, to carry it. Apropos of drought and heat, there is an interesting note on the great fire in Radnor Forest in 1800, which extended 10 miles and did much damage. In the South of England, however, extensive fires are of yearly occurrence. In most springs vast heath fires occur in Dorset, and in March the sky is often lighted up for hours, even days, with terrible conflagrations sweeping over thousands of acres at a time, and sometimes destroying great numbers of trees. The little paper by the Rev. T. Williamson on the destruction of an ash tree by lightning calls for special notice.

Mr. Thomas Hutchinson contributes a very good paper on the wolf in Britain. He mentions that the wolf survived in Scotland until 1680, in Ireland till 1710, and in England on Dartmoor and in the Forest of Dean, as late as the days of Queen Elizabeth. As natural history was not much cultivated till quite recently, and local traditions were soon forgotten, it is possible that wolves lingered long in out-of-the-way places. Mr. Harting, in his "Extinct British Animals", sums up all that is certainly known in these words:—"So far as can now be ascertained, the wolf became extinct in England during the reign of Henry VII., it survived in Scotland till 1743, and the last was killed in Ireland, according to Richardson, in 1770, or according to Sir James Emerson Tennant, subsequently to 1766." There is nothing surprising in this, for wolves are still sufficiently abundant in France, and some estimates, necessarily very conjectural, give the numbers still existing in that country as 2,000. They are said to have increased very much of late years, and rewards are now paid for 1764 heads every year.

The bear, we believe, is still found in France in very small numbers, though it probably became extinct in Britain before the end of the 10th century. The wild boar abounds in France, not merely in wild countries, like the district of the Vosges, but even in Normandy, where its ravages, were they not well authenticated, would read like travellers' tales. In October, 1876, a band of a dozen charged down the streets of Bernay, a town of 7,000, or nearly double as large as Ross or Tewkesbury, while at the same moment another band crossed the open country from one forest to another. In that year they visited some of the villages of Perigord in troops.

Mr. E. A. Swainson gives a bright little note on the Ornithology of the Brecon Beacons. It is to the effect that "the raven is to be found in the

Mountain at all seasons, but, otherwise, the higher parts are nearly devoid of bird life. About three or four pairs of ravens meet yearly in the Mountain, chiefly, I believe, in the Cwm Serré Cliffs immediately to the north-east of the highest summit. This precipice is about 600 feet high, and affords these fine birds a retreat quite secure from molestation. They also breed yearly in a precipitous ravine on another side of the Beacons, generally in an inaccessible spot. I once, however, found a nest to which I was able to climb; it contained five eggs. Three of these I took for my collection. The buzzard is to be seen occasionally in Cwm Serré, and a few years ago a nest of this bird was found in a cliff."

Mr. J. C. Mansel Pleydell, the learned president of the Dorset Field Club, in his admirable "Birds of Dorset," mentions the raven as still lingering in some of the sea cliffs of that county, but a few days ago we heard that in the remarkably tall trees growing on the top of Badbury Rings, the famous encampment near Wimborne, and not many miles from the busy towns of Poole, Wimborne, and Bournemouth, the raven regularly nests, and has done so this year, though our informant added that the nest, containing five eggs, was taken—that goes without saying.

"The raven," says Mr. Pleydell, "is another bird which has become nearly extinct through persistent persecution. Fifty years ago it used to breed in the cliffs of St. Alban's Head and Gadcliff. Several were often seen together soaring over the cliffs above Kimmeridge, uttering their ominous croak. In 1865 Mr. Harting noticed its occurrence near Lulworth, where there was a brood reared in Swyre Cliffs in April of that year. A pair have frequented the Whatcombe Woods for the last two years, and I hope to hear of their breeding. A pair of these birds showed much precautionary skill in stealing the eggs of sea fowl from the perpendicular cliffs of Ballard Down, near Swanage. While one stood as sentinel on a commanding eminence, the other swooped below, and after taking an egg returned with it in its bill to its companion. Both then flew out of sight, and after a short interval returned to repeat the same tactics. This was observed several times in an afternoon."

In reply to our inquiries, Mr. Mansel Pleydell has just sent us a most interesting note. "I fear," he observes, "the nesting places of the raven no longer occur within the boundaries of the county of Dorset. The free and general use of guns, aided by the achievements of the gamekeeper, has annihilated it with many other birds familiar in the days of my youth. The few and far between croaks now heard, as the bird passes aloft, come from migrants, which, as in Noah's day, went forth and returned."

All large and noble birds are relentlessly persecuted, and few can long escape in thickly-peopled regions. It is a comfort to hear, on good authority, that the kite still lingers in Breconshire or Radnorshire, where it is carefully preserved, but as it is reduced to three or four pairs, and the stragglers are pitilessly slaughtered by so-called bird fanciers, its residence in that district is not likely to last many years, and when a pair nests in another neighbourhood it is soon destroyed and its eggs taken.

We think we have said enough to show that the present volume is equal to its predecessors, and that it contains some superior articles and reports of general interest, while even those parts of the book relating to the Woolhope Club proper, are certain to have many attentive readers, and to be carefully treasured up for future reference.

S. U. M

Woolhope Naturalists' Field Club.

APRIL 5TH, 1895.

THE Annual Meeting was held in the Woolhope Club Room on Friday, April 5th, 1895, when the following were present:—Mr. James Davies, the retiring President, Rev. M. G. Watkins, the President-elect, and the following members: The Revs. J. O. Bevan, A. J. Capel, W. S. Clarke, Preb. Wm. Elliot, E. R. Firmstone, C. S. Hagreen, Preb. W. H. Lambert, H. B. D. Marshall, and M. Marshall, Dr. T. A. Chapman, Messrs. H. C. Beddoe, J. Carless, R. Clarke, G. Davies, T. Hutchinson, T. D. Morgan, O. Shellard, H. G. Sugden, H. Vevers, H. C. Moore, Hon. Secretary, and James B. Pilley, Assistant Secretary.

The Financial Statement, presented by the Treasurer, Mr. H. C. Beddoe, showed a balance in hand of £8 11s. 11d., with assets £8 for arrears of subscriptions due, and liabilities £10 8s. for printing.

The Report of Mr. James B. Pilley, Assistant Secretary, showed that there were 227 Members of the Club in 1894. There were two deaths—those of Judge Cooke, who died October 20th, and Mr. C. G. Martin, who was President of the Club in 1885, who died on April 20th. There were five resignations. Twenty-six Members were elected in the course of the year. The income received was £121, against £104 in the year 1893. More than fifty Members attended the Field Meetings at Bosbury and Caerleon, and about 120 attended on the Ladies' Day at Church Stretton.

RECORDS OF RARE FACTS.—Dr. John H. Wood reported the occurrence of the Black Redstart *(Ruticula titys)* in the month of January at Canon Frome Court; it was either a male or young female. It entered the house, and was captured and placed in a cage with the object of being identified, and unfortunately was found dead the following morning.

Dr. Wood also recorded a Horn-beam at Stoke Edith, opposite the hamlet of Perton, on the right-hand side of the lane to the Pigeon House, scarcely forty yards from the main road. A mistletoe was growing upon the tree. This is a new record not only for this parasite on the Horn-beam, but also a new locality for the tree not recorded in *The Herefordshire Flora.*

Dr. Wood also reported Mistletoe on other trees, of which a notice will be preserved in the minutes of the Club.

Mr. James B. Pilley gave information proving that many clutches of eggs of wild birds had been taken in this county. There has been, however, no complaint in Herefordshire of systematic destruction of birds, such as has occurred in Glamorganshire, nor are there, as in that County, regular nesting places of species. The Glamorganshire County Council has obtained an order protecting the eggs of

the goldfinch and kingfisher, and the Cardiff Naturalists' Society has appointed a sub-committee to consider whether an effort should be made to protect the eggs of any other birds.

Mr. James Davies, in his address as retiring President, stated that at their last Quarterly Meeting on January 12th, the Herefordshire County Council had referred this subject to the Agricultural Committee, agriculturists being those chiefly interested in the preservation of bird life. Mr. Frank James, a member of the Woolhope Club, is exerting himself on behalf of our friends—the birds—and we have every confidence in evoking a greater amount of sympathy for them after the terrible experiences the survivors from the severe frosts of last February have undergone. Whilst upon this subject, the attention of members is drawn to a very sensible letter from Mr. Cordeaux on the Bird Act, to be found on page 468 of the *Field* for April 6th, in which he writes of the indiscriminate selection and scheduling of such birds as need no protection.

The dates and places appointed for the Field Meetings were as follows:—May 28th, Tuesday, Wroxeter *(Uriconium)* and the Shrewsbury Museum; June 28th, Friday, Wapley Camp, between Titley and Presteign; July 23rd, Tuesday, Ladies' Day, Forest of Dean, Speech House, &c.; August 30th, Friday, Caerwent, Caldicot Castle, the Severn Tunnel Pumping Works at Portskewett, near Chepstow.

A report was given respecting the Archæological Map of the county. After three years' assiduous attention to its preparation, for which the Club is chiefly indebted to our retiring President, Mr. James Davies, and to Rev. J. O. Bevan, the map is at present in the hands of the Society of Antiquaries, where it is undergoing careful scrutiny and revision by Mr. Haverfield.

At this Meeting circulars and schedules were distributed amongst the Members on the subject of the Ethnographical Survey of the United Kingdom, in pursuance of whose objects a Committee, delegated from the Society of Antiquaries, the Folk-lore Society, the Dialect Society, and the Anthropological Institute, has been appointed by the British Association. It proposes to record for certain typical villages and the neighbouring districts:—1. Physical types of the inhabitants. 2. Current traditions and beliefs. 3. Peculiarities of dialect. 4. Monuments and other remains of ancient culture. 5. Historical evidence as to continuity of race. The villages or districts suitable are such as contain not less than a hundred adults, the large majority of whose forefathers have lived there so far back as can be traced. Any member interested in this subject and disposed to pursue it, should communicate with our Honorary Secretary, Mr. H. C. Moore, who will point out the lines upon which the British Association are proceeding in their investigation thereof.

Other miscellaneous business of the Club having been transacted, the proceedings terminated with the Retiring Address of Mr. James Davies, President in 1894.

THE FROST OF JANUARY AND FEBRUARY, 1895.

THE severe and prolonged frost of the early part of this year deserves to be recorded.

Its severity will be understood by the readings of the thermometer on the two coldest nights, February 8th and 9th, at the Graig, Ross, as taken by Mr. H. Southall, viz.:—4·5 and 4·4 degrees respectively at four feet from the ground, with a temperature of 3 degrees on the grass.

As regards duration: the frost set in on January 22nd, attained severity on January 26th, and was prolonged nightly without a break until March 8th, but with less severity from February 19th.

Details of the frost, and its general effects upon vegetation, &c., will be given by our meteorological observer, Mr. H. Southall. There are, however, new lessons of a practical nature for which we have not been hitherto prepared. Throughout the kingdom fractures of water pipes, services to houses, and even of mains laid at a depth of more than three feet have occurred. The trials of citizens and of the water departments have been severe, and the damage in large cities has amounted to several thousand pounds. From the published statistics in Birmingham it is stated that none of the mains above six inches in diameter sustained injury, and the central districts were less affected than suburban localities. We deduce the lesson that bursts were less due to the depths of the mains than to arrested circulation of the water, where the main has, *within a short distance*, been less than two feet from the surface.

THE HURRICANE OF MARCH 24TH, 1895.

IT was evident on Saturday that the depression of the forecast was approaching steadily our western coasts, which, together with the south-western and northern parts, were forewarned. On Sunday, March 24th, one of the most destructive gales raged over nearly the whole of the United Kingdom, committing sad havoc amongst roofs and chimney stacks, and uprooting trees by thousands. The violence of the gale was at its maximum about one o'clock p.m. In Hereford the most serious damage was inflicted on the spire of St. Martin's Church, eighteen feet of which, calculated to weigh about three tons, were carried away and fell through a square in the roof between the beams on to the gallery and floor below. The trees blown down in the vicinity of Hereford are too numerous to mention, though it is gratifying to note that the fine old elm trees in the Castle Green escaped without damage, as they had only recently been trimmed and all their treacherous branches had been removed. Eleven of the fine elm trees in the avenue of the Green Crize road, Bullingham, were blown down, simultaneously it is reported.

In *The Times* of March 26th, it is reported that "this gale was of a class which recurs usually at long and irregular intervals, and is remarkable for two reasons—(1) the keenness with which the limits of the zone are marked, and (2) the rapidity of its movement. These two features suggest that it is akin to disturbances of the "tornado" class, while the great breadth of the zone covered by the gales seems to show that it may probably belong to a different class, of which there have been several instances in the course of the past twenty years, and of which the well-known storm of March, 1876, was a specimen. If we draw two lines, one starting at Valencia Island on our west coast, and ending at a point rather to the northward of Scarborough on our east coast, the other starting at Land's End and ending at the mouth of the Thames, it will be found that they form the limits of a zone within which nearly all the really strong gales occurred —the winds both to the northward and southward of this zone being much less violent than those within it. In the Channel, on the one hand, no gales of great force were experienced, and the observer even at the North Foreland appears to have reported nothing more than a moderate gale; while Wales and the central and north-eastern parts of England had storms of a force varying from 9 to 11 on the Beaufort scale. With regard to the velocity of the storm, the movement of its centre, it appears that at 6 p.m. the position of its central area could not be traced from the observations in our islands, so that its progress must have been at the rate of at least 50 miles an hour—probably much more—and the velocity of the wind (from between south and west) on its southern side very great in fully exposed places."

At Birmingham the anemometer at the Edgbaston Observatory, recorded a pressure of 37 lb. to the square foot, which is the highest on record. The

anemometer clock was stopped by the oscillation of the observatory tower. The record of the velocity of the wind is lost for the same reason, but it is calculated that a pressure of 37 lb. to the square foot is equal to a velocity of 86 miles an hour. The highest previous record noted at Edgbaston was in the storm of February 11th, 1894, when a pressure of 27·5 lbs. and a velocity of 50 miles an hour were recorded, so that the late gale gave a result nearly 10 lb. higher than any previous record.

RETIRING ADDRESS OF Mr. JAMES DAVIES, PRESIDENT IN 1894.

The simple words "tempus fugit," with which we have been familiar from our earliest school days, are very expressive, and serve to remind us of the yearly revolution which brings us round to our Annual Meetings, at which the Retiring President is expected to give an address, in accordance with the rules, before he hands over the office to his successor. It is generally understood that such address should assume a kind of résumé of the proceedings of the Club during the past year, with a few observations on the details of the several Field Meetings. It may be briefly stated that there have been, as usual, four excursions, with a good supply of papers on a variety of scientific subjects; but in many cases time would not admit of their being read on the spot, and Members must be content with a perusal in the volume of the *Transactions* of the Club.

The first Field Meeting for the year 1894 took place on Thursday, the 24th of May, when between 50 and 60 members assembled for the purpose of exploring the valley of the river Frome. The party left Hereford by the 9.40 Worcester train for Ashperton Station, where they were met by carriages for the proposed route. The first object of visit on the programme was Mainstone Court, the seat of the late Captain Johnstone. Here a very interesting paper was read by the Rev. Michael Hopton, in which the Roman road from Circutio (at Stretton Grandison) to Glevum, at Gloucester, was noticed, as also some monastic remains at a short distance, with the site of a fish pond. Here too when some buildings were taken down in the year 1850 a dungeon was found. The remains were probably those of a cell attached to the Priory of Ledbury. From Mainstone Court the carriages were driven to Munsley Church, where another paper, descriptive of the edifice, was read by the Rev. Michael Hopton—the incumbent. As it is hoped that the two papers will appear in the *Transactions* of the Club, it is unnecessary to enlarge these remarks. Mr. Hopton drew attention to the ancient yew tree in the Churchyard, which from calculations based upon the growth made by a former curate of the parish, is supposed to have been planted in the ninth century, and, therefore, upwards of a thousand years old. An account of this yew tree was given in an article appearing in the *Hereford Times* of the 12th March, 1881. The next halt was at Bosbury Church, where the members were met by the Rev. Samuel Bentley, the vicar, who spared no pains in pointing out the many interesting features of this Church, which is of the Transitional Norman period. It consists of a nave with north and south aisles, and a chancel, to which has been added a chantry chapel of the perpendicular style, erected in the early part of the 16th century by Sir Rowland Morton, then residing at The Grange, in this parish. A very beautiful screen separates the chancel from the nave, richly ornamented with tracery, which is considered one of the finest specimens of rood screens in England. The style is perpendicular. A very singular feature is the

detached tower in the churchyard, standing 60 feet from the Church, and erected apparently about the beginning of the 13th century. There are six other Churches in Herefordshire with this peculiarity of detached towers, namely, Ledbury, Pembridge, Holmer, Richard's Castle, Yarpole, and Garway. A 14th century cross still remains in the churchyard. From the Church the party walked to view some ancient buildings which formerly formed a portion of the Bishop of Hereford's Bosbury Palace. From early Anglo Saxon times the Manor of Bosbury was part of the possessions of the See of Hereford. The entrance gateway, with the prison adjoining, as well as an underground dungeon, and such rooms in the present Farm House as were portions of the palace, were pointed out and described by the Vicar. In the year 1572 it was partially destroyed by fire during the episcopate of Bishop Scory, and was not properly rebuilt. In the Cromwellian period it was sold to Silas Taylor, and thus alienated from the Bishopric. The next visit was to a house, known as "The Temple Court," the residence of J. Pitt, Esq., where, as the name would naturally indicate, was formerly a preceptory of the Knights Templars, a fraternity of much importance during the middle ages, established in 1118, whose business was to defend the sacred places in the Holy Land, and protect pilgrims on their way through the mountainous passes to Jerusalem.

At the hostelrie, known as "The Crown Inn," the excursionists lunched, when, as it was the Queen's birthday, the President proposed the health of Her Majesty, with the hope that, notwithstanding her already long reign, she would yet be spared to us for some years to come, after which the business of the Club was transacted, ten new members elected, and five more nominated for election at the next meeting. The President took occasion to acknowledge the obligation they were under to the Rev. S. Bentley, and the Rev. Michael Hopton, for their literary contributions that day, and he particularly mentioned that Mr. Bentley had recently published a most interesting History of Bosbury, well illustrated, which he recommended every member of the Club to obtain.

Here the party resumed the carriages for the return journey, and the next object of visit was Castle Frome Church, where they were met by the Vicar, the Rev. R. Bayley, who pointed out and explained the details of the building, which contained some remains of Norman work in a closed west door and priest's door. The Norman font was also described by Mr. Bayley, who pointed out the carvings on the side, representing the Divine symbols of the four faces of man, lion, ox, and eagle, as mentioned in Revelation iv. 6—8, and Ezekiel i, 10, emblems which were similar to those on the faces of the two Cherubims in the Holy of Holies, in the Temple of Solomon and the Tabernacle of Moses, and may be typical representations of the Trinity. The supposed site of the Castle was also shown. At the Vicarage House, Mr. Piper read a very interesting paper showing that the De Lacys, Lords of Ewyas, had possessions in these parts.

From Castle Frome the party continued their journey to Canon Frome Rectory, where they were hospitably entertained by the Rector, the Rev. Michael Hopton. After which some of the party walked to inspect the Church. The last place of visit on the programme was Ashperton moat and site of the Castle, where

Mr. Piper again read a short paper, giving a history of the Grandison family, after whom the parish of Grandison has been named, and to which is attached the ancient Chapel of Ashperton. The papers read during the day will, it is hoped, appear in the *Transactions* of the Club, and therefore further details in the matter of their contents would on the present occasion prove tedious.

The Second Field Meeting took place on the 26th of June, when a large number of Members visited Cardiff, Llandaff, and Penarth. This excursion was for the purpose of visiting Cardiff Castle, Llandaff Cathedral, and certain geological formations at Penarth. Through the kindness of the Marquis of Bute the party were allowed complete ingress to the Castle. through which they were conducted by Mr. Edwin Seward, the president of the Cardiff Naturalists' Club, who gave a full descriptive account of the various parts through which the excursionists passed, pointing out in detail all the objects of interest, which were too many and varied to be here mentioned more than by way of general remark. Suffice it to say that the Castle has been handsomely restored by the present Marquis, and decorated in a manner unsurpassed by any similar building in the kingdom ; and the tourists were highly gratified with the inspection, and truly obliged to his most noble lordship for the privilege so kindly allowed them. Indeed, it is not too much to say that it was a memorable day in the annals of the Club.

After luncheon at the Angel Hotel, the party proceeded in brakes to Llandaff Cathedral, where they were met by the Rev. Minor Canon Downing, who conducted them over the sacred building, and gave a description and history of this ancient Cathedral and See. This Cathedral, so far as the site and See are concerned, is of remote antiquity. There is evidence that there was a Church in the 5th century, and the names of Dubritius and Teilo are associated with it as early occupants of the See, and it is recorded that their dust lies here, commingled with the soil of centuries. The Norman work dates from the 11th century. Within the last forty years the nave, which was almost in ruins and open to the sky, has been restored, and the internal structure now presents a very fine appearance, and is a great credit to this ancient diocese.

After the inspection of the Cathedral of Llandaff, the party proceeded to Penarth Hotel, from the grounds of which there is afforded a view of much interest, comprising the town of Cardiff, with its acres of docks, the Bristol Channel, the Somersetshire coast, and the towns of Clevedon, Weston-super-Mare, Burnham, and Minehead, the two islands of the Steep and Flat Holms, as well as the Penarth coast to Lavernock, Sully, and Barry, whose island has now become joined to the mainland by the ballast from the huge dock which has there been constructed, and claims to be one of the largest in the world. Here the geological features were pointed out by Mr. John Storrie, of the Cardiff Naturalists' Club. At low tide the Lower Lias and the Rhætic beds, with the fish bone bed, may be seen at Lavernock point ; and beneath the Rhætic beds the New Red marl, with its gypsum bands, is visible, as well as the faults which have there disturbed the strata.

Three papers had been promised : one in connection with "Cardiff Castle,"

by the Rev. J. O. Bevan ; another on "Grayling in the River Monnow," by the Rev. Morgan G. Watkins ; and a third on "The correlated variation of the larva of Arctia Caia," by Dr. Chapman, of Burghill, but want of time unfortunately precluded their being read. It is, however, hoped that they will all appear in the *Transactions* of the Club.

At the luncheon your President introduced the subject of a united meeting of the Cardiff and Woolhope Naturalists' Field Clubs, which was reciprocated by the members of the Cardiff Club ; and it was arranged that as the Woolhope Club contemplated visiting Caerleon-upon-Usk, that interesting antiquarian locality would be a fitting spot for such united gathering, and would tend to cement the two Societies, and stimulate the students of natural history and archæology in their respective pursuits.

The third Field Meeting was held on the 26th of July, at Church Stretton, and was intended for the re-union known as the "Ladies' Day," when upwards of 100 ladies and gentlemen left Hereford by the 9.20 train, arriving at Church Stretton at 10.47. Here the party were met by Mr. E. S. Cobbold, Honorary Secretary of the Caradoc and Severn Valley Field Club, who had kindly consented to act as Director for the day, and whose exertions to render the meeting a success cannot be too highly praised. The first object of visit was the Parish Church, which presents features of various dates from the Norman period, and consists of a nave and chancel with a tower surmounted by a spire rising from the centre. Thence the party walked through the little town of Church Stretton to Brockhurst Castle (distant about a mile and a half), where a paper was to have been read on this Anglo-Saxon edifice (of which now nothing remains except a mound recording the site), by Mr. William Phillips, of Shrewsbury. Mr. Phillips was unfortunately unable to attend, but Mr. Cobbold gave a very lucid description and history ef the Castle to such of the party as were sufficiently courageous to ascend to the summit of the hill.

From this spot the excursionists wended their way towards the Longmynd, and, continuing their course up the Ashes Valley, eventually gained the moorland on the summit, where it was arranged to bivouac. There being no formal lunch provided by the Club, the tourists had to make their own arrangements for refreshments, and they presented a very amusing spectacle as they camped in a circle upon the hill-top. After lunch, several members walked to the Pole—about half-a-mile distant—the highest point of the Longmynd, adjudged under the recent Ordnance Survey to be 1,696 feet. Several papers had been promised, which were to be read after lunch, as well as the business of the Club transacted, but time was only allowed for the latter. The papers were as follows :—"Scientific Reflections on the neighbourhood of Church Stretton," by the President ; "Brockhurst, the site of a Saxon Castle," by Mr. William Phillips ; "On Sponges" by the Rev. J. E. Vize ; "Three New Bramble Forms," by the Rev. Augustin Ley ; and "Additions to the Flora of Herefordshire," since the publication of the volume in 1889 by the Rev. Augustin Ley. These papers will all appear in due course among the *Transactions* of the Club. Leaving the summit of the Longmynd, the party continued their course over the moorland to the

Light Spout Waterfall, where a photograph was taken by Mr. Ernest Davies, architect, Hereford, and thence continuing down the path through this picturesque brook glen, by the Carding Mill, reached Church Stretton in time for the evening trains. The neighbourhood of Church Stretton cannot be too highly praised, as may be evidenced by the circumstance that this was the sixth meeting of the Club in that locality. The succession of hill and dale, the geological, botanical, and archæological associations, will amply repay repeated visits to a spot so highly favoured by Nature and connected with the history of mankind.

The Fourth Field Meeting was arranged for the 28th of August, to visit Usk and Caerleon in Monmouthshire. Upwards of 50 members and visitors left Hereford by the 9.15 train, and arrived at Usk about half-past eleven. Here they were met by the Rector of Usk, who accompanied them to the Church, where a very interesting and lucid description of the edifice (written by Mr. Stephen Williams) was read by the Honorary Secretary of the Woolhope Club, after which Mr. F. Kempson, at the request of the President, kindly added some remarks on the details of the Church, which were well appreciated, and provoked considerable discussion upon some of the more prominent features and characteristics. From the Church the party proceeded to the Castle, where a short paper was read by the President, upon the Roman Station of Burrium, which was in or near the town of Usk, as well as of the history of the Castle, which was intimately connected with royalty during the dynasty of the Houses of Plantagenet, Lancaster, York, and Tudor. As this paper will appear in the *Transactions*, further notice here would prove tedious. Since the meeting your President has received a communication from Mr. F. J. Mitchell, of Llanfrechfa Grange, that in digging the foundations for a New Court House near the Usk Prison, a large quantity of pottery and other Roman remains were found, and afterwards collected together by Mr. A. B. Berrington, of Pant-y-Goitre. They will be deposited in the Museum at Caerleon, for which there will be provided a special compartment.

Retracing their steps to the Railway Station, the party proceeded to the ancient town of Caerleon-upon-Usk, an early British, as well as a Roman Station, and the chief city in the province of Britannia Secunda. At Caerleon Railway Station they were met by Mr. Mitchell, who conducted the party round the walls of this ancient city, and pointed out step by step the leading features, more particularly the Roman brickwork, and the supposed site of the Roman bridge over the River Usk. The party then proceeded to an elevation, or rather a small hill, known as "The Tump," respecting which there was much speculation and discussion as to its origin and purpose. Here they were met by the members of the Cardiff Naturalists' Society, under their President, Mr. Edwin Seward, F.R.I.B.A., including a large number of ladies, thus forming, as it were, an united meeting of the two Clubs, and which, it is hoped, will be followed by similar re-unions.

Upon "The Tump," which is situated in the grounds of Mr. Alfred Williams, who kindly opened them to the visitors, two papers were read—one on "The Wolf in Britain," by Mr. Thos. Hutchinson, and another entitled "Caerleon and Caerwent," by the President; from this spot the tourists proceeded to the

Museum, which is an appropriate building, and contains a large quantity of Roman remains found at Caerleon and the immediate neighbourhood, and which will well repay a visit. Many thanks were due to Mr. Mitchell for his devotion to the members, which added much to the enjoyment of the walk over this Roman soil, and to Mr. Williams for allowing so large a party to visit his beautiful grounds, which contain the curious antiquarian remains known as "The Tump"—and also to the respected Rector of Caerleon, who invited to tea as many of the party as were able to avail themselves of his kind offer of hospitality.

At the General Meeting of the Club on the 12th April, 1894, it was resolved that one of the excursions should be a visit to Cwm Elan, near Rhayader, to inspect the works in progress in connection with the Birmingham Water Scheme. It, however, transpired that the train service of the Midland Railway would not admit of a return journey during the day, and the excursion to Cardiff, which was one of those that were suggested at the meeting, was substituted by the Central Committee. As several members expressed a desire to visit Cwm Elan, while the valley existed in its natural state, and previously to the inundation of this romantic glen by the huge reservoirs for the supply of water to the large population of Birmingham, a special limited Field Meeting was arranged. The members were met by Mr. Stephen Williams, of Rhayader, the architect and local engineer, who accompanied them, and very kindly afforded every information respecting this gigantic water scheme for the supply of the inhabitants of one of the largest and most populous cities in the kingdom. Your President was unable, through other engagements, to join the party; but your Hon. Secretary has furnished a detailed statement of the Rhayader Excursion, which will prove interesting to those who were not present, and shall be given in his own words. He writes as follows:—On Monday afternoon, August 20th, a small party met at Rhayader. Early next morning, in a conveyance under the guidance of Stephen Williams, Esq., F.S.A., and after a drive of about four miles, they reached the place where the village for the accommodation of all workmen connected with the Birmingham Water Supply, from the rivers Elan and Claerwen, has been recently built, and was being extended to accommodate 1,500 men. The system of water supply, hospitals, provision for the comfort of the little colony by means of a canteen, reading room, and chapel have been most admirably carried out. From the village the party walked up the valley to the proposed site of the first dam at Caban Coch, called The Caban Dam, across the river Elan, over which the daily compensation of twenty-seven million gallons of water will be poured into the river Wye.

Mr. G. N. Yourdi, the resident engineer of the works, here pointed out how the dam would be wedged below the bed of the river to a depth of from twenty to thirty feet into the solid rock, and wedged also into solid rock on each side of the valley, forming a mass of masonry, when completed, one hundred and twenty feet high, and at the top about two hundred yards in length, enclosing a reservoir capable of containing seven hundred million gallons.

The party ascended the steep incline on the left of the valley, and on arriving at the Stone-dressing Yard, were interested in finding several large

boulders with distinct striation observable, the effect of glacial action. Walking about a mile beyond the Caban Dam, the river Claerwen was crossed by a frail and quivering wire-swing footbridge, after which the house "Nantgwilt" was reached. This was formerly the residence of the Poet Shelley, and recently that of Mr. Lewis Lloyd.

After a short rest here for luncheon the return route was directed across the river Elan by a substantial stone bridge, a short distance from the place where it unites with the Claerwen. The wooden huts of the offices of the department were passed, and the walk was extended to the proposed site of the submerged dam in the Caban Reservoir, a few yards above which the culvert for twenty-seven million gallons of water per day, for the supply of Birmingham, will take its origin—seven hundred and eighty feet above the Ordnance Datum. The submerged dam is about one mile distant from Nantgwilt. A walk of about half a mile further brought the party to Cwm Elan. Both these residences will be submerged in the Caban Coch Reservoir, as also a Baptist Chapel, the small Church of Nantgwilt, and a few small farms and homesteads.

From Cwm Elan the party retraced their steps for the return journey, and, their carriages having met them punctually at the proposed rendezvous, returned to Rhayader, where they arrived at five p.m. and were hospitably and agreeably entertained by Mr. Stephen Williams.

The Watershed is about 12 miles long from north to south, and 7 miles from west to east. The mean annual rainfall at Nantgwilt is 68 inches.

A practical remark may be added to Mr. Moore's very interesting account of the Rhayader excursion. When the Birmingham water scheme was contemplated it was feared that the supply of water to the city of Hereford would be endangered; but a very slight calculation will evince how unnecessary was the alarm. Taking the length of the river Wye, from Chepstow to the mouth of the Elan, at 150 miles, and allowing an average width of 50 yards, with the recognized quantity of 6¼ gallons to a cubic foot, or 277¼ cubic inches to a gallon of water, it will be found that if the 27 million gallons of water required for the daily supply of a portion of the population of Birmingham were spread over the surface of the bed of the river Wye from Rhayader to Chepstow, it would present a sheet of water of less than half an inch in depth; so that the abstraction of water would be infinitesimally small at the lowest water mark, whilst the continuous floods, to which the river Wye is subject from the Welsh Hills, would render the diminution still more inappreciable. Such a flood as occurred in the recent winter, when the water of the river rose 16 feet, would have supplied the daily grant of 27 million gallons for twelve months.

A very important incident in connection with the *fauna* of England, and equally interesting to the ornithologist and the agriculturist, is that the reduction of wild birds, as well those of prey as of a smaller species, has occasioned a very marvellous increase of vermin, not only in the shape of rats and mice and similar small animals, but of insects and flies, which in places have proved destructive to vegetation. To endeavour to remedy this evil a statute was passed in the last session of Parliament for the purpose of extending the Wild

Birds Protection Act, 1880, and giving power to the Secretary of State, upon the application of the County Council, to prohibit the destroying of wild birds' eggs in any place, or destroying the eggs of any specified kind of wild birds within the county, as well as to extend the provisions of the earlier statute to any wild bird which may not be included in the schedule to that Act. At the Quarterly Meeting of the Herefordshire County Council on the 12th January last, a communication on the subject from the Home Secretary was referred to the Agricultural Committee with the view to preserve in this matter what may be styled the compensation of Nature.

The main objects of such a Society as the Woolhope Naturalists' Field Club is, doubtless, the advancement of science in the various branches which fall under its cognizance, but we must attach to the name a far more extended meaning than is generally allowed. It does not consist in mere book study, but in a practical development of the knowledge gained by that which lies externally around us. The mechanical genius, the chemist, the architect, the mining engineer stand side by side with the geologist in providing for our homes and domestic comforts, and are necessary helps in their several spheres.

The manufacturer has to call in the aid of practically developed science in the acquisition of wealth, and the observation of nature has greatly assisted in the rules of ecclesiastical as well as naval architecture.

There are other subjects too numerous to be noticed. The multiplied number of elements, the atomic theory, the doctrine of gases, galvanism, and electric current, present an interesting field of research, which will well repay the students of science in their several vocations where applied knowledge is necessary. To the man of seventy winters the rapid advance in the various branches of science is truly astounding.

In astronomy the discovery of new asteroids and comets forms a very important chapter. In geology there has been much developed during the last half century—since a period when it was comparatively in its infancy. In botany, zoology, ornithology, ichthyology, entomology, archæology, and kindred subjects, we have seen the same rapid strides, until the student can well realise the feelings of one of old, "Of making many books there is no end, and much study is a weariness of the flesh." It is gratifying to know that the Woolhope Naturalists' Field Club has done its share, and the *Transactions* form a most valuable cyclopædia upon a variety of subjects. Many of the authors are still amongst us to pursue their labours. Others have gone to their rest, and it may be truly said, when we read their memorials in our published transactions, that "their works do follow them."

But in addition to the papers read at the Field Meetings, many of our members have published independent volumes, of much permanent value as scientific records. Amongst these may be well noticed "The Herefordshire Pomona," by Dr. Bull, "The Flora of Herefordshire," by the Rev. Augustin Ley; "The Birds of Herefordshire," contributed by members of the Club, and collected and arranged by Dr. Bull: "A Handbook to the Geology of Shropshire," by the Rev. J. D. La Touche; "Herefordshire Words and Phrases, Colloquial

and Archaic," by the Rev. Dr. Francis T. Havergal; and a very interesting preface to a reprint in black letter, on "A Treatyse of Fysshinge with an Angle," published in 1496, as well as other contributions by our President elect, the Rev. M. G. Watkins.

With such a record of valuable work, it is hoped that the Woolhope Naturalists' Field Club will continue in the prosecution of the objects for which it was originally established, now upwards of forty years ago, and that our younger members will be seen to come forward and assist in the several branches of science in which they may feel an interest—thus rendering themselves useful in their day and generation, in a life devoted to the honour of God, and the diffusion of knowledge and happiness in the world.

I cannot conclude without a remark in reference to a gentleman to whom we are so highly indebted for the time and labour which he bestows on our behalf, and it is only those who are officially in intercourse with him who know the many hours which he devotes by night and day to the service of the Club. A well-deserved acknowledgment was presented to him last year, which was cordially supported by all our members, but it was felt to be a very slight memorial in return for the great service which he has rendered.

The continuation of the volumes of *Transactions*, which were in arrear when Mr. Moore took office as Honorary Secretary, has been effected, and the materials are now ready for the completion of the years 1893 and 1894, as soon as the funds of the Society will admit of their publication.

Our grateful thanks are due to our respected Hon. Secretary, and I feel assured that we shall all most heartily unite in the hope that he will long live to continue his very valuable assistance in the work of the Woolhope Naturalists' Field Club.

Woolhope Naturalists' Field Club.

FIRST FIELD MEETING, MAY 28TH, 1895.

ATCHAM CHURCH, WROXETER, AND SHREWSBURY.

ON Tuesday the ruins and the excavations, so far as they have been exposed, of the ancient Roman city of Uriconium were visited. The site of this ancient city, enclosed originally within a circumference of about three miles (says Mr. T. Wright), is represented in the present day by a small village on the river Severn under the name of Wroxeter, about five miles and a half south east of Shrewsbury. The party, having trained to Shrewsbury, were there met by Mr. William Phillips, our honorary member, who has done so much useful work for the Club in the mycological branch of natural history, and who at once assumed directorship of the day's proceedings. Driving through Shrewsbury, which was left by the Abbey Foregate, near which are the only existing remains of one of the numerous towers of defence upon the line of walls, and passing the fine old Abbey Church built of New Red sandstone, whose Norman west door surmounted by a magnificent window of early perpendicular architecture forms so prominent an object, thence past the column to the memory of General Lord Hill, built of Grinshill stone in Doric architecture to a height of 133½ feet, the open country is reached, and after a drive of four miles from Shrewsbury the river Severn is crossed by a bridge of seven arches close to which is situated the ivy mantled Church Tower of Atcham.

Here a halt was made in accordance with the programme for the day, and the Vicar, the Rev. A. G. Kingsford, kindly met the members, and pointed out, during their short half-hour of inspection, the principal features of interest. Of these we may record the fine tracery Screen from Worfield Church, a Norman light in the North wall of the nave, and an elegant lofty Lancet Arch in the West end, in front of which in a gallery is a small but ancient organ of some reputation, to which is attached a history of its diapason, highly valued by the late Sir Frederick Gore Ouseley, and which was destroyed by a stroke of lightning. It will probably scarcely be credited—but it is nevertheless true—that the steel stays of a child were marked, and the boots of another were rent, as they sat in the gallery during the same electrical disturbance, though no serious damage was inflicted on the children themselves. Such are stubborn facts, and the boots are exhibited in Shrewsbury Museum. What most interested our Herefordshire members was the association of an ancient stained Glass Window in the South wall of the Church with Bacton in the Golden Valley. In the year 1811, when there was no

resident Clergyman at Bacton, a window (most probably suffering from want of proper preservation), to the memory of Blanche Parry, maid of honour to Queen Elizabeth, was removed amidst rejoicings and a general holiday at Bacton to Atcham Church. The act of removal is recorded on an inscription on the East wall of Atcham Church. However, as regards the window in question, the elements have, unfortunately, waged war victoriously. So much damage was done by the winds in the early part of 1894 that the window was condemned as dangerous. It was removed and a modern stained glass window supplants that to the memory of Blanche Parry. There still exists a beautiful ancient glass window in the East end to the memory of Miles ap Harry, an ancestor of Blanche Parry, which likewise was removed from Bacton Church. As regards the exterior of Atcham Church, the chief points of interest consist in its traces of Norman work at its base, the enormous stones used in the masonry indicating by their size and tracings of decoration of laurel leaves their connection with those dug up amongst the ruins of the adjacent Roman city. On the East wall are observed at the height of a man's eye small openings, one at each side of and below the East window, of which there is no trace interiorly. These openings are not large like that which will be seen at Presteign under the East window there when our Club visits that Church at their meeting announced for Friday, June 28th.

After thanking the Vicar, seats were resumed for the extension of the drive for another mile and a half, passing the grounds of Attingham Park, and over the river Tern, to Wroxeter. When the party reached the site of the enclosure, Mr. Phillips left his carriage, and from a favourable intermediate position gave particulars of the excavations which had been conducted between the years 1859 and 1863. Out of 170 acres of enclosure only four have been excavated, and fortunately these have revealed to us much connected with the interior domestic arrangements and articles pertaining to the Roman rulers. From a diagram Mr. Phillips showed the contour of the city, the small rivulet called the Bell brook flowing from east to west through the city, the Watling Street-road from Kenchester and Caerleon, leading to Deva (Chester) in the North, and a cross road from the East leading over the Severn by a bridge (of which the masonry foundations are said to have been seen during the present century) to the Breidden Hills, whence all trace of its prolongation has been lost. A depression on the opposite bank of the Severn, which can be seen from the extremity of the lane at the west of the church, indicates the continuation of the road, and consequently the site of the ancient bridge.

Both by Ptolemy and Antoninus the name Uriconium is written Viro-conium. This is probably at bottom "Vrekon," the same word as "Wrekin," a hill which is visible five miles away. "Uriconium" seems a mere variant. Next (after the analogy of Exeter from "Exanceaster") in Saxon times it became "Wreokonceaster." Leland calls it "Wroxcester," and it eventually settled down into "Wroxeter." In Roman times Wroxeter stood on the Watling-street, the great road beginning at Rutupiæ in Kent, and passing by way of London and St. Alban's to Shrewsbury, and so to Deva (Chester).

Besides this Wroxeter was in direct connection with Isca (Caerleon), where the 2nd Legion was stationed. From Isca a Roman road ran north to Gobannium (Abergavenny), by Ewias Harold and Abbeydore to Magna (Kenchester). This road continued to Wroxeter and so to Chester, the head-quarters of the 20th Legion. Wroxeter was probably destroyed first by the Picts in the deluge of barbarians from the North, when the Romans left the Britons to themselves, 426 A.D., and then a century later it seems to have suffered the same fate at the hands of the Saxons. The Severn, having changed its course, now flows over part of what was the Roman town.

A few minutes were given to an inspection of Wroxeter Church, with its monuments to the Newport family, an altar tomb dated 1544, an Easter-sepulchre, an ancient oak chest in the Vestry, parish registers from 1615, pure Norman lights in the Chancel, beautiful Norman doorway, and transitional architecture elsewhere, with a puzzling incongruous filling in of perpendicular work in the west wall of the tower. The approach to the churchyard on the west has its steps enclosed within Corinthian pillars. By the kind permission of Mr. West a view was obtained in his adjoining garden of an arbour whose façade was composed of Roman architectural columns, shafts, and capitals intermixed with ecclesiastical work, made up from fragments discovered in the neighbourhood by his predecessor. Upon arrival at the site of the excavations, about half a mile north east of the Church, Mr. Phillips took the opportunity of demonstrating from a favourable eminence the plan of the buildings whose ruins of tesselated pavements, hypocausts, barrel roofs, and numerous compartments were exposed to view. The custodian of the premises exhibited flue tiles with flanges, bricks, flat tiles, and numerous specimens of finds. After the lucid description given by Mr. Phillips, the work of following the plan on plate 5 of the small book, an abridgment of Thomas Wright's "Guide to the ruins of Uriconium," sold on the premises for eighteenpence, was easy, and the better part of an hour was pleasantly occupied in strolling over the ruins, which can be so well viewed from a commanding eminence formed out of the excavations. Very excellent specimens of Roman mortar and cement were examined. In the remains of the old wall, about fifteen feet high, the groining of the three barrel roofs is still conspicuous, and in this wall it was observed that every, however small, piece of New Red Sandstone masonry employed in the structure was placed upon its proper bed as found in the quarry, thus preserving it from peeling off in shales, as is always the case when the stone has been laid by careless, ignorant, or unscrupulous builders.

After stopping for want of funds, excavations were resumed in 1867. These resulted in opening up the public Baths of the town, and the *latrinæ* adjoining. Here too tesselated wall patterns were found, a feature which is unique in Roman remains. Many coins have been picked up at various times. They appear to terminate about 385 A.D., and thus afford the means of making a guess when the place was finally burnt. The Britons who would occupy the town at the departure of the Romans must have been more civilized than is generally supposed. The Romans had spent 374 years in Britain disseminating their own civilization between the arrival of Ostorius in 52 A.D., and the departure of the

legions in 426. Think what 374 years mean in our own history. They take us back to the reign of Henry VIII., and how enormous is the advance that has been made since that time in the arts and sciences! For the antiquities found at Uriconium, and now, by agreement with the Duke of Cleveland, deposited in the Shrewsbury Museum, reference should be made to Mr. T. Wright's book, "Uriconium."

At 2.15 the return journey was undertaken, and on arrival at Shrewsbury the members assembled in the room of the Caradoc and Severn Valley Field Club.

Here the Rev. J. D. La Touche delivered a scientific exposition of the causes of the Ice age, briefly discussing the theories of Sir Chas. Lyell, Dr. Croll, and Sir Robert Ball, and by means of a diagram and model he demonstrated the eccentricity of the earth's orbit in an ellipse, and Kepler's law, the precession of equinoxes, the cold period due to astronomical changes, and the inclination of the axis of the earth to its orbit as the standard for the regulation of heat.

He proceeded to illustrate upon Mr. Charles Fortey's excellent model the causes of Glen Roy Parallel Roads near Ben Nevis at the respective heights of 1,150, 1,070, and 860 feet above the sea, leaving a vertical distance of 80 feet separating the two highest lines, and the lowest road 210 feet below the middle parallel. Mr. La Touche and Mr. Fortey visited this district last year, and a model of the locality is the outcome of their visit. The model, on the horizontal scale of one inch to a mile, embraces within an area of over 600 square miles the valleys of the Spean, the Spey, and the Roy of the Lochaber district of Scotland, extending from Fort William on the west to Loch Fricht on the east. The model is about three feet long, and represents a length of about 36 miles. On the vertical scale, Ben Nevis 4,370 feet high, is represented about $4\frac{1}{8}$ inches in height. Mr. Fortey used about four thousand pins in following the various contours. The heads of the pins were cut off to the altitudes required, and the model was gradually built up of clay. Towering above the dominant hills stands the monarch Ben Nevis—these mountains on the west coast are the first to receive the vapour-laden winds of the Atlantic, which, robbed of their vapour during the glacial epoch would precipitate it in the form of snow, and charged with the heat set free in the process of precipitation, would pursue their course across Scotland to the east coast, where the rainfall at Culloden, the north-east end of the Caledonian Canal is only 24 inches annually compared with 46 inches at Loch Laggan, twenty miles east of Ben Nevis, and with 86 inches at Fort William, the south-western end of the Canal.

At the conclusion of the lecture a visit was paid to the Shrewsbury Museum where, amongst numerous other objects, thousands of finds from Uriconium in the magnificent collection of local antiquities were examined at leisure.

After dinner at the George Hotel, Mr. John Cordeaux, M.B.O.U., from Great Cotes, Lincolnshire, read an interesting paper expressly written for the Woolhope Club, on "The rush of the Arctic Birds on the east coast of Great Britain in the winter of 1894-95," and exhibited specimens of three beautiful and rare birds, namely the Shore Lark, the Snow Bunting, and the Little Auk.

The members, of whom a list is given below, left Shrewsbury at six o'clock,

after an excellent expansion of their views on subjects of archæology, physiography, and ornithology. The following attended :—The President, Rev. M. G. Watkins; ex-Presidents, Rev. C. Burrough, Dr. T. A. Chapman, Mr. James Davies, Rev. Preb. W. H. Lambert, G. H. Piper, and H. Southall; Rev. J. D. La Touche, long time President of the Caradoc Club; Members—Judge Ingham, Revs. H. Burges Bayly, W. S. Clarke, E. R. Firmstone, C. S. Hagreen, C. Harington, E. J. Holloway, H. B. D. Marshall, H. North, F. S. Stooke Vaughan, and R. H. Warner; Messrs. Attwood-Mathews, R. Clarke, J. Cockcroft, Luther Davis, C. Fortey, C. Hardwick, Jas. W. Lloyd, G. W. Marshall and friend, J. H. Parry, W. Pilley, Scudamore Powell, William Phillips, H. Vevers, and H. A. Wadworth; Honorary Secretary H. C. Moore, and Assistant Secretary J. B. Pilley; with the following visitors—Mr. John Cordeaux, M.B.O.U.; Mr. Davis, from Malvern; Mr. Alex. Grant, B.D., from Glasgow; Mr. Joseph Hooker, from Stokesay; Mr. Thomas La Touche, of the Indian Geological Survey; and the Rev. J. Oakeley, of Hereford.

THE GREAT ICE AGE. THE PARALLEL ROADS OF GLEN ROY.

By the Rev. J. D. La Touche.

Mr. La Touche said: The great Ice Age or the Glacial Epoch, as it is called, is one of those phenomena which, though now fully accepted by all competent geologists, is, probably, by those who have not had an opportunity of examining the evidences on which the arguments in its favour are based, looked upon with a certain amount of incredulity. But he hoped, by the help of the model now before them, to bring forward reasons sufficient to convince any one of its reality who studies the matter impartially. All feel how hard it is to realise on a warm day like that they had just been enjoying, the fact that the face of nature, which is now decked in all the glories of summer, was, not long ago, concealed below a veil of ice and snow. Still more difficult must it be to imagine a vast covering of ice, thousands of feet thick, filling our valleys, and even covering the tops of our highest mountains in past time. Yet to those who have examined them, the scoring of the rocks in North Wales and in Scotland by the blocks of stone embedded in the under surface of glaciers, and the transport of large masses of stone to our shores from their original home in the mountains of Norway and Sweden, are, in themselves, a convincing proof of the existence of an enormous ice sheet as the only efficient cause of these phenomena. But in this model, which is an accurate reproduction on a small scale of the district round Glen Roy, no one can fail to see that the terraces which are so remarkable a feature in that locality are the shores of ancient lakes, and that the theory which assigns to their formation the existence of great ice barriers caused by the descent of glaciers from Ben Nevis and the high lands at the head of Loch Arkaig, is fully competent to explain the facts. Before, however, entering on a more particular description of the locality in question, he wished to say a few words upon the cause of the Ice Age itself, and the probable date of its occurrence. Difference of opinion, no doubt, exists on these points. Some maintain that a change in the level of the land in the Northern Hemisphere must have occurred. This view has been discussed by Sir C. Lyell in his Principles of Geology, and he appears to lean to the belief that the great accumulation of ice in the Northern Hemisphere is chiefly due to geographical conditions. At the same time he attached great weight to a hypothesis suggested by Dr. Croll, which has of late been much strengthened by the arguments adduced by Sir Robert Ball from astronomical considerations, and which is of so much interest, as affording certain data as to the probable time of the glacial epoch, that he purposed briefly now to draw attention to it. The main facts are as follows: The earth's orbit is an ellipse of which the sun occupies one focus. The form or eccentricity of this ellipse is influenced by the position from time to time of the planets of the solar system, and has been calculated for the last million years. From this calculation it appears that the ellipticity very

slowly and irregularly changes during long periods, so that while the differences of the distance of the earth from the sun in opposite parts of its annual course was 13½ millions of miles some 850,000 years ago, and again 10½ millions of miles 200,000 years ago, it has in intermediate periods sunk so low as 1½ millions of miles, and is at present but three millions. Now it is clear that this fact would in itself produce a considerable effect when it so happened that the winter in our Hemisphere coincided with a period of maximum distance. But two other facts must also be borne in mind. First, according to Kepler's famous second law, a line drawn from the sun to the earth sweeps over equal areas in equal times, and the consequence of this fact is that when nearest the sun the earth's motion is very much faster than when further away; and the second point is the slow and regular change in the direction of the axis known as the precession of the equinoxes. By virtue of this, in the course of 21,000 years the axis makes a complete revolution, and in half that period, viz., 10,500 years, it is exactly reversed. At intervals therefore of 21,000 years winter occurs when not only the earth is traversing that part of its orbit in which it is furthest removed from the source of light and heat, but its motion is so slow that it is subject to the refrigerating effects of its position for a much longer time. When the conditions coincide with the greatly enhanced eccentricity already spoken of, it was considered by Dr. Croll that sufficient data were afforded for the production of a glacial epoch; but since the publication of these views, certain facts as to the effect of the inclination of the earth's axis to the plane of its orbit have been pointed out by Sir R. Ball in a book lately published by him, which tend to greatly strengthen the argument in favour of the astronomical theory; and it is most remarkable that these facts appear to have escaped the notice of all previous astronomers, including such men as Sir J. Herschel. It can be shown by reference to higher mathematics that while the amount of heat imparted to the whole earth during its passage from any one point in its orbit to the opposite point, is equal to that received by it during the remainder of its annual course, the distribution of the share of heat falling to either hemisphere during the period of its summer or winter, is very unequal indeed. Had the axis been at right angles to the plane of the orbit, the heat would be equally divided between each half; but owing to the obliquity of the ecliptic, in other words, the angle of inclination of the axis, an inequality is caused in proportion to the extent of that inclination. For the particular existing angle of 23° 27′ Sir R. Ball calculates that, assuming the total amount of heat imparted to our hemisphere during the year to be 100, the proportion received during the summer would be to that in winter as 63 to 37, and according to the formula by which he arrives at this result, it would appear that had the earth's axis been parallel to the plane of its orbit, as is, indeed, probably the case with the planet Uranus, the proportion would have been 81 : 18. The consequences of this discovery would evidently be most important. If during the recurrence of several periods of 10,500 years the conditions of the earth were such that during its short but hot summer the northern hemisphere were receiving 63 parts of the annual heat derived from the sun, while during the very long winter it only reached 37, and that this state of things occurred when the sun's distance was 13

millions of miles greater in midwinter than in midsummer, it is plain that the effect on the temperature of each hemisphere must be very considerable. After illustrating these remarks by reference to a diagram and by the help of a small globe, a more particular description of the district of which the model is a representation, was given. The scene of the parallel roads, or more correctly, terraces, lies to the N.E. of Fort William, and between the Caledonian Canal and Loch Laggan. At its southern extremity rises the gigantic mass of Ben Nevis, the highest mountain in Great Britain. In the exceptional situation of this mountain at the lower part of the three valleys of Glen Spean, Glen Roy, and Glen Gluoy, may be found the clue to explain the occurrence of these ancient shores which for upwards of twenty miles wind along the hill sides. In most cases the highest land is found at the head of valleys, and any glaciers which in remote ages may have been formed on it when the ice age was disappearing, would pass through them down to the sea; but, in this case, these great masses of ice, descending from the heights of Ben Nevis, and meeting another ice-stream from the highland at the head of Loch Arkaig, would inevitably form a block or dam at the lower part of those valleys and thus prevent the flow of any water that might accumulate from the melting snow in depressions of the surface at a higher level. It is most important to observe that in each case the terraces terminate in what is called a "col," which means a kind of saddle at the point where two valleys unite. The plain inference from this fact is that as the ice was gradually disappearing, lakes would be formed where no opportunity was given for the escape of the water that supplied them in consequence of the great dam of ice which blocked the passage to the west; but towards the east, where, from the lower level of the land, the thaw would be more rapid, the water in the lakes would flow over the cols and escape eastwards. There are, in all, four of these terraces. That in Glen Gluoy is of comparatively small size, and is the highest of them. The other three terraces form very striking features in the Valley of Glen Roy; the lowest, which was also the last formed, extends for about 20 miles along Glen Spean and terminates at the head of Loch Laggan in the usual col, where the stream that supplies that beautiful lake, towards the west, is separated from another which flows towards the east. At their other extremity each of the roads ends abruptly high up on the hill sides, where in fact the ice barrier formed the dam by which the waters of the lake were kept at a certain level. The breadth of the terraces varies from 60 to 6 feet, being wider where the mountain sides are less precipitous, and narrower where their steepness prevented the accumulation of *débris* at the edge of the lake, as it was detached from time to time from the hills above. It is also probable that in winter, when the surfaces of the lakes were frozen over, much of this *débris* would accumulate at the water's edge, and, subsequently sinking down gradually, help to form the roads.

The President (Rev. M. G. Watkins), in thanking Mr. La Touche for his instructive and clear demonstration, said that he had traversed the district in the

year 1877, and had observed the appearances of ice action in that locality. He could bear witness to the excellency of the model which Mr. Fortey had executed in so painstaking a manner; the whole scene of his visit was most vividly brought to his recollection, and upon the model he could trace his route. The grandeur of the mountains and the gigantic scale of the former system of lakes was most impressive, and he, as an explorer and examiner, could not hesitate to follow Mr. La Touche in his theory of the causes of the parallelism of the various roads. One glance at the celebrated Parallel Roads shews the traveller to whom Agassiz has given the key (as Ariadne gave the clue of the Labyrinth to Theseus), that they are to be ascribed to the action of glaciers slowly moving down the valley. He concluded by thanking Mr. Fortey for the opportunity given to the members of having the country represented to them so faithfully, and hoped this explanation would induce many another member of the Club to go and view for himself these mighty and wondrous revelations of the Great Ice Age, those great collecting grounds of the glaciers which dammed the glens and produced so evidently these parallel terraces.

THE RUSH OF ARCTIC BIRDS ON THE EAST COAST OF GREAT BRITAIN IN THE WINTER OF 1894-95.

By John Cordeaux, M.B.O.U.

In looking through a catalogue of birds belonging to any inland county, or special faunal area, we invariably find that it includes several which can only be considered very occasional and erratic visitors. These are usually wanderers from the nearest coast, or such as, purely pelagic in their haunts and habits, have had the misfortune to be driven inland by fierce gales till, sinking exhausted, they add by the mere accident of their death in that locality, another species to the avi-faunal list.

The winter of 1894-5 has, perhaps beyond all precedence in the last half-century, been characterized by gales of unusual force, coupled with a temperature for many weeks in succession [December 27th, '94 to February 18th, '95] ranging from a few degrees of frost to 11°, and in one locality* 18° below zero—an extreme of cold rarely recorded before in the British islands, the effects of which have been disastrous to our winter birds, from the ubiquitous rook and starling to the great white swans from the northland which have visited the coast. Without doubt, the principal feature of the season from a Naturalist's point of view has been the remarkable immigration of Arctic birds on to the north-east coast of England—the most notable of these being the little auk (*Alca alle*), provincially known amongst our fishermen as the Iceland auk, and sometimes as the German auk. In the summer, this small oceanic species is found in almost incredible numbers in the open Polar waters near its breeding haunts. In the winter, it moves south into the North Sea and Atlantic, and has then been seen as far south as the Azores. It is a regular visitor to the Eastern shores of Great Britain out at sea, and its occasional occurrence inshore is the result of unusually severe weather and continuous storms, which prevent it feeding. Few winters pass without some storm-driven birds being recorded on the coast or inland. Fishermen say they often come across great numbers of Iceland auks far from land. Ornithologists not acquainted with its habits might conclude, judging from the very occasional examples found dead on the shore or inland, that it is a rare winter migrant off the coast, coming down from high latitudes, when the very opposite is really the case—numbers wintering at sea off these islands. My object, however, is not to write the natural history of the little auk, but to record its special occurrence in extraordinary numbers in the winter of 1894-5. I may state that it is quite impossible in the short range of this notice to speak otherwise than collectively of those found dead, or alive but exhausted, on the coast or in the interior of the country; in some instances in the very centre of England.

* At Belton Park, near Grantham, on February 8th.

The great storm of December 22nd, 1894 (like that known asthe "Royal Charter" gale in October, 1859), will be remembered in this generation by the destruction of life and property on sea and land; commencing from S.W. to W., and then N.W., and blowing for hours with the force of a hurricane.

There were indications in advance in the movements of birds that a great atmospherical disturbance was approaching. On the 18th, the temperature, which for weeks had been abnormally high, fell suddenly, and some snow fell; on this day, I noticed fieldfares coming in from the sea and flying inland; on the 21st, 9 a.m., till noon, there was an enormous immigration of wood pigeons; and on the 22nd, of *Corvidæ*; these latter on the Yorkshire coast in continuous flights, both up the coast from N. to S. and also direct in from the sea, E. to W., the two lines cutting each other at right angles; amongst the immigrant crows, rooks, and daws from the sea, a single raven was observed. Larger flocks of snow-bunting, and equally great flights of another charming Arctic bird—the shore-lark (*Otocorys alpestris*)—appeared on the coast of Holderness; these latter more especially abundant in January. On December 28th and 29th, strong gales from N. W. to N., much snow and rain, after this a few little auks came on the coast or inland. Again, on January 13th, 1895, a heavy gale from the east with a continuous drift of snow—one of the very worst storms from the east in my recollection—and subsequently a great increase in the number of little auks driven to land. It was, however, on January 21st, wind N.E. strong, hail and snow, that the main body of these small ocean wanderers were seen between Scarborough and the Spurn, on their way to the south.

I will now briefly mention a few of the chief incidents of this invasion as observed along the east coast. Great flights of little auks appeared on the coast of Scotland, especially after the gale of January 13th; and since this, numbers sought refuge in the Firth of Forth, and sheltered bays along the coast. This visitation has been admirably treated by Mr. W. Eagle Clarke, in a paper illustrated by a map, in "The Annals of Scottish Natural History," for April, 1895. Mr. Geo. W. Proom, the principal light-keeper on the Longstone reef, Farne islands, reports them as very plentiful on the rocks and at sea. Mr. T. H. Nelson has recorded about 250 obtained near Redcar. At Whitby, Mr. Stonehouse says the first was picked up in the town on January 16th; and, up to February 8th, fifty may have been got in the neighbourhood, and this is probably too low an estimate. At Scarborough, they occurred in extraordinary numbers, here and at Filey probably 400 to 500 would be an approximate number of those picked up or otherwise obtained; the two Scarborough bird-preservers were overwhelmed with work, and had to turn the bulk of their customers away. I am indebted to Dr. Hewetson, of Leeds, for having taken down in writing the report made by Mr. W. J. Clarke, naturalist, of Scarborough. He says:—"At 10 a.m. on January 21st, I was walking south of Cayton bay, about half-way to Filey, not having noticed any birds. I heard a sudden twittering, and, thinking it was a flock of waders, turned quickly round and saw a flock of upwards of two hundred little auks flying south over the breakers, about fifty yards from shore. I fired one shot, killing twelve and recovering seven. The sea was full of them,

swimming and diving. This flock at once towered, and flew straight up the face of the red cliff at Cayton Bay, about 300 feet perpendicular; they mounted quite easily, and disappeared inland. After this, flock after flock passed in a continuous stream for a couple of hours to the south and down wind, from 50—60 in a flock to only 3 or 4. At no minute during this time could you look without seeing flocks passing, and many flew inland, over the lower cliff. I saw a little auk in full flight approach a breaker, through which it dived, to come out on the opposite side swimming. I could have shot any quantity had I wished."

Immense numbers were seen in Filey Bay; Mr. D. Brown, the naturalist there, says he has received the report of the men who shoot from the Brigg, of hundreds seen close in to the rocks, in flights of 20–30 together; about forty, to his knowledge, were picked up on the beach. One shot from the Brigg fell in the water and was instantly seized by a glaucous gull, and swallowed entire.

At Flamborough, the fishermen report the sea north of the headland covered with them, and great numbers all along the coast. Mr. Bailey, the well-known naturalist recorder of Flamborough, was told by George Emerson, a great observer of birds, that when fishing with his lines down, a "great hunting hawk" struck a little auk from a passing flock, and carried it off. Many were picked up on the coast south of Flamborough, in Bridlington Bay. At the Quay, Mr. Machen told me, one came down the chimney of a bedroom; it was taken in the morning to the beach and set at liberty, flying out to sea apparently none the worse for its adventure. He also said that when skinning an immature great black-backed gull, he found an entire little auk in the stomach, so little injured that he intended setting it up in the same case. Little auks were picked up all along the coast of Holderness, and many also in the interior. At the Spurn on January 21st, continuous flocks were seen all day passing to the south. On the flat and dreary coast of Lincolnshire, where the sea recedes for miles, the close observation of birds which keep the sea is difficult and practically impossible.

"A coast
Of ever shifting sand, and far away
The phantom circle of a moaning sea."

Many were picked up on the shore and inland in the open country, in fields, on roads, and in ditches, one in a poultry yard amongst the chickens; most of these ultimately finding their way to the local bird-stuffers. Near Donna Nook, on this coast, Mr. G. H. Caton Haigh, of Grainsby Hall, on January 26th, shot one just inside the surf, which was very heavy, and saw a flock of about a score on the wing. In Norfolk, up to February 21st, Mr. J. H. Gurney, of Keswick Hall, had scheduled 276 occurrences in that county. Regarding the total number picked up or obtained from one source or another on the east coast of England, I feel it impossible to give even an approximate estimate. On the Yorkshire coast, with which I am best acquainted, the number could not be less than a thousand, but probably nearer fifteen hundred.

Little auks, picked up inland, some of which I have handled, had their feathers clogged with wet soil on which they had crouched. In no instance do I know of any food having been found in their stomachs. All I have seen were

very thin, the great pectoral muscles wasted, and the breast bone sharp and prominent. They vary much in size; size, however, is no indication of sex. Mr. Oxley Grabham, of Scarborough, who has examined a great many, told me that one of the largest and one of the least were both females. Altogether, amongst those which have been obtained, the females greatly exceed the males in number. The weight is from 4 to 5 oz.

In their normal condition, they are bonnie, plump birds, clothed with a dense and close plumage of strongly contrasting black and white; at the same time, they exhibit every possible variation, hardly any two being quite alike. The pure white speck above the small eye, white edging to the scapularies, and the white tips of the secondary quills, are all well-marked and attractive features. In some, the white of the cheeks and sides of the neck extends backwards, so as to meet behind the neck. I have seen one with the occiput pure white. The colour of the soft parts varies in different individuals. The short grouse-like bill is black, and differs much in size when a series of birds is compared. Inside of mouth flesh colour, with the palate studded with reversed horny papillæ, tongue very large, iris dark hazel; in a single Lincolnshire example, it was a dark slaty-blue. Tarsi and toes in front a bluish or slaty-white, the same parts behind and beneath, dusky (almost black in some); webs dark. One got at Scarborough retains a considerable proportion of the black on the throat and breast, characteristic of the summer plumage; and, in many, this pectoral band is more or less clearly defined; in others, absent. All observers agree they fly very fast, with rapid movements of their narrow pointed wings, in a direct line, like a shower of bullets; they can turn, and also rise suddenly to a higher level, with great facility. On the water, they sit buoyantly, floating like corks, and are the most expert of divers, even in the heaviest seas.

Gulls leave the water when it grows too rough, and fly inland to rest and feed, but it is not so with true sea birds—the petrels, auks, guillemots, and puffins, these must keep the water or die; their home it is and always must be—an abiding place in sunshine and calm, in darkness and storm; a feeding, sleeping, and playing ground, ever shifting and unstable, and this at all seasons, but especially in the later autumn and winter, when they have drawn away hundreds of leagues from their breeding haunts. Rarely at any time for a few days together can our northern ocean be called a glassy or a silken sea, for even in so-called moderate weather, the grey waters are heaped and piled into long foam-topped ridges; and salt spray from broken crests, driven before the wind, bites into the flesh like the sting of a whip-lash. Then too, and for weeks together, the surface of the dreary grey plain of shifting waters is swept by winds cold, cruel, pitiless; or, at times, the giant strength of the northern hurricane will beat the waters almost flat, into the likeness of a seething cauldron of hissing froth, till distances become obscure in a shroud of snow-white spindrift, and the hoarse scream of the storm fiend is a reality drowning all other sounds between heaven and earth. How sea birds manage to survive winters like the last, has long been a marvel to me. It is the admirable adaptation of their nature to its special environments, faculties acquired and handed down through

thousands of years of an ocean life. Cold, with the normally high temperature and dense protecting clothing possessed by birds, cannot hurt them as long as they get suitable food; it is rather that they succumb through inability, in bad weather, to procure their ordinary supply of small crustaceans and marine insects. We must not forget, however, that sea birds are much less subject to accidents than birds are on the land. Their chief foes are predatory fish and cetaceans, and, in addition with the smaller sort—as auks and petrels—the larger gulls. At the same time, they are generally quite safe, unless they approach too near the shore, from the great enemy and destroyer of bird-life—that is, man himself.

It is suggestive of the arctic character of the recent winter that three examples of a purely arctic species, namely Brünnich's guillemot (*Uria Bruennichi*), were got at Scarborough and Filey at the same time as the little auks came inshore; this guillemot is an extremely rare straggler to British waters, and has only once been recognised, many years ago, at Heligoland. Other arctic visitors were plentiful: glaucous gulls, the burgomaster of the whalers, a few Iceland gulls, and also the lesser gull (*Larus minutus*), fulmars, many whooper swans, grey geese and brent geese; the latter shewing a great variety, from the white-bellied western Atlantic form, to others almost black underneath, probably all drawn together from a wide area in the Polar seas. All these frequented the coast and estuary of the Humber, with ducks, divers, and grebes of many sorts; but chiefly mallard, wigeon, scaup, common and veltet scoters, pochard, female and young golden-eyes, tufted ducks. Inshore along Kilnsea bay, the floating ice was closely packed, and a mile in width, and, when covered with new-fallen snow, was highly suggestive of the scenery of an arctic fjord.

I have endeavoured, in this slight sketch, to shew the special circumstances in which ocean birds, confused and blinded in the darkness, are driven headlong before a gale to great distances, so that by dawn they have possibly travelled hundreds of miles from their sea home, to drop exhausted, it may be, in some fair and pleasant land like Herefordshire—a land of apple orchards and hop gardens, of fruitful valley and rough hillside, running stream and wooded wilderness. Unfortunately, where the poor bewildered wanderers touch earth, their fate is sealed—it is not their element; and storm-driven birds like far-wandering migrants, which have missed their course, possess no faculty, as far as we know, of finding their way back; with them to be lost, is to be lost for ever.

Mr. Cordeaux was gratefully thanked for this excellent paper by all who heard it. Besides its own intrinsic merits the Woolhope Club accepts it for insertion in the *Transactions* because it illustrates several problems in the migration of birds, and shows some causes by which birds seldom seen and unfamiliar to inland dwellers are occasionally found among the rivers and woodlands of Herefordshire. It comes therefore under the scope of papers which treat of local ornithology, and, as such, will be valued by all lovers of birds.

Woolhope Naturalists' Field Club.

SECOND FIELD MEETING, FRIDAY, JUNE 28TH, 1895.

WAPLEY CAMP, THE RODD, AND PRESTEIGN.

ON Friday, June 28th, Wapley Camp, The Rodd, and Presteign were visited. By the courtesy of the Great Western Railway authorities the train from Titley Junction to Presteign was stopped at a place called "The Crossing," at the western base of Wapley Hill, on an elevation of about 520 feet. Here the members alighted, and walking up the hill past Highlands Farm (selected for its healthy air and fine scenery, as an occasional resort of the late Miss Frances Ridley Havergal), soon reached the summit.

The highest contour given in the Ordnance Survey maps is 1,000 feet. This contour passes immediately below the southern side of the wall surrounding the Warren House, from the south western angle of which to the top of the highest embankment of the Camp the difference of level was found by aneroid barometer to be one hundred feet, thus making the elevation of 1,100 feet at the summit of the artificial earthworks. From this altitude is displayed a varied broken outline of country, from which, on the Jubilee Bonfire night in 1887, between 50 and 60 bonfires were counted. Commencing from the west, Burva Camp stands conspicuously isolated in the foreground, with the steep heights of Knill Garraway directly on its south. Knill Garraway is the northern end of Rushock Hill, around which winds Offa's Dyke on its western side for the distance of nearly two miles, thence proceeding between Burva and Evenjobb to regain its usual northerly course through Knighton. Beyond Burva the Radnor Forest forms the whole background. The prominent knob called Whimble, 1,965 feet high, is about one mile and a quarter N.N.W. of New Radnor. Bâch Hill, two miles north of New Radnor, has a trigonometrical station at 2,002 feet, and two miles westwards the highest elevation of the Radnor Forest is 2,166 feet. On the day of the Club's visit the distant objects were obscured owing to heavy clouds and rain, but on a clear day the Brecon Beacons, 2,905·5 feet high, can be seen; the Clee Hills, the Clun Forest, the Longmynd range, and other heights in the neighbourhood of Church Stretton, in Shropshire; the Bettws and adjoining hills in Montgomeryshire; May Hill, the summit of which is in Gloucestershire; the Gadr Vawr, 2,630 feet high, in Breconshire, seen over the Black Mountains; the Sugar Loaf, 1,954 feet high, in Monmouthshire, also the Blorenge and Scyrrid; and the Malvern Range very distinctly in Worcestershire.

In Herefordshire the northern extremity of the Black Mountains, near Hay, is seen and their entire range down to the spur, called Hatterall Hill, at their southern extremity. The eastern side of the Black Mountains is situated in Herefordshire ; the western boundary line of the county runs along their extreme summit, attaining at its greatest altitude a height of 2,306 feet. Garway, 1,203 feet, Aconbury, 905 feet, and other hills in the foreground are visible. Shobdon Hill wood, about three miles north-east, as the crow flies, attains an elevation of 1,039 feet, and about three miles further north-east is situated the important ancient Camp of Croft Ambrey, 1,000 feet high at the top of the wood, behind Aymestrey. Two miles due north of Wapley Camp, Cole's Hill, in the parish of Kinsham, has a triangulation station elevation of 1,097 feet, and beyond its summit may be seen Harley's Mountain, in the parish of Lingen, interesting from the fact that it is cultivated up to its summit, on which is an Ordnance Survey mark, Centre 1265·3, Surface 1266·6 feet.

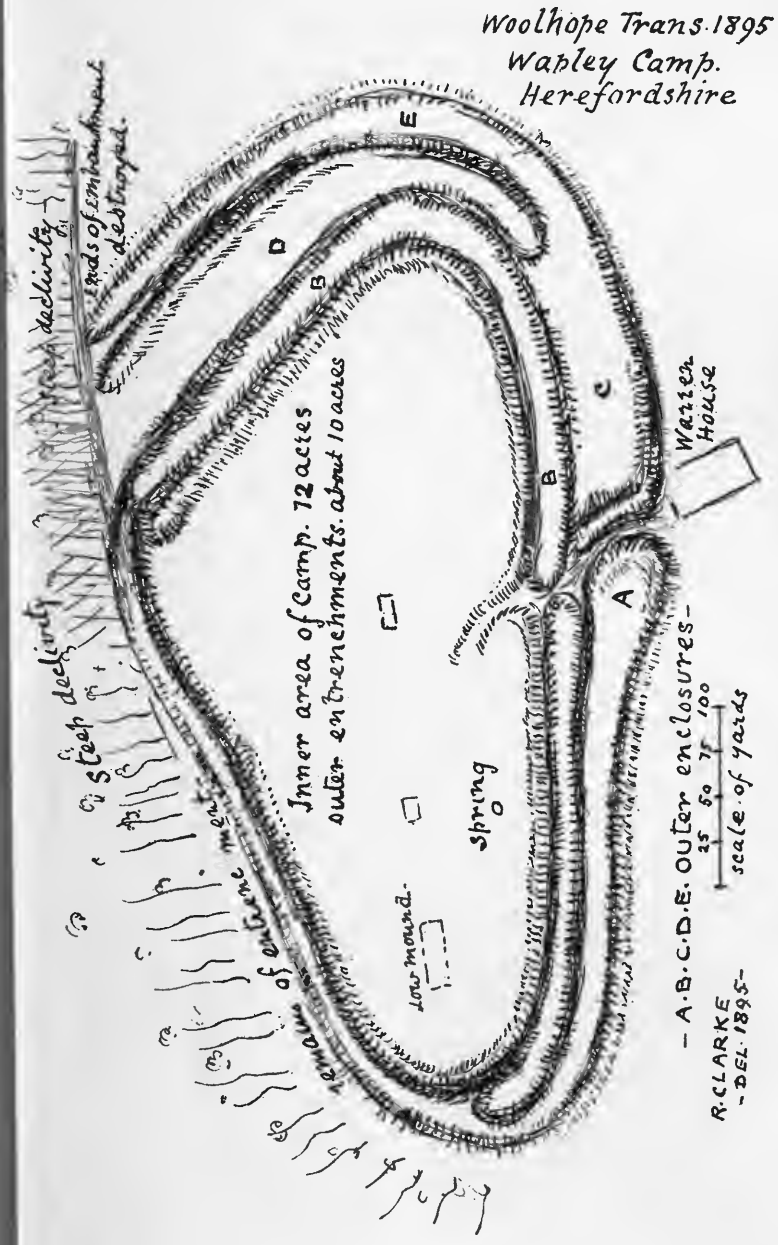
As regards the streams of the neighbourhood, shortly after leaving Titley Station the river Arrow is crossed. One of the tributaries of the river Lugg, having its source from the watershed of the Radnor Forest heights immediately above the falls of Water-break-its-neck, flows thence under the name of the Summergill Brook south of New Radnor, becoming at Hindwell, one mile north of Old Radnor, the Hindwell or Endwell Brook, under which name it flows under the roughly scarped heights of Knill Garraway ; near Rodd it is crossed by the Titley and Presteign Railway ; thence flowing by Upper and Lower Broad Heath, and by Combe, it enters the river Lugg about three miles east of and below Presteign. The charming valley of Kinsham is situated one mile below the junction.

WAPLEY CAMP.

Wapley Camp is more generally known as "The Warren." The Camp is an irregularly-shaped area of twenty-one acres on the summit of an enclosure of 256 acres, walled for the purpose of a rabbit warren, the circumference of the wall being over 2½ miles. Some curiosity was aroused by observing numerous branches of oak trees, stripped of their bark, strewed about the enclosure. Mr. Edwin E. Edwards gave the solution of their presence as follows :—Oak coppice wood is cut out of a portion of the adjoining thirteen acre wood, called Cwm Wood, as food for the rabbits. The bark forms not only food for the rabbits, but is useful food, due to its astringent properties. Cwm Wood was allotted, with the grant of the Warren, to an Earl of Oxford.

The Club was allowed to visit "The Warren" by the permission of the proprietor, Mr. J. Charlton Parr, of Staunton Park.

The connection of Wapley Camp with the numerous ancient lines of defensive works extending from the Herefordshire Beacon through the Bromyard district by Thornbury, and the Leominster district by Croft Ambrey, is so fully described in the address delivered by the Rev. James Davies in May 1873 (see *Transactions*, 1873, page 59) that it is unnecessary to add further remarks upon its importance as a military post of occupation, and its connection with contiguous defensive earthworks in the country of the Silures. The plan



opposite page 60 of the volume referred to shows the lines of defence as follows:—On the eastern side there are as many as five entrenchments. extending as far as the main entrance to the Camp on its southern side; from the main entrance along the western side the entrenchments are reduced to three in number, whilst on the northern side there is but a single line of parapet with a trench, the access upon this side being difficult and up a very steep acclivity. In Rev. Davies' account there is no notice made of three mounds situated within the Camp, running east and west, near the perennial spring. These mounds from their solidity and age are very suggestive of sepulchral tumuli. Lower down the hill again, near its southern base, are three similar mounds, running in a north to south direction. The Warren is a capital landmark of the neighbourhood, being bare of trees with the exception of a solitary Yew tree growing on the top of the rampart at a distance of about forty yards west of the southern entrance.

References to Wapley Camp will be found in *Camden's Britannia*, Vol. III. of 1806, p. 84, and in *Archæologia Cambrensis* IV., 4, page 338. For the Ordnance Survey Map, see Herefordshire, XI., N.W. on the scale of six inches to one mile.

Whilst our party was engaged in the examination of the large ramparts and ditches a heavy shower of rain caused their dispersal in various directions, and spoiled the prospects of the entomologists. The dark green fritillary, *Argynnis aglaia* was seen, unusually early; the small tortoiseshell, *Vanessa urticæ;* the painted lady, *Pyrameis cardui.*—N.B. this species rarely appears until the end of July or early in August; and the small heath, *Cœnonympha pamphilus*, was very abundant. On descending from the Camp, the handsome larvæ of the mullein moth, *Cucullia verbasci*, were very conspicuous.

On the eastern side of the enclosure the Stagshorn Club-moss, *Lycopodium clavatum*, was found in abundance, a dwarf representation of the oldest of terrestrial plants which made their appearance in the Silurian period, and which, in the Carboniferous period, attained the stature of forest trees.

GEOLOGY.

Those members who sought shelter near the exposure of Ludlow rocks within the Camp were fortunate enough to hear Mr. W. H. Banks make remarks on the Geology of the district. We have not however been favoured with any written paper for publication; as Mr. Banks affirms that there is nothing new to be added to what has already been published. Leaving the Old Red Sandstone of Herefordshire at a distance of about two miles and a half from Titley Junction Railway Station the Ludlow Rocks are entered, which here extend for a width of about half a mile. At Bradford the Wenlock shales are superficial, upon Wapley Hill the strata of Ludlow Rocks are inclined to the south. For many miles north-east, and west, are grey calcareous sandy beds, in some places mixed with gravel, whilst in a southerly direction all that is visible to the eye to the range of the Black Mountains is the Old Red Sandstone.

The following references may be made for Geological features in the outlying district. *Woolhope Transactions*, Vol. 1854, page 11, in the Address of the Rev. T. T. Lewis. Vol. 1861, page 7, Address of Mr. R. W. Banks.

Vol. 1866, page 172, Remarks of Mr. Curley. *Records of the Rocks*, by Rev. Wm. S. Symonds, pp. 139, 160. "Old Stones" by the same author, page 57 of edition 1880. In Murchison's *Siluria*, Chapter VI. geological sections are represented through Nash Scar, and through Corton near Presteign.

Descending from the Camp, the members returned through the grounds of Highlands, and entered the road to Presteign, visiting, *en route*, the ancient mansion, now a farmhouse, occupied by Mr. Aaron Rogers, of The Rodd, which gave its name to a family as early as the beginning of the fifteenth century. It is a picturesque brick building, bearing over the porch, and over the windows some graceful oak carving, and upon its porch door the date 1629. A front view is given in the Rev. C. J. Robinson's *Mansions and Manors of Herefordshire*; an end view showing the large chimney stacks is given in pen and ink sketches of H. T. Timmins's *Nooks and Corners of Herefordshire*, and the elaborately-carved mantel-piece on the first floor is represented between pages 68 and 69 of the same work.

The old timber house at Wegnall, on the opposite side of the railway line, was visited on the way to Presteign. Wegnall Mill, on the river Hindwell, is apparently of the Elizabethan period, with a grand stone chimney stack of similar character, and a good porch.

The showery condition of the weather had so scattered the members that, on arrival at Presteign, the Church was visited by detachments in separate parties. This Church was visited by the Club in 1889, see *Transactions*. Since that date it has undergone restoration, and to the remarks on page 330 of Vol. 1889 may be added the following objects as worthy of notice:—An early walled-up light, with splayed sill, in the north wall of the aisle, formed of rough Travertine, whose dimensions, as seen externally, appear about 3 feet high by 9 inches wide; another light in the same wall more westerly, also of Travertine, about 4 feet high by 18 inches wide; internally, the remains of another Travertine circular arch in the west wall, near the entrance door; and a round arch in the east wall of the north aisle. Externally, above the east window, there is inscribed a date which, however, is not decipherable. The walled-up opening eighteen inches by six inches under the east window, and the opening about two feet and a half square under the east window afford scope for conjecture of the curious, and remind us of somewhat similar openings in the east wall at Atcham Church, which we visited last May.

In the Village the Radnorshire Arms is a picturesque, black and white gabled building, over the porch of which the date 1616 is inscribed.* During alterations to this building a small secret chamber was discovered in the front of the house, probably, by tradition, the hiding place of a royalist. Two or three small volumes were found behind the oak panelling of the cell, one of which had been much gnawed by rats. One contained "Reflections upon the Psalms." The regicide Bradshaw resided at the rectory here, and it is traditionally reported that he purchased the Radnorshire Arms. That the times were trying for loyal Church people the Parish Registers bear evidence. For

*The date 1617 as given in the *Transactions*, Vol. 1889, page 330, is an error.

instance, amongst other entries appears one showing that Nicholas Taylor, the same who harboured King Charles I. at Lower Heath, "was constrained to send in these bad times," there being "no lawful minister settled in our Parish, for those gentlemen" (different clergymen of the Church of England) "to baptize my children, therefore I cause this to be registered, being May 15th, 1672, as followeth." Then follows a list of his children baptized from 1657 to 1660.

After an excellent luncheon well served at the Radnorshire Arms, Mr. H. Southall made a few remarks on the late extraordinary season, 1894–1895 with its unprecedented frost, and violent hurricane of Sunday, March 24th, short notes of which have already been published.

About a quarter of mile distant from the village of Presteign is an elevated knoll known as "The Warden," an eligible site for a defensive position, and here is supposed to have been a castle of the men of the March or men of the Border. The termination "warden" or "wardine" is prevalent along the border land of Herefordshire, Gloucestershire, Shropshire, and Cheshire. In the *Shrewsbury Chronicle* of January 12th, 1894, is a list of names ending in "Warden," and in the issue of that paper for March 2nd, 1894, *Saxon* writes as follows:—"The termination 'Warden' indicates the former existence of a protracted Saxon settlement in which dwelt the æthcling or his reeve, around whom clustered for protection the rest of the tribe forming a free township. The noble, or æthling, was a wardian, or *Weardman*, accountable to the *Hundred-moot* for the security of the land acquired from the Britons along the western border of Mercia."

Probably Mr. Flavell Edmunds is more happy in his etymology than is "Saxon." He ascribes the suffix to sites of camps near water, *e.g.* in Herefordshire we have Bredwardine (Bre-dwr-din) the water camp of the promontory or hill; Leintwardine (Llain-dwr-din) the water camp of the strip of land; Lugwardine (Lugwater camp); Marden contracted from Marwardine (Maér-dwr-din) the field of the water camp; Pedwardine (Peada's water camp). King Peada being a son of King Penda; etc., etc.

By permission of the proprietor, Mr. Clifford Jones, the members were allowed to visit the grounds of Silia, the entrance to which is close to the Warden. These grounds have been laid out principally in a plantation of of rare Conifers, a list of which is given on page 331 of *Transactions*, 1889. It was gratifying to find that so few trees had been injured by the prolonged and severe frost of last February. The following plants also especially attracted attention:—*Tritŏme kniphofia=Niphota*, *Bamboo Metăke*, *Spiræa aruncus* from Tyrolese and Swiss Valleys, a Japanese Maple, and an *Acer atro-purpurea*.

The following attended the meeting. In the absence of the President, Mr. James Davies acted as President for the day. The following ex-presidents attended—Rev. C. Burrough, Rev. William Elliot, Rev. A. Ley, and Mr. H. Southall. Vice-presidents—Mr. W. H. Banks and Mr. T. Hutchinson. Members—His Honour, Judge R. W. Ingham, Revs. H. A. Barker, W. S. Clarke, E. R. Firmstone, J. E. Grasett, H. B. D. Marshall, M. Marshall, and Rev. H. C. Sturges; Colonel Napier Sturt; Messrs. Ernest Ballard, R. Clarke, A. J. H.

Crespi, C. Fortey, Iltyd Gardner, E. A. Greenly, F. R. Kempson, W. P. J. Le Brocq, P. Levason, R. Lewis, H. J. Marshall, Alfred Parker, Scudamore Powell, John Probert, H. G. Sugden, J. P. Sugden, H. A. Wadworth, H. Cecil Moore, Hon. Sec., and James B. Pilley, Assistant Secretary. Visitors—Mr. and Mrs. Charlton Parr met the members at the cottage of the warrener ; Miss Moberly and Miss B. Symonds, from Boultibrooke ; Mr. Edward Boycott, Mr. James Gaskell, Mr. C. C. Marshall, Mr. C. H. D. Marshall, and Mr. Paul Marshall.

A CHAT ABOUT CONIFERS.

THE BEAUTIFUL COLLECTION AT PRESTEIGN

By Dr. Crespi.

The fashion of introducing hardy trees and shrubs from temperate regions into England originated, in its modern form, with the discoveries of Douglas and his successors, who, for nearly fifty years, found an almost inexhaustible supply of novelties in California and the wonderful region north of that beautiful land. This field was in time completely worked out. Every shrubbery and pinetum in Europe bears witness to its wealth, in the sequoias, piceas, pines, cypresses, and other splendid conifers which so much increase the sylvan beauty of England. The mountains of Mexico and of Northern China, the Himalayas, and the Caucasus have also sent us some species, and when Japan was opened up Fortune and Veitch were the pioneers of a multitude of collectors who have ransacked that fairy kingdom, from the plains to the summit of Fusi Yama, for its inexhaustible variety of trees and shrubs adapted to our English climate. So eagerly has this exploration gone on in all parts of the world that at last the travelling horticulturist finds his occupation practically gone. He has introduced so many hardy trees and shrubs that, in despair of finding more, he is reluctantly penetrating the steaming jungles of the tropics in search of those exquisitely beautiful orchids which find enthusiastic and wealthy cultivators in another branch of the gardening cult. Mr. Joseph Chamberlain is not the least distinguished admirer of these lovely flowers. Though the modern enthusiasm for introducing hardy novelties may be said to have begun when the Horticultural Society sent David Douglas to the wilds of America, Englishmen had long before that day been bringing home the trees and shrubs of the lands which they had visited. The pilgrims to the Holy Land brought the seeds of the cedars of Lebanon at so early a date that the trees near London and in some of our beautiful southern parks and ancient gardens are actually finer than the majority of those on Lebanon itself. Perhaps no greater popular mistake is made than to fancy that the cedars of Lebanon are very large, numerous, and ancient. The real number perhaps hardly exceeds 400, and most of these are under 200 years old, though a few have seen the flight of from 400 to 800 winters. There are 12 of great age ; and of those the largest is 63 feet in circumference and another is 49. The cedar is more remarkable for girth than height. There is a fine cedar at Sion House, eight feet in diameter three feet from the ground. Sion House, the Duke of Northumberland's seat, near Isleworth, in Middlesex, is also interesting to the antiquary as being the place where the crown was offered to Lady Jane Grey. Some cedars planted at Beaufort Castle, the seat of Lord Lovat, in Invernesshire, in 1783, are three or four feet in diameter. The Maronites assert that the cedars near the village of Eden, in Lebanon, are the remains of the forest which supplied Solomon with timber for

the Temple full 3,000 years ago. However apocryphal this antiquity may be, they are certainly very old, and they were very old 300 years ago. Maundrell gives the size of some of the cedars—the largest he measured was 36 feet 6 inches in circumference, and 117 feet in the spread of its branches. There is a magnificent cedar at Ranston, near Blandford, the beautiful seat of Sir Talbot Baker. Its head was blown off in a great storm some years ago, but till then Sir Talbot tells me it was the finest in the United Kingdom. This giant, in spite of this catastrophe, is not squat, but is still of colossal height, probably 120 feet or more, a grand, glorious, beautiful object. Who first brought the oriental plane, thought to be the sycamore of the ancients, from the Levant we no more know than we do the name of the benefactor who brought the chestnut from Asia Minor, and the southern almond to flower in the cold days of our northern spring.

It is surprising how few of the familiar trees and shrubs of England are native to it. When Cæsar visited Britain the only indigenous conifer—if we except such distant relatives as the yew and the juniper—was, it is believed, the Scotch fir. Even the larch is supposed to be an importation from Norway, and several of our oaks are suspected of a foreign origin. All our other firs and pines, and piceas and cypresses are naturalised, though many have flourished so well as to appear to the manner born. The tamarisk, so much at home on our southern coasts, was brought by Edward Grindal, afterwards Archbishop of Canterbury, as a memorial of his Italian exile. Although John Evelyn claims with honest pride that the publication of the "Sylva" led to the planting of millions of trees, there were quiet folks who, like Scott's Laird of Dumbiedykes, were "aye stickin' in a tree," on the principle that it grew while all the world was asleep. The cherry, which Lucullus introduced into Italy from Pontus, passed 26 years later into Britain, where it flourishes as it hardly does in any other country; and the apricot arrived in the sea chest of Tradescant, the Lambeth gardener, who had shipped on board a privateer in the hope of rifling the Sultan of Morocco's garden of this choice fruit.

Certainly the most beautiful collection of Conifers in England or Wales known to me is that at Silia—about half-a-mile from the Radnorshire Arms—a beautiful hostelry dating from the 17th century, in the middle of the old town of Presteign. Capt. Bevan, the gentleman who laid out Silia, chose a site on the slope of some hills, having a higher one opposite to them seven miles off. The side of the hill was laid out in terraces, and it was said 40 acres were covered with choice Conifers half a century ago. Now the trees have, many of them, reached a height of 60, possibly even of 80 feet in some cases. The most wonderful thing is the symmetry of many of the trees. No artist could depict anything more exquisite. To say that Silia would well repay a special visit from London would be no exaggeration. For my part, although I had often seen beautiful Conifers, I must confess that I had never realised how lovely a large collection of them could be.

Careful selection might do much to increase the number of sorts of fruit trees growing in the open air, and we may yet see grapes, tomatoes, and maize flourishing and ripening on our sunny southern coast. But it is a mistake to

suppose that trees can be acclimatized—that is accustomed to a colder climate than is natural to them. Every species of plant bears a certain range of temperature, but it is impossible to extend that range. Many plants at first placed in greenhouses because they were the natives of warmer regions, have done well in the open air, and hence have been cited as instances of successful acclimatisation; the truth being that they could bear a lower temperature and a greater range of temperature than was at first supposed, and it chanced that the climate of the locality into which they were introduced suited them perfectly. The Aucuba Japonica is an instance in point, so is the Aponogeton Distachyum, an aquatic from the Cape, which thrives in the open air in the bleak and biting climate of Edinburgh; so, too, with the Araucaria imbricata from Chili, and some Nepaulese and Japanese plants, but the potato, the dahlia, the heliotrope, and the Marvel of Peru are as sensitive to frost as on the day of their first introduction into England, nor is the chrysanthemum one whit better able to bear frost than when first removed from its far distant southern home.

Woolhope Naturalists' Field Club.

LADIES' DAY, TUESDAY, JULY 23RD. 1895.

VISIT TO THE CROWN WOODS AT HIGHMEADOW, STAUNTON CHURCH, THE BUCKSTONE, AND THE SPEECH HOUSE, IN THE FOREST OF DEAN.

ON Tuesday, July 23rd, the Royal Forest of Dean was visited by the Club under the most favourable circumstances: the electrical disturbances of previous days had cleared the atmosphere, the rain had revived parched vegetation and laid the dust; overhead it was fine, with clouds tempering the July sun. It was the ladies' day, and a most attractive programme had been drawn out by Mr. Philip Baylis, Her Majesty's Deputy Surveyor of the Royal Forest.

Journeying from Hereford in special carriages, the large party, more than one hundred in number, reached Symond's Yat about eleven o'clock. Although the ascent of Symond's Yat was not in the programme of the day, the following few remarks about its elevation and the boundary line between Herefordshire and Gloucestershire may be considered useful. The Ordnance Survey map gives a contour of 500 feet on the platform of Symond's Yat Rocks, which is to be found on the six inches to one mile map, Herefordshire sheet 54 S.W., Monmouthshire part of sheet 9, Gloucestershire part of sheet 30. On page 32 of "A Week's Holiday in the Forest of Dean," we are told that the Yat is 502 feet above sea level; we may rest assured that this record is given with the accuracy, intelligence, and attention to details, which characterize every page of this little book. The boundary lines here between the three adjacent counties are perplexing. The platform on the summit of Symond's Yat Rocks is in Gloucestershire. The boundary line from Lydbrook to the base of Symond's Yat is the middle of the river, until arrival at a boundary stone not visible in a flooded state of the river, whence the boundary verges southwards, and cutting off a promontory proceeds northwards for three hundred yards, thence returns down to the river south of the Saracen's Head public-house, a hundred yards above Symond's Yat Railway Station. The entomologist, botanist, or geologist, who desires to fix the locality of his finds, should purchase the other three contiguous Ordnance maps, namely, Herefordshire sheet 54 N.E., Gloucestershire part of sheets 23, 30, and 31; Herefordshire sheet 54 N.W., Monmouthshire part of sheet 9; and Herefordshire sheet 54 S.E., Gloucestershire part of sheets 30 and 31.

To the lover of nature, to the geologist, and student of physiography, the great gorge near Symond's Yat Railway Station, in which flows the river Wye,

furnishes an interminable series of lessons in connection with the dislocations of the crust of the earth, the powerful action of water in denudation, and in deepening the channel, leaving the dark craggy cliffs of Mountain Limestone clothed with rich foliage, while the outlying rocks called the Long Stone and the Bowlers Rocks having resisted the powers of denudation stand out like massive needles, inaccessible to man, the annual nesting place of ravens until they were scared away about twenty years ago by the blasting operations of the tunnel and the railway embankment.

The members, on their arrival at Symond's Yat Station, were met by Mr. Henry Smith, woodman of the Mailscot district; also by Messrs. Jones and Brown, woodmen of other districts in the Crown Woods of Highmeadow, who had been deputed by Her Majesty's Deputy Surveyor of Dean Forest (Mr. Philip Baylis) to conduct the party through the first part of their route. The first mile walk along the side of the railway, so far as "The Slaughter," was enjoyed by all, especially by the botanists, who gathered Atropa belladonna in fruit, Hypericum montanum, besides other more common species, Campanula trachelium and latifolia, Dipsacus pilosus, Erica tetralix, &c. Several grasses were also found, notably Festuca sylvatica, and Hordeum sylvaticum. The entomologists found themselves in a paradise of insect life, for have we not here, in plenty during some seasons, the purple emperor, Apatura iris, which holds the highest rank amongst English butterflies, and also occurring near the river the very local hairstreak Thecla w-album, and the large fritillaries in legions! Several specimens of the silver-washed Argynnis paphia were observed, a family which in some years occurs in multitudes. The best capture of the day was a fine specimen of the beautiful geometer, the large emerald Geometra papilionaria, by no means a common insect, which was captured in the Dean Forest, near the Speech House. Time did not permit a visit to the stalactite caves in Lady Park Wood about half a mile further, so well kept in order by Mr. Thomas Davis, proprietor of the Symond's Yat refreshment house, and so well deserving a visit under proper guidance, which is imperative, since a stranger may easily get bewildered with the maze of ramifying passages before he reaches a large domed chamber, roofed with stalactites and floored with stalagmites. The view, looking down the river from the base below these caves, is charming, with the rocks called the Seven Sisters on the opposite side, in Lord's Wood on the Great Doward.

From the name "The Slaughter," given to this locality, it has been suggested that it might have been the scene of a conflict between Ostorius Scapula and the British Chief Caractacus. In the absence of any written chronicle, it must be left to the imagination to picture Ostorius's hosts fording the river from the ford below the new weir, and endeavouring to force Caractacus by the Great Doward from his encampment on the little Doward (see *Transactions* 1884, page 213), but, failing in the attempt, being driven across the river, pursued, and slaughtered in the place which bears the name. This, however, is pure conjecture. The tongue of rocks projecting like a promontory to form the eminence called Symonds Yat Rocks was undoubtedly defended by a line of earthworks extending from rock to rock. Some observers can distinguish

four or even five of these lines of defence. Of these the innermost is the highest, and apparently some masonry was built as a parapet on or within the rampart. At its eastern extremity near the road leading to the rocks, after passing the last cottage, masonry, set in cement, is at the present day to be seen *in situ*. We have no historical record of the date of these entrenchments. They may date from the times of King Offa, 755 to 794, or from the subsequent numerous plundering expeditions of the Danes in the time of King Alfred in the latter part of the ninth century, or even from more recent times.

Entering the woods from "The Slaughter," for the one mile walk to the Double View, the footpath conducts southwards along the boundary line between Gloucestershire on the left and Monmouthshire on the right, for about three hundred yards, until on the right a stone boundary marked S. M. (Staunton Manor) forms the boundary line for half a mile to Bellman's Oak in a S.W. by W. direction, thence again southwards. We have not been able to ascertain the origin of the name "Bellman's Oak." In the present time a young oak tree supplants the original. The Near Hearkening Rock is situated about three hundred yards west of Bellman's Oak, and about a hundred yards further west is the Suck Stone. The Far Hearkening Rock is situated three quarters of a mile further down the hill, opposite the Little Doward. These are nothing more than masses of Old Red Conglomerate Sandstone, and were trysting places where, in the days of deer hunting, hunters were accustomed to assemble in order to determine from their sounds in which direction the dogs were hunting.

The pathway up the wood to the Double View is fairly direct, and in a southerly direction with Mailscot Wood on the left or east, Lady Park Wood or Redding Enclosure on the right or west. Any turn to the left might bring the traveller to Highmeadow Colliery directly east, or to Braceland, at present tenanted by C. C. Hough, Esq., in the south-east. About half-way up the hill the pathway crosses a small cave.

A specimen of Pyrus aria was brought from Symonds Yat; but what proved more interesting was a specimen of a Pyrus cut by Mr. Henry Smith from a tree about twenty-five feet high on the verge of the cliff near where the little boy fell down a few weeks ago (now alive and progressing towards recovery from two broken legs) in Mr. Machen's private grounds, perhaps sixty yards or more from the entrance gate. This is Pyrus rotundifolia (Bechstein), named Pyrus latifolia (Boswell Syme) in all but the last edition (ninth) of the London Catalogue. The Rev. Augustin Ley informs us that from the Symonds Yat locality it was first named as a British plant. A few fine shrubs of the Spindle tree (Euonymus europæus) were met with. Mrs. Ley informs us that the superiority of the French crayons is due to their manufacture from the charcoal of this shrub. Paris quadrifolia was found in seed; Viburnum, both opulus, the guelder rose with lobed leaves, and lantana, the way-faring tree with heart-shaped leaf, downy beneath, were found, and a glorious profusion of the brilliant Epilobium angustifolium, or French willow, with purplish-red blossoms, heralded the approach to the open platform on the summit, which thirty years ago was called the pleasure ground, and which is now known as The Double View. The six-inch

Ordnance Map gives an elevation of 69·7 feet on the railway at The Slaughter, and an elevation of 737·5 feet at The Double View, thus making a gradual ascent of 668 feet in this one mile of sylvan walk. The following distant hills were visible from the Double View:—Commencing on the right, the Malvern Hills, Titterstone Clee, Brown Clee, Garway, and Graig, the whole range of the Black Mountains, with the top of Pen-y-Gadr Vawr beyond them. Southwards the view is obstructed by the neighbouring heights. From the Double View a footpath across a field leads to Staunton village. The road to the Buckstone is indicated by two masses of the Old Red Conglomerate Sandstone on the left hand side, just beyond the last house in the village; it is necessary to leave these two masses on your right, thence to pass through the wicket of the enclosure, and keep alongside the wall all the way until arrival at the Buckstone on the top of the hill. The elevation is not given in the six inch Ordnance map: but in an excellent map, dated 1867, in the Crown office, Whitemead Park, it is given as 891 feet above the water in Lydney Basin. It is advisable to ascertain how this datum "above the water in Lydney Basin" compares with that employed in the Ordnance Survey maps, namely, the approximate mean water at Liverpool. In the observations made during the organization of the Ordnance Survey it was found that mean tide levels differed considerably at the various stations, the extreme difference amounting to more than 30 inches. The same map in the Crown offices gives the altitude of Symonds Yat 479 feet. The six-inch Ordnance map has a contour of 500 feet upon the extreme summit of Symonds Yat rocks. From the platform of rocks the ground first descends, thence ascends slightly southwards on the road to Coleford, until at the distance of about one-third of a mile, where a bench-mark elevation of 485 feet is given.

From the above-referred-to Map in the Crown Office, dated 1867, we gather the following information, interesting to those who study the floods of the Wye:—Summer level taken at the ferry at Symonds Yat, 31 feet; flood level, 1852, 49 feet; thus indicating a rise of 18 feet at that locality for this flood of the river Wye in 1852. Reference to our transactions 1891, p. 235, gives 18 feet 4 inches as the height of flood at Wye Bridge, Hereford, on February 6th, 1852.

The following objects are seen from the Buckstone:—Beginning with the foreground, the eye rests upon a large proportion of the great expanse of over 20,000 acres of timber in the Forest of Dean proper and in the High Meadow Woods. The neighbouring district is High Meadow, sold by Henry Hall, 4th Viscount Gage, to the Government of George III. in 1817, for £155,863 3s. 2d. This property was offered to the Duke of Wellington, but it is said that he preferred Strathfieldsaye to being daily reminded, in such a hilly district as this, of hardships encountered in the Pyrenees. The massive tower of Newland Church is visible in the Valley below, and St. Briavels' Church and tower, with the Cotteswold Hills, and Hills of Somersetshire in the extreme distance. Ruardean Hill, on which there is a triangulation survey altitude of 931·5 feet, about one mile distant from the village of the same name with conspicuous church spire, is the highest hill in the Forest of Dean proper, the next highest altitude being 914·2 at Pingry Tump, Mitcheldean Meend, which is strictly within the limits of the

Forest. It must be borne in mind that the Buckstone and the woods, previously traversed to day by the members, although they are Crown property, embracing both the Doward Hills on the opposite side of the River, are not considered within the limits of Dean Forest. The four High Beeches (there used to be five until within the last three years), a prominent landmark in the Forest, stand out conspicuously, towering above their neighbours. The Adam's Rocks on Backbury Hill, the solitary oak on the hill above Mordiford, Caplar, and the Ladylift are prominent. The outline of May Hill, obscured by intervening heights of the Forest, is not visible, but the clump of fir trees upon its summit can be discerned. In the remote distance are seen the Malvern Hills, Titterstone Clee (1749 feet high), and its higher neighbour seven miles north of it, the Brown Clee (the greatest elevation in Shropshire, 1792 feet). In vain did we look for the Breconshire Beacons, although the extreme northern limit of the Black Mountains was very clearly defined. An observation was heard that the Wrekin was discerned, but we very much doubt the fact, considering the intervention of the high hills of the Radnorshire Forest, over 2,000 feet high, and the range of the Caradoc, Lawley, and Longmynds (which latter were positively distinguished) all approaching 2,000 feet high. Coming nearer again, Garway in Herefordshire, 1,203 feet high, and its neighbour The Graig, in Monmouthshire, 1,389 feet high were visible. The whole range of the Black Mountains, rising in Herefordshire, upon its west boundary line to a height of 2,306 feet, is very distinct (with the Pen y Gadr Vawr beyond in Breconshire, 2,630 feet high), terminating in the following heights:—The Sugar Loaf, 1,954 feet; the rounded Blorenge, 1,908 feet; and the Holy Mountain, the Scyrrid, 1,601 feet high. Herefordians had difficulty in recognising the Scyrrid, with the Sugar Loaf visible over its centre, being accustomed to the aspect of this hill displaying the landslip which is not visible from the Buckstone.

The Buckstone was a Logan or rocking stone, 19 feet in its greatest length, 13 feet in extreme breadth, and with a circumference of 55 feet, resting on a base only 2 feet in diameter, and capable of being slightly oscillated by one strong man applying force at the north-east extremity of the lever, until, unhappily, it was overturned by a party of about half a dozen persons on June 10th, 1885. It was broken in its overthrow. The fragments have been restored as nearly as possible to their original position, where they have been so securely pinned, that it no longer is a rocking stone. Some have supposed it may have been an object of reverence by the Silurian or Celtic people, and have pointed out a hollow in a neighbouring rock as a probable place for sacrificial rites. However, the rocking of the stone is a natural phenomenon easily explained by geological facts. The lower portion of the huge block being formed of a stratum of sandstone of a softer character, has been acted on by exposure to atmospheric changes, consequently great erosion has there taken place, so that the massive block had a very small base upon which it rested, as it were, upon a pivot. It is a detached mass of Old Red Sandstone conglomerate, a formation which can be traced as a pear-shaped mass around the greater part of the Forest of Dean. The course of its out-crop can be traced from the hills north of Tintern to the Buckstone, thence by the masses at

the bottom of the hill in Staunton village, the Suck-stone, the near and the far Hearkening-stones, thence round the Dowards, and after crossing the river at the Whitchurch Ferry it forms, at the base of the hill below Symond's Yat, lofty vertical escarpments resembling an artificial military work of defence. Onwards it is seen along the west of Coppet Wood Hill and round its northern end, the Chase Hill, where its direction is discerned from a distance by a line of yew trees, round Penyard Hill, thence turning south so far as Mitcheldean. It overlays the higher beds of the Upper Old Red Sandstone, and is succeeded by the Carboniferous Limestone belt of the coal field of Dean Forest. Some scattered fragments are visible in the fields below the Buckstone on both sides of the road leading to Monmouth. One of these stones is called the Broadstone.

The distance by road from Staunton to Monmouth is three miles, principally down hill. The pedestrian, however, is advised to shorten the route considerably by turning up the hill past the "Duke of York" on the road to Monmouth, along a path which enters the wood, and proceed along the Kymin Hill over the old Roman or British road, here very distinct. Mr. Robert Clarke, leaving the party, took this route to Monmouth for the purpose of comparing the designs of the 14th century heraldic tiles recently discovered in Hereford Cathedral and All Saints' Church, Hereford, with the old tiles now built into the interior walls under the tower of St. Mary's Church, Monmouth.

Descending from the Buckstone, again traversing Staunton village, the party made for the Church overlooking the village, situated at an elevation of 725·4 feet, and close to the Double View. Here they were met by the Rev. Canon and Rector Christopher Jay Jones. Mrs. Jones and the ladies of the Rectory welcomed the overwhelming party in their charmingly situated Rectory grounds, and surprised them with a treat of refreshments tastefully laid out on their lawn, for which the members were sincerely grateful. The scrupulously neat and well cared for appearance of the churchyard could not fail to attract much commendation; and when the members had assembled within the Church, our member, Mr. F. R. Kempson, explained the principal architectural features. Mr. Robert Clarke has taken notes, and staying behind in order to make himself more familiar with the details of the architecture, has furnished the following particulars:—

Staunton Church is an interesting structure, and consists of a nave, north and south aisles, a central tower, chancel, and south porch. The nave has five arches on each side, and originally had narrow aisles. During the 14th and 15th centuries the aisles were taken down, and broader aisles added. On the north the aisle was shortened from the west end by three bays, of which the early Norman and Transitional arches remain blocked up. The eastern ends of both aisles terminate in flat transept ends against the central tower. The nave arches on the north side are interesting as showing the transition from the semi-circular Norman arches to the pointed, although retaining the same details. The nave arches on the south are all pointed with Norman and Early English details in the capitals. A curious feature about the capitals of the pillars is that they are on different levels, thus forming unequal bows to the arches. Under the tower arch

on the south side is an Early English moulded arch with its piers considerably stilted inwards at their bases. The settlement has occurred so uniformly as to lead some observers to the error of considering it the original design of the builder. The chancel contains 14th and 15th century windows. A very interesting feature is the stone pulpit projecting out of the tower staircase. This appears to have been built after the staircase was up, and also an entrance above to a rood-loft, probably about the 14th or 15th century, judging by the details of the doorways. On page 252 of *Records of the Rocks*, the Rev. W. S. Symonds informs us that this curious stone pulpit was for many years built up and hidden in a buttress to save it from being destroyed by the Puritans. At the end of the north aisle two projecting altar corbels remain, and a good piscina and credence on the right. There is a credence at the east end of the south aisle. The Late Saxon or Early Norman font, situated in the transept end of the south aisle—it is represented on page 100 of H. G. Nicholls' "Forest of Dean" published by Murray in 1858—is worked out of a coarse Sandstone block, square in plan, 2 feet 5 inches high by 1 foot 11 inches wide. The details, simple flat sinkings with a band of flat circular balls and an incised line around the upper part, are very roughly worked, and follow the uneven sides of the block. The interior is hollowed out square, tapering down about twelve inches deep and twelve inches wide at the bottom, with a hole for the drain. On the top edges are the remains of the holes used for the lock and hinges of the old covers. Seeing that font covers with locks were not introduced until the 14th century, it is probable that this font was in use at the period of the rebuilding of the aisles, and then superseded by the present octagonal font, a good Early Perpendicular structure, with tracery panels in the shaft and around the bowl, coeval with the work in the aisles. The idea that the old font was probably worked out of a Roman altar ought to be allowed to perish out of recollection. It contains none of the details or features of a Roman altar. Previously to the restoration of the Church, twenty-five years ago, the position of this ancient Font was outside the Church, at the east corner of the entrance porch.

The tower belfry windows are Norman on two sides, and Early English on the other two sides. An Early corbel course runs round about ten feet from the top. At the angles are four figures for gargoyles; one holds a shield apparently charged with three conies or rabbits, another holds a water bottle, a third holds an instrument like a violin, and the fourth is simply a figure without any emblems.

The village Cross is situated in a bold position just outside the churchyard on the south. It consists of four octagonal steps, with a large square base with angle stops, chamfered edge working into an octagon; on this stands another octagonal block; in the latter a short piece of the shaft remains, about one foot five inches high, 11 inches square at the bottom, square with angle stops up to the octagonal part. The whole is eight feet in height.

At 1-30 p.m. the members and visitors took their seats in carriages for the Speech House, their destination for lunch. The length of the caravan conveying the large party extended at times for more than half a mile from van to rear. An opportunity was afforded of obtaining a list of the company.

The President, the Rev. M. G. Watkins; ex-Presidents: Rev. Sir George Cornewall, Sir Herbert Croft, Rev. Augustin Ley and Mr. H. Southall; Revs. H. A. Barker, J. Barker, J. E. Grasett, C. S. Hagreen, C. Harington, R. Harington, E. J. Holloway, A. G. Jones, M. Marshall, W. R. Shepherd, H. C. Sturges, and R. Wood; His Honour Judge Ingham; Major J. E. R. Campbell, Colonel J. C. Little, Deputy Surgeon-General W. R. Perry; Messrs. C. D. Andrews, Ernest Ballard, Philip Baylis, H. C. Beddoe, W. E. Britten, J. Carless, R. Clarke, Dr. A. Cutfield, Luther Davies, G. H. Hadfield, H. Scott Hall, C. Hardwick, T. Idanwarne, H. J. Marshall, John Probert, G. R. Sinclair, H. G. Sugden, H. A. Wadworth, and G. W. Wheeler; Hon. Secretary, H. Cecil Moore; Assistant Secretary, James B. Pilley. Amongst the visitors were:—Mrs. Baylis, Britten, Campbell, Cutfield, Edwards, W. B. Giles, Grasett, Hagreen, Hardwick, Hall, Ingham, Ley, Little, M. Marshall, Moore, North, Perry, H. G. Sugden, J. P. Sugden, Shepherd, Wheeler; Misses H. E. Baker, A. Ballard, C. Baylis, Beddoe, Britten, E. Bull, Carless, Croft (two), Davis, De Quincey, Feilden (two), Giles, Goss, M. Holloway, Johnston, Kempson, Perry, M. Reynolds, E. Shaw, Sturges, Wadworth, and Williams: Gentlemen: A. Boulton, D. Campbell, M. C. Campbell, Connor, T. T. Galliers, Dr. Harrison, Lacon Lambe, Rev. F. Gurney Little, Marshall, Dr. McNicholl, from Southport, — Perry, from Wickham, and — Taylor, from Birmingham, with others whose names could not be ascertained.

At the distance of a little more than half a mile from Staunton, on the road to Coleford, there stands upon the left hand, a few feet within the hedge, a rough, unhewn, upright stone, "a maenhir," eight feet high, called the Long Stone, in a situation nearly due east from the Buckstone. In the opinion of Mr. J. F. Nicholls, F.S.A., "it was a Roman centurial mark, and, judging from its size, it was probably one of the *prosignes*" (*British and Gloucestershire Archæological Transactions*, vol. vi., page 357). For those who entertain a delight and some faith in traditions, we give the local tradition in connection with this stone, which is, that "it bleeds if punctured with a pin exactly at midnight." This stone is similar to the three stones at Trelleck, 4½ miles south of Monmouth, all of conglomerate, respectively 14, 10, and 8 feet high.

From Staunton to Coleford the distance is a little over two miles, and thence turning easterly to the left for Speech House, after proceeding about one mile from Coleford, the expansive rolling sea of timber to right, to left, and in front, indicates the approach to the large acreage of Crown property covered by timber. From this position the road makes a continuous descent for two miles, from an elevation of 720·5 feet to 252 feet near the Speech House Road Railway Station. About mid-way down this decline there is an extensive stone quarry whence the pedestrian may ramble in the numerous rides of the forest for more than two miles either north or south before he reaches a road for vehicular traffic, whilst in front of him on the east extend four miles of timbered country, before he reaches the wedge of civilization splitting off the eastern border of the forest from north to south in Cinderford and its suburbs. From the Speech House Road Station the road ascends to the Speech House Hotel, 1,210 yards distant, on the north-west angle of which there is a bench mark of 578·7 feet.

Reports connected with the Forest of Dean have been frequently published in the *Transactions* of the Woolhope Club; for instance, in *Transactions*, 1866, page 196, appears Rev. P. B. Brodie's paper on the Geological and Economical History of Coal; in *Transactions* for the year 1868, on pages 255 and 256, reference is made to the Forges and Furnaces in Herefordshire (detailed more fully in Appendix No. 1, on page 270 of the same volume) to which the iron ore was brought from the Forest, to be smelted with charcoal, as testified by the nature of the cinder heaps there discovered. In *Transactions*, 1870, page 48, is a reference in a paper by Dr. Thomas Wright, F.G.S., F.R.S.E., "On the Geological features of the Landscape," to the thickness of thirty-two beds of coal in the Forest. In *Transactions*, 1871, page 9, there is a short account of the visit of the Club on August 9th, 1871. Pages 91 to 100 of *Transactions*, 1878, contain a long account including cursory notes by Edwin Lees, F.G.S., and a drawing of the Newland Oak Tree. Dimensions, localities, and other particulars respecting various Oak, Beech, and Holly Trees, and notices of the old Roman roads are given in *Transactions*, 1887, page 175, &c. Reports are given of Fungus Forays in the Forest in the years 1887, page 175, and 1888, page 269, with a list of the funguses met with on pages 193 and 272. Particulars in detail respecting the Newland Oak tree are to be found in *Transactions*, 1889, page 338. A list of the Roman coins found in the Forest is recorded on page 356 of 1889. To the geologist we should recommend the perusal of "Geological Notes upon the Forest of Dean," by H. D. Hoskold, accompanied by numerous sections and two diagrams, occupying from pages 123 to 177 of *Proceedings of the Cotteswold Naturalists' Field Club* for 1890—1891, Vol. x., part 2. The most comprehensive book, now getting scarce, treating of the antiquarian, historical, political, and commercial aspects of the Forest is "The Forest of Dean," by H. G. Nicholls, published in 1858 by John Murray. With such a plethora of interesting and varied material the student of the Forest cannot fail to derive many an hour of occupation and instruction. The visitor to the Forest will not, however, be considered properly equipped without "A Week's Holiday in the Forest of Dean," by John Bellows, Gloucester, a little book abounding with illustrations, and containing a map on the scale of one mile to half an inch. The edition marked 243,350 on its title page is brought nearly up to the present date.

The presence of, and assistance rendered by, Her Majesty's Deputy Surveyor of the Royal Forest, Mr. Philip Baylis, contributed highly to the success of the Ladies' Day. By his instructions, three Crown keepers and four Crown woodmen were deputed to show the visitors the way through the Forest and its inclosures. He had also caused to be collected on the greensward facing the west front of the Speech House Hotel, various remarkable natural history growths in forestry, which were all explained to the visitors by himself, and by the head forester, Mr. James Johnson. These productions varied from masses of ferns, dating from the age of the coal measures, to specimens of timber of the present period, modified by various incidental attacks to which timber is liable from the attacks of insects, disease, and from careless or unskilled pruning. A section of a tree displayed the cunning of the insect which had eaten its way

into the heart of the tree, and the still more crafty boring of the green woodpecker in the pursuit and successful capture of its prey. In the nucleus of a museum, at present near York Lodge at Parkend, are to be seen distinctive specimens of timber, well grown and badly grown; the roots of a transplanted tree throwing off numerous fibrous roots, ramifying in all directions, compared with those of a tree which has not undergone the process of transplantation; the absorption of the roots which occurs when the base of a tree has been considerably banked up; here are bosses of enormous size and fantastic shape due to blight and disease; a section of a well-grown larch tree of about sixty years' growth, exhibiting the annual rings widely separated. The museum contains a fine specimen of a tree fern (Sigillaria) from the coal measures, a foot and a half in diameter, and from two to three feet long. One curious example was exhibited of the burial of the official stamp of the forest—a crown with the words Dean Forest in capital letters an inch high—impressed upon a tree, almost as legible now as on the day of its being stamped, although completely occluded by several inches overgrowth of the cortex and the cambium so as to leave externally no trace of the signature. The date of the stamp was 1780 or thereabouts, and its distinctness was remarkable after so long a burial under the cortex and cambium. A section of another tree exhibits the disease termed "ring-shake," in which the peculiarity exists of the entire separation of the heartwood from the sapwood, the heartwood thus forming within the tree an internal closely-fitting, but detachable, plug. Of all the extraordinary features presented in forestry, one was exhibited, the solution of which is said to have baffled the expert in forestry, Professor W. R. Fowler, and which is considered unique. On cutting down an apparently healthy oak tree, thirty feet high, within it was discovered firmly encased another dead oak tree, deprived entirely of its cortex, so firmly grasped that the inner shell of the healthy outermost tree bears impressions of the cags of the inner tree; in one instance a small dead branch of the inner tree is enveloped in a branch of the outer tree. This unique specimen is divided into four or five sections, one of which affords a striking evidence of the previously decayed condition of the inner tree, from the fact of extensive borings indicating its occupation by a woodpecker, whilst not a trace of a corresponding mark is visible on the enveloping outer tree. This climax of curiosities met with in forestry must really be seen to be believed.

Luncheon was the next duty of the day. This was prepared and well served in the outdoor enclosure of the admirably-conducted Speech House Hotel. The business of the Club included the election of two members, and the nomination of one candidate for membership. After luncheon the large party adjourned to the lawn facing the west front of the Speech House. A paper was here read by the President, on "Keltic Lanes in Herefordshire," which indicated a close observation in reconnoitring his own district. We are not aware whether Mr. John Bellows ever published a paper on habits and customs recently, or still existing, in the Forest of Dean, probably derived from Celtic sources, but we know that at a winter meeting of the Cotteswold Naturalists' Field Club in 1881, he read a paper entitled "Notes on certain Races of the British or Celtic period

which remain in the Forest of Dean," in which he brought to bear a vast amount of research tending to show that, in the Court still held in the "Speech House," we have the last vestige, though perfect in itself, of the grand system of the Druids in Britain. Of these customs may be mentioned the regulation of the Courts of the Forest by periods divisible by the Druidical numbers 3 and 9. The Druidical year consisted of 360 days, which divided by 9 gives 40 days, the periods for assembling of the Verderers Court. The Swainmote (or Free Tenants Court), a Court higher than the Verderers, was held every 120 days, or three times a year; the highest Court of all, the Court of Eyre, was held once every three years, and three justices sat on the Bench at this Triennial Court. In the lower Court three witnesses were required, swearing with a stick of holly held in the hand. The bounds of the Forest used to be perambulated every three years. The triennial perambulation has been long discontinued, the last perambulation was made in 1833.

Leaving aside superstitions connected with the holly tree, and its associations with some idea of sacredness, we ought to mention a practical side of this subject, namely, that the growth of holly trees was encouraged to serve as winter food for the deer in the forest, the branches being cut down and strewed about for that purpose, in the same manner as we observed that branches of oak trees are every winter cut down and strewed about the Warren at Wapley Camp as winter food for the rabbits, which gnaw the bark of the tree. It is not so generally known as it ought to be that the leaves of the upper branches of the holly tree are not so prickly as those growing within the reach of the browsings of deer and cattle. Northwards of the Speech House magnificent holly trees extend east and west for two miles, from the Great Western Colliery near to Foxes' Bridge; they have, for their better preservation, recently undergone considerable lopping of their tops.

Mr. Moore exhibited a specimen of a double purple clematis in full blossom which delights in the peculiar freak of bowing down, in a twisted corkscrew form, and thus shortening the axis of its flower, so as to bring itself into closer contiguity with the nearest circle of leaves. These don a purplish colouration, add to the grandeur of the flower by assuming the character of its petals, the whole presenting the appearance of a very grand efflorescence.

The Rev. A. Ley exhibited a specimen of a new variety or a new species of Pyrus, a pretty shrub belonging to the Aria group of Pyri, discovered by him clothing in abundance a limestone cliff, up to the elevation of nearly 2,000 feet, at Craig Cille, near Crickhowell, in Breconshire. It is described in the current July number of *Science Gossip*, where it is also figured, half natural size, on page 113, and is named Pyrus minima. Mr. Ley has promised a descriptive account, with sketch, for our Volume of *Transactions*.

The remainder of the afternoon, until the assemblage of the party at Speech House Road Station for the special train homewards at 5.50 p.m., was occupied by roaming over the forest in detachments under the guidance of one or other of the woodmen or foresters, of each of whom, judging from our own experience, it may be said that he knew his own district well enough to

traverse its puzzling congeries of branching rides even in the dark—

> "He knew each lane, and every alley green,
> Dingle and bushy dell of these wild woods,
> And every rocky bourne from side to side,—
> His daily walks and ancient neighbourhoods."

Vestiges of the ancient Roman roads, formed of cubes about eight or ten inches square, with a boundary of kerbstones about six inches wide, enclosing a width of about eight feet, (for a section of the road, see "A Week's Holiday in the Forest of Dean," page 44), used to be seen in the road about two hundred yards north of the Speech House Hotel. The County Council in its march of civilisation has no sympathy for those ancient landmarks; they have been removed, to be supplanted by road metal of the period, and lo! before our eyes we had to witness a huge traction roller completing its work of road making, an exhibition which proved to us the more heart-rending because we had just been expressing our sympathy with the conclusions of a writer in *Archæologia Cambrensis* that "the spirit of progress, if properly enlightened, is never unfriendly to antiquity." Many roads in the Forest have traces of Roman pitching and kerbing, made for commercial as well as for politico-military purposes, especially for the conveyance of the valuable iron ore from the "scowles" to the furnaces, or "bloomeries," of which many traces have been found in the neighbourhood.

Members who had not previously visited the Forest were disappointed in not finding more of the larger trees. They are few and far between, and can be best seen by taking up quarters for several days in the Speech House, and driving daily under the guidance of one who knows the locality. The continuity of forests under timber is frequently broken by main roads connecting the inhabited portions. The main railway connecting the Wye at Lydbrook junction with the Severn near Lydney, now under the joint management of the Great Western and Midland Railway companies, runs through the Forest from north to south, whilst numerous private railway lines connected with iron and coal works and quarries intersect it in various directions. When we read the history of the changes the Forest has gone through since the times of the Romans, we may be thankful to know that, according to the Perambulation of 1833, the forest contains about 24,000 acres, of which, roughly speaking, 19,000 belong to the Crown, and 14,000 to 15,000 acres are under timber.

The term "Forest" does not necessarily imply plantations with trees, for instance, a Highland Deer-forest has very frequently none. Manwood (*Forest Lawes*, 1615) defines it thus—"a certain territory of wooded grounds and fertile pastures, privileged for wild beasts and fowls of forest, chase and warren, to rest and abide in, in the safe protection of the King, for his princely delight and pleasure." He quaintly adds "It doth appear that there were forests—yea, even in the verie time of King David; for he saith in his fiftieth Psalm these words; 'all the wild beasts of the forests are Thine.' Thus, ergo, there were forests of wild beasts in his time."

According to older usage, the characteristics of a forest in England are:—It must contain animals for the chase, trees or underwood for the shelter of them,

and it must belong to the Sovereign. In still earlier times, we learn, on the authority of Cæsar, that the ancient Britons lived in woods. He says:—"A town amongst the Britons is nothing more than a thick wood, fortified with a detached rampart, to serve as a place of retreat against the incursions of their enemies." Again, Strabo, who died about A.D. 25, in his treatise on Geography, writing of Gaul and Britain, says:—"Forests were the only towns in use among them, and these were formed by cutting down a large circle of wood and erecting huts within it, and shelter for cattle." The Romans employed iron furnaces and worked numerous veins of iron ore in the Forest of Dean, and ran several roads through the forest, and there is no doubt that some settlers of the hardy race of the Saxons, hunters from childhood (see Asser's "Life of King Alfred"), may have indulged here their innate desires for the chase. In the Ordnance Survey maps portions of entrenchments are frequently marked as "Offa's Dyke" from Sedbury Park, near Beachley, opposite Chepstow, in Tidenham Chase, west of Newland, and, last of all, near Lydbrook Railway Station, opposite Welsh Bicknor, from which point the river Wye was, so far as anyone knows, the boundary, until the re-appearance of the Dyke near Byford, north of Hereford. This brings us up to about the years 755 to 794. In the two following centuries we find the borders of the Severn and the Wye the scenes of numerous plundering expeditions of the Danes. In his "Strigulensia" Dr. Ormerod is of opinion, that Buttington Tump in the parish of Tidenham, opposite "The Bulwarks" on the opposite western side of the Wye, near Chepstow, is the site of "Buttingtune," the scene of Ethelred's crowning victory over the Danes. Other antiquaries agree with him, including the Rev. C. S. Taylor, author of "The Danes in Gloucestershire," a paper in the *Transactions of the Bristol and Gloucestershire Archæological Society*. In the "Chronicles of Florentius Vigorniensis" we read of the ransom by King Edward, for forty pounds of silver, of the Bishop Cymelgeac, Cameleac, Cyfeiliauc, who had been carried away captive from Yrcenefield (Archenfield) by "Pagan Pirates," under Ohterus and Hroaldus in 912; and it has been suggested that upon their final defeat the remnant of these invaders encamped within the entrenchments of defence at Symonds Yat.

Edward the Confessor exempted the Forest from the payment of the *Danegeld;* which exemption was continued under the reign of William the Conqueror (Domesday Book). That it was a resort of this Norman is known through the profane oath which he swore "by the splendour of the Almighty" of vengeance against the Northumbrians, when the news was brought to him, whilst hunting in the Forest in 1069, of their having assisted the Danes in their assault upon the city of York.

Later on we find a tax on forest miners to provide a Castle at St. Briavels in the time of Henry I. There are records of several visits to the Forest by King John, and of his hunting expedition in 1213. We find it recorded in history by Camden, by Fuller in his "Worthies," and by Evelyn in his "Silva," that the destruction of the Forest of Dean, whether by negotiation, or by stratagem, or by treachery, was one of the instructions prescribed for the Spanish Armada in 1588. We have read somewhere (and we shall be grateful to any reader who will enable

us to recall to mind our authority) of Napoleon having the same object in view of crippling us in one of our main resources of timber for our ships. Notwithstanding all the vicissitudes Dean Forest has experienced, the chief havoc, far exceeding devastation by hurricanes and snowstorms, was executed at the period following the civil wars of Charles I. During the earlier part of this period Sir John Winter, an ardent royalist, was the principal proprietor, the manor of Lydney having been presented to an ancestor, Admiral Winter, for his services off Dunkirk against the Spanish Armada. In 1644 Colonel Massey, the commander of Cromwell's forces, defeated Sir John Winter near Chepstow. When the Parliamentarians became victorious, the House of Commons, in 1645, granted the estate to General Massey. Sir John Winter has left on record that about 40,000 trees were cut down during the Commonwealth, by order of the House of Commons; nor does the felling appear to have been altogether discontinued upon Sir John's reinstatement into his possessions.

The oak trees frequently suffer in the early summer from blight, and principally from devastations by insects of the micro lepidopterous species. Of these there are numerous enemies, which, in the caterpillar stage, literally divest trees of their earlier foliage; the principal offender is the small caterpillar, which, in the month of July, becomes the pretty innocent-looking green oak-moth, called the Tortrix viridana. It is a fact that, in the first week of June of this year, numerous acres of forest presented the striking appearance of winter, due to absence of their leaves, eaten by the larvæ of the viridana, and, probably, of one or more species. It was a very gratifying sight to the writer to witness at the end of July, the transformation scene of these numerous acres, flourishing in their reinvestment with their second foliage. Semper floreat Foresta!

THE WOLF IN BRITAIN.

On page 252 of *Transactions*, 1894, Mr. Thomas Hutchinson read a paper on the subject of extinction of the wolf in England. In the time of Camden and Holinshed we have upon their authority the fact that all parts of Scotland abounded with wolves. Although Camden says there were not any wolves in England (Magna Britannia, Gough's edition, Vol. iii., p. 16), yet we must infer that they existed in England from the writings of Sir Edward Coke, Lord Chief Justice of the Court of Common Pleas, 1606, Lord Chief Justice of the Court of Kings Bench, 1613, author of *The Institutes of the Laws of England*, &c. In reference to the Forest Courts in the above work the following extract occurs :—

"There be many beasts of the Forest by the laws of the forests of England. The hart in summer, the hinde in winter, and all that proceed of them ; the buck in summer, the doe in winter, and the proceed of them ; the hare, male and female, and their proceed ; the wild boar, male and female, and their proceed ; and the wolf, male and female, and their proceed ; the fox, male and female, and their proceed ; the martin, male and female ; capreolus the roe, as it appeareth before, is no beast of the forest, but it is a beast of chase." . . . . .

It must be remembered that Coke, a most accurate writer, wrote in the time of Elizabeth, by whom he was made Solicitor-General in 1592, and it must be borne in mind that he employs the present tense in the above abstract.

The best work to consult on the extinction of the wolf, &c., is Harding's "Extinct British Quadropeds." He has treated the matter exhaustively.

THE KELTIC LANES OF SOUTH HEREFORDSHIRE.

By The Rev. M. G. Watkins.

An interesting study for dwellers in the rural districts of Herefordshire consists in tracking and mentally reconstructing its old roads. Many of these go back to the earliest historic population of the island, the Kelts. Before them the origin of these lanes is lost in remote antiquity. They are generally to be found winding along the sides of hills, with perhaps a preference for dipping into the valleys below. As for cutting a path as straight as may be over moor and moss, and running with few deviations over the tops of lofty hills, as may be seen in the case of the great Roman roads in Lancashire and the North, this was furthest from the mind of their makers. For these roads were not all at once surveyed, and then cut out ; they grew from the force of circumstances. The primitive men who first trod them possessed few or no tools—perhaps did not know the metal, iron—and being in all probability but small dissociated tribes, only too glad to be left alone, did any more powerful neighbours live near them, saw no object in levelling rocks and engineering a straight road at the cost of much labour. With regard to a conquering people like the Romans, another policy suited them. It was enough for the aborigines if they and the beasts of burden (chiefly mules and small sized horses or ponies) could pass along by the loops of road which festooned as it were, the hills. The straighter the road, on the other hand, the less time was wasted by the Romans in pushing on conquest or suppressing rebellion. To the Kelts, natives of the country in general, time meant nothing. A little of this feeling still clings about the country. A Mr. Loveden, of Moreton-on-Lugg, in 1799, contributed some notes on the agriculture of the county of Hereford to be published in Arthur Young's "Annals," and amusingly writes—"the labourers here partake in the Welch languid manner of work."*

Seven or eight of these Keltic lanes may be found near Kentchurch. One formed until quite recent years the direct road to Hereford, and has been used in the memory of man. Another runs down to a ford in the river, and maintains a right of way, passing up Garway Hill. In Monmouthshire, in the adjoining parish of Llangua, two very good examples may be seen. One is still used by pedestrians and runs from the Great House, the site of the old Benedictine Monastery, to the lower road by the Church. It is known as Tabernpwylch Lane, from an old tavern which formerly stood at the lower end by the river. This lane is in every respect a typical example of such roadways. It is deep, yews bend over it, and ferns cling to the sides. Throughout the winter a stream runs down it ; its floor being formed of solid native rock. In some respects a finer example, in that it is both deeper and narrower, runs between Pentwyn Farm and Great Marlborough, in Llangua. Tabernpwylch Lane raises curious thoughts of those who used it in past centuries. First came savage races bearing rude stone

* Annals of Agriculture, Vol. 35, p. 103.

weapons, in the course of numberless generations giving way to neolithic man, and then to bronze and iron using peoples. The Romans do not seem to have entered this district. A bronze coin of theirs was found last year at Llancillo, but no traces of them exist on the right side of the Monnow. Englishmen of Mercia must have passed up and down the lane; also Saxon churls and villeins. Then came the Benedictine monks. Before 1183 A.D., Llangua Manor and Church were given to the Normandian Abbey of Lire, and a cell dependent upon it was raised at the head of the lane. It is easy to fancy the monks in their black habits passing up and down the lane, perhaps visiting their brethren at Llanthony, and returning in the summer eve as the westering sun cast their lengthening shadows before them. Every now and then a mediæval knight might come down it in armour, with a goodly band of followers, and the country folk made it the ordinary road for centuries. After the dissolution and the destruction of the Monastery, the lane must have seen something of the Civil War. Charles I. is known to have been in this district. Hawking parties would use it as a short cut. Then it settled down into the placid monotony of last century and the first half of this. Since then—strange contrast to its roughness and the character of the animals and vehicles which used it for centuries—the Great Western express trains daily rush past, in front of its exit upon the Monnow.

The Roman writers have left such fragmentary notices of Britain that I have not been able to find more allusions to the Keltic or indigenous lanes, than Cæsar's "secreti calles," which suggest lanes overhung with brushwood; and another allusion—"Omnibus viis notis semotisque."* These "semotæ viæ" might well represent the primitive lanes, running like a thread through the hills among forest and coppice-growth, branching off in some places, in others opening on moorland, and only to be discovered at the further side by people well acquainted with the country. It may easily be understood how useful hidden lanes of this kind were to poachers and outlaws in such a district as was Archenfield (in which Kentchurch is situated), and which was probably not cleared and opened up until the end of the 17th century.

The growth of these lanes seems to have been much as follows:—First, the most convenient tracks over a district were marked with large stones, put down some twenty feet from each other, as the coastguardsmen on the cliffs of South Devon still mark out the paths over the commons facing the sea. The "trackways," however, to be seen on Dartmoor at the present day appear to have been boundaries rather than paths. In the course of centuries, it may have been, these stones gradually sank into the earth, and the path which resulted also cut its way lower. A little labour was then seemingly bestowed upon it—rough stones thrown out on each side and the like—to make it serve, not man only, but ponies as well, and, thanks to the constant moisture which prevailed in these ditch-like roads, vegetation began to grow along the sides. The exchange of commodities and convenience of carrying corn and firewood on rude pack-saddles upon these beasts caused the lanes to assume the width which they now present, and which they have certainly borne for ages, say, about half the width of modern roads.

* Cæsar de bello Gall: "loci impediti atque silvestres," Vol. 19.

In Devonshire curious lanes are occasionally to be seen deeply cut into the ground and overhung by bushes, but only half the width of the Herefordshire Keltic lanes, in fact just wide enough for a man to pass through. These are known as "Church lanes," and probably do not date further back than Saxon or Mediæval times. To return to Herefordshire lanes, modern needs have dealt with them in three ways. New roads are often made on one side of them, and the old lanes are then left as deep ditches half choked with rubbish and vegetation, but easily tracked by the curious. One old lane thus treated at Rowlstone forms at a corner a convenient horse pond. Or, secondly, modern roadmakers have incorporated part of the lanes when it suited their needs, and at certain places left the old tracks of the lane to tell of the operation. There is a beautiful road in Surrey, running from Cold Harbour to Dorking, which has been thus treated. The old lane itself has been widened here and there into the modern road, but evident traces of the primæval lane still remain at several places on the left side. Thirdly, the lane was wholly abandoned, and traffic carried over a new road often in an entirely different route to the old lane.

One interesting feature in these old lanes, in itself vouching for their antiquity, is that on either side fringes of aboriginal greenery run along with them. Yews, and especially hollies, alders, butchers' broom, all the most ancient brushwood of the native flora may thus be seen, presenting a strong contrast to neighbouring fences which are modern and singularly free from these indigenous plants. Every here and there, too, from the depth of solid rock or pebbles seen on the side of the lane, some notion may be formed of the extreme antiquity of these lanes, where the slow tide of human life has cut its way in the course of ages, much as the rivers of the country have also deepened their channels during the same long centuries.

Kingsley, whose eye few features of a district escaped, attributes the formation of some of these lanes to human labour rather than the slow course of time, thinking that the ground was so hollowed for the purpose of concealment from enemies; and he states that he has seen many ancient roads of this kind, long disused, around the Spurs of Dartmoor. He contrasts them somewhat fancifully, in a moral point of view, with Roman roads constructed on the scientific lines prescribed by Vitruvius. "It marks strongly the difference between the two races," he says, "the difference between the Roman paved road with its established common way for all passengers, its regular stations and milestones; and the Keltic trackway, winding irresolutely along in innumerable ruts, parting to meet again, as if each savage (for they were little better), had taken his own fresh path when he found the next line of ruts too heavy for his cattle."* And then he terms the Kelt "a sneaking animal." The Kelt may have been a fickle character, but he was not cowardly, as the Romans themselves had to confess in old days when Brennus and his Gauls vanquished them at the River Allia, and then sacked Rome. Aristotle, too, tells how the Kelts would dare even the waves.

In any case, these old lanes, undoubtedly among the most ancient

* Prose Idylls, p. 171, 168—170. (Ed. 1873).

monuments of Herefordshire, will well repay careful inspection. They transport us to a distant antiquity. They are beset with interests on all sides. Their long slow growth may be paralleled with the geological formation of the mountains above them. They wind along in juxtaposition with modern improvements, as if to bring out the wide contrast between them, and to challenge investigation. These remarks are a small contribution towards the more particular study.

A NEW FORM OF PYRUS.

The Rev. A. Ley has furnished us with the following notes contributed by him to *The Journal of Botany* for March, 1895.

In 1893 I found a *Pyrus* in Breconshire, which appeared to me to be the well-known *P. scandica* Syme, of Glen Catacol, Arran, and which I distributed through the Botanical Exchange Club under that name. Last year I had good opportunities of observing its flower and ripe fruit; and having, through the courtesy of the authorities at Kew, compared it with plants in that collection, I think it well to call attention to it by a short note in this Journal, leaving to a future opportunity to publish a fuller description, with, it is hoped, a drawing.

Pyrus minima, n. sp. or n. var. A small spreading shrub, much branched, with slender branches. Leaves linear-oblong, shallowly pinnatifid, with 3-4 principal lobes, bright green above, ashy-felted beneath. Flowers open early in June, freely produced, in loose corymbs, small, in size resembling those of *P. Aucuparia* Gaertn.; petals cream-coloured, unopened anthers cream-coloured; calyx erect and prominent upon the unripe fruit, and persistent till the fruit falls. Fruit *small*, globose, bright coral-red, ripening in the end of August, bitter. Very near the *P. scandica* Syme, of Arran, and perhaps a variety of that plant, from which the leaf-differences would scarcely separate it; but the small flowers, the very slender branching habit, and especially the small globose bright red fruit, seem to indicate specific distinction. Loc.:—On a limestone mountain cliff called Craig Cille, near Crickhowell, Breconshire; also on limestone rocks at Blaen Onnen, two miles westward from Craig Cille. Undoubtedly native, and in great abundance at the former station, where the shrubs clothe the limestone cliff to its head at an altitude of about 2000 ft.; seedlings also being frequent. *P. Aucuparia* Gaertn., *P. intermedia* Ehrh., and *P. Aria* Sm. var. *rupicola* also occur on the same cliff; but the very distinct habit and fruit of the present plant, as well as other reasons, forbid the idea that it can be due to hybridity. The anthers in *P. intermedia* seem uniformly to be pink; those of *P. Aria* and its varieties usually cream-coloured. What is the colour of the anthers in *P. scandica*?—Augustin Ley.

A FEW NOTES ON FUNGI.

By Dr. A. J. H. Crespi.

My knowledge of the fungi lacks completeness and accuracy, but is sufficient to tempt me to write something about them. There are at least 12,000 species of fungi in England and the rest of the United Kingdom, and of these fully 4,000 are microscopic species; so that fungi are truly legion. *Saccado's Sylloge Fungorum*, finished twenty-two years ago, records 39,663 species existing in different parts of the world. A definition of a fungus is not easy, and what Dr. M. C. Cooke, of Kew, the author of some of the ablest works in the language on the subject, has failed to attempt I cannot hope to succeed in accomplishing. They grew almost everywhere—in houses, on wood, in the closed cavities of nuts, in animal tissues—in short, in and upon everything.

A blacksmith at Salem threw on one side a piece of iron which he had just taken from the fire, and next morning he found on this very piece of metal, lying over the water in his trough, a mass of fungi two feet in length; it had crept over the iron to some wood near, and not from the latter to the iron. This immense mass had formed in twelve hours. The Rev. M. J. Berkeley, F.R.S., saw a species of fungus on a lead cistern at Kew, and Sowerby found one growing on some cinders on the outside of the dome of St. Paul's Cathedral. The great puff ball will reach the size of a pumpkin in a single night, and Lindley calculated that the cells of which it is made up will multiply at the rate of 60,000,000 a minute. Dr. Greville records that a specimen of one of the largest British Fungi—the Polyporus Squamosus—reached a diameter of 7 ft. 5 ins., and weighed 34 lbs. It took four weeks to reach that size, growing at the rate of 19 ounces a day. A specimen of this species has been known to reach a diameter of 11 inches in a week.

The late Dr. Benjamin Carpenter, F.R.S., recorded an instance of the tremendous power which fungi exert in growing. Basingstoke was, many years ago, paved, and some time afterwards the pavement was found to be uneven. This increased until some of the heaviest stones were completely lifted out o place by the growth of enormous fungi underneath. One of these paving stones measured 22 inches by 21 inches and weighed 83 lbs. And something precisely similar has just taken place at Torquay, where in places the pavements have been upheaved by fungi. Dr. M. C. Cooke had a similar incident brought under his notice—a large kitchen hearthstone being forced out of its bed by the growth of a fungus. Sir Joseph Banks relates a still more startling occurrence. A cask of wine leaked, and, after a time, there grew from the leakage a fungus which finally filled the cellar and lifted the cask to the ceiling.

Fungi, like human beings, give off carbonic acid, and not oxygen, as do most other vegetables. This is due, probably, to the absence of green colouring matter.

A popular error is to suppose that fungi are eatable, and toadstools poisonous. There is no such line of demarcation, nor, strictly speaking, has toadstool any precise scientific meaning. Very many fungi are eatable, the number of poisonous varieties being greatly exaggerated. The common Agaric usually eaten in England is not the most palatable and wholesome; indeed, in Italy it is said to be condemned and not allowed to be sold in the fungus market, which is there quite an institution. But this assertion is a traveller's tale, and not more trustworthy than many of the narratives of visitors to foreign lands, who hastily jot down their first impressions and believe everything they chance to hear.

Few foods are more savoury or greater favourites than well-cooked fungi. The souls of good vegetarians hunger and thirst after them, and no wonder! They have the reputation of being very nutritious, but physiologists say that this is an error, and that there is reason to believe that a given weight of them is not so sustaining as from its chemical composition it ought to be. This does not mean that they are not useful adjuncts to food. As flavouring ingredients they have no superiors. Far greater use of them ought to be made, and I cannot see why the supply of fungi should not be increased twentyfold. In this way a most valuable industry might be developed, or, more correctly, built up in our midst. Nothing is easier than to grow them, and they are very profitable.

A physician of repute, whom I have often met at the Woolhope fungus dinner at Hereford, has several times told me that he has freely experimented on fungi, and has eaten many species with impunity. If the smell was pleasant he tasted the raw fungus and then fried half of it. He rarely suffered temporarily, never permanently, and he believed that most fungi could be eaten with safety. I should not, however, advise my readers to try experiments for themselves until they can at least distinguish those species which are known to be poisonous. Some species are deadly poisons, and even a small piece will bring on violent illness sometimes ending in a most painful death.

The active chemical principle which, in very rare instances, causes inconvenience and even death from eating fungi, is called *muscarine*. It is the same principle which, I believe, is found in putrid poisonous meat. Some foul smelling and repulsive species are rich in it, but most fungi are harmless, and a few country walks in the early autumn in the company of a mycologist would furnish hints enough to be an invaluable guide to any person of common intelligence. Unfortunately, or perhaps I should write fortunately, no amount of reading will make a man a practical mycologist. It is in the fields and in the woods that the science must be learnt. There, and there only, and from the teaching of an old student, will the tyro learn to distinguish the wholesome from the dangerous.

We eat and cultivate the Agaricus campestris, or common field mushroom, and think it the only species fit to place on the table, but Dr. Cooke tells me that probably many other species could be as readily cultivated did we only know how, and that much still has to be found out as to the propagation and cultivation of many eatable species. I can assure the reader that the Lactarius deliciosus

and some of the Agarici proceri are excellent and abundant, and equal to the sorts held in the highest favour by the general public. The Fistulina hepatica and the Agaricus procerus, or "Parasol" mushroom, are far away better than the common field mushroom; so at least my honoured friend, Professor John Horsfall, M.A., F.R.C.S., the great surgeon of Bournemouth, tells me.

The best way to get information on this most difficult subject, which cannot, I repeat, be learnt from books, would be to have lectures on fungi from some practical teacher. I can imagine the excellent and brilliant address which such a lecturer as the Rev. John E. Vize, of Forden, Welshpool, would give In such a way, and in it alone, could trustworthy information be conveyed, which would be of invaluable service to learners. Mycologists rather ignore the utility of fungi as food, and think it a degradation of the subject to approach it from the dietetic side; but usefulness might play an important part in the matter, and in that way the general public would be led to see the beauty and value of the study of fungi.

THE NEW FOREST.

By Alfred J. H. Crespi, of Wimborne.

Everyone has heard of the New Forest, and knows that the pitiless Conqueror depopulated the southern districts of Hampshire to make himself a great forest, where he and his sons could hunt. But alas! for the truth of this familiar and pathetic story, a glance at the soil shows that it never could have carried a large population, so the tale has lost nothing in the telling. Everyone, too, has heard that the Conqueror's fierce son—the Red King—on the eve of an expedition to France, rode down from Winchester, 18 or 19 miles, to Canterton Glen, a spot henceforth memorable in history, where, struck by an arrow in the breast, he died. Perhaps some have wondered how his death came about; whether his companion, Sir Walter Tyrrel, shot him purposely, as Walter Savage Landor tries to prove, or whether the French Baron accidentally killed him, or whether, as a dark tradition whispered, some Saxon churl dispossessed of hut or lands, chancing to pass by, shot the Red King and brought his life of infamy to an end. Everyone also knows that the New Forest was fatal to three members of the Conqueror's family. There, in 1081, Richard, his second son, met his death. There, died, accidentally shot by an arrow, in May, 1100, another Richard, son of Duke Robert, and there, on the 2nd August of the same year, the Red King perished, to the grief of a few.

The New Forest is that portion of Hants bounded by Southampton Water on the east and by the Avon on the west, with the sea to the south, and a line from North Charford on the west to Wade and Owerbridge on the east. In Domesday Book the New Forest was said to have 17 tenants in chief, and 17 under-tenants, the latter corresponding to modern copyholders; 87 bordarii, or cottagers—that is people holding a bord for which they gave rent or service to the lord; 66 villani, and 232 serfs. The total area of the Forest is 91,000 acres; of this private owners hold 26,000 acres, while the Crown is absolute lord of 2,000, and to the remaining 63,000 acres, it has, in common with 850 proprietors, certain ill-defined claims. About 5,000 acres are covered with ancient and well-grown timber; 10,000 with timber nearly two centuries old, and as much more with young plantations, while many thousands of acres are barren waste and moor, usually dreary enough and swampy, though at certain seasons resplendent with flaming gorse and delicately-tinted heather in full flower.

In 1670 only 5,000 acres belonging to private individuals had been enclosed, while in 1783, 24,797 had been appropriated or enclosed, beside 901 acres of encroachments, and 625 of Crown copyhold. As for the timber, in 1608 123,927 trees were fit for cutting down, and these, with dotard and decayed trees, represented 315,477 loads of wood. This, in 1783, had been reduced by the peculations of the keepers, and the neglect of the verderers, to 20,830 loads. Deer were plentiful in the Forest for many centuries, but though large sums were paid by the Crown for hay, they seem to have been shamefully neglected, the

keepers and the poachers thinning them mercilessly ; while as many as 300 died, in one Forest walk, from starvation, in the winter of 1787. They were finally cleared off in 1851, the Crown taking, in lieu of feeding them, the right of planting 10,000 additional acres. Some deer, however, still wander through certain parts of the Forest, but not in large numbers, and a good many wild ones are found in Mid-Dorset, near Plush, and Buckland Newton, and a few, too, near Wimborne, at Lychett.

There are several ways of seeing the neighbourhood to advantage. The best, perhaps, is to take rooms at Brockenhurst or at Lyndhurst, in the very heart of the Forest ; from both these places an active walker could penetrate into nearly every corner. Or a visitor could stay at Romsey, ten miles from Lyndhurst, and fourteen from Brockenhurst. This I have twice done, and in the bright sunny, dry weather of August and September long excursions can be made, and the Forest can be thoroughly explored. I passed September, 1875, and July, 1881, at Romsey, and found it a most charming residence, with abundant railway facilities, and its nearness to Hursley, Salisbury, and Southampton makes it convenient. In all these places, there is no dearth of accommodation. Romsey is only sixteen miles from Salisbury, ten miles from Winchester, and ten from the famous Church of St. Cross, and, morever, it has a grand and perfect Norman Abbey, of noble proportions and in magnificent preservation. Lyndhurst is the capital of the Forest, and one of the most prettily situated woodland towns in England. Its superb modern Church, completed thirty-five years ago, has a remarkable fresco by Sir F. Leighton. Ringwood, at whose Grammar School Stillingfleet was educated, is eleven miles from Rufus's Stone and close to Ellingham, the grave of Alicia Lisle ; and, though more distant, it has some advantages, as it is easy to get to Bournemouth from it and to Christchurch Priory Church, and not difficult to reach Swanage, Dorchester, with its ancient camps and Roman Forum, and Weymouth. Wimborne, though farther off, is not inconvenient, and cheap return tickets are issued by all trains but one from May to October inclusive, to Lyndhurst-road, and Brockenhurst, and the distance to the latter, twenty miles, can be covered in little over half an hour. Besides its fine and unique Minster, and chain Library, Wimborne is near some very perfect camps ; the most remarkable of these are Badbury Rings, and the Castle Hill, at Cranborne. Wimborne is remarkable for having *all* the books in its library chained : not so many as at Hereford, but then at the latter some of the books are *not* chained. Fordingbridge, again, is not inconvenient, while even Lymington brings some parts of the Forest close.

The visitor must depend on an out-door life and long excursions for his chief pleasure, the Forest towns not being sufficiently large to satisfy the lover of busy centres of life and activity. In bad weather, rare fortunately from the beginning of May to the end of September, the district is extremely dreary, and the townsman will utter many complaints ; still, if he visits the Forest for its seclusion and woodland scenery, he can surely dispense for a time with the excitement of cities and the din of busy populations.

As a rule the timber in the Forest is not remarkable for size, although the

Boldrewood oaks are handsome and of great bulk, and Mark Ash is noted for its magnificent beeches. The tree from which the arrow is said to have glanced that killed the Red King is long dead, but its site is marked by a stone, enclosed in an ugly triangular case, bearing on its three sides the following inscription :—

"Here stood the oak tree on which an arrow, shot by Sir Walter Tyrrell, glanced and struck King William II., surnamed Rufus, on the breast, of which he instantly died, on the second day of August, 1100. King William II., surnamed Rufus, being slain as before related, was laid in a cart belonging to one Purkiss, and drawn from hence to Winchester, and buried in the Cathedral Church of that city.

Anno, 1745.

That where an event so memorable had happened might not hereafter be unknown, this stone was set up by John, Lord Delewar, who had seen the tree growing in this place."

The continuity of English life is shown by the survival of Purkiss among local names. At Minestead, a village near Rufus's stone, it is still seen, and a shop is kept by a descendant of the ancient possessor of the name, while at Wimborne one of the principal booksellers kept until recently the old family name fresh and green, and other representatives of the family could easily be pointed out. Purchase, obviously a corruption of Purkiss, is a common name in south-east Dorset.

Brockenhurst Church was mentioned in Domesday Book. It is very interesting, as the following extract from the work on the Forest, published in 1862, by Mr. John R. Wise, will show ; at the same time there is nothing remarkable in Brockenhurst and its Church :—"The approach to the Church remains in all its beauty. For a piec of quiet English scenery nothing can exceed it. A deep lane, its banks a garden of ferns, its hedges matted with honeysuckle, and woven together with long bryony, runs winding along a space of green to the lych-gate, guarded by an enormous oak, with a circumference of twenty-two feet eight inches, its limbs now fast decaying, its rough bark gray with the perpetual snow of lichens, and here and there burnished with soft streaks of russet-coloured moss, whilst behind it, in the Churchyard, spreads the gloom of a yew, which from the Conqueror's day to this hour has darkened the graves of generations."

The approach to the district from the Isle of Wight, and even from Bournemouth, can be conveniently made from Lymington, a quaint and rather handsome little watering place, not specially remarkable for size or situation, nor for its antiquities, but prettily situated, and at one time of much greater relative importance. It is necessary, however, to be on one's guard against local traditions, and not to accept without question exaggerated reports of departed grandeur :—

"From the earliest times it evidently possessed the salt works, which so late as the beginning of the present century made the salt trade of Lymington second only to that of Liverpool, paying, as it did, a duty of £50,000 yearly upon the produce of its Salterns. The rock salt of the north, however, has driven

sea-made salt out of the market, but so long ago as 1147 Richard de Redvers, a descendant of one of the noble families of Normandy, confirmed to the Church and brethren of St. Mary at Quarr, in the Isle of Wight, the tithe which his father Baldwin had granted to them of the Lymington Salterns. In the reign of Edward III.—when it sounds quaint to modern ears to be told that Lymington contributed nearly double the number of ships and men sent by Portsmouth to that Monarch's fleet for the invasion of France—the borough was summoned to return representatives to Parliament, but none were returned till the twenty-seventh year of Elizabeth's reign, and it is somewhat remarkable that from 1574 to 1834 the Burrard family held 46 mayoralties, and represented the borough in 30 Parliaments. They appear in fact to have been the Sultans of Lymington. It may interest the curious to know that the modern proposal to pay Members of Parliament is simply a revival of an old custom. In earlier times the officials of boroughs invited to send representatives to Westminster frequently made a return that no one could be found willing to undertake the duty. The archives of Southampton show that Thomas Reynolds, in 1st Henry VII., received for his "Parliament wages" from January 23rd to March 8th, £71 3s. 4d., and at Christchurch, Sir Peter Mew, about the beginning of the Eighteenth Century, gave a bond, the condition of which was that he would not demand any pecuniary reward of the burgesses, nor put the borough to any expense on account of his services in Parliament. In 1677, to prevent animosities and other inconveniences, it was ordered by the Mayor and burgesses of Lymington that for the future the election of Mayor, as well as of Members of Parliament for the borough, should be by means of different coloured 'bullets,' to be placed by each burgess in a box for that purpose; but this order does not appear to have been acted upon, and was rescinded shortly afterwards."

It will startle the modern Radical to learn that that excellent institution, the ballot, with its immense advantages, was actually long ago proposed and perhaps tried at what he would regard as a very sleepy Hants borough.

Through all the vicissitudes of eight centuries the ancient Saxon Forest, the boundaries of which were extended by the pitiless Norman, has continued in its way to be one of the most beautiful parts of England. One landowner after another has seized upon broad belts of woodland, and large tracts of the Forest have, under one pretence or another, been cleared and cultivated; and Mr. Auberon Herbert is at this moment complaining that the resident officials are recklessly cutting down timber, and spoiling some of the loveliest parts of the little kingdom entrusted to their tender mercies. Small towns and villages have sprung up in the district, and some of the best kept and straightest roads in the kingdom run through that part of the country. Yet after all, for sylvan beauty, for calm repose, for accessibility, no other tract of equal extent is so remarkable. Change there has been, but less than one would expect, and portions of the Forest remain as they were four or five centuries ago. In the New Forest the England of the Middle Ages still reigns supreme.

The New Forest is said to be singularly rich in animal and vegetable life, but such claims are so generally made everywhere that they cannot always be

accepted without demur, and to the best of my knowledge it is doubtful if they have much to rest upon as far as the New Forest is concerned. Seventeen kinds of bronzed and green ferns grow in the forest, and 72 species of birds are resident in the district, while at least 230 of the 354 British species have been found in it. The insect life of the district is rich and varied, and the vegetation is in some places luxuriant, while in others little except gorse, heather, and poor grass flourishes. Taking it as a whole, the Forest is not fertile, though in the river bottoms there are patches of rich land, which, partly from natural advantages and partly from loving care, have an air of fertility and beauty in marked contrast to other parts.

How can I describe this lovely district? Persons, ignorant that forests are not necessarily covered in all their extent with tangled old trees, fancy that as soon as they enter the New Forest they see on all sides vast tracts of woodland, and nothing but woodland. Never was there a greater mistake. Thousands of acres, as I have said above, are covered with majestic timber, and still larger tracts with recently-planted trees, but there are also still more extensive heaths. The charm of the New Forest is, next to its extent, its variety. The heather is so thick, tangled, and tall, that during the late summer, when it is literally one mass of flowers, the Forest is more attractive than the most carefully kept garden, and I know nothing equal to it for wild, unapproachable loveliness. The dry, indeed arid, soil of much of the district seems, in conjunction with the bright sunshine, to suit garden flowers particularly well, and their abundance and variety are difficult to surpass elsewhere in England. So with the older woods—it is their beauty and extent that delight. The timber may not always be as large as one could wish, though hundreds of acres are densely wooded, and carry trees fully satisfying the connoisseur. So with the young plantations, their extent makes them remarkable. Persons who often stroll through large woods and plantations, and are keenly alive to the beauties of woodland scenery, feel how little they have entered into the charm of a vast forest until they wander for hours in the New Forest. Nothing resembling it exists in any other part of England, and nothing like it could now be made, while under the most favourable conditions it would take two or three centuries to produce such a forest. The mildness of the climate has something to do with the luxuriance of the heather and gorse, and with the beauty of the scenery, which is equal to anything in the South of England, though falling short of the romantic glens of Derbyshire, and the rich verdure of Brecon and Hereford. The New Forest is on the whole flat, though not painfully so, or, rather, its surface is slightly undulating, with here and there hills of low elevation, one of the prettiest of these ridges being near Romsey and Broadlands.

One of the most charming excursions from Brockenhurst is to the noble ruins of Beaulieu Abbey. For nearly three miles the road winds among trees, and it then passes for a couple more over Beaulieu Heath, and finally gradually descends for a mile into the village, and on passing through the latter, to the left, the handsome house of Lord Montagu is seen; while a little to the right, over the river Exe, stands the parish Church, a vast building 150 feet long, once the

refectory of the ancient Abbey. The Church is beautifully and reverently kept, and is remarkable for its superb pulpit, and for a covered arcaded passage in the wall leading to it. This so-called pulpit was the rostrum of the refectory, in the days when the Abbey was in its glory, and the Reader occupied it at dinner. It is said that only one or two others of equal beauty and interest remain. One of these is at Frampton, near Dorchester. Near the Church extend for a vast distance the ruins of one of the grandest abbeys ever founded in this land, and no ruins are more exquisitely situated. The Church was only seven feet shorter than Winchester Cathedral. Well was the spot named Beaulieu.

An uneasy feeling has taken possession of the public mind that the Forest is in danger of being enclosed, or felled, or destroyed. Attempts have been made to establish absolute lordship over parts of it, and though there is little immediate danger of destructive change no one knows what form these claims, inquiries, and investigations may any day assume. The best guarantee for the preservation of the Forest is that so large a proportion of the area known as the New Forest is covered with such very young timber that it would not be worth while to stock it up, and nothing of the kind is likely to be attempted for years. The older timber might, it is true, be cut down and the beauty of the scenery destroyed for a century or more—assuming that the removal of the better grown timber would not be the first step towards the cultivation of the land on which it grew. Fears for the New Forest may have been unnecessarily aroused, and there may be little immediate prospect of destructive change, but the time must not be allowed to slip before it is too late to assert the claim of the nation to what remains of the Forest. No one could otherwise tell when the loveliest woods in the South of England still open to the public might be closed against visitors, and converted into private property, and no one knows when the most charming woodland scenery, the most beautiful heaths the eye could rest upon, may be spoilt by the hand of man and his so-called improvements. Timber of comparatively small size is constantly being cut, both on Crown lands and on the estates of local magnates, and as long as this thinning is not carried too far, no fault need be found; indeed it is a positive advantage to keep trees from being too thick. But in wandering through the New Forest, it has often pained me to see hundreds of trees lying in all directions. The excuse is that it is necessary to thin the timber. All I know is that, with the exception of some portions, large tracts of woodland are so sparingly covered with timber that on hot days there is hardly any shade. Nothing is easier than to cut down a few thousand young trees and to thin a wood, but it takes twenty years before those remaining grow sufficiently to fill the large gaps made in all directions. So little old timber remains in this country that we must regard with grave suspicion all attempts to remove fine young trees that might some day take the place of the Forest giants whose growth has needed centuries.

If what I have said of the importance of preserving the New Forest in its present state, on account of its charming scenery, historical associations, and advantages as a health resort, is not satisfactory to zealous advocates of economy, who fancy that every foot of waste land should be used to grow food for our vast

and unfortunately hourly-increasing population, let me remind them of a few ominous facts. Were the New Forest cleared, were the 63,000 acres remaining used for agriculture, the produce would not maintain the inhabitants of such comparatively small towns as Bath or Cheltenham. At present half our food comes from abroad, and so rapid is the increase of population that not even the cultivation of all the parks and forests of England would provide food for the fresh mouths we may expect in the next ten years. There is such a thing as being penny wise and pound foolish, and the destruction of ancient woods, and the cultivation of waste places, would be dearly purchased by the increased disease and suffering, and greatly decreased enjoyment of life that would result.

I have not mentioned the Forest pigs—the liveliest and most charming little creatures in the world. In September, when they are running wild, nothing is more amusing than to watch them. Thousands of little fellows, black as ebony, with sparkling eyes full of fun and mischief, career madly about in all directions, intent on getting food, but withal inquisitive to a degree. If you sit down for a few minutes the little fellows are attracted, and first from one quarter, then from another, you see them stealthily approaching until I have counted over 20 a few feet off, gazing with undisguised interest at the intruder. Sometimes they gain confidence, and come sufficiently near to be actually touched; but usually they pull up some little way off, and as long as the person they are watching keeps quiet they feast their eyes upon him, but if he moves they are off like a shot at a speed so little like that of ordinary decorous farmyard swine that one is startled. When out of reach they halt, and in due course recommence their gambols. Truly they are, as Mr. Gilpin, of "Forest Scenery" memory, well said, most intelligent animals, with little tricks and ways that to the lover of Nature are an inexhaustible source of delight.

Woolhope Naturalists' Field Club.

FOURTH FIELD MEETING, FRIDAY, AUGUST 30TH, 1895.

VISIT TO CAERWENT, CALDICOT, AND THE SEVERN TUNNEL PUMPING WORKS AT PORTSKEWETT.

ON Friday, August 30th, on the Fourth Field Meeting of this Club, the ancient Roman town of Caerwent was visited, also the Castle of Caldicot, and the great pumping works of the Severn Tunnel at Sudbrook, in the parish of Portskewett, the Churches of Caldicot and Portskewett being visited *en route*. This extensive programme embraced archæology, ecclesiology, and triumphant engineering science over formidable sources of nature, well within the scope of investigation by a Naturalist's society.

The train, *vid* Grange Court, landed the members at Chepstow Railway Station about twelve o'clock. No delay occurred in filling the four brakes from the Beaufort Arms, and in driving to Caerwent along the course, in places, of the Ancient Roman road, Via Julia, ascribed to Julius Frontinus.

This road originally conducted from Gloucester (Glevum) through the Forest of Dean by Lydney and Chepstow to Caerleon. From this road the summit of the Wyndcliffe 770·5 feet high, is conspicuous on the north-east, and the road is bounded on the right, at the distance of three miles from Caerwent, by the Gray Hill, 900 feet high, on which is a pre-historic stone circle, thirty-two feet in diameter. The large Wentwood Forest occupies the background. St. Pierre Park is on the left, and occasionally a peep is obtained of the fine estuary of the Severn. At the distance of four miles from Chepstow the village of Crick is reached. The large modern house on the right-hand has been attached to the ancient building of Crick Manor House. A chapel with two lancet windows of the 13th century in the east end, a square-headed trefoil window on the south side, and varieties of architecture of the 15th century, the Elizabethan period, down to the bricking up of windows of the present century, adjoins Crick Manor House. The chapel is now desecrated by being used as a barn. Mr. Wakeman tells us that it is enumerated among the Churches of the See of Llandaff in the Bulls of Popes Calixtus, and Honorius, 1119, and 1129.

Crick was held of the Lords of Striguil or Chepstow by the service of half a Knight's fee. From Mr. T. Wakeman's notes on Crick, printed in 1860 for the

Caerleon and Monmouthshire Antiquarian Association, we read that "A Sir William de Deneford held the manor of Gilbert Marshall in 1240, and his name occurs as a witness to one of that Baron's charters to Tintern Abbey," and that Crick came into the possession of De-la-more, or De-Mora of Portscuet in 1321; that Sir John De-la-Moore was Lord of Crick in 1399, and married one of the family of Sir William de Denefords or Dernfords. The arms of the Denefords were azure, three salmons *nayant* in pale argent. It is possible that the sign of "The Three Salmons," with which we occasionally meet in this district, may have its origin from this family coat.

Nicholas Moore, high sheriff in 1639, twice entertained King Charles I. when he was making his head-quarters at Raglan in 1645. On Tuesday, July 22nd, the King left Raglan attended by the Duke of Richmond, the Earls of Lindsay and Lichfield, Lords Digby and Astley, and others, met Prince Rupert, who had crossed over from Bristol, and held a council of war at Mr. Moore's house. On July 24th, he again visited Crick, where the intelligence of the capture of Bridgwater by the Parliamentarians dissuaded him from crossing the estuary. In the *Iter Carolinum*, which accounts for the King's whereabouts daily from January 10th, 1641, to February 13th, 1646 (old style), there is no record of King Charles crossing the channel here, but in *Symonds' Diary*, and in a newspaper of the period, it is recorded that the King "had a very narrow escape of being taken near the Black Rock" at Portskewett. There is written evidence that a party of Oliver Cromwell's soldiers in pursuit of a royalist party compelled the boatmen at the Black Rock to row them over the channel; the boatmen landed their crew on the rocks called the English Stones, then high and dry, it being low water, at least a mile and a half distant from the Gloucestershire coast; on the return of the tide, which rises here very rapidly, the whole party was overwhelmed and drowned. The use of the ferry was henceforth forbidden by Cromwell. It was re-opened in 1718 under the name of "The New Passage," as a distinction from the "Old Passage" from Aust to Beachley 2½ miles higher up the river.

A short distance beyond the fifth milestone from Chepstow the party entered Caerwent.

The members visited by invitation the grounds of Ty Mawr, the Great House, where Mrs. Till exhibited a collection of Roman coins dating from 117 (Trajan) to the die of Urbs Roma and Constantinopolis. The collection was classified by Mrs. Bagnall-Oakeley, and the list is given in *Archæologia Cambrensis*, 1886, pp. 224 to 227. Mrs. Till had also a fragment of a Samian bowl of exquisite tracery, and on the lawn is a small Roman plain column, surmounted by some sculpture of ecclesiastical design, which latter must not be considered coeval, or in any way connected with, the pillar on which it is placed. In the large adjoining orchard is the site of the Roman villa, where was discovered the beautiful tesselated pavement which our members inspected last year in the Caerleon Museum. At the south-east angle of the enclosure is a mound, possibly of observation, and the most important and largest discoveries have been unearthed from this portion of the village. The members left the

orchard by an opening in "The Port Wall" of the ancient town, and traversed the walls on their southern and western sides, finally assembling at the Church.

Caerwent is situated on ground gently rising from 50 feet at the south-west angle of the walls of circumvallation to 95 feet in the north-east angle of the churchyard. Its position, at the distance of two-and-a-half miles from the coast of the Bristol Channel, was taken advantage of by the Roman invaders as a base of operations for their advance into this portion of the kingdom. It is easy to believe, from the character of the intervening plain, that in eighteen centuries much ground has been reclaimed for agricultural purposes, and that the River Nedern or Troggy is the bed of an estuary which, eighteen hundred years ago, was under tidal influence, whence a creek, or Pill—to use the local colloquial expression—may have extended to the walls of Caerwent. The tradition of the proverbial old men is that, a century ago, enormous iron rings for securing ships' cables still existed on the "Port Wall" on the southern side of the village. The Nedern is at the present time but a small brook at least two hundred yards distant from the south-west angle, with every prospect of becoming a rivulet still smaller in volume considering the average daily drainage of twenty-four million gallons from the Great Spring, or "subterranean river" as it is locally called, drawn from a depth of 180 feet by the six gigantic pumps of the Severn Tunnel Works in No. 1 House at Sudbrook, Portskewett.

The ground plan of the walls of the ancient fortification forms a parallelogram with rounded angles, about 500 yards from east to west, and about 390 from north to south. The main road, Via Julia, from Gloucester (Glevum) to Caerleon-on-Usk (Isca Silurum), and thence to South Wales, ran through the centre of the town from east to west, and was traversed at right angles by a road running from north to south. At the present day the south face of the wall is in very good condition, with an average height of 19 feet 3 inches, laid in roughly squared stones on the exterior face, the inner core being formed of larger and roughly quarried stone laid diagonally. On the south side are three pentagonal bastions; these are not bonded into the walls, and are of a later period than the main walls. There are indications of a moat upon the northern side, extending also along the upper portion of the north-western face, now occupied by garden grounds and cottages of the inhabitants.

NOTES ON CAERWENT.

By Mr. James Davies.

At the meeting of the members of the Woolhope Naturalists' Field Club at Caerleon-upon-Usk, in August, 1894, I had the honour of reading a paper upon that ancient city, so much noted in connection with both British and Roman history; and towards the conclusion I read some observations upon the neighbouring station of Caerwent. I have been requested to renew and enlarge those remarks upon the present occasion, respecting the latter city, but I fear that they will prove a very imperfect record of its important history.

The country, which lay westward of the river Severn, was the last which remained for Roman conquest, and when the Britons had retreated to their mountain homes, before the Imperial Standard, the Romans planted fortified camps for the protection of their acquired possessions, and amongst these was that of Venta Silurum, now known as Caerwent, in the southern extremity of the Silurian kingdom—and, as usual with conquerors, roads were constructed for military and commercial intercourse between the several stations. Whether there was an early British town or village at Caerwent does not appear certain, but the probability is that there may have been such, upon which the Romans afterwards erected a larger station, as it was in those days conveniently situated for commerce, there being, as it is said, a small navigable river, the Nedern, the estuary of which afterwards washed the walls of the more important Roman City of Venta Silurum.

The earliest evidence which we possess of the Roman stations in this country is found in the Itinerary of Antoninus, to which we have to refer for the first traces of our history.

According to the Itinerary there were three stations in Britain which were associated with the name of "Venta."

1.—Venta Belgarum at Winchester on Iter VII., which lay on the road leading from Clausentum, near Southampton, to Londinum (London).

2.—Venta Icenorum, near Caster, in Norfolk, on Iter IX., which lay on the road leading thence, passing Sitomagus, near Thetford, to Londinum (London).

3.—Venta Silurum, at Caerwent, on Iter XIV., which lay on the road leading from Isca Silurum at Caerleon, passing Venta Silurum, thence Abone on the north of the river Severn, near Chepstow, Trajectus on the south side of that river, thence to Aquæ Solis, at Bath, passing Verlucio, near Warminster, Cunetio, near Marlborough, Spinæ, near Spene, and to Calleva Attrebatum, near Silchester, where it appears to have united with Iter VII., connecting Clausentum, near Southampton, with Londinum. In a commentary upon the Itineraries of Antoninus, by William Burton, published in 1658, the author gives the following pithy remarks upon this station:—"Venta Silurum. I before gave notice that there were three Ventas in this Itinerary; one of the Belgæ and one of the Iceni, and this last is attributed to the country of the Silures. Tacitus names them in an old copy. The nation of the Silures was charged with no fierceness, nor with clemency, but that they would exercise war. And in the life of Agricola that the Silures passed into Britain, he conjectures, as a colony of the old Iberi, that, saith he, their coloured looks and curled hair for the most, and their situation over against Spain, cause a belief that the old Iberi passed over and possessed those places. And in the same book Julius Frontinus sustained the brunt, a great man, as far as he might, and overcame in arms the strong and stout nation of the Silures. Ptolemy made the Demetæ the utmost people of the island towards the west, and the Silures after them more to the east. Amongst them is the Wye, or Vaga, the limit betwixt the Gloucestershire and Monmouthshire men. In former times this city was called Caerwent."

It may be here observed that the Demetæ were the inhabitants of the south-west parts of Wales, now known as Pembrokeshire, Carmarthenshire, and probably a portion of Cardiganshire, and the name is evidently a Latinised form of the ancient British "Dyfed," which sometimes meant South Wales generally.

With respect to the origin and derivation of the word "Venta," various opinions are current. One speculation is that it may have been derived from the Veneti of Armorica, consequent upon the Armorican invasion of parts of Britain. The name of "Venta" was the origin of the English Winchester—the Venta Belgarum of the Romans—as also of the Welsh Caer Gwent, or Caer Went, and these two names were similar, the English "Ceaster" or "Chester" being synonymous with the Welsh "Caer." The same similarity exists in the two names of Leicester and Caerleon, both signifying "Civitas Legionum."

There is another theoretical speculation which has suggested itself. At the Congress at Manchester of the British Archæological Association in 1894, Dr. Phené, in a paper upon the roads of pre-Roman origin, endeavoured to show that the roads of Britain were of pre-Roman formation, and that the occupation of Britain was for commercial purposes, and that the pre-Roman roads of ancient Italy bore exactly the same peculiar features as the early roads of Britain. There was evidence, he stated, of two distinct Italian tribes—the Venones and the Senones—located in Britain long prior to the Roman Conquest, sufficient to prove Italian occupation at a very early date. These Italian colonists the Venones, had their meeting places for commerce at the intersection of the ancient roads, as at Winchester and other places.

One stronghold of the Venones was in the Forest of Arden, and that name followed the course of these people through the Continent to Rome. It was applied to vast woods near which they were located, and was the old Italian word "ardente" (burning), which showed their traffic by smelting, and near those places crucibles for such purpose have been found.

The prefix of "Venta" may have had its origin in the lingering recollection of the Venones.

In the year 1885 the members of the Cambrian Archæological Association, during their annual meeting at Newport, visited Caerwent; and the company who attended had an opportunity of examining the remains of this ancient city, which consist principally of the walls which could be traced the whole way round the city. They formed a somewhat irregular parallelogram, the north and south walls being about 500 yards in length, and the east and west 390. There was a tradition that Caerwent was once a seaport, and that the Nedern, a small rivulet flowing in an adjoining field, was once a tidal river, and that vessels came up even to the walls of the city. Some of the old inhabitants had it on tradition that there were iron rings in the walls to which the ships were fastened, and some asserted that they had seen them, and described them as being about ten inches or a foot in diameter, but very much corroded.

It is recorded in the account of this visit in the *Archæologia Cambrensis* for 1885, Vol. 2 of 5th series, that in the year 1786 Sayer, the historian of Bristol, visited this place, and stayed some time making careful notes. He found in the

south-west angle remains of cross walls, which occupied considerable space, and that at that time lime kilns were in active work, and much of the walls were remaining. The cross walls were being taken down at the time he wrote, and being burnt for the sake of the lime. Many tesselated pavements had been found—three in 1689, another in 1777, in the south-east angle, and another in 1830.

In the month of September, 1893, a very interesting discovery was made of the foundations of a Roman villa, near Caerwent Church, and by the side of the road from Chepstow to Newport. It appears that whilst digging the foundations for some cottages about to be erected, the workmen came in contact with some mosaic pavement, which proved to be a portion of a Roman villa of considerable size. In reply to a letter by the editor of the *Archæologia Cambrensis* to the architect, Mr. Milverton Drake, that gentleman reported that the excavations were not on a large scale, but sufficient had been opened to show that they were on the foundations of a very extensive building, having a frontage of little short of 100 feet—that there were remains of a good mosaic floor, and that coins and pottery were plentiful in the vicinity.

The general arrangements, as indicated by Mr. Milverton Blake, were as follows:—The vestibule, with a mosaic floor, was approached by two steps, and was 88 feet 5 inches long. One one side was a flue, or drain, right against the wall, formed of freestone slabs at the bottom and side, away from the wall. The bottom of this drain was 3 feet 4 inches below the top of the wall, which was then standing. The walls of the rooms were of coursed masonry, 1 foot 6 inches thick. On the other side of the vestibule three rooms and a passage had been uncovered. The first room, next the entrance to the vestibule, had a mosaic floor, and measured 20 feet by 20 feet; the second room measured 27 feet by 20 feet; then came a passage 8 feet wide, and beyond, a small chamber only 10 feet 6 ins. wide.

In 1855 the Monmouthshire and Caerleon Antiquarian Society made some interesting discoveries, an account of which was contributed to the 36th Volume of the *Archæologia*. In addition to pavements, pottery and coins have been discovered, and a large number were exhibited in the temporary museum at Newport during the meeting of the Cambrian Archæological Association in 1885.

In the *Archæologia Cambrensis* for 1851, Vol. II., new series, there is a record of a large discovery of Roman coins at Caerwent, near the churchyard, and between the roads leading to Newport and Usk. They were said to be of debased metal, and of the reigns of Gordian III. and Philip the Arabian, A.D. 240.

In the "Life of St. Beuno," by the Rev. W. J. Rees, there is a reference to Caerwent. Beuno lived in the sixth century, and was placed for education with St. Tangusius, who lived at Caerwent. Here he obtained a knowledge of the Holy Scriptures and of the Rules and Services of the Church; and Ynyr Gwent, who was king of that country, observing that he was humble, chaste, and generous, and keeping the commandments of God, became a disciple of Beuno, and granted him three estates in Ewyas, in Herefordshire, where Beuno erected a Church, which at the present day can be identified under the name of the parish of "Llanveyno."

In the *Archæologia Cambrensis* for 1886 (Vol. III. of 5th series) there is a very interesting contribution to its pages, which gives a detailed account of the Roman coins found at Caerwent and Caerleon, which extend over almost the whole period of the Roman occupation of this island, and, as the author (Mrs. Bagnall-Oakeley) states, tend to prove that the Second Legion was not withdrawn from this district until the final departure of the conquerors took place. These coins include a considerable number of those of the usurper Carausius, who probably had his head-quarters at Caerleon, and knew that the Second Legion was to be relied upon for his protection. He usurped the Imperial power in this island A.D. 288, and after reigning about seven years was killed by his minister Allectus, who held the government of this island, as his successor, for three years. Coins of Allectus, as well as Carausius, have been found at Caerwent and Caerleon, and are included in Mrs. Bagnall-Oakeley's list. In the work entitled "Roman Britain," by the late Prebendary Scarth, the writer informs us that during the usurpation of Carausius and Allectus, gold, silver, and brass coins were struck in great numbers in Britain, and that they bear the mint mark of "M.L." denoting that they were coined at London. There were others coined at Rutupiæ and Clausentum, but the mint mark of London occurs most frequently.

In the neighbouring Forest of Dean the Romans worked mines of iron ore, as appears from the beds of scoriæ and cinders, as well as hand bloomeries and ore imperfectly smelted, which are said to have been found there, in addition to Roman coins and fragments of pottery. There is, likewise, evidence of a Roman road through the Forest, apparently connecting Venta Silurum either with Ariconium, near Ross, or Glevum, at Gloucester, which joined the Iter XIV. somewhere eastward of Chepstow.

These associations with our ancient Roman stations evince that there was a considerable trade with the Britons in connection with their ironworks; and their lead, copper, and tin works were commercially valuable. The trade in tin was known centuries before the arrival of the Romans. Pytheas the oldest geographer who wrote of the north and west of Europe lived 320—330 B.C. He travelled to the south of Britain, and his travels resulted in the commencement of a commerce with the merchants of France and Italy.

The study of the history of such an ancient locality as Caerwent, although it is now only a small village, affords a mental reverie which is both instructive and pleasurable. We come to the just conclusion that the history of our land is a truly wondrous record of the mysterious preparations of Providence for the benefit of futurity.

The Conquest of Britain by the Roman forces introduced an improved civilisation to our ancient British ancestors. It instructed them in the arts of war and peace. It led to the erection of cities, with buildings of a far superior character to the wattle and daub huts of the natives in their secluded hills, woods, and morasses. It established a system of laws, the remains of which may yet be seen, and taught a literature previously unknown in the national lore. Above all, in the combination of the divine arrangements it was the indirect

channel for the introduction of a revealed religious faith, so that we can well appreciate the words of one of the most eminent of Welsh historians, now deceased, when, in allusion to these combined circumstances, he exclaims in his own bold and racy language, "Meddyliaf gwelaf y llaw Rhagluniaeth yn agored y ffordd i efengylu Brydain" (I think I see the Hand of Providence opening the way to evangelise Britain).

The thanks of the Club are accorded to Mr. James Davies for his paper.

Caerwent Church stands upon the highest part of the village. The northern walls of the Churchyard are covered with a profusion of the Scale fern (Ceterach officinarum). On entering the churchyard an elegant monument in the north-west angle attracts the eye. It is a white marble column, around which are a moulded cable and anchor, to the memory of Thos. A. Walker, the indomitable contractor, who undertook, under Sir John Hawkshaw, the charge of the Severn Tunnel works in 1879, at the period when, after seven years' labour, the whole of the works were inundated, and who carried them to a successful completion until they were opened for goods traffic on September 1st, 1886, and for passenger traffic on December 1st. He died 25th November, 1889. On the north side of the Church is a large porch entrance to the nave; the massive and strongly-built tower at the west end suggests its use as a military tower of observation and of defence; the foundation stone at the south-west angle measures 7ft. 3in. in length, 3ft. 3in. in width, and the sexton gave the information that it had been found to be as much as a yard and a half in depth. About thirty-four years ago there were four bells in the tower, when the belfry was destroyed by fire. There is now only one bell. On the south side the most conspicuous object is the support of the nave walls by three massive buttresses. The sexton stated that, when digging graves on the south side of the churchyard, he frequently comes across foundations of old buildings. In 1893, at a depth of five feet, a Roman pavement was discovered which appeared to run under the south wall of the chancel.

In the Church is a carved oak pulpit bearing the date 1632; a rough representation upon its central panel of Llandaff Cathedral, the arms of Sir Charles Williams, of Llangibby, and an inscription from 1st Corinthians, ix, 16—"Woe is unto me if I preach not the Gospel." The parish register dates from 1752. So soon as the party had assembled within the Church, they had the pleasure of hearing the following remarks on

ST. STEPHEN'S, CAERWENT.

By Mr. F. R. Kempson.

This Church is peculiar for its great length of chancel in proportion to the nave, the chancel being 37ft. 6in. long, and the nave 40ft. 6in. The chancel inclines considerably to the north.

In the south wall of the chancel there is an arcade of three arches which span about 9ft. each and are carried on piers which are more than 3ft square, the piers being built with dressed quoins with a very simple impost moulding. The first two stones of the arches are in dressed stone, forming skewbacks for segmental arches, which are built with thin rough masonry. This arcade has been frequently pronounced to be Roman. I see nothing whatever in the arches, or the piers, to confirm this view. I think the piers, which are some of them stop-chamfered, and the springing stones of the arches, which are also stop-chamfered, are early mediæval work which carried pointed arches, and that the upper portion of the wall, including the segmental arches, has been subsequently rebuilt.

The east wall of the chancel is 3ft. 6in. thick. It has good plain buttresses of thirteenth century character, and is lighted by two lancet windows with cusped heads, the lights of which are rather unusually wide, but very graceful, particularly so from within. The sill of one (the northern) of these lancets is higher than the other.

In the north wall there are three lancets somewhat similar to those in the east end, but they have been tampered with, and, I think, probably rebuilt, together with the whole of the north wall of the chancel, which is only two feet thick. These windows are not particularly graceful from within, and are ugly from without.

The chancel arch has a span of about 14 feet; it is beautifully moulded and is probably coeval with the eastern lancets.

In the nave we are struck with the great height as compared with the width and length. I think it was originally roofed at a lower level.

The south wall is the oldest part of the nave. It is about three feet six inches thick, and, I take it, of thirteenth century construction. In it there are two arches, each having a span of seven feet six inches, and separated from each other by a blank pier, or piece of wall twelve feet long. This interesting and peculiar construction I have never met with before. The arches must, I think, have served as entrances to chapels, or, perhaps, more probably to a narrow passage aisle. The ground should be carefully explored on the south side of the nave and chancel, by which means there is no doubt many doubtful points could be cleared up. I think the great buttresses on the south side of the nave are comparatively modern, and that they were rendered necessary in consequence of the effect of the thrust of the roof on the south wall.

The north wall of the nave seems to vary a little in thickness, and was, I think, entirely rebuilt in the fifteenth century. The base of this wall runs through from the quoins to the jambs of the doorway. The window westward of the porch is of simple but good design; the window eastward of the porch is beautifully moulded within and without; the tracery and all the details are remarkably good, and, although so dissimilar, I believe these two windows to be of the same date.

The stoup which is in the nave, on the east side of the entrance doorway, is an indication that the porch was not contemplated when the north wall was

rebuilt. I have no doubt, however, that the porch, which is a remarkably fine one, was added almost immediately afterwards. In order to construct it, the masonry comes awkwardly close on to the jambs of the windows. The side walls of the porch are built quite in a different style of masonry; none of the courses join those of the nave wall, and, although there was a stoup inside the nave, a second one was added in the porch.

The doorways and stairs, as well as the window to the parvis, are all complete, and the recess for a figure is there also, but the floor has been carried away.

The entrance arch to the porch is beautifully moulded, and the outer member has been elaborately cusped.

The tower, which is a good late 15th century addition, is very similar to other towers in the neighbourhood. It is divided from the nave by a lofty fine arch. The entrance to the belfry stairs was formerly from within. The western doorway, which has a depressed arch, is blocked up. The battlemented parapet has lost its pinnacles.

The font is large and peculiar, being hexagonal in form; the mouldings are, I consider, very impure. To my mind it is disappointing, not beautiful, and of very doubtful date.

The roof of the chancel is modern, but the nave and porch still retain their old timbers in a barrel form, although concealed from view by plaster.

Leaving Caerwent by its eastern gate, the drive was resumed southwards, and over the Nedern brook to Caldicot, distant about a mile and a half. Immediately before entering Caldicot village, the masonry and architecture of Upper House on the left, and of Church Farm on the right, indicate a suspicion of monastic connections. The pretty and carefully-tended churchyard, entered by a handsome lych gate, was much admired. This Church is always open for daily service, and there are, in addition to this parish Church, two mission Churches. The population is about 1,300. The Church was restored in 1858. The parish register dates from the year 1716. The members were received by the Rev. Frederick W. Clarke, and the party was again favoured by Mr. Kempson, who gave the following description:—

ST. MARY'S CHURCH, CALDICOT.

The tower is placed between the nave and chancel, and is separated from them by remarkably fine arches. The lower portion of the tower is of 13th century date. The north wall of the chancel is probably of coeval work. The south wall has two wide and peculiarly treated late 14th century two-light windows, between which there is a priest's door of the same date. The east window and buttresses are of 15th century character, as is also the top of the tower. The nave is lighted on the south side by two windows of 15th century character, one of which is peculiarly treated, while both of them are in every way good. The west window of the nave has three lights. In other respects it is

exactly similar to the south windows of the chancel. The arcade has been carefully repaired; the north aisle has been rebuilt, and seems to have been shortened a little at the east end; the vestry on the north side of the tower is modern.

The porch is of great beauty; the main archway is remarkably fine. A portion of a recumbent figure has been ingeniously built into the south-east jamb of the main entrance. It is said to be a figure of the founder, and has always been called "Old George." There are steps and doorways leading up from the inside of the porch. I think they cannot have led to a parvis, or chamber, because of the great height of the porch archway. The stairs probably led to a gallery, or wide platform, over the entrance to the church from the porch, which has a low arch, and the object of this gallery was probably for dressing the figure of the Blessed Virgin in the niche over the entrance.

On the eastern jamb of the entrance doorway may be seen cut the dedication cross in the form of a crucifix. There is a fine peal of bells, eight in number, of which one is stated to be pre-Reformation, marked in old English type, + In honore Sanctæ Mariæ.

I have seen it stated that "two parts" of the tithes of Caldicot were given by Milo Fitzwalter, created Earl of Hereford, to the Priory of Llanthony, near Gloucester, in the year 1137.

There are two separate piscinas in Caldicot Church almost close together, one recessed in the south wall of the nave near the east end, and the other close to it in the sill of the window. Either of these would be convenient for a nave altar, but I cannot account for both being placed so near together as they are.

Leaving Caldicot Church, the members walked to Caldicot Castle, where they would gladly have spent a couple of hours. The owner, Mr. J. R. Cobb, F.S.A., had very kindly thrown the gates open in the absence of the family who reside here in summer; the drawbridge, working on a central axis, was lifted, and a very pleasant half-hour was passed in the inspection of the ruin, which has fortunately fallen into the custody of an antiquary, under whose hands it has been judiciously treated. The masonry of the entrance gate was much admired. Mr. Cobb had sent a draft of a pedigree of owners of Caldicot Castle and manor, owners of Brecon manor, and constables of England, commencing with Algerus, stalher * to Edward the Confessor, to the present date. The 3rd Humphrey de Bohun married Margaret, eldest daughter of Milo Fitzwalter, in 1170, and from that time to 1531 their descendants, High Constables of England, held the Castle. The antiquaries, Mr. Wakeman and Mr. Octavius Morgan, were of opinion that the Keep of the Castle in the north-west angle of the enclosure, undoubtedly the oldest part, was built by Milo Fitzwalter, Earl of Hereford, 1144, but Mr. Cobb considers that is too early a date. It is curious and unfortunate that this Castle should not be mentioned in Mr. George T. Clark's book on "Military Mediæval Architecture." There is a good paper contributed in 1850 to

* Stalhere, Stalher, or Stalre signifies a constable or master of the stable.

the Caerleon and Monmouthshire Antiquarian Association by the late Octavius Morgan and Mr. T. Wakeman, and in "The Marches of Wales," published in 1894 by Chapman and Hall, Mr. Charles G. Harper gives sketches and descriptive history.

King Henry VIII. made Caldicot Castle parcel of the Duchy of Lancaster, by whom it was sold in 1857, and purchased by Mr. J. R. Cobb, the patriotic purchaser of *The Foudroyant*.

A drive of about three-quarters of a mile brought the party to the village stocks, at the entrance to the churchyard at Portskewett, where they were met by the Rector (the Rev. W. H. Williams), who pointed out the principal features. The Church is dedicated to Saint Mary, and its parish register dates from 1593. In the northern end of the churchyard is a leaning shaft of an old cross. Mr. Kempson made the following remarks:—

PORTSKEWETT CHURCH.

The nave and chancel are no doubt Norman, with later insertions; the south doorway is Norman, its tympanum and jambs are thickly covered with plaster and whitewash; the north doorway has a fine tympanum, with Greek cross in the centre, and cable moulding across the opening. There is a dedication cross, placed saltire, cut in the right jamb, and two incised crosses on the left jamb. The north window of the chancel is Norman, as is also the fine chancel arch. There is a peculiar shallow recess on the north side of the chancel near the floor line, and there is a set off inside all along the north side of this wall. All the other windows are later additions, and are good in detail. The tower, which is small, is quite characteristic of the neighbourhood. The font, which is in the nave, is an old one of a good type; but the original font, which is absolutely plain, was found in a broken condition built in a wall at some distance from the Church. It was a square font, like many in Pembrokeshire, and I believe it is coeval with the Norman Church.

In a field on the west of the churchyard are mounds and irregularities of the surface, which traditionally represent the site of King Harold's hunting-lodge.

This district between the Wye and the Usk, called Gwent, passed through rough times after the departure of the Romans. Its position on the Severn estuary exposed it to the numerous plundering expeditions of the Danes. In *Liber Landavensis*, p. 545, we read of Gruffydd and Irish pirates, according to Florence, crossing the Wye and burning "Dymedham" (see *Freeman's Norman Conquest II., App. P.)*, and in the Saxon Chronicle is the following entry:— "Anno. 1065. In this year before Lammas, Harold the Earl ordered a building to be erected in Wales at Portskewith *after he had subdued it*, and there he gathered much goods, and thought to have King Edward there for the purpose of hunting; but when it was all ready then went Caradoc ap Gruffydd with the whole force which he could procure, and slew almost all the people who there had been building." Harold annexed this district to his earldom of Hereford. After the Norman Conquest it fell into the hands of William Fitz-Osborn, created by William the Conqueror Earl of Hereford and Lord of Gwent.

The *Gwentian Chronicle*, or "Brut y Tywysogion" of Caradoc of Llancarvan, who died in 1157, has the following extract:—

"A.D. 795 the Black Pagans first came to Britain from Denmark, and made great ravages in England; afterwards they entered Glamorgan, and killed and burnt much, but at last the Cwmry conquered them, driving them into the sea, and killing many of them, and thence they went to Ireland": Again: "A.D. 893 the Black Pagans came to Wales over the Severn Sea, burnt Llanelltyd the great, and Cynfig, and Llangarvan, and Gwent, and Brecknock, and Buallt, and during their return through Gwentllwg whilst ravaging Caerleon-upon-Usk, Morgan, Prince of Glamorgan fought a battle with them, and drove them over the Severn Sea into the Summer country (Somersetshire?), where many of them were killed by the Saxons and Britons of that country."

A short drive soon brought the members to Sudbrook.

Sudbrook, or Southbrook chapel, in the parish of Portskewett, also formerly called Trinity Chapel, was formerly the chapel to a mansion long since demolished. A portion of its churchyard has been washed away by the high tidal waves of the River Severn, and the same fate would probably by this period have befallen the ruins themselves had they not been protected by a new embankment formed of the tilted *débris* from the Severn Tunnel excavations. The staff of the Great Western Railway Company have still further displayed their conservative disposition by fencing the ruins with an iron railing. Within the railed enclosure is the basement stone for the shaft of the churchyard cross. The chapel consisted of a nave, chancel, chancel arch with a bell turret for two bells, and a south porch, all built in the Early English style. Its situation is in the east end of the ditch of a bow-shaped entrenchment, whose southern face, exposed to the tidal waves of the Severn, has been completely washed away. The ramparts are about 20 feet high, the length of the arc is about 200 yards, its greatest distance from the river being at the present period about 80 yards. At the north-western extremity there is a triple line of ramparts terminating at what was probably the only entrance from the land side on the northern exposure. Irregularities of the ground beyond the western face indicate the existence of farther outlying covering works of defence. The word Sudbrook probably is derived from Sud-burgh, the southern fortification.

Sudbrook is occupied by the Severn Tunnel Pumping Works, which form the subject of a separate paper.

Mr. A. E. Boycott contributes the following list of snails he found at Caerwent:—

Helix aspersa, Tachea nemoralis (vars. *Castanea* and *mista*), *Fruticicola hispida, Patula rotundata, Anianta arbustorum, Hyalinia cellaria, Hyalinia nitidula.*

A list of the party attending is now given: The President, Rev. M. G. Watkins, Vice-President, Mr. James Davies. Members: C. G. Blathwayt, Major J. E. R. Campbell, J. Carless, Rev. W. S. Clarke, R. Clarke, J. Trueman Cooke, G. Davies, Rev. E. R. Firmstone, Charles Fortey, Iltyd Gardner,

Rev. J. E. Grasett, G. H. Hadfield, Rev. C. Harington, J. W. Hinings, Rev. E. J. Holloway, Rev. M. Hopton, F. R. Kempson, Rev. Preb. W. H. Lambert, Rev. H. B. D. Marshall, Rev. M. Marshall, Rev. H. North, W. Pilley, J. Probert, J. Riley, C. Rootes, M. J. G. Scobie, Rev. H. C. Sturges, H. G. Sugden, Rev. F. S. Stooke-Vaughan, H. C. Moore, Hon. Sec., James B. Pilley, Assistant Secretary, and the following visitors:—F. L. Blathwayt, A. E. Boycott, W. J. Boycott, H. J. Davies, Rev. T. W. Davies, — Davis, from Malvern, C. F. Hadfield, Walter Hall, from Sheffield; J. M. Holmes, F. D. Jones, C. W. E. Kempson, E. F. Mitchell, James Nott, from Malvern, O. C. H. Riley, Rev. A. Sturges, Rev. F. H. Tatham, and H. E. Wood.

THE SEVERN TUNNEL PUMPING WORKS.

By H. Cecil Moore.

Sudbrook, in the parish of Portskewett, is occupied by the Severn Tunnel Pumping-Works, the largest concentration of pumping works in the world, their pumping capacity being calculated to discharge 66 million gallons in 24 hours. The question naturally occurs:—wherefore this enormous pumping-power?

Although there did occur occasionally during the construction of the tunnel some inflow of Severn water, it is satisfactory to learn, on the authority of Mr. Chas. Richardson, the acting engineer, dated June, 1889; "there is now positively *no* leakage from the River Severn." During the first six years of tunnelling under the river, everything had been progressing very satisfactorily. The key to the whole undertaking appeared to have solved all doubt as to its practicability, from the fact of solid hard Pennant rock underlying the 300 yards of deep water at *low* tide in the "Shoots" channel on the Monmouthshire side, and extending far beyond the channel, than which a stronger material, or one through which it would be more safe to carry the tunnel could not have been desired. An unforeseen and most formidable difficulty was encountered on the land side at Sudbrook, at a distance of 400 yards from the margin of the river. On October 16th, 1879, a big fresh water spring, appropriately called a subterannean river, was tapped, which rushed in at the rate of 6000 gallons a minute, and flooded the whole works for fourteen months. This proved to be an immense body of water which has its gathering ground in adjacent high hills. Even after the completion of the tunnel in the end of the year 1885, such serious damage was done to the brickwork from the surrounding water-pressure, amounting to nearly 60 lbs. upon the square inch, that security could only be obtained by continuous employment of pumping power, in order to relieve the water pressure. Hence will be seen the necessity of this large concentration of pumping power, involving an expenditure of about 40 tons of coal daily, and a staff of about ninety men.

Mr. Richard Hosken, the superintendent of the works, met our party and conducted them to the office, upon the walls of which were displayed elaborate plans and sections of the tunnel. Outside the office door was a fine fossil Reed, or Calamite, 3 feet 3 inches high whose longest diameter at the base was 18 inches, and 10 inches at the summit. Close to it stood a Stigmaria, 10 inches high, 11 inches at the base, and 5 inches at the summit. Both these specimens had been met with in the Coal Measures of the excavations.

From the office Mr. Hosken conducted the party to the huge building called No. 1 House, which covers six powerful pumps and their machinery. Iron staircases conduct to a platform above, where are seen six gigantic engine beams, each 35 feet in length, with a parallel motion attached to each end, which parallelizes the path of the piston and pump rods. Of the six pumps three on one

side are plunger-type, and on the other side are three drawing lifts, or bucket pumps. These pumps, in conjunction with others at different situations, have sufficient capacity to pump out the whole of the water that ever could come into the tunnel during the wettest periods, and leave a large and ample margin for break-downs or any other contingency. Whilst some, perhaps at times only three, are in use, the remainder are kept in reserve for contingencies. The engines are similar and all their parts are duplicates, so that any one piston rod or valve will serve for either engine. When repairs are necessary, huge machinery can be transported to its place by a powerful traveller which traverses the engine house in its entire length. Only a few weeks ago one of the huge 35 feet beams was placed in its position without for one moment stopping the usual daily pumping operations of the contiguous engines.

Each of these six pumps is capable of raising five million gallons a day. The scrupulous cleanliness, the smoothness of working, and the small amount of vibration were specially remarkable.

The power, description, and situation of the whole sixteen pumps employed is given in detail in the following table kindly furnished by Mr. Hosken.

		Cylinder. Diameter.	Pump. Description.	Pump. Diameter.	Pump. Stroke.	Gallons per Stroke.	
(29-foot shaft.) Sudbrook.		Inches.		Inches.	Feet.		
No. 1 House ...	1	70	Bucket	34	9	336	
	2	70	,,	34	9	336	
	3	70	,,	34	9	336	Fresh Water Spring, 180 feet deep.
	4	70	Plunger	12 / 35	9	42 / 356	
	5	70	,,	35	9	356	
	6	70	,,	12 / 35	9	42 / 356	
Iron Pit, Sudbrook .. No. 2 House. .	7	75	Bucket	35	9	356	Tunnel Drainage 220 feet.
	8	50	Plunger	26	10	218	
	9	50	,,	26	10	218	
12-foot shaft, Sudbrook ... No. 3 House...	10	70	Plunger	37	10	442	Tunnel Drainage 220 feet.
Miles Chains 5 4	11	65	Bucket	34	9	336	Drainage, 160 ft.
	12	65	Plunger	35	9	356	
Benacre ...	13	22	Plunger	20	6	78	Open Cutting Welsh Side 80 ft.
	14	22	,,	20	6	78	
Gloucestershire side. Sea Wall ..	15	41	Bucket	29	9	244	Open Cutting English Side 100 ft
	16	41	Plunger	29	9	244	

As before stated the pumping capacity of the whole machinery is equal to 66 million gallons in the 24 hours; but the maximum amount hitherto pumped in one day has been 32 million gallons, or 145,000 tons.

For this enormous discharge there are three outlets. Mr. Hosken took us to view one connected with the fresh water discharge from the subterranean river, which, at that time, was calculated to be discharging not more than 14 million gallons in the 24 hours. It presented a fine rush of water over a waterfall eighteen feet in width. This outlet is the *fresh* water discharge, the "Big Spring" water: it has discharged as much as 20 million gallons in 24 hours. The 5 miles 4 chains pumping station has a separate discharge; this is the water from the open cutting, and the percolations through the brickwork up to this point. There is also a separate discharge for the water from the 5 feet barrel tunnel drainage, which is pumped from Nos. 2 and 3 houses. There are also two engines at Sea Wall on the Gloucestershire side with a separate discharge.

It must not be supposed that all the fresh water is allowed to run to waste in the River Severn. Neighbouring villages, for a distance of five miles, whose wells have been dried by this incessant pumping receive a supply from Sudbrook in iron pipes. We shall not be surprised to hear at any time of its use as energy for the creation and supply of electricity.

Mr. Hosken had kindly made arrangements for such visitors as were so disposed to descend the shaft in parties of five at a time. Accompanied by a guide, and protected with overcoats and sou'westers, several made the descent, saw the great underground river, and thence entered the tunnel, the whole process of descent, exploration, and ascent, occupying about twenty minutes.

The boiler department was inspected. Here two main steam pipes connect the boilers with the engines. These pipes are arranged with sluice-valves so that the engines can be worked singly or altogether. Other machinery was also visited, including that connected with the working of the huge Guibal Fan, 40 feet in diameter and 12 feet wide, which successfully ventilates the tunnel.

Through the influence of Mr. Hosken we have obtained permission of the Great Western Railway authorities to re-produce the accompanying plan and section of the Severn Tunnel, an examination of which is recommended in order to fully understand the various geological strata met with in its construction.

An inspection of the plan shows that the width of the river is 2¾ miles. The section shows that at low water the river is entirely confined to the "Shoots" channel, on the Monmouthshire side, only a quarter of a mile at the top, and 300 yards at the bottom. The remaining two miles are occupied by the half-tide rocks, a mile and a half wide, on the Gloucestershire side, called the "English Stones," and by the "Lady Bench" rock on the Monmouthshire side, half-a-mile wide.

The important question requiring solution for the practicability of the whole scheme was the nature of the formation underlying the 300 yards of deep water in the "Shoots" channel. It was accordingly proposed to sink a shaft through the low water rocks of the Lady Bench, close to the edge of the "Shoots." This met with such strong opposition from the local navigation board that the shaft

was placed on shore at Sudbrook at the distance of half-a-mile further from the "Shoots." The sinking of this shaft was commenced in March, 1873.

The most important geological sections recorded below, are from a paper in the proceedings of the Geological Association, Vol. VII., by Mr. Evan D. Jones, sometime assistant engineer in the works, as quoted in Professor C. Lloyd-Morgan's pamphlet, on the Severn Tunnel Sections.

SHAFT No. 4 OR THE SUDBROOK SHAFT.

		Feet.
	Fine Sand and Gravel	7
Trias	Yellow Sandstone	13
	Red Marl (very hard)	65
	Dolomitic Conglomerate	4
Carboniferous	Pennant Grit	19
	Lower Coal Measures (Clay Shales, 25 feet; Coal Shales, 10 feet)	35
	Millstone Grit	11
	Shales (very hard)	6
	Limestone and Shales	14
	Red Sandstone (hard and close grained)	26
		200 feet

Bottom Heading:—driven *horizontally* from the above Shaft.

		Yards.
Carboniferous	Red Sandstone (same as in the bottom of shaft)	40
	Limestone and Shales	90
	Shales	40
	Millstone Grit	40
	Lower Coal Measures (Coal Shales, 30 yards; Clay Shales, 70 yards)	100
	Pennant Grit	1,600
	Upper Coal Measures (broken by Fault)	400
		2,310 yards.

Trias ... All beyond the Fault to the mouth of the tunnel and cutting on the Gloucestershire side.

It fortunately happened that the Pennant Rock rapidly thickened downwards, with the result that for a mile under the river, including the part under the "Shoots" channel, the tunnel was driven through this hard rock.

The conception of the tunnel scheme is due to Mr. Chas. Richardson, C.E.,* a pupil of the elder Brunel during the construction of the Thames Tunnel in 1848. Mr. Richardson, whilst engaged in the Portskewett Ferry connection between Bristol and the South Wales Union Line, had numerous opportunities of studying the swiftly rushing currents and other objections to a bridge over the estuary here. In 1871 his plans were deposited, not for the first time, in Parliament. In 1872 the Act passed the House of Lords, and in March, 1873,

* Mr. Charles Richardson died, aged 81, at Clifton, on 10th February, 1896.—Ed.

the Great Western Railway commenced the work, as before stated, by sinking the shaft at Sudbrook.

Under the surface soil and some dirty gravel, was a 5 feet bed of fine sand, and beneath this a bed of Yellow Sandstone rock which forms the Sudbrook cliff, the upper part of which was found riddled with pot-holes, some of them being four or five feet deep and only six inches in diameter, all filled with fine sand.

When the shaft had reached far below the low water level of the Severn, some fresh water springs quite pleasant to the taste were intercepted. When collected in wells they were found to be influenced by the tides of the Severn, the rise and fall being nearly two hours after that of the river.

In December, 1874, the heading from the Sudbrook shaft towards the "Shoots" was begun. The mixed bed of Coal and Shales was troublesome heavy ground, so that the heading here had to be double timbered and floored, which made it small and low. Some copious springs were afterwards found in the Pennant rock, so that, in order to prevent flooding of the pumps in the event of a breakdown, a strong flood door sufficiently large to admit the passage of the trolleys, with a 12-inch sluice-valve was built in it at a distance of 340 yards from the shaft.

After passing the "Shoots" the heading emerged into the upper Coal Shales, thence through two small beds of coal, until it came to a vertical Fault at a distance of 2180 yards from the shaft, then suddenly entered the New Red Sandstone, and finally the New Red Marl on the Gloucestershire side.

In August, 1877, about 1600 yards of 7 feet square heading had been driven under the river, and a second shaft, afterwards known as the "Iron Shaft," had been half sunk for permanent drainage pumps. About this period two other shafts, called the "Marsh Shaft" and the "Hill Shaft" *(see Section)* were commenced, all on the Monmouthshire side, and on the Gloucestershire side a shaft known as the "Sea-Wall" pumping station *(see Section)* was begun. From each respective shaft headings were driven in both directions, and one or more Plunger Pumps were fixed at each shaft.

In 1879 when the heading *landwards* from the west side of the Sudbrook shaft had attained a length of 355 yards from the shaft, *i.e.*, 400 yards *inland* from the high water margin of the Severn, a big fresh water spring, since known as the subterranean river, was suddenly tapped on October 18th, the water rushing in at the rate of 6,000 gallons a minute, and flooding the whole of the workings in twenty-four hours. Fortunately the men were changing shifts at the time, and were all able to escape. They, however, neglected to shut the flood door after them. The water rose in the shaft until it attained the high water level of average tides in the Severn, at which height it remained rising and falling with the tides nearly two feet, but always one hour and a half later than the tides.

This was a heart-rending result after six years and a half of work. Sir John Hawkshaw, formerly consulting engineer, now undertook the responsibility of chief engineer. Mr. Chas. Richardson became joint engineer, and as such could advise, but Sir John Hawkshaw would decide. Mr. Thomas A. Walker took

possession as contractor on December 30th, 1879. Sir John Hawkshaw decided to make an invert to the entire length of the tunnel, and to increase the thickness of brickwork to 3 feet instead of 2 feet 3 inches, and to lower the gradients of the tunnel at the "Shoots" by 15 feet, altering the gradient westwards on the Monmouthshire side to 1 in 90, and retaining the gradient of 1 in 100 on the Gloucestershire side.

The year 1880 was occupied in fixing more pumps, and emptying the headings and the shafts. In this work the name of Lambert, the diver, stands out most conspicuous. He was engaged to shut the flood-door before mentioned, 340 yards from the shaft. His trials were terrible in the double-timbered heading in the coal shale, due to his air-pipe curling up in coils, and when he had travelled 270 yards, when only 70 yards distant from the flood-door, he was compelled to return. His life depended upon his coolness and steadiness, as he had to gather up the coils of his air-pipe in his progress in complete darkness. At this time one Fleuss, the inventor of a diving apparatus *without air-pipes*, was exhibiting at the London Aquarium. He was invited down, but on making acquaintance of the surroundings, he declined to go and shut the flood-door for ten thousand pounds. Lambert undertook the perilous work, and although failing in his first attempt because his helmet pinched his nose too tightly, when the nose pipe had been altered, he essayed again, and after an absence of one hour and twenty minutes returned successful. The works had now been flooded for fourteen months, and it was not until January 4th, 1881, that the water from the Great Spring was so successfully mastered that for more than two years there was no trouble from it.

During 1881 other troubles occurred. The great snow storm of January 18th, the date of the memorable blizzard in the west, caused great difficulties in the supply of coal for the pumping engines. In April salt water penetrated the tunnel from the Salmon Pool close to the Gloucestershire coast. In May a strike of one week's duration took place amongst the miners upon the introduction of the ten hours system instead of the eight-hour shifts. In the course of the year the long headings were so advanced that on 26th September the junction was effected. Swan electric lights were introduced, and ventilation by means of a Guibal fan was established.

In 1882, towards the end of February, Sir John Hawkshaw passed through the whole of the heading under the river. The Brush electric system and telephone were introduced. A cottage hospital, post office, money order office, savings bank and telegraph office were established. On November 26th, after Sunday evening service, a fire broke out in the Mission-room which burnt it to the ground. On the next morning the foundations of a larger room capable of seating 1,000 persons was commenced. By the electric light men worked at night, and on December 17th, less than three weeks from the fire, the new buildings were opened. On the Gloucestershire side the workmen and their families lived in wooden huts, constructed over the tunnel because of the difficulty of acquiring ground outside the tunnel widths. A heavy double chimney of brickwork was built between every two houses. One November midnight the total collapse of one of the chimneys occurred carrying

with it into the cavity, 30 feet below, a few waistcoats and trousers with all their contents which had been suspended on nails driven into the chimney breasts. A fortnight after this event a panic occurred in the works below owing to a sudden inrush of water from one heading into another upon the removal of a piece of timber which had dammed back the water.

In 1883 a Hospital for infectious diseases was opened. Many disasters occurred during the latter part of the year. On Octobor 10th the fresh water broke into the tunnel in larger volume than ever, calculated at the rate of 27,000 gallons per minute, whilst the pumps continually working lifted only 11,000 gallons per minute. On October 12th the largest of the pumps at 5 miles 4 chains shaft broke, thus drowning that pit at a time when the water of the great spring had gained its highest level. On October 17th, suddenly in the night a great tidal wave, afterwards discovered to have been 10 feet above the expected height, flowed over the sea-wall on the Gloucestershire side, and, flooding the meadows on the Monmouthshire side, poured down Marsh Shaft with a fall of 100 feet. One man lost his life in attempting to escape by the shaft down which the water poured. Eighty-three men imprisoned in the tunnel in which the water rose to within 8 feet of the crown of the arch, were all rescued after great difficulties. On October 18th the works of the tunnel were reported to be in a worse position than they had been since January, 1881. More engines and more pumps were ordered from Messrs. Harvey & Co., of Hayle, in Cornwall. When the action of the pumps had so reduced the floodings as to lay bare the headings sufficiently, the services of the plucky and intrepid diver Lambert were again engaged, and he again succeeded in closing the flood-door in the long heading.

In order to deal with the formidable inrush from the great fresh water spring, Sir John Hawkshaw determined to drive a side-heading parallel to the tunnel, but 40 feet north of it, from the Old Pit at Sudbrook, to intercept the spring. The heading was to have a gradient of 1 in 500, so that when it reached the point where the great spring had broken in, it would be 3 feet below the bottom of the invert of the tunnel. He decided also to construct a concrete invert for a length of nearly four miles in the bed of the little river Neddern.

By October 6th, 1884, the fresh water from the great spring was mastered. On October 17th a junction was effected between the top heading from 5 miles 4 chains shaft and the heading from Sudbrook, making a complete passage from end to end of the tunnel. Upon this day by climbing of ladders, up headings, and crawling through a small hole, Sir Daniel Gooch, the Chairman of the Great Western Railway Company, and the Earl of Bessborough, one of the Directors, were passed through the works from the Gloucestershire side to the Monmouthshire side.

In this year, 1884, the greatest number of men were employed; at one time, 1,641 on the Gloucestershire side under Mr. John Price, foreman, and 1,987 on the Monmouthshire side under the foreman, Mr. Joseph Talbot, making a total of 3,628 men. The total length of tunnel executed under Mr. Price was 3,260 yards, also 100 yards under the road known as Ableton Lane. The total length under Mr. Talbot was 4,406 yards. The length of the tunnel stated in the

contract originally was 7,942 yards, but this had been reduced in 1884 to 7,666 yards, the cutting at the western end being lengthened 276 yards in order to provide material for the sidings at the station near Rogiet, afterwards known as Severn Tunnel Junction. Finally the extreme length of the tunnel was fixed at 7,664 yards.

In 1885, on April 18th, the last length of the brickwork of the tunnel was keyed in at a point nearly midway between Sudbrook and the 5 miles 4 chains shaft.

On September 5th, Sir Daniel Gooch, Lady Gooch, and a party passed in a train from Severn Tunnel Junction to the Gloucestershire side, and returned to the Monmouthshire side. On this same day the water had risen in the ground outside the tunnel to a height of about 105 feet, and the pressure shown was 45½ lbs. per square inch. On September 7th the contractor, Mr. Thomas A. Walker, left for Buenos Ayres, South America. On October 30th he received a telegram from Sir John Hawkshaw to return home. On December 14th he arrived at Southampton. On examination he found that the pressure upon the brickwork, where the Great Fresh Water Spring had been stopped back, had risen to 57¼ lbs. on the square inch, and had in places broken the bricks, through which the water penetrated into the tunnel. He broke out the pipe adjoining the sluice-valve at the eastern end of the side-heading, and opened the sluice gradually as the pumps were able to take the water. On December 21st the sluice was opened, and the pressure was gradually reduced from 57¼ lbs. on the square inch to 30 lbs.

Arrangements were made to sink a large shaft at the side of the tunnel, 29 feet internal diameter. In this shaft were to be fixed six large pumps with six 70-inch Cornish beam-engines in a house entirely covering the shaft. It was also determined to fix two 65-inch engines with two new pumps in the pumping shaft at 5 miles 4 chains, and two 41-inch beam engines with 29-inch pumps in the shaft at Sea-wall. The 29-feet shaft was 35 feet in external diameter outside the brick-work, the circular wall being 3 feet in thickness. It was commenced on February 8th, 1886, completed on the bottom on April 7th, and the brickwork lining completed on June 3rd. When the water pressure had been entirely taken off the brickwork, all broken bricks were carefully cut out, and all damaged brickwork repaired.

On September 1st, 1886, the line was opened for goods traffic, 13½ years from its commencement.

On November 17th, the tunnel works were inspected by Colonel F. H. Rich, R.E., and his report to the Secretary of the Railway Department, Board of Trade, is dated November 22nd. He reports that the tunnel is of unusually large dimensions and particularly dry. He gives the length of the tunnel as 7,664 yards, and writes: "The sides which rise about 7 feet above the rail-level carry a semi-circular arch of 26 feet in diameter, which varies in thickness from 27 inches to 36 inches; and there is a brick invert 18 inches to 3 feet thick throughout the tunnel, which has a brick semi-circular drain about 3 feet 6 inches wide over the centre, and a brick barrel-drain 5 feet in diameter under the invert. This latter carries the surface water to a shaft at the north end of the tunnel, and drains the

cuttings at both sides of the railway. In addition there is an old heading 12 feet wide at the north end of the tunnel which has been utilized for drainage purposes. The tunnel is lined with vitrified brick in cement. The top of the tunnel is about 145 feet under the level of high-water spring tide, and about 50 feet under the bed of the river at its deepest point."

The first passenger train from London to South Wales passed through the tunnel on July 1st, 1887, fourteen years from the commencement of the work.

The Railway-bridge 18 miles higher up the Severn, at the distance of 26 miles from Gloucester, connecting the Forest of Dean on the west bank with the Midland Railway between Birmingham and Bristol at Sharpness Point on the east bank, was commenced at the same time as the Tunnel in 1873. It was completed and opened for traffic on October 19th, 1879, at the same period when the disastrous flooding of the Tunnel works occurred, owing to the Great Fresh Water Spring being intercepted. The river at this place is 3,700 feet wide. The bridge is 4,162 feet in length ; it has 22 spans, of which the two widest are 327 feet.

Tonite, made by the Cotton Powder Company, was the ordinary explosive employed. The fumes generated were so slight that it was possible to return to the work in one minute after the explosion. The tonite used amounted to 250 tons.

Portland Cement—36,794 tons were brought from the Medway or the Thames.

Brickwork—76,400,000 bricks were used for the tunnel and bridges, supplied as follows :—

From Cattybrook, near New Passage	19,125,440.
,, Fishponds, near Bristol	7,229,100.
,, Staffordshire	21,944,460.
,, Five miles four chains brickyard	28,101,100.

With reference to the authorities referred to in this compilation, the main facts are quoted from the 2nd edition of "The Severn Tunnel" by Mr. Thomas A. Walker. Additional notes have been taken from "The Severn Tunnel," by Mr. Chas. Richardson, with notes on the "Geology of the Sections" by Prof. C. Lloyd Morgan, a pamphlet printed in 1877 for the Bristol Naturalists' Society. Both these works would be profitably consulted by those desirous of more detailed descriptions.

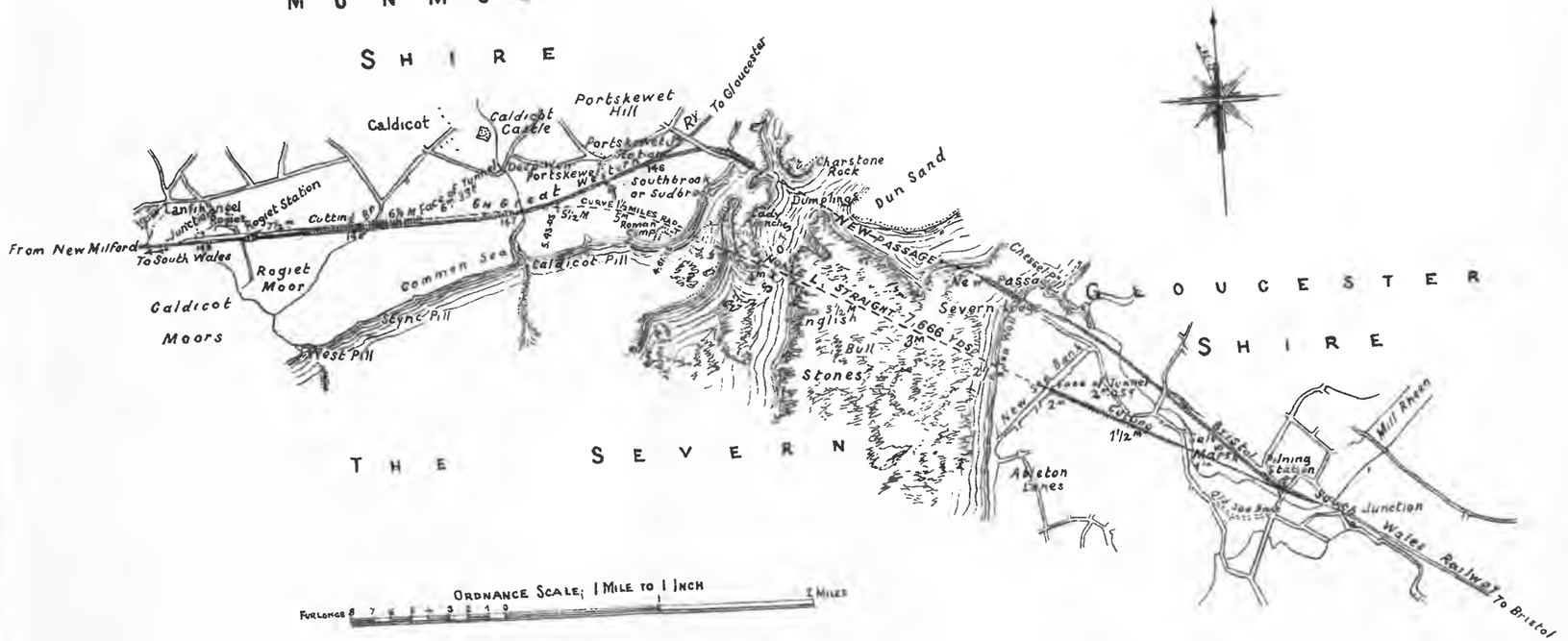
A few more words may be added on the local geology.

Special attention is directed to the before-recorded Pot-holes on the bank of the River at Sudbrook, see page 94, because of their situation and number. I suppose that they must be accounted for by the violent whirling action of pebbles set in motion by eddies, formed by the powerful and rapid ebb and flow of the Severn tides.

The cutting leading to the western mouth of the Tunnel near Rogiet station, now called Severn Junction, was through New Red Sandstone. In the Caldicot or Marsh shaft, sunk through the alluvium of the river Neddern, a band of *Scrobicularia* marl was found 39 feet from the surface, concerning which Prof. W. J. Sollas reports—"It is characterised by an admixture of fresh-water and brackish-water shells, such as *Limnæa*, *Planorbis*, *Scrobicularia piperata*, and *Cardium edule*. Diatoms are common in it, and also remains of chara."

SEVERN TUNNEL

PLAN

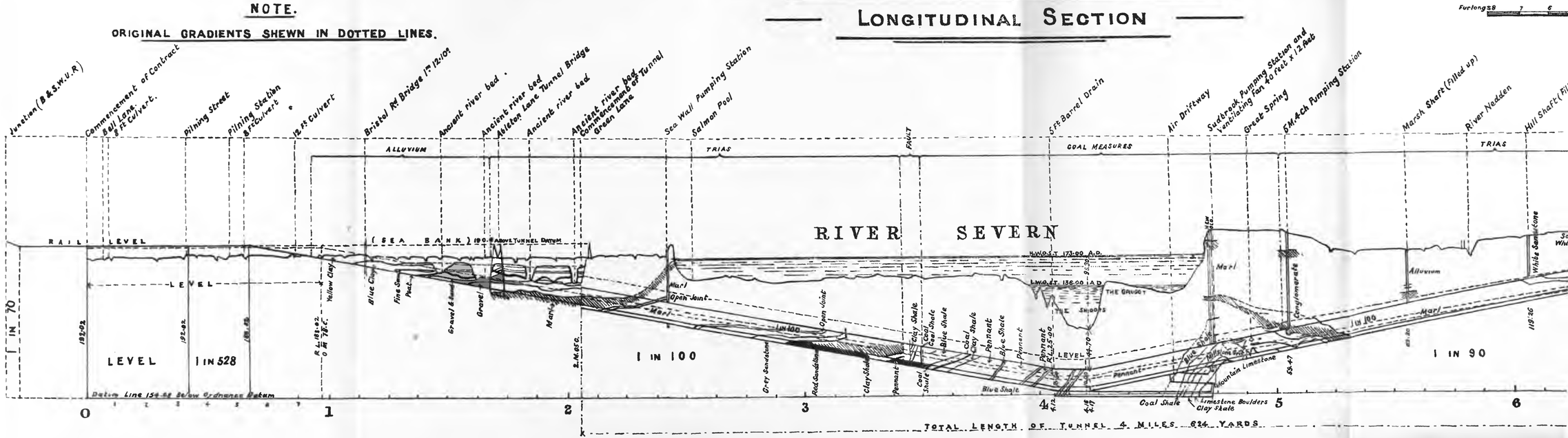


SEVERN TUNNEL

LONGITUDINAL SECTION

NOTE.

ORIGINAL GRADIENTS SHEWN IN DOTTED LINES.



SEVERN TUNNEL

LONGITUDINAL SECTION

WN IN DOTTED LINES.

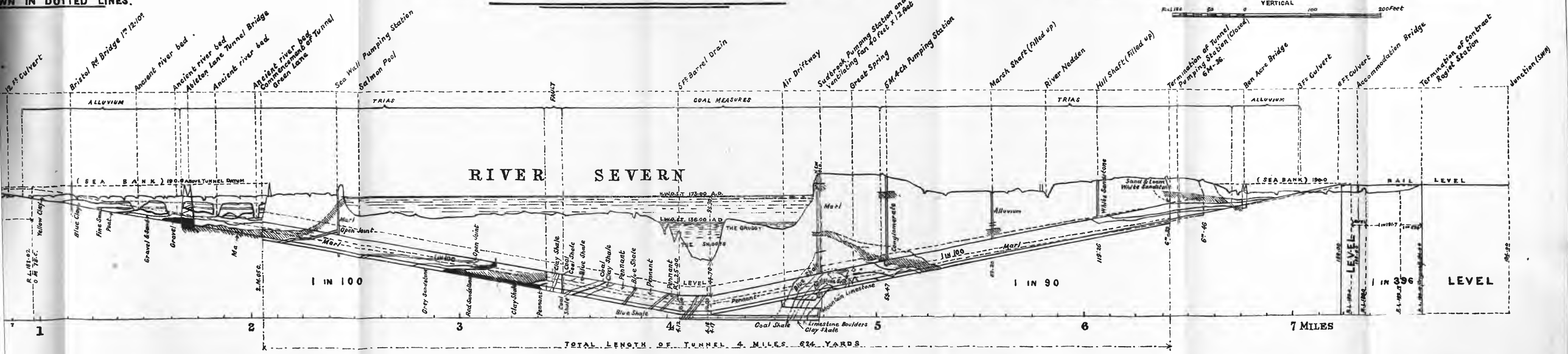
SCALES

HORIZONTAL

Furlongs 8 7 6 5 4 3 2 1 0 1 Mile

VERTICAL

Feet 50 0 100 200 Feet



On the Gloucestershire side the cutting to the approach of the tunnel was through alluvium, which gave evidence of the previous existence at different levels of river courses, the bottom of the largest being about six feet below the present low water level in the channel. The succession of beds from the surface was as follows :—

	FEET.
Yellow Clay	10
Peat	1 to 2
Blue Clay	6
Peat	1
Loamy Sand	5
Gravel	12 to 18, resting upon New Red Marl.

Cardium edule and *Tellina solidula* were found in the bed of sand in the gravel. Mr. W. C. Lucy inspected the Drift on the occasion of the visit of the Cotteswold Club in May, 1895, and considers that it came eastward of the river. The following notes from his pen are quoted from the above referred to paper by Professor Morgan :—"In the gravel were large boulders of Quartz, Millstone Grit, Coal Measures, Sandstones, Slate (probably from Cumberland), Lickey Pebbles, Fine Quartzites, Old Red Conglomerate, Trap Rocks, and rolled Lias gryphites. I found one piece of glaciated Diorite. The Drift is probably of two ages. One may be considered as belonging to the low-level drifts of Mr. Prestwich, in which is mixed up high-level drift with rocks derived from far distant places."

In conclusion it may be of interest to some to place on record some other tunnels for comparison of length.

The longest in the world is that of St. Gothard, between Lucerne and Milan. It is 16,280 yards, or 9 miles and 340 yards in length. This Tunnel is 26½ feet wide, and 18 feet 10 inches to the crown of the arch. It is 900 feet below the surface at Andermatt and 6,600 feet beneath the peak of Kastlehorn.

The following list of tunnels in our own kingdom is taken from page 318 of "Our Railways," by John Pendleton, 1894 :—

		Yards.
Severn	Great Western	7,664
Totley	Midland	6,226
Stanedge	North Western	5,342
Woodhead	Manchester, Sheffield and Lincolnshire	5,297
Cowburn	Midland	3,727
Bramhope	North Eastern	3,745
Medway	South Eastern	3,740
Festiniog	North Western	3,726
Sevenoaks	South Eastern	3,600
Morley	North Western	3,350
Box	Great Western	3,227
Littleborough	Lancashire and Yorkshire	2,869
Sapperton	Great Western	2,800
Polehill	South Eastern	2,759
Mersey	Mersey	2,700
Bleamoor	Midland	2,600
Queensbury	Great Northern	2,502
Kilsby	North Western	2,423
Dove Holes	Midland	2,420
Shepherd's Well	Chatham & Dover	2,376
Oxted	Brighton & South-east junction	2,266
Wapping (Liverpool)	North-Western	2,250
Clayton	Brighton and South Coast	2,200
Sydenham	Chatham & Dover	2,190
Drewton	Hull & Barnsley	2,116
Dronfield	Midland	2,024

THE EXTRAORDINARY HEAT IN SEPTEMBER, AND COLD IN OCTOBER, 1895.

THE following Temperatures are recorded in *The Times* of November 6th, 1895, by Mr. G. J. Symons, F.R.S., writing from 62, Camden Square, N.W. :—

TEMPERATURE OBSERVATIONS AT CAMDEN SQUARE, LONDON.

	September.				October.			
	9 a.m.	9 p.m.	Max.	Min.	9 a.m.	9 p.m.	Max.	Min.
	°	°	°	°	°	°	°	°
24	65·6	63·3	82·8	50·8	31·9	38·8	46·1	27·2
25	60·6	61·7	80·6	56·3	33·7	36·0	47·2	29·1
26	64·9	64·2	82·4	56·2	32·6	38·0	40·3	27·9
27	66·8	64·7	82·6	56·7	34·1	30·9	44·5	27·6
28	64·6	60·3	79·2	55·0	29·9	35·8	45·8	26·6
29	63·9	60·0	77·1	55·2	35·0	37·3	41·9	30·1
30	57·9	58·8	77·6	54·0	32·9	39·2	47·7	29·0
Means	63·5	61·9	80·3	54·2	32·9	36·6	44·8	28·2

The mean of the *maxima* and *minima* in September 24 to 30 was, therefore, 67·6°, but if the 9 a.m. and 9 p.m. observations are worked in it becomes 65·0°. On the average of a long series of years the hottest seven consecutive days are July 14th to 20th, and their average temperature is 63·1°. Therefore, the week ending September 30th was at least 1·9° warmer than the average warmest week in the year.

The mean of the *maxima* and *minima* in October 24th to 30th was 36·5°, but if the 9 a.m. and 9 p.m. observations are worked in it becomes 35·9°. On the average of a long series of years the coldest seven consecutive days are January 7th to 13th, and their average temperature is 37·9°. Therefore, the week ending October 30th was 2·0° colder than the average coldest week in the year.

Mr. Symons further remarks with reference to the cold in October :—The absolute *minimum*, 26·6° on the 28th, has been exceeded only thrice in the last 38 years, viz : by 26·2° on the 5th in 1873, 25·4° on the 26th in 1887, and 23·8° on the 28th in 1890. Only once before in that long period has frost occurred on seven days in October (in 1887), and in 1895 alone were the seven days consecutive. There had never before been more than four consecutive days with frost in October.

THE FLOOD OF NOVEMBER 11TH, 1895, AND NOVEMBER 15TH, 1894.

A flood occurred at Hereford within four days of the anniversary of last year's great flood. Following a severe gale and heavy rains the guage fixed to Wye Bridge which on Sunday at midnight registered 4 feet of flood, registered as much as 12 feet on Monday at 7.30 a.m. This was a very rapid rise. The water continued to rise steadily all day until at 11 p.m. on Monday, 11th, according to information received from the boatman, Harry Jordan, it reached its maximum of 14 feet 9 inches. The water entered the cellars of several houses in St. Martin Street, and great anxiety was experienced during the night. It only required a few more inches rise to have flooded St. Martin Street.

Although the river Lugg did not overflow to any great extent yet the road from Hereford to Mordiford was considerably under water.

In a letter received from Mr. G. G. Clarke, resident Surgeon at The Hospital in Elan village, Rhayader, the river Elan rose 4 feet on Sunday, 10th, and on Wednesday, 13th, had subsided to 18 inches above ordinary level.

THE FLOOD OF NOVEMBER 15TH, 1894, was unrecorded in *Transactions*. At 6 a.m. the gauge on the Wye Bridge registered 16 feet 9 inches. The City Surveyor reported that it was a higher flood than had been known in the Wye for fourteen years. Six footbridges on the riverside between the Friars and the Rifle Butts were washed away. When the flood was at its maximum the Canon Moor brook was discharging, according to the City Surveyor, nearly 100 cubic feet per second. Owing to the enlargement and proper grading of this brook, and clearing out of the Tanbrook, four years ago, the localities of Newtown Road, Millbrook Street, Edgar Street, and the railway line at Barton, were not flooded as formerly they were wont to be.

Woolhope Naturalists' Field Club.

ANNUAL MEETING, THURSDAY, NOVEMBER 14TH, 1895.

AT the Annual Meeting there was a large attendance. On the proposition of Mr. James Rankin, M.P., seconded by Rev. Prebendary W. Poole, Mr. H. Cecil Moore was elected President for 1896. Mr. Thomas Hutchinson was appointed joint Secretary. The name of Rev. Morgan G. Watkins was added to the Editorial Committee, and the Committee of Management for 1896 was elected.

BOTANY.

Mr. Moore exhibited a dried specimen of Jerusalem artichoke, *Helianthus tuberosus*, which had been gathered in full blossom about a fortnight ago. The Jerusalem artichoke seldom blossoms in Great Britain, and only after prolonged periods of hot sunshine. It flowered in the phenomenal year of drought 1893, in the Jubilee year 1887, a few specimens flowered in 1895, and Mr. Vevers recalls to mind having seen it in blossom about forty years ago.

"FLORA OF HEREFORDSHIRE."

It was resolved that the Record of plants collected by Rev. Augustin Ley, additional to those published in the *The Flora* of 1889, should be published as a supplementary list in the volume of *Transactions* now in course of publication for the year 1894.

GEOLOGY.

A fine fossil, 9½ inches in diameter and 3 inches in thickness, Lituites giganteus, a cephalopod mollusc of the Lower Ludlow formation of the Silurian system, recently presented to the Museum by the Rev. A. J. Capel, was exhibited. It was found in an extensive bed of gravel four feet below the surface soil, whilst digging the cellars and foundation of Mr. Merrick's house on Aylestone Hill. It is supposed that it must have been conveyed to this locality in ancient times in a drift from the neighbourhood of Woolhope. This unexpected discovery should stimulate members to closer observation in gravel pits, in railway cuttings, &c. It is many years since the Committee on erratic blocks, one of the oldest of the British Association Committees, received any reports from Herefordshire on this subject of surpassing interest to the glacial geologist. A reawakening of interest in this county would be welcomed. Again it is necessary to call the attention of members to the fact that the fossils of the

Woolhope limestone are but poorly represented in the Museum. Mr. Langton Brown has succeeded in adding a few, obtained, we believe, from the quarries of Scutterdine and Littlehope, near Mordiford.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

It is hoped that the members of the Woolhope Club will continue active in the prosecution of useful scientific work, to justify their existence as one of the Societies in the Union. At the last meeting of Delegates of Societies, reference was made to the importance of securing suitable geological photographs, and setting down facial types and folklore. With reference to the ethnographical survey of the United Kingdom, members who are disposed to contribute from the county of Hereford should apply to the Honorary Secretary of the Woolhope Club, who will supply forms of schedule prepared by a Committee of the British Association.

ORNITHOLOGY.

Mr. C. G. Blathwayt has written to report that during the month of August his sons had several times seen three Hobbies (*Falco subbuteo*), in a wood in the neighbourhood of Bromyard.

A pair of Honey Buzzards, exquisitely set up by Mr. Ashdown, exhibited attacking a wasp's nest, were recently on view at his premises in Commercial Road. They were shot on Captain McCalmont's estate at Bishopswood, and have now been returned to Mr. H. Brain, their owner.

Mr. Ashdown exhibited a Brent Goose, shot near Peterchurch, and a Pomatorhine Skua from Radnorshire just over the borders of Herefordshire.

Ornithology in Herefordshire from 1889 to 1893 is given on pages 381 to 386 of *Transactions*, 1892. Ornithology in 1894 is given on page 258 of *Transactions*, 1894.

ORNITHOLOGY IN HEREFORDSHIRE.

From January to December, 1895.

By W. C. Ashdown, F.Z.S.

Not a year passes by without the occurrence of many uncommon species of British birds, either visiting the county on migration, or driven hither by storms and gales. The rarer birds of the year comprise :—

Peregrine Falcon (Falco peregrinus).—A fine female killed in the act of striking a pigeon, on a meadow adjoining Llanwarne Court, January 12th; this is in the possession of Mrs. Maddox of that place.

Tufted Duck (Fuligula cristata).—On the 16th of January, the President, Rev. M. G. Watkins, brought in to me a specimen which awakened some curiosity, owing to its very close resemblance to F. Nyroca; the example is a very interesting one owing to its immature plumage; it has been generously presented to the local Museum.

Smew (Mergus albellus).—Mr. William Blake, of Ross, forwarded me a perfect adult female killed on the Weir; this is now in his private collection.

Curlew (Numenius arquata).—This bird still frequents the Black Mountain district, Mrs. Trafford, of Michaelchurch, sending in a clearly marked specimen killed in the locality on the 18th January. Others have been observed.

Merlin (Falco æsalon).—A female was taken in the hard weather, January 19th, by Mr. Spencer, at Clehonger.

Golden-eye (Clangula glaucion).—An adult male was shot by Lieut. James-Trevor on the Wye, and was brought to me for identification on the 4th February.

Red-necked Grebe (Podiceps griseigena).—Mr. William Blake, Ross, sent in a very good example, shot near Ross on the 7th February. This is, I believe, the first record of the appearance of this scarce bird within the county boundary; of course having the winter dress, the rufous colouring of the neck was supplanted by a greyish tint, but the yellow iris and general structure differ from that of P. cristatus, the Great Crested Grebe; this bird is in Mr. Blake's collection.

Sclavonian Grebe (Podiceps auritus).—Mr. Sanders, Street Court, Kingsland, shot a male bird on the 14th February, and sent it to me for preservation. As far as I can ascertain this is the only authentic record of the occurrence of this species in the county. Dr. Bull has mentioned that one was taken in 1849, but we have no details respecting it.

Little Grebe (Podiceps fluviatilis).—An example was picked up dead by the same gentleman who shot the preceding bird; it was choked by a bullhead. The remarkable feature in this specimen was the summer plumage so remarkably early in the year. I have set it up for the local Museum, Mr. Sanders having kindly presented it.

Tufted Duck (Fuligula cristata).—A male, with very long crest, was obtained by Mr. Blake, killed near Ross on the 15th February.

The month of February was a deadly one, in every sense, for great numbers of our resident orchard birds, the Green Woodpecker (Picus viridis) dropped from complete starvation on every side; numbers were brought to me either killed after this manner or shot by the bee-keepers and others in the district.

Crossbill (Loxia curvirostra).—Two males were sent in from Pontrilas on 6th April, by Mrs. Donegan, Grosmont.

Honey Buzzard (Pernis apivorus).—A pair of these birds was shot on Capt. Mc'Calmont's Bishopswood estate, near Ross, on 10th July, and sent to me by Mr. Howard Brain. Needless to say the birds would have been protected had it been known what useful and valuable birds they were A nest was afterwards discovered in the neighbourhood containing two eggs, both of which, strange to say, were unfertile. I dissected and set up these specimens under the greatest difficulty, considering the mass of wasp larvæ in the throat and gullet, added to the prevailing heat of the day. A ridge of wax matter lay on the under mandible of the male.—Mr. W. E. de Winton, M.B.O.U., who has described this handsome pair of Buzzards in the Zoologist, has called my attention to one error, respecting the cere, which was really a faint brownish yellow.

As some five or six of this scarce species were taken in the county several years ago, it is only reasonable to believe that Herefordshire is peculiarly adapted to its habits and wants. A male presented some years ago to the Public Museum by Mr. H. C. Moffatt, of Goodrich, who had it set up, suffered considerably from the depredations of moth; it has been rescued and renovated for the collection.

Green Sandpiper (Totanus ochropus).—A male was shot by Mr. J. Wyndham Smith, near Ross, on the 1st August.

Brent Goose (Bernicla brenta).—Mr. T. P. Powell, jun., Dorstone, forwarded a specimen shot in the locality on the 7th October. It is recorded that one was obtained near Ross in 1882, but no particulars are given.

Dun'in (Tringa alpina).—On the 5th November, Mr. Sanders sent me a good specimen shot at Eardisland, doubtless swept inland by a storm.

During the autumn several immature specimens of the Hawfinch (Coccothraustes vulgaris) came in from different parts of the county; they have undoubtedly been hatched here. I am glad to say that the owl killing practice is still on the decline, an evidence that the landowners and farmers are wise in prohibiting the slaughter of these useful birds. Beyond the county boundary the very rare Gadwall Duck (Anas strepera), a female, was shot by Mr. A. Crawshay at Talybont, on the 5th February. A Pomatorhine Skua (Stercorarius pomatorhinus) was picked up dead near Builth in October, and sent in by Mr. Gwynne Vaughan. This was an immature example.

OBITUARY, 1895.

THE Club regrets the loss by death of two estimable and learned Honorary Members—the Rev. W. Houghton, M.A., F.L.S., and Mr. H. T. Wharton, M.A., F.Z.S.

The Rev. W. Houghton was author of "Country Walks of a Naturalist," "Seaside Walks of a Naturalist," "Gleanings from the Natural History of the Ancients," etc. In 1875 he dedicated to Dr. Bull and the Members of the Woolhope Club his handbook for entomologists, entitled "Sketches of British Insects." His truthfully illustrated work on "British Freshwater Fishes" is a standard work upon the subject.

Mr. Wharton, known as "Sappho Wharton," died on August 22nd, at his residence in South Hampstead. He brought out his first edition of "Sappho" in 1885. The third edition has recently been published. The *Academy* of September 7th writes:—"The author spared no pains to make the volume worthy of its subject. Merely as a specimen of bookmaking it has few rivals." His eye and ear were well trained in observation as a botanist and an ornithologist. He was one of the joint compilers of the official list of British Birds published in 1883 by the British Ornithological Union, especially supervising and elucidating the Latin nomenclature. He also contributed a chapter on the local flora to a work entitled "Hampstead Hill."

Both the deceased Honorary Members have contributed papers to the *Transactions* of the Woolhope Club.

Of Ordinary Members we have lost by death, amongst others, two valued Members. Mr. J. Griffith Morris, who died December 17th. He was President of the Club in 1877, the year in which the publication of "The Herefordshire Pomona," by Dr. Bull, originated. He materially assisted Dr. Bull in his collection of specimens of fruit for illustration in this valuable work. His house was always hospitably open to mycological visitors at the annual Fungus Forays, which he supported by his attendance and study.

Rev. Canon H. W. Phillott died on December 4th. He was President in 1878. He contributed papers on "The Cedar Tree," "Roman Camps," and facts connected with the local history of Weobley and Wormesley. His "Diocesan History of Hereford" is a valuable and useful work.

Woolhope Naturalists' Field Club.

1896.

EXCESSIVELY HIGH BAROMETRIC PRESSURE.

MR. H. SOUTHALL writes that the reading, 30·774 inches, of the standard barometer at his residence, The Graig, Ross, on January 9th, when corrected and reduced to sea-level, makes 30·965. His previous extraordinary record was 30·973 in 1882.

This high barometric pressure did not escape the observation of Mr. G. J. Symons, F.R.S., who, writing from 62, Camden Square, London, in the *Times* of January 9th, remarks that at 9 p.m. the reduced pressure had attained 30·934 inches, and publishes the following, only three instances during more than a century, of the pressure in London exceeding 30·9 inches.

			Inches.
1778	December 26th,	2 p.m. ...	30·918
1825	January 9th,	9 a.m. ...	30·922
1882	January 18th,	10.30 a.m. ...	30·975

Doubtless more startling figures will be recorded at other places, *e.g.*, the Hebrides. A telegram forwarded by Mr. Reginald Bushell, of Hinderton Lodge, ten miles north-west of Chester, was to the following effect:—"Barometer reading by Hick's verified standard, corrected and reduced, at 10.20 this morning, 31·013 inches."

EARLY LEAFING OF THE OAK TREE.

Mr. Thomas Hutchinson recorded the fact of an oak tree in full leaf on April 12th, as seen from the railway line in a field between Moreton and Dinmore Stations. This is a remarkably early date for the leafing of the oak tree. For "leafing of the oak and ash" see *Transactions*, 1889, pages 341 to 345.

Woolhope Naturalists' Field Club.

ANNUAL MEETING, APRIL 21ST, 1896.

THE Annual Meeting was held in the Woolhope Club Room on Tuesday, April 21st. The following were present:—Rev. M. G. Watkins, the retiring President; and H. Cecil Moore, the President elect; Revs. J. Barker, C. Binstead, C. Burrough, A. J. Capel, W. S. Clarke, E. R. Firmstone, E. J. Holloway, W. H. Lambert, and H. C. Sturges; Dr. T. A. Chapman; Messrs. H. C. Beddoe, J. Carless, R. Clarke, J. Davies, T. Hutchinson, F. R. Kempson, W. Pilley, O. Shellard, H. G. Sugden, and James Pilley, Assistant Secretary.

The financial statement presented by Mr. Beddoe showed a balance in hand of £80 16s. 8d. The income for 1895 was £112, compared with £121 in the previous year.

The dates and places of the field meetings for the year were fixed as follows:—

May 19th, Tuesday—Bircher Common, Croft Ambrey Camp, Aymestrey, and Mortimer's Cross.

June 23rd, Tuesday—The Elan Valley, near Rhayader, for the Birmingham Water Supply from Wales.

July 30th, Thursday, Ladies' Day—Downton and the Valley of the Teme, Ludlow.

August 28th, Friday—Droitwich.

Mr. Moore, President elect, exhibited trays containing collections of Roman Coins, found in the County, and presented through the Woolhope Club to the Hereford Museum, as follows:—

A collection of 84 coins out of the large hoard of nearly 18,000 found in two earthenware vases about fifty yards on the north of Bishopswood Church, about one mile east of Kerne Bridge railway station. A collection of 71 coins and a few other relics found during a series of years at Kenchester, the site of the Roman encampment Magna, presented by Mr. Charles Hardwick, of the Old Weir, Kenchester. Thirdly, a collection of 43 coins from the same place, presented by Mr. Richard M. Whiting, of Credenhill.

Mr. Moore had prepared a tabulated chronological list of all the Roman coins for publication in the *Transactions*.

After the proposal and election of Members, the retiring President gave his Address.

THE ADDRESS OF THE RETIRING PRESIDENT,

REV. M. G. WATKINS, DELIVERED APRIL 21ST, 1896.

AN ideal President of the Woolhope Club ought to lay before the members, not indeed the achievements of science during the year—that is expected from the President of the British Association—but the new information which has during his year of office been acquired concerning the district, its archæology, its flora, and its animal life. This custom shows the steps up which, it may be hoped, our Society annually mounts. It enables us to take stock of our knowledge, and although the gains which we yearly count may in themselves seem minute, by comparing them with what was known of the natural history of Herefordshire and the districts adjacent when the Club was formed, or even with the knowledge of twenty years ago, ample justification may be shown for the existence, nay, the success, of the Woolhope Club. It will be my effort very shortly to remind you of what the Club has done last year, and to make a few suggestions concerning what might be usefully attempted in the future. I can only pretend indeed to touch these subjects lightly, but it would be unpardonable, after the honour that has been laid upon me, were I wholly to omit this part of a President's duty.

First, to treat of the places visited. Many members must have acquired a distinct accession of knowledge from their visit during May to the buried Roman town of Viroconium or Wroxeter. The smallness of the so-called town was noticeable, but it must be borne in mind that little of the true area of the town has been excavated. Its size was very large, three miles in extent, much larger than the walls of Chester or Caerleon. The rooms are certainly small. The system of flues and heaps of bones left by the Romans must have struck all. Mr. Phillips, an honorary member, most kindly pointed out the position of the town, which is bisected in one direction by the Watling Street and in another by the Bell Brook, and was built in close proximity to the Severn. The numerous villæ, or country houses of the Roman officials, which have been found in Lincolnshire generally lie by the side of some great Roman Road. It is unfortunate that further excavations are not carried on. They would probably add largely to the fine collection of domestic Roman articles in the Shrewsbury Museum—glass and pottery, ornaments, coins, and the like. The place was in direct communication with Isca (Caerleon) where the Second Legion was posted. Its history is largely conjectural. The Romans left the Britons to themselves in 426 A.D., and soon after it is probable that the town was destroyed by the Picts in the deluge of barbarism from the North; or, as some say, by the Saxons in the year 584 (*Newell's History of the Welsh Church*, p. 20). Part of the old wall has remained standing since the Roman occupation, and has always appealed to the wonder of those who saw it. Atcham Church and the Blanche Parry window were found very interesting. The Rev. J. La Touche contributed an excellent lecture on the Ice Age, illustrating Mr. Fortey's carefully prepared model of the

parallel roads of Glen Roy. Nor must Mr. Cordeaux's kind paper on the large numbers of the little Auk which were driven on our shores in the Arctic winters of 1894-95, be forgotten.

The second Meeting was held at Wapley Camp, the Rodd (a picturesque brick building dating from 1629), and Presteign. Mr. Southall contributed a few verbal remarks on the previous winter, with its excessive and long-continued cold. I forbear to speak of this meeting, as I was unable to attend it.

On July 23rd, the Ladies' Day led the Club to investigate not only the antiquities but still more the beauties of the Forest of Dean, especially the views from the Buckstone and the Speech House. Much gratitude is deservedly due to Mr. Philip Baylis, the Deputy Surveyor of the Forest, to the Head Forester, and to the three Crown woodmen, who did their best to guide visitors to the most interesting portions of the Forest, and to show and explain its beauties. Mr. Kempson took extreme pains to describe Staunton Church. The Buckstone (formerly a "Logan," or rocking stone), the fine spruces and hollies near the Speech House, the Roman Road, some remarkably astonishing features met with in forestry, as exhibited by Mr. Philip Baylis, and other curious sights, delighted a large assemblage of members and their friends.

With the 30th of August the journeys of the Club ended for the year. On that day a most interesting district was inspected, containing plenty of food for the lover of antiquity, as well as for the devotee of modern engineering art. By Chepstow to Caerwent (Venta Silurum), past the old manor house of Crick, a beautiful corner of England, the Club made its way. At Caerwent remains of the Roman occupation were seen, old walls, coins, and the like. Thence by Caldicot Castle and Church, time only allowing too brief a stay at the former, members proceeded to the site of Harold's Palace, near Portskewett Church. As in every old church curious features were here found. An easy drive brought the Club to Sudbrook, the pumping works connected with the Channel tunnel, where the gigantic pumps are capable of discharging 66 million gallons of water a day. Mr. Hosken, the manager, was particularly kind and helpful here to the Club, which owes him a deep debt of gratitude for his lucid explanation and readiness to show every part of the works that contained anything likely to interest members.

Taking these four excursions together, and mentally running over the amount of their teachings on the Roman occupation, on architecture, both baronial and ecclesiastical, and on the history of the districts explored, and bearing in mind the admirable papers contributed on archæological subjects by Mr. Davies, a recent President, by the indefatigable Mr. Moore, our President elect, and by others, men will, I hope, regard the work done in 1895 as a good record, and will deem that the Woolhope Club deserves well of Herefordshire for its usefulness. Nothing need be said of the many pleasant meetings of friends, and the collision of mind with mind involved in these excursions; which enable us all to rejoice also in the many pleasant prospects and beautiful corners of our county.

And now to touch upon a few subjects which have more or less come before the Club, and are cognate to its end and aim. Members may be con-

gratulated on the speedy completion of the Archæological Survey of the county, which engaged so much of the time and energies of one whom we much miss from our meetings, the Rev. J. O. Bevan. A new volume of *Transactions* will also be speedily put into members' hands. This—thanks again to the perseverance of our Secretary and President-elect—has enabled the Club to bring up much lee-way. Indeed it is now abreast of the papers read this last year. The continued prosperity of the Club is shown by its 215 members. I am happy also to be enabled to announce that before June has ended, the accomplished painter of one dear to us all—the late Dr. Bull—hopes that his portrait will take its place on the wall of the staircase here among our Herefordshire Worthies.

Turning to the Ornithology of the district, it may be noted that it has fallen into good hands. Mr. Ashdown, who enjoys exceptional advantages, has put together a list of the rare birds observed during 1894 and 1895. It may earnestly be hoped that he will continue this record annually. A specimen of the Ruff was taken in 1894, curiously remote from its usual haunts. The Slavonian Grebe is another very rare visitor of last year. In common with all lovers of birds, I must deeply lament the shooting of a pair of Honey Buzzards, at Bishopswood. They would have been protected had their harmless and useful nature been known, and here comes in the utility that a little knowledge of our birds may possess in the way of protecting the rarer and more beautiful kinds. However, the next best fate that could have befallen these Honey Buzzards has actually happened to them. They were stuffed and set up by Mr. Ashdown.

Our old friend, the Black Woodpecker, has once more attracted some attention, a clever Gloucestershire ornithologist, and a member of the Club, having informed us that, some years ago, he was confident he had seen it in (I think) Monmouthshire. I am sure he will forgive me if, in the utter absence of any British killed specimens, and in the many years of bird-observing which are passing over us without a black woodpecker being obtained, I cannot regard it as a British bird. While entirely satisfied of his good faith and his persuasion of having seen it, I must yet remain in a state of scientific incredulity. No one, however, will rejoice more than I shall when an indubitable specimen of this bird is added to our avi-fauna.

Mr. Moore has called my attention to a great number of Roman coins which have been for many years in the possession of Mr. Hardwick, of Credenhill, and which Mr. Charles Hardwick has most kindly presented through the Woolhope Club to the Hereford Museum. They seem almost to cover the ground till within fifty years of the departure of the Romans. A large "find" of Roman coins also took place at Bishopswood in April, 1895, while a new road was being made. The earthenware jars which contained them were unfortunately broken, but the coins weighed some hundred-weight and a quarter and numbered about 18,000. By referring to the *Transactions*, 1889, p. 358, it will be seen that no later coins than those of Allectus (A.D. 293) have been found in the Forest of Dean. But now the series is continued, as coins have been found in the Bishopswood collection of Licinius, Constantine the Great, Constans, Constantius, Helena, and Theodora, that is, speaking roughly, to about A.D. 337. Great interest

attaches to many of the coins as they bear Christian emblems, the labarum, and the like. Mr. Moore has prepared a tabulated list of these coins for publication in the *Transactions*.

This Club must view with pleasure the establishment of a Microscopic and Microzoologic Society, under the able guidance of Mr. Alfred Watkins and Mr. Holloway, of Clehonger. We may hope that some of their future discoveries may be embalmed in our *Transactions*. These are singularly devoid of researches into the lower forms of life in Herefordshire. Diatoms and Desmids have indeed been almost wholly neglected, so far as I know, by the members of our Club. A society which specially devotes itself to the forms of life on the border land between animals and plants must, it may be hoped, make interesting discoveries.

Last year the British Association issued circulars respecting the ethnography and folklore of the country. I have not heard of any in this district taking up these special studies. They demand much leisure and careful measurement and tabulation, but if steadily pursued, especially in a country bordering upon Mercia on one side and Wales on the other, they would doubtless lead to valuable results. In the meantime, the papers issued by the British Association on these points are extremely suggestive and useful to all inquirers.

Mr. James Davies has called my attention to the discovery of Hut-circles, presumably of Celtic origin, on the top of the Black Mountains, near Llanthony, and on the Gader, the highest peak. These were visited and reported on by several Cardiff naturalists. Nothing decisive could be settled. There are some remains, I may mention, in a field between Grosmont and Llangua which may have been quarries, or attempts to find useful beds of stone, but which also may be ancient British remains. Perhaps an expedition some summer to the Gader in search of such antiquities might not be displeasing to many of the younger members of the Club.

During the last week the repairing of a butcher's shop in High Town disclosed the remains of very solid Norman piers. Many seized the opportunity of inspecting these. They appear, from the researches of Mr. W. Pilley, to have belonged to the old Moot Hall of Hereford, the recesses between the piers being sleeping places. Doubtless they will be described, and it may be, figured in the *Transactions*.

Taking a wider survey of science generally, I shall only notice one discovery of the last year which seems likely to exercise a beneficial influence upon the science of surgery – the discovery of Röntgen's Rays, as they are called. These will facilitate the tracking of foreign substances in the living body, and so aid in operations. It will be possible by their help also, it is hoped, to look into the inner nature of metals and metallic objects.

Perhaps I may, in conclusion, point out one or two inquiries which seem specially to belong to the Woolhope Club. First of all a Topographical survey of Herefordshire is imperatively required, giving the exact meaning of all its river, mountain, town, and place, names. This has been attempted in an unscientific fashion by Mr. Flavell Edmunds, but even since his time philology has made giant

strides, and much of his writing is seen to be mere guess work. Important information too would be gained by a topographical survey as to the extent of Wales and Welsh-speaking people, the influence of the Welsh marches upon the neighbouring villages and farms, and the like. Speaking generally, that influence seems to have been bounded by the Wye.

Next, to all lovers of birds, the Act of 1894 will give satisfaction. It enables certain species to be protected when the occasion arises for doing so, as in the Wild Birds Protection Act of 1880, and, what is perhaps still more useful, it closes altogether certain definite areas or breeding places. Fortunately there seems no need to apply its provisions at present to birds in Herefordshire.

The 11th rule of the Club prescribes "the formation and publication of correct lists of the various natural productions of the county." While awarding the highest praise to the Flora of the county (by Messrs. Purchas and Ley), it may be pointed out that a list of the Fishes of Herefordshire, and another of the Coleoptera of the county, are urgently required. Two or three of the Members of the Club who are quite competent to draw up this latter list might easily be named, or the work of cataloguing both the fish and the coleoptera could readily be put into the hands of a small committee or section of icthyological and entomological members, as is done in the case of the Lincolnshire Naturalists' Union.

And now, after again, at the close of my year of office, returning the Club my hearty thanks for the honour it has conferred on me of acting as its President

"*ne me Crispini scrinia lippi*
Compilasse putes, verbum non amplius addam."

Woolhope Naturalists' Field Club.

First Field Meeting, Tuesday, May 19th, 1896.

CROFT AMBREY CAMP, AYMESTREY, AND MORTIMER'S CROSS.

On May 19th the Club held their first meeting this year. Training to Woofferton, after two miles walk on the high road through Orleton parish, the naturalists were glad to get upon a footpath beyond the Maidenhead Inn, near Portway, which conducted by Ashley Moor House to Bircher Common, which was entered on its north east boundary. The southern slope of the common was traversed, following nearly its contour on an elevation of about 600 feet, for the length of one mile, until the fence bounding the enclosure was reached a little north of Highwood House, the residence of Mrs. Devereux. The common was gloriously covered with gorse in full blossom, and the walk on the soft turf under a hot sun was particularly agreeable, refreshed as it was by a bracing northerly breeze, and diversified by the distant prospect of the Brecon Beacons in front. Having entered the enclosure, the walk extended for another mile alongside the pools in the Fishpool Valley, over grounds brightened with spring flowers, with here and there a noble tree, notably a lofty Larch, past the keeper's cottage in Croft Park grounds, thence over grass and through fern to the summit, on which is situated the Camp of Croft Ambrey. Some few of the party paid a visit to Croft Castle and Church.

Upon arrival at the Camp, it was explored and examined, and a long halt was made which was occupied in determining the names of the distant heights on the skyline. After the President had made a few remarks upon the important position of the Camp, on the borderland of the Silures and Ordovices, and upon the local geology, leaving the Camp by its original entrance at its south western corner, the descent was made to Aymestrey village. At the Church the Members were met by the Rev. J. S. Sidebotham, who explained its principal features. The Church bells were set ringing in honour of the occasion, and their particularly sweet chimes were wafted along the gorge of the Valley which is at this locality contracted to its minimum. Some members found time to pay a short visit to the grand exposure of Upper Silurian rock behind the Crown Inn, a few score yards above the bridge, on the right bank of the Lugg.

At four o'clock the members assembled for dinner at Mortimer's Cross Inn, after which they adjourned to hear Sir Herbert Croft read his paper under the shade of the Gospel Oak, on the site of the Battle of Mortimer's Cross, and returned to Hereford from Kingsland Railway Station, after a walk of about 12 miles. The party mustered 53 in number, composed as follows :—The President (Mr. H. Cecil Moore), Sir Herbert Croft, Revs. H. A. Barker, J. Barker, A. Bannister, C. Burrough, E. R. Firmstone, C. S. Hagreen, E. J. Holloway, W. Ireland, A. G. Jones, Preb. W. H. Lambert, H. B. D. Marshall, R. T. A. Money-Kyrle, H. North, F. S. Stooke Vaughan, Major J. E. R. Campbell, Colonel J. C. Little, Captain C. Dansey Oldham, Deputy Surgeon-General W. Perry, Dr. F. S. Powell, Dr. J. H. Wood, Messrs. C. D. Andrews, R. Clarke, J. Davies, M. J. Ellwood, F. R. Kempson, J. Lambe, R. Lewis, H. J. Marshall, W. Pilley, C. Warre Prescot, J. Probert, J. Riley, H. J. Sugden, J. P. Sugden, H. A. Wadworth, A. Watkins, T. Hutchinson, (hon. secretary), and James B. Pilley (assistant secretary); and the following visitors :—The Very Rev. the Hon. J. W. Leigh (Dean of Hereford), Rev. J. S. Sidebotham (vicar of Aymestrey), Rev. A. C. Auchmuty, Mons. Bunard des Closiers, Dr. Douglas Eshelby (Frocester), Lacon Lambe, P. C. du S. Leather, Donald Matthews (Redditch), C. E. A. Moore, Lieut. McPherson, Rev. A. Pope, Colonel Pulley (commanding 3rd Ghoorkas), and the Rev. T. G. Watton.

Three members were elected, and five gentlemen were proposed and seconded.

FUNGUS.

Dr. T. A. Chapman sent a specimen of a fungus on the leaves of Populus alba (the silver Poplar), which Mr. William Phillips calls *Ascomyces aureus* (Pers.), not recorded in his work on British Discomycetes, International Series, because it had not been recorded in Britain when the work was published in 1887.

Mr. Phillips writes : "I have recently received it from several parts of the country on Populus nigra. This is the first specimen I have seen on Populus alba. By some authors it is put in the genus *Taphrina* under the name *T. aurea* (Pers.) It is closely allied to *Ascomyces deformans*, Berk., which crumples the leaves of peach trees. The sporidia are enclosed in minute club-shaped sacs or asci."

Dr. Plowright writes: "The fungus is not a Uredo as most people would think from its colour, etc. It is, I believe, known by several generic names, *Taphrina aurea* Pers. ; *Ascomyces aureus* Pers. ; *Exoascus populi* Hum. ; these are all the same species and occur on the leaves. But more accurately it is called *Taphrina rhizophora*, Johns., on the young fruit of P. alba and tremula."

A specimen has been sent also to Rev. J. E. Vize, who detects the fungus as above.

BOTANY.

Mr. Donald Mathews, one of our visitors, honorary secretary of the Redditch Literary and Scientific Institute, took notes of the principal plants met with in the walk to the Camp, as follows :—

Ranunculus Flammula, Viola pumila, Euonymus europaeus, Ornithopus perpusillus, Vicia sylvatica (not in bloom), *Saxifraga granulata, Chrysosplenium*

oppositifolium, *Sanicula europœa*, *Cornus sanguinea*, *Viburnum opulus*, *Asperula odorata*, *Valeriana officinalis*, *Lysimachia nemorum*, *Lunaria vulgaris* (not in bloom), *Euphorbia Helioscopia*, *Moenchia erecta*, *Colchicum autumnale* (in fruit), *Ophioglossum vulgatum*, *Aspidium aculeatum*, *A. oreopteris*, *A. spinulosum*, *Asplenium trichomanes*, *A. ruta muraria*, *Ceterach officinarum*, and *Blechnum spicant*.

It may be again recorded here that in the month of July, 1860, the Rev. Thos. Hutchinson found the very rare Crested Hair Grass, *Koehleria cristata* growing among the fern near the summit of the fence leading from Cock Gate and Croft Rectory to the top of the hill on the eastern side of Croft Ambrey. It is recorded in *Herefordshire Flora*, and any botanist interested in this rare find should refer to *Transactions* 1881, pages 51 and 52.

ENTOMOLOGY.

It was not a favourable day for the entomologists. Mr. T. Hutchinson, son of the Rev. T. Hutchinson, had issued a notice of what had been found chiefly by himself and his family in this locality at this period of the year :—*Stauropus fagi*, *Demas coryli*, *D. hamula*, *D. unguicula*, *Melanippe hastata*, *Eupithecia pulchellata*, *E. irriguata*, *E. indigata*, *E. dodoneata*, and many other good species. In addition it may be remarked that the only specimen of *Hepialus velleda* taken in the county was taken by himself at rest on a beech tree within the wood west of the Common.

TREES IN THE PARK.

Croft Park has been previously visited by our members. References may be found in *Transactions* 1870, page 306, 1878, (page 110), for measurement of the fine Spanish chestnut trees, and 1881, (page 51) opposite which page a plan of the camp is represented.

Although much timber has been felled within the last half century, yet a few fine trees remain. One mile north of the Castle, leading from the Keeper's Lodge at the top of Fishpool Valley, are six or eight, the largest of which has its trunk riven asunder. The girth of the largest oak tree in this particular locality measures 18 feet.

As regards the avenue of Spanish chestnut trees we read in *Transactions*, 1870, page 306, that they were said "to have been planted by Dr. Herbert Croft, Bishop of Hereford, 1662-1691, after the Restoration": our local Directory says, "by Sir James Croft, M.P. for Herefordshire and Controller of Queen Elizabeth's household, with seeds which were taken from one of the ships of the Spanish Armada, which was wrecked on the coast of Wales, near a Welsh residence of Sir James Croft." We regret that we cannot reconcile the diverse statements, which give a difference of a century's growth, but consider the earlier date as more probably correct.

At the present time the largest has a girth of 24 feet at the height of 5 feet from the ground. It is nearly the last tree on the right hand side as you proceed along the western drive from the Castle to the Lodge near Mortimer's Cross.

Along the eastern drive, or approach from Cock Gate, an avenue of fine oak trees extends for nearly half a mile, succeeded by an avenue of about forty fine old beech trees on each side. Cock Gate is two miles distant from Berrington and Eye railway station, and four miles from Woofferton.

At the present period the largest oak tree in the park, known as 'the garden oak,' is within the private grounds, and is situated at the western end of the garden lawn. From a length of fifteen feet from the base its boughs project in a remarkably uniform manner, maintaining the same picturesque uniformity in their stag's horn stage of decay. This pollard tree girths 25 feet at 5 feet from the ground.

Mr. T. R. Groom, of Hereford, timber merchant, considers that one of the most finely-grown oak trees he has seen in Herefordshire was from Croft Castle grounds of which he gives the following details: "It was 76 feet in its first length, without a knot or offset, as upright as a pine tree, and when cut off was 101 feet in length, with a cubic content of 346 feet of timber." See *Transactions* 1893, page 129. For a general description of the trees in the park see *Transactions* 1870, page 306.

CROFT CHURCH.

Croft Church is close to the Castle. It is a small structure, consisting of a nave separated from the chancel by a pointed arch. Ancient roofs cover the nave and chancel. There are 14th century windows in the nave, and a wooden bell turret of the 18th century has been added on the West end.

There is a blocked up doorway presenting indications in the north wall of the chancel of a chapel now demolished.

In the chancel on the north side is a very fine altar tomb of the 15th century, with a raised canopy at the head, containing recumbent effigies of a knight in armour, and a lady at his side. A carved shield on the canopy contains the arms of Croft impaling Cornwall. This no doubt represents Sir Richard Croft who fought at Mortimer's Cross 1461, M.P. for Herefordshire 1477, made a Kt. Banneret 1487, died 29th July, 1509. His will is dated 19th June, and was proved at C.P.C. 11th Nov., 1509. He married Eleanor, daughter of Sir Richard Cornwall, Baron of Burford, co. Salop, widow of Sir Hugh Mortimer, of Kyre. Inq. P.M. 1520-1.

On the floor of the Church are many fine encaustic tiles, heraldic and foliated, similar to the tiles in Malvern Abbey Church. It is hoped that in some early future these will be illustrated by Mr. Robert Clarke, with other tiles found in the county of Hereford.

CROFT CASTLE.

Croft Castle forms the subject of a pretty sketch by Mrs. Stackhouse Acton, with Croft Church in close vicinity to it, in Robinson's *Castles of Herefordshire*.

The Castle is a quadrangular stone building enclosing a courtyard. It has circular battlemented towers at each angle, connected by curtains 30 to 34 yards in length, reminding one of the type of later Edwardian castles. Originally it contained only three sides, the fourth, facing the East, having been enclosed between the towers in the last century.

The old Tudor or Elizabethan square-headed windows with stone mullions, jambs, and label mouldings, remain in some places, intermixed with the modern insertions, or restorations in wood, of the old stone work. On the north side modern brick additions have been attached.

Leland in his *Itinerary*, 16th century, on his way from Eaton to Ludlow, writes :—"Croft, the manor of the Crofts, set on the brow of the hill, ditched and walled castle-like." It is said that he did not visit the castle, of which he gives no further particulars.

Symonds (*Diary* p. 203) writes :—"The Ludlow men (1645) thought it prudent to dismantle the Castle lest the enemy should seize on it for their own uses."

For the history of Croft Castle, from its record in Domesday Survey, its retention by the Crofts, a Saxon family, for seven hundred years, until it was sold by Sir Archer Croft in 1746, afterwards surrendered by the mortgagee to Mr. Richard Knight, iron-master, of Downton, and its subsequent changes, see Robinson's *Castles of Herefordshire.*

AYMESTREY CHURCH.

The Rev. J. S. Sidebotham, Vicar of Aymestrey, addressed the Members and explained the prominent features of the Church which is dedicated to St. John the Baptist and St. Alkmund. The early name of the village was Alkmundstre, changed into Aylmondistre, Aylmistre, and for several centuries known as Aymestrey.

The Church consists of a nave with a clerestory, north and south aisles, chancel, and a fine tower at the west end of the nave. The principal entrance is at the west, under the tower, and groined with stone.

The Rood Screen has been restored by the careful substitutions of the mutilated and missing portions. It is a richly carved piece of oak work with moulded mullions, and carved tracery arches, the overhanging portion above is richly canopied over, and originally supported the rood-loft which is now gone.

There are four smaller and plainer old oak Screens of about the same period, enclosing the east ends of the north and south aisles, which enclosures were probably used in early days as side chapels. There is a walled up doorway in the south wall of the south aisle.

The Chancel, probably the oldest part of the Church, has two small early Norman lights, and some remains of herring-bone walling in the exterior of north wall.

On the Chancel floor within the altar rails has been laid an alabaster slab, inlaid with black, to the memory of Sir John Lingen, who died in 1522, and his wife Isabel, daughter and heir of Sir John de Burgh.

The Tower is a 15th century structure, added after the nave had been built.

During the restoration some remains of Fresco paintings were discovered under the whitewash on the walls.

In the Churchyard are the remains of a Churchyard Cross.

There are six Bells in the Tower : five are dated 1732, and cast by Abraham Rudhall, of Gloucester ; the sixth has no inscription.

Of the Parish Registers, the earliest is illegible ; it is said to date from 1591, and is supposed to have been damaged by a flood in 1770.

A FEW REMARKS ON THE NATURAL HISTORY OF AYMESTREY.

The natural history of this beautiful village affords study for a man's lifetime. Two of our members, who resided here for several years, found themselves in a happy paradise. The labours in the field of geology of Rev. T. T. Lewis, the President of our Club in 1853, commencing in the year 1827, are well known to every reader of Sir Roderick Murchison's "Siluria." Sir Roderick derived much information from his field work, and was liberally supplied by him with organic specimens. Mr. Lewis' address in January, 1854, forms the earliest printed pamphlet of our *Transactions*, and should be referred to. So also should *Transactions*, 1870, pages 25 to 30, which are occupied by "Notes on the Natural History of Aymestrey," by his friend, Rev. Thomas Woodhouse, in which he records the observation of 75 species of birds, 464 species of plants, and 22 species of ferns. During the last quarter of a century changes have taken place. Some of the finest trees have fallen a prey to gales, others have been felled. In the grounds of Aymestrey House, opposite the Church, grows a magnificent hedge of yew and box, and in the same grounds stands the finest cherry tree we have ever seen ; jackdaws, however, are so numerous about the adjacent Church tower that they never allow its fruit to be gathered by man. A favourite habitat of the jackdaws is on the heights of the Rock Quarry. Mr. Woodhouse never heard the nightingale in the parish, but in his day the croak of the raven was often heard on Croft Ambrey.

The Parish of Aymestrey reaches as far west towards Deerfold Forest as Haven Farm, on the road to Lingen, formerly the residence of our member, Mr. Charles Fortey, on whose grounds grows the celebrated mistletoe oak (*Transactions*, 1870, page 8). The oak tree and the mistletoe are both still flourishing. For illustrations of the tree see *Transactions*, 1869, opposite page 15. About five and twenty years ago Dr. Bull assisted Mr. Fortey in planting an avenue of Spanish chestnut trees in the orchard at Haven leading to the Dingle, and thence to the very diminutive camp, 940 feet high, begirt with prominent Scotch firs. The trees were about five feet high when planted. One of the best, recently measured by Mr. Fortey and Mr. Moore, had a girth of 5 feet 9 inches at 5 feet above the ground.

The angler who is fortunate enough to ply his pastime in this neighbourhood meets with many a pretty reach of scenery. The Kinsham valley above Deerfold bridge, immediately before entering the parish, the Shirley fishery, the Shobdon and Lyepool fisheries, the Garden-house fishery down to Aymestrey bridge, and the Aymestrey reaches below the bridge afford sport of both trout and grayling in their respective seasons, and cover an expanse of charming sylvan and meadow scenery in their valleys and hills.

Here it is not out of place to record an event in Natural History, witnessed in the Aymestrey reaches by Mr. C. W. B. Moore, of Aymestrey House, Aymestrey (brother of our President), and his angler companion.

A RABBIT ATTACKING A STOAT.

The attention of the two anglers, quietly sitting down on the bank of the river, was aroused by a commotion amongst some patches of bracken fern on the opposite side, accompanied by a squealing as of some animal in distress. The cause was shortly revealed by the appearance in the open meadow of a young rabbit pursued closely by a stoat. Some very pretty doubling backwards and forwards was witnessed, when suddenly a large rabbit appears upon the scene, which, rushing fiercely out of the fern patch, charges the pursuing stoat and bowls the enemy over and over, causing it much temporary bewilderment. The young and old rabbit both retire to their friendly shelter under the ferns. The stoat, upon recovery, returns to the same grounds, and again getting upon the scent of either the same or another young rabbit, the whole scene is again repeated, but it was observed that the old rabbit's coat bristled larger and if possible more fiercely than before, as it again charged straight at the stoat and again bowled it over. One of the anglers became so excited at the doubtless maternal instinct displayed that he jumped up, and waving his arms vehemently exclaimed " Bravo old 'un, go it old 'un," which had the effect of frightening the trio, of dispersing them in different directions, and bringing down the curtain all too soon upon the interesting scene. The large rabbit was probably a doe, prompted by maternal instinct to attack its great enemy in defence of its young.

A somewhat similar case of a rabbit attacking a stoat is reported in the *Field* of May 7th, 1892.*

THE RIVER LUGG.

The river Lugg (Ancient British, Llûg=bright) rises about eleven miles north-west by west, as the arrow flies, of Presteign. Its source is from the elevations nearly 1,600 feet high of the Pool Hill, about midway between Llanbister and Beguildy, in Radnorshire. On the track across Rhos Crûg (the moor tump) near its source is an elevation 1,596, and an Ordnance Pkt. 1,576·5. Close to its source it receives upon its left bank a small feeder from the east, which flows between Cnwc Bank and Llan Lluest. At Crûg the Lugg is crossed by the Central Wales branch of the L.N.W. railway, one mile east of Llanbister Road Station, about midway between Knighton and Rhayader, and about 2½ miles from its source.

The next tributary, after flowing through Ferley Dingle, enters the Lugg upon its left bank, about one mile south of Llangynllo Station, and at Llangynllo another enters upon its right bank.

Near Monaughty (Mynachdy) the aqueduct of the Birmingham Water Supply from the Elan Valley in Wales is carried over the river in two 42 inch steel pipes, in a span of 24 feet.

* Again a similar case is reported in the *Field* of August, 17th, 1897.—H. C. M.

Half a mile south of Monaughty the Bleddfa Brook from the Cwm-y-gerwyn Hill, a spur of the Radnor Forest, enters upon the right bank about 1½ miles east of Bleddfa.

About one mile below this tributary the Lugg crosses the site of the Battle of Pilleth, A.D. 1402, opposite the hill Bryn-glas, and near Castell Forelallt, four miles south-west of Knighton. In this battle, in the early part of the rebellion of Owen Glendower, Sir Edmund Mortimer was taken prisoner, and the Herefordshire men suffered severely. The battle is thus alluded to in Shakespeare's King Henry IV. :—

" When all athwart there came
A post from Wales, loaden with heavy news;
Whose worst was, that the noble Mortimer,
Leading the men of Herefordshire to fight
Against the irregular and wild Glyndwr,
Was by the rude hands of that Welshman taken;
A thousand of his people butchered,
Upon whose dead corpse there was such misuse;
Such beastly, shameless, transformation
By those Welshwomen done, as may not be,
Without much shame, retold or spoken of."

Henry IV., Part I., Act I., Scene I.

The last four lines refer to the "shameful villanie used by the Welsh-women towards the dead carcases," as we read on the authority of Hollinshed.

Near Whitton a small feeder flowing through Cwm Whitton supplies the Lugg upon its left bank. A much larger feeder from the Radnor Forest on the west empties upon the right bank under the name of the Cascob Brook. Close to its junction, but upon the opposite, or east side, Offa's Dyke may be traced for the length of four miles along the western slopes of Furrow Hill and Hawthorn Hill, in its northern course towards Knighton.

Near Boultibrook, the residence of Lady Bridges, the Norton Brook enters upon the left bank, and at Presteign the Lugg enters Herefordshire.

The Hindwell Brook, fed by the falls of Water-break-its-neck on the south of Radnor Forest, enters on the right bank at Combe above Kinsham. The Limebrook stream, flowing from Lingen by the ruins of Limebrook Abbey, enters below Kinsham on the left bank, near Deerfold Bridge, where the Lugg enters the parish of Aymestrey, through which it flows, reckoning all its windings, for a length of nearly five miles.

When it has reached Aymestrey Bridge the Lugg has flowed over a course of twenty-seven miles of Silurian formation, and has received in that course five main tributaries on its left, and four on its right bank.

After a total course of 47 miles from its source, and after draining a large area, the Lugg empties into the Wye at Mordiford, below, and four miles east of, Hereford.

CROFT AMBREY CAMP.

In Brayley and Britten's *Topographical description of the county of Hereford* published in 1810, on page 360 we read: " Croft Ambrey, a British camp on an eminence to the North of Croft. On an eminence to the S.W. above Avemestre

is a smaller camp of a square form." The smaller camp is a six acre camp in Pyon Wood, one mile south west of Croft Ambrey, half a mile north of Aymestrey bridge, and commanding the main road, named Watling Street, which runs along the eastern base of the hill on which the camp is situated. Although this camp is not quite square in plan, it has at least one straight side about 200 yards in length, and military engineering skill is displayed in the profile of its foss and vallum.

The fine camp at Croft Ambrey is situated on an elevation of 1,000 feet, commanding a very extensive view, especially the open view towards the north. Every advantage has been taken of the natural features of the ground so as to convert a position strong by nature into a formidable place of defence. A natural ridge of Aymestrey limestone traverses the camp from west to east, from each side of which ridge excavated material has been piled upon it until a rampart of extraordinary, and apparently unnecessarily large, dimensions has been formed, in fact, in one place, from the bottom of the ditch to the summit of the rampart, the actual measurement is as much as 60 feet. This rampart is mainly upon the south, the most readily accessible side, where there is a double line of earthwork and ditch, and upon the sloping *glacis*, at the distance of about 150 yards, a parapet forms a triple line of defence. From the general section of the defences this camp has been planned on the same lines as Wapley, although the lines of defence at the latter camp are more numerous.

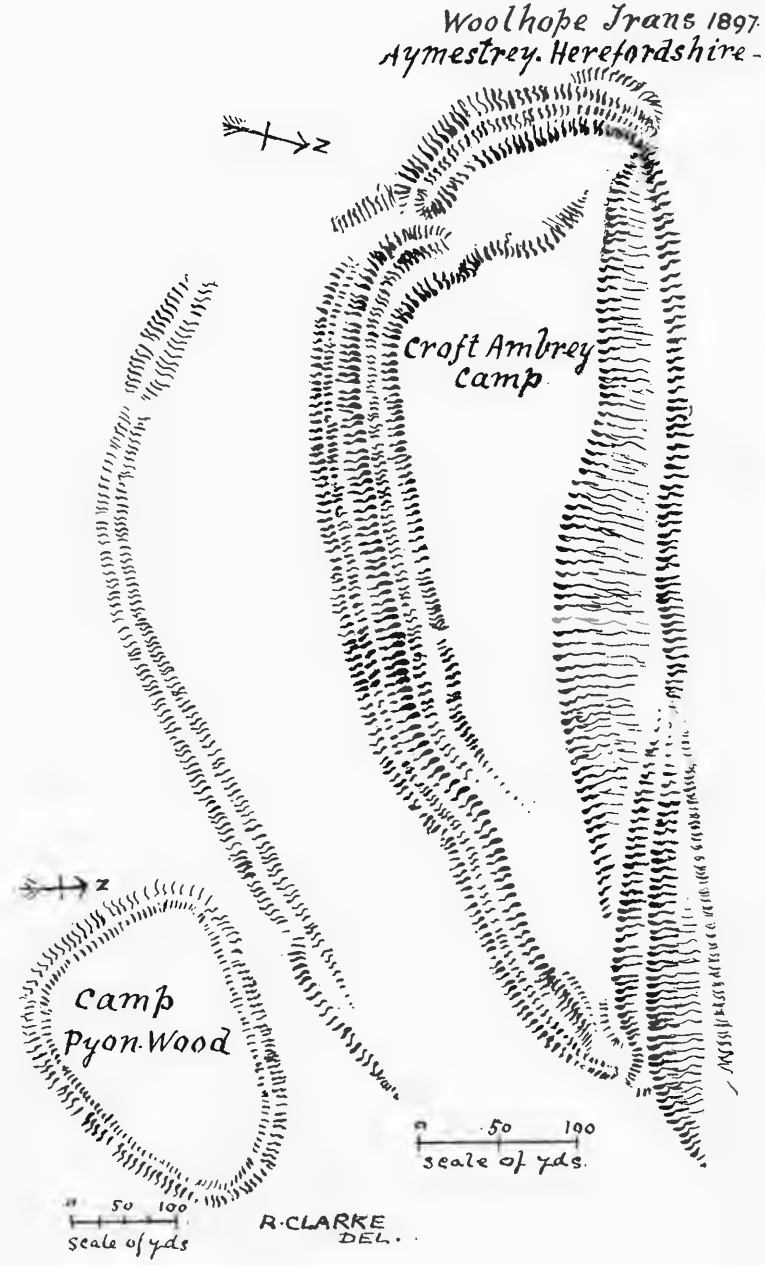
The original entrance to the camp at the south-west corner winds along a covered way which is further protected interiorly by an earthwork traverse. Towards the north east extremity the camp narrows considerably, leaving only space for the entrance which is used at the present period, and presents every appearance of a modern introduction.

Upon the northern side there is a steep declivity, which would require but little artificial defence in the days of archers and pikemen, and before the days of artillery. A low parapet would here provide sufficient security; no traces, however, now exist of any such parapet.

The inner defences extend from east to west, a length of 600 yards, and in their greatest width hardly attain 200 yards, but the area of the whole, including the ditches and out-works, cover a space of 24 acres, and the camp might have held half a legion, say 3,000 foot soldiers on an emergency.

Although there is an absence of water supply within the *enceinte*, there exists a water spring down the hill, about two or three hundred yards distant from the north-eastern angle. This spring in the present day supplies Leinthall Hall in Gatley Park half-a-mile distant, and apparently has done so for at least two centuries and a half, judging from the fact that there is upon the premises a large leaden tank dated 1637, and that in the course of the restoration of the water supply a large extent of corroded leaden pipes has been excavated.

Croft Ambrey Camp is one of the largest of the numerous ancient Camps, more than forty in number, in Herefordshire, as the following comparison displays :—Credenhill, the largest, embraces 50 acres; Wall Hills, near Ledbury, 33 acres; Sutton Walls, near Hereford, 30 acres; Ruckhall, at Eaton Bishop, 30 acres; Wall Hills, Thornbury, 25 acres; Croft Ambrey, 24 acres; Wapley,



21 acres; Midsummer Hill, near Eastnor, 21 acres; Herefordshire Beacon, 21 acres; Aconbury, 18 acres; and the walled Roman town of Kenchester, 17 acres. The above areas include the outer defences enclosing the ditches, and are taken from an advance proof of the Archæological Survey of Herefordshire.

The acreage of the Camps have been calculated by a professional surveyor at Oxford, using the 25-inch Ordnance Maps.

The earliest history bearing upon this locality is given in the "Annals of Tacitus," Books XII. and XIV., also in his "Life of Agricola," and it associates the territories of the Silures and Ordovices, on the borderland of whose possessions this Camp is situated, with the early struggles of our ancestors with the Roman invading forces. We find Ostorius Scapula marching against the Silures, "whom neither rigour nor clemency could induce to abandon their resolution of prosecuting hostilities," and immediately afterwards following Caractacus to his retreat amidst the lofty mountains in the territory of the Ordovices, where, after nine years from the commencement of the war in Britain, Caractacus and his family were made prisoners. Afterwards revolts were frequent, and many an attack was made upon the Roman legionary cohorts which had been left to rear fortified posts against the Silures, who are described as a people "resolute and fierce by nature," "the most determined of all."

Other tribes north, south, and east, joined in the general cause against the invaders. Suetonius Paulinus quelled the revolt in the south under the British Queen Boadicea. The credit of subduing the strong and warlike nations of the Silures in a difficult country belongs to Julius Frontinus, probably about A.D. 70 to 78, and after many years of forays in which the Ordovices had some successes, it is recorded that they were almost totally extirpated by Agricola about A.D. 80, before he advanced into the northern parts of the kingdom.

Let us now glance at the map of Roman Britain according to Antoninus, Ptolemy, and the discoveries of modern times, which accompanies *Iter Britanniarum* by Rev. T. Reynolds, published in 1799. We find on the northern boundary of the Silures a prominence given to Stretford and Street, a few miles south of Bravinium (Leintwardine). Proceeding westerly the Silurian boundary embraces Old Radnor, Cwm, thence to the sea in the present Cardigan Bay. Cwm is most probably a square camp in Radnorshire, on the right bank of the Ithon, near Castell Collen, seven miles north of Builth. Ostorius most probably advanced from the territories of the Trinobantes in the east, having left his base secure at Camulodunum, and his left flank protected by the Cotteswold Hills on the south, he would probably cross the Malvern range, possibly by Herefordshire Beacon, whence his route would take him by Wall Hills (Ledbury), Wall Hills (Thornbury), Garmsley, near Kyre, the diminutive camp of Ashton near Berrington, Croft Ambrey, and only seven miles west of it the camp at Wapley, before he arrived amongst the difficult hills of the Ordovices, to which Caractacus had prudently retired with the crafty purpose of entangling Ostorius amidst their fastnesses.

Within sixteen miles march south of Croft Ambrey is the site of the Roman walled-town of Magna (Kenchester), through which the road from Isca

Silurum (Caerleon) and Gobannium (Abergavenny) passed. This road, under the name of Watling Street, passes within one mile west of Croft Ambrey, thence leads northwards near Wigmore, through Bravinium (Leintwardine) and Uriconium (Wroxeter) to Deva (Chester). This road is met at Wroxeter by the more commonly known Watling Street from Kent through London and the midland counties. During the Roman invasion this road would have been useless to them without the occupation of defensible posts along its route. In this locality we have Croft Ambrey on the east, the camp in Pyon Wood on the west, and three miles north the defensible post at Wigmore.

In the 7th century the West Saxons pushed their possessions as a wedge between the Mercians and the Silures.

In the 8th century Mercia attained the first position of supremacy, even above Northumbria and Wessex, and Offa (A.D. 758—796), who conquered the land between the Severn and the Wye, carried his ravages into the heart of Wales. His name is perpetuated in Offa's Dyke, ten miles west of Croft Ambrey.

At Wigmore we see the earthen mound characteristic of the English or Saxon stockaded enclosure, in later times encircled by the Norman masonry keep. According to George T. Clark, in his *Mediæval Military Architecture*, 1884, page 42, "the attacks of the Danes upon Wigmore are on record." It was Roger, the sixth Lord Mortimer, who, on May 28th, 1265, in concert with the Lord of Croft, artfully contrived the escape of Prince Edward from the custody at Hereford of Peter de Montfort, a son of Simon.

In still later times we find Ludlow Castle, seven miles distant, the great head quarters of the government of the powerful Lords of the Marches.

Although we have no particular "finds" of ancient coins, pottery, or implements of war in confirmation thereof, nevertheless the above historical facts tend to associate the camps of this locality, originally ancient British strongholds, with their successive occupation by the Romans, Saxons, Danes, and Norman, in the mediæval period, by the Lords of the Marches.

With reference to the etymology of Croft Ambrey, we read in Jakeman and Carver's *Directory and Gazetteer of Herefordshire*, that "it is said to have been the camp of the British King, Ambrosius." This is not very probable. We have no evidence of Ambrosius, a praiseworthy ruler of the most southern parts of the kingdom in the early part of the fifth century, ever having visited Herefordshire. In Epping Forest there is an ancient camp called Ambersbury Banks, and in Wiltshire there is Amesbury, formerly Ambrose-burh, Ambrose's fortified town. In both Sussex and Worcestershire there is an Amberley, Ambrose's place. In Oxfordshire there is Ambrose-den, or Ambrose's hollow. Welsh legends associate the name of Ambrosius with Ambresburh or Amesbury in Wiltshire. Gildas and Nennius both refer to Ambrosius (which in Welsh becomes Emrys) as Gwledig (ruler or prince) of Lower Britain. Gildas represents him as leader of the Britons in their effort to expel the German invasion, and his descendants as still in power in Lower Britain at the period of his writing in the middle of the sixth century. (*Celtic Britain*, by J. Rhys).

Croft is an old English or Anglo-Saxon word signifying a field or

appropriated land. Ambrey is a British word. Croft Ambrey would signify "Ambrey's field."

Researches by our member, Mr. James Davies, on the etymology of Croft Ambrey have been furnished as follows:—"Ambrey or Ambury may be a transformation of *Am-bre*. *Bre* in Welsh is a hill, and *am* a circuit. Rev. T. D. Fosbrooke in his Encyclopedia of Antiquities, page 541, under the names Amberley, Ambury, writes:—"Mr. Gough says that the first term denoted an Earthwork, and a Danish Camp on Minchinhampton Common is so called; but Ambury is applied to an old Danish Temple near Huddersfield. The etymology of the first syllable is uncertain."

Mr. James Davies further writes:—"In the Cornish language '*Bre*' was a mountain or hill, and the suffix is preferred in names of places as follows:—Carn-brea, also in Wales as Moelfre, Tenbre—see *Cornish Lexicon*, by Rev. Robert Williams, page 32." Again—"Ambrosius, also styled Aurelius Ambrosius, was a British King . . . He is said to have killed Vortigern—

See *Archæologia Cambrensis*, 2nd Series, Vol. II., page 299.

See also "Epitome of History of Britain,' attached to Rees' "History of Cambro-British Saints," page 614.

There is a Fort or Camp on the Snowdon range of mountains called Dinas Emrys or the Fort of Emrys, *i.e.*, Ambrosius. As to Ambrosius, continues Mr. James Davies, see "Review of the Conquest of Britains by the Saxons," by D. H. Haigh, *Arch. Camb.* 3rd Series, Vol. VIII., page 71, also "Horæ Britannicæ," by J. Hughes, page 188." Surely this subject has provided some occupation for our historians.

The commanding elevation of Croft Ambrey makes it a favourable site for a beacon fire to speed the message on in case of war's alarms. The guide books say that thirteen counties are visible from the Camp. We cannot certify this statement. We were favoured on the day of our visit with a very clear atmosphere, especially towards the north. Some of our members from the Salopian diocese recognised Corndon Hill, the ridge of the Stiperstones, The Longmynds, and other hills in Shropshire, hills in Montgomeryshire, and possibly part of the Berwyn range in Merionethshire. To those counties add Radnorshire, Breconshire, Monmouthshire, Gloucestershire, Worcestershire, and do not forget to reckon Herefordshire.

Such an expanse of scenery varied by hills of striking outline naturally prompts us to the consideration of their formation.

GEOLOGY.

From Croft Ambrey the spectator views rocks embracing the earliest dawn of vegetable and animal life, as well as the most ancient azoic rocks.

To the geologist the district of Aymestrey is classic ground; and lest he should shudder at the spelling of the word, we will at once state that the above is according to the usage of the present day to which we shall adhere, whilst the geologist who is not familiar with our provincialisms will probably continue his adherence to the *Aymestry* of Murchison's Siluria. Here the Rev. T. T. Lewis, who was President of the Woolhope Club in 1853, was quietly pursuing those

researches, and gathering into his museum since the year 1827 (see his "Address" on January 24th, 1854, also see *Transactions* 1870, p. 5), those treasures of the great invertebrate period of ancient life which opened to Sir Roderick Murchison the key of the "Silurian System," so elaborately worked out by him in the marvellous work under that title published in 1838, in such a manner as to be intelligible to the student, and of which no man can bring against him the accusation "I have gathered a posie of other men's flowers, and nothing but the thread which binds them is mine own." The name of Murchison is perpetuated in all countries in the history and orders of the Silurian system, but the Woolhope Club will never cease to associate with it the name of Lewis of Aymestrey, as chronicled in their *Transactions*. Sir Roderick Murchison has frequently acknowledged the great debt he owed to Rev. T. T. Lewis "my most efficient coadjutor in all the regions of Siluria," page 128, as indeed he styled him in the Preface to the 1st edition, first discoveries by whom are referred to in the following pages of the 5th edition, published 1872: pages 5, 116, 119, 128, 129, 133, 198, and 605. In one place he writes—"This central member of the Ludlow formation was named by me after the beautiful village of Aymestry where the rock is well laid open, and its relative position as well as fossil contents were elaborately worked out for me by my friend the late Rev. T. T. Lewis."

From Ashley Moor house until the members left Mortimer's Cross the ground traversed is entirely Silurian. The boundary line between the Old Red Sandstone, "the age of fishes," and the calcareous sandy beds of the Silurian formations, "the invertebrate period," follows closely the main road from Mortimer's Cross eastwards as far as Highwood House, thence enclosing Bircher Common, and extending north-easterly to Ludlow, it passes westwards, encircling the heights of Bringwood Chase. On the Geological Map 55 N.W. is represented a section from Croft Ambrey to Bringwood, shown on Horizontal Section, Sheet 34.

Starting from the high road between Lucton School and Cock Gate, with his back to the Old Red Sandstone, the geologist proceeds northwards through Croft Park, passes for the length of one mile over the Upper Ludlow Beds until, on arrival at Croft Ambrey Camp, 1,000 feet high, he reaches an upthrust of Aymestrey Limestone, reaching from the river Lugg, and extending thence eastwards for a total length of four miles, the whole stratum dipping to the south. From the summit of Croft Ambrey, looking north, he has the valley of Leinthall Earles between him and the next elevation, Gatley Hill, 1,108 feet high, distant one mile and a half. Along the northern slope of Croft Ambrey Hill are the Lower Ludlow Beds, followed by Wenlock Limestone, all dipping southwards, and in the valley Wenlock Shales underlying another exposure of Wenlock Limestone, dipping north, forming portions of a small anticlinal of one mile in extent, whose summit has been denuded. Here, at the southern base of Gatley Hill, is a geological fault. See Section and Plan.

A similar anticlinal of three miles length, and of the same formations, extends from Gatley Hill to Bringwood; the intervening valley, the catchment of which drains into Burrington Pool and into the Teme, has been similarly denuded down to the Wenlock Shales. (See Section).

About one mile north of Aymestrey is the watershed between the Lugg and the Teme, or, in other words, the parting line of watershed between the Wye and the Severn, which are respectively supplied by the above tributaries.

On visiting the village of Aymestrey, the geologist is delighted with an exposure of Upper Silurian rocks in a quarry 90 feet high, called Rock Hall quarry, in the Common Wood, behind the Crown Inn, on the right bank of the Lugg, south of Aymestrey Bridge, and less than one hundred yards distant from it. Here is developed, in successive layers, the "Aymestry Limestone" of "Siluria," and the same formation extends in a narrow band southwards for three-quarters of a mile, half-way to Mortimer's Cross. From opposite the southern extremity of the quarry a band upon the left bank of the river stretches at nearly a right angle through Pokehouse Wood north-easterly, to form the natural ridges of the ramparts of Croft Ambrey Camp, before referred to. Rock Hall quarry is noted for "finds" of the finest specimens of Pentamerus Knightii, the size of a closed fist, the special characteristic of the Aymestrey Limestone, and so called from its five compartments. Here also the geologist has been rewarded with finds of Favosites alveolaris, Heliolites, Strophomena euglypha, Encrinites, &c. In the top layer of the Aymestrey Limestone the small Leptæna levigata, and Rhynconella navicula, have been found in abundance. Of recent years the best of the fossiliferous beds have been excavated, and the fossils are more rare. The quarry is now disused.

The Aymestrey Limestone rock has a position between the Upper and Lower Ludlow formations, and is also known under the title of Middle Ludlow. Salter regarded the Aymestrey Limestone as only a calcareous condition of the Lower Ludlow formation. Most of the Aymestrey fossils are also found in the Wenlock Limestone. H. B. Woodward in his *Geology of England and Wales*, 2nd edition, 1887, page 103, describes it as "a dark-grey or blue earthy limestone, often well-bedded in layers of from one to five feet in thickness, but sometimes of a concretionary nature. It is inconstant in occurrence, and generally contains numerous layers of shells and corals, whilst associated with it are beds of shale. The thickness has been estimated at from 30 to 40 feet, but frequently it is much less." On page 15 of La Touche's *Geology of Shropshire* we read that about the neighbourhood of Craven Arms it is 20 feet thick. In the neighbourhood of Hereford the Aymestrey Limestone forms a wall around the greater part of the well-known Silurian upthrust encircling the Woolhope valley. There is a fine exposure in the Perton lane, about 6 miles from Hereford, leading from the Ledbury road to St. Ethelbert's Camp on Backbury Hill.

Of other quarries in Aymestrey there is one in Grayley Wood, at the back of the Garden House, where formerly the typical character of the Aymestrey Limestone was well developed; and another on the eastern side of the small six-acre camp in Pyon Wood, half a mile north of Aymestrey Bridge. For the long narrow belt of Wenlock Limestone extending from the keeper's cottage near Lyepool bridge, thence westwards, crossing the river to Shirley, re-crossing the river west of Deerfold bridge, circling back east of the ruins of Limebrook Abbey, thence in a north easterly direction by "Haven," through

Dickendale (where a landslip has been reported), to Wigmore, see the accompanying part of Sheet 55 Geological Ordnance Survey, where it is marked b 6″.

These bands of Aymestrey Limestone yield a more hard and durable road material than other Ludlow stones and shales which, originally mudstones, are liable to disintegrate and return to mud upon exposure to climatic influences. Stone from the local quarries is used in the bye-ways, cart-tracks, and lanes, but it is evident to the observer, and is confirmed by the practical quarrymen, that the material from the quarry in Pyon Wood is much better than that from the quarries near Lyepool and Lower Lye, on the road to Lingen, on the left bank of the river, and than that from the quarry at the western end of Mere Hill Wood on the right bank of the river. The main high-roads under the supervision of the County Council are metalled with the best stone in the kingdom, the Clee Hill basalt, which is used universally throughout the County of Hereford, and generally in many adjoining counties. At the present period the Worcestershire Council are making comparative experiments with the Rowley Rag basalt from Dudley in their vicinity, and the basaltic Dhu Stone from Clee Hill: there has to be taken into account the initial cost of conveyance from so long a distance. The observant traveller in a vehicle along the highway (Watling Street) from Mortimer's Cross to Aymestrey, and in places to Leintwardine, will observe the firmness and solidity of the road, due to the fact of its foundations dating from the time of the Romans.

The Lower Ludlow Beds which underlie the Aymestrey Limestone, and from which they are usually separated by soft soapy beds (the decomposition of which unctuous "Walker's earth," similar to an imperfect fuller's earth, has been occasionally the cause of landslips), consist of grey and greenish-grey sandy shales, micaceous sandstones, and flags. Some of the upper beds are calcareous, and contain small concretions of impure limestone. The shales have been locally termed 'mudstones,' from their tendency, when wet, to dissolve into mud. Their thickness has been estimated at 750 feet at Malvern. The uppermost strata (according to Murchison) become somewhat more sandy, constituting thick flagstones termed 'pendle' by the workmen."* Of these landslips we have several examples in Herefordshire, *e.g.*, on Backbury Hill, on Dadnor's Hill, Dormington, at "The Wonder," near Putley Cockshoot, and at Palmer's Cairn, on Churn Bank, less than half-a-mile north of Maidenhead Inn, in Orleton parish, which we passed in the early part of our walk this morning. A representation of the latter is given on page 129 of Murchison's "Siluria," 5th edition, 1872.

Fossils of the Lower Ludlow formation, Wenlock Limestone, and Wenlock Shales, may be found on the northern slope of Croft Ambrey and in the valley at Leinthall Earles.

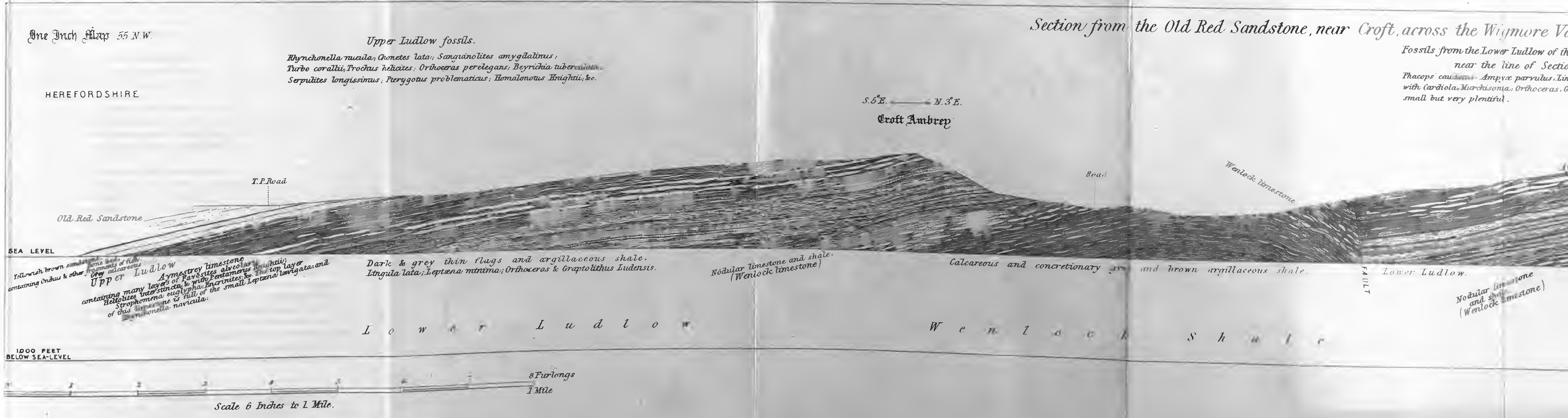
In the dark and grey thin flags and argillaceous shale of Lower Ludlow are Lingula lata, Leptæna minima, Orthoceras, and Graptolites Ludensis. See Section.

The Upper Ludlow Beds "consist of flaggy arenaceous and micaceous

* "The Geology of England and Wales," by H. B. Woodward, 2nd edition, 1887, page 101.

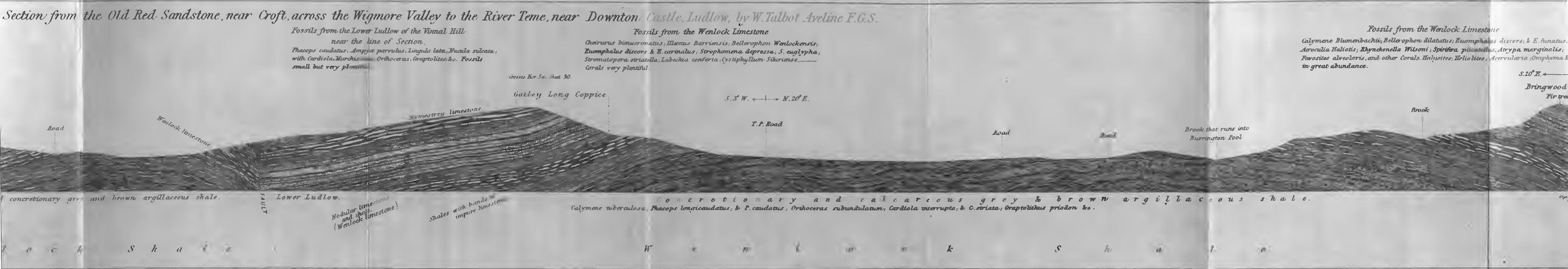
From Sheet 55 Geological Survey of Great Britain, 1856. By permission of the Controller H.M.S.O.

SCALE ONE INCH TO 1 MILE



One Inch Map 55 N.W.
HEREFORDSHIRE
Upper Ludlow fossils.
Rhynchonella nucula; Chonetes lata; Sanguinolites amygdalinus;
Turbo corallii; Trochus helicites; Orthoceras perelegans; Beyrichia tuberculata;
Serpulites longissimus; Pterygotus problematicus; Homalonotus Knightii; &c.
Section from the Old Red Sandstone, near Croft, across the Wigmore Va
Fossils from the Lower Ludlow of th
near the line of Sectio
Phacops cau . Ampyx parvulus, Lin
with Cardiola, Murchisonia; Orthoceras, G
small but very plentiful.
S.5°E. N.5°E.
Croft Ambrey
T.P. Road
Road
Wenlock limestone
Old Red Sandstone
SEA LEVEL
Yellowish brown sandstone
containing Onchus & other fragments of fish.
Grey calcareous beds
Upper Ludlow
Aymestrey limestone
containing many layers of Favosites alveolaris;
Heliolites interstincta, & with Pentamerus Knightii;
Strophomena euglypha; Encrinites; &c. The top layer
of this limestone is full of the small Leptæna lævigata: and
Rhynchonella navicula.
Dark & grey thin flags and argillaceous shale.
Lingula lata; Leptæna minima; Orthoceras & Graptolithus Ludensis.
Nodular limestone and shale.
(Wenlock limestone)
Calcareous and concretionary grey and brown argillaceous shale.
FAULT
Lower Ludlow.
Nodular limestone
and shale
(Wenlock limestone)
L o w e r   L u d l o w
W e n l o c k   S h a l e
1000 FEET
BELOW SEA-LEVEL
8 Furlongs
1 Mile
Scale 6 Inches to 1 Mile.

Section from the Old Red Sandstone, near Croft, across the Wigmore Valley to the River Teme, near Downton Castle, Ludlow, by W. Talbot Aveline F.G.S.



From Horizontal Sections Sheet 34, Geological Survey of Great Britain, 1854. By permission of the Controller, H.M.S.O

ot Aveline F.G.S.

ockensis;
ugLypha,
ise,——

21° F.

One Inch Map 55 N.E.

Fossils from the Wenlock Limestone

Calymene Blumenbuchii; Bellerophon dilatatus; Euomphalus discors; & E. funatus; Acroculia Haliotis; Rhynchonella Wilsoni; Spirifera plicatellus; Atrypa marginalis; Favosites alveolaris, and other Corals. Halysites; Heliolites; Acervularia; Omphyma &c. in great abundance.

S.20° E. ←——→ N. 2° W.

Bringwood Chase
Fir trees

Brook

Road

Road

Brook that runs into Burrington Pool

Road

Old Red Sandstone *

RIVER TEME

HEREFORDSHIRE

S. 2° E. ——→

* Yellowish brown and greenish grey micaceous sandstone (Downton Castle building stone) containing Trochus helicites and Lingula cornea, at the bottom is a bed containing Onchus and other fragments of placoid fishes.

y and calcareous grey & brown argillaceous shale

Orthoceras subundulatum; Cardiola interrupta; & C. striata; Graptolithus priodon &c.

Nodular limestone

Shale with bands of impure limestone.

Dark grey thin flaws and argillaceous shale. Large Cephalopoda such as Lituites giganteus; Orthoceras Ludense; & O. filosum; Phragmoceras ventricosum; & P. pyriforme; Pleurotomaria Lloydii & P. undata, many Brachiopod shells, also Ischadites Konigii &c.

Shales with sandstone bands.

Grey calcareous beds and argillaceous shale.

Blue earthy limestone. (Aymestrey)

Aymestrey limestone fossils. Pentamerus Knightii; Atrypa reticularis; Orthoceras Mocktreense; &c.

l n p k S h a l e

Lower Ludlow. Upper Ludlow

5000 feet

Scale of Feet. 6 Inches to 1 Mile.

shales and sandstones, greenish-grey sandstones, and layers of thin shelly limestone. Their thickness near Ledbury is about 140 feet. The upper beds include the well-known Ludlow Bone-bed, capped by the sandstones known under the name of the Downton Sandstone."*

Fossils of the Upper Ludlow formation may be found in any excavations made in Croft Park between Croft Ambrey and the main road at the southern boundary of the Park.

Amongst Upper Ludlow fossils from this locality recorded on Sheet 34 of Geological Map are Rhynconella nucula, Sanguinolites amygdalinus, Trochus helicites, Beyrichia tuberculata, Pterygotus problematicus, Chonetes lata, Turbo corallis, Orthoceras perelegans, Serpulites longissimus, Homalonotus Knightii, &c. See Section.

In the upper yellowish-brown sandstone underlying the Old Red Sandstone in Croft Park, on its extreme southern boundary near the main road, is a bone-bed, containing Onchus and other fragments of fish, overlying the grey calcareous beds of Upper Ludlow. See Section.

In the Silurian System we have traces of the earliest examples of vertebrata belonging to the class of the fishes, also of the higher Crustacea, somewhat akin to the king crabs of the present period, which latter occur mainly in the highest beds. Traces of Plants (Pachytheca) are found also in the very uppermost beds of the system.†

To prevent the student of the large scale map from being led astray, as was the writer, with anticipations of finding a travelled boulder, or other rock of special local interest, by the prominence given in the Ordnance Map XI., N.E., to "Pencombe Stone," in the lane leading from Mortimer's Cross to Ledicot, and about 1½ mile south-west of the former place, the explanation is hereby given that Pencombe stone is the name given to an old cottage on a foundation of masonry, and in the lane about fifty yards distant from the cottage at the bottom of the hill is a large flat-stone placed for the convenience of water-drawers, or to enable pedestrians to cross the overflowing pool in times of floods.

The permission of the Controller H.M.S.O. has been obtained to reproduce parts of Sheet 55, N.W., Geological Survey, and Sheet 34 of Horizontal Sections, which illustrate the two anticlinals referred to, and otherwise treat of the neighbourhood. Geologically, this an interesting locality, and its study, with the message sent to the Field Club in the year 1876 by Sir Charles Lyell through the Rev. W. Symonds, brought to their recollections, may stimulate the energies of some of our members. The message will be found in *Transactions*, 1870, page 7, it was :—

* Ibid. pp. 103, 104.

† In the recently published work "The Story of our Planet," by Rev. T. G. Bonney, L.L.D., F.R.S., 1898, we read on page 487, that some traces of plants have also been found in even earlier ages in the Ordovician system, *e.g.* two supposed species of the genus *Buthotrephis*, possibly in distant affinity with our Pill-wort (*Pilularia*). Some two or three other plant remains have also been discovered in the same early formations.

From the same authority, pages 496 and 497, we learn that the Wenlock group has a rich fauna consisting of 536 species, and that the fauna of the Ludlow group numbers 392 species, but a marked advance is exhibited in the latter in the development of life, from the discovery of the first vertebrate animal: of these, the oldest, *Scaphaspis ludensis*, an armour-plated ganoid, occurs in the Lower Ludlow.

"Tell them to continue their field work with steady perseverance, and new wonders will reward their labours."

PLACE NAMES.

Reference to "Ancient and Modern Names of Places in the Domesday Survey of Herefordshire," by our local historian, the late Judge W. H. Cooke, gives us :—"Aymestrey" occurring twice under the spelling Elmodestreu, and other places in the immediate locality as follows :—Croft as Crofta, Orleton as Alretune, Kingsland as Lene, Land in Kingsland as Alac terra, Shobdon as Scepedune, Wigmore manor and castle as Wigemore, Wigmore district as Wighemore, Leintwardine as Lenteurde, Covenhope (pronounced Conhope) as Camehop, Leinthall Earles as Lenhale, Leominster as Leofminster, Ledicot as Leidecote, Strete manor as Strete, and Street estate as Le Stret.

Although apparently there is no mention in Domesday Survey of Deerfold, yet traditionally this forest carries a trace of its Norman age as a Royal forest. The other three Royal forests in Herefordshire are Aconbury, Ewyas, and Haywood.

Amongst other ancient place-names we have, on the authority of the late Mr. Flavell Edmunds, ancient British names preserved in Dinmore, from Din-mawr, the great camp; Dinedor, from Din-dwr, the camp by the water; Leintwardine, from Llain-dwr-din, the water camp on the separated plot of ground. The chieftains of Mercia appear to be commemorated in the following names: Crida, A.D. 586, an Anglian chief from the eastern parts of England, the reputed founder of Mercia, is commemorated in Credenhill* ; Peada, the 4th King of Mercia, A.D. 656, in Pedwardine ; Wulfor or Wolfhere, king about A.D. 656, in Wulforton, corrupted into Wooferton ; Cenred, the 7th king, in Kenchester, possibly in Kinnersley ; Coelred, his successor, A.D. 709, in Ceorles-tre, corrupted into Cholstrey, near Leominster. The powerful King Offa, who, after a long reign in the 8th century (A.D. 755 to 794), greatly expanded and firmly established the Mercian Kingdon, has left a permanent record of his name in Offa's Dyke.

BLUE MANTLE COTTAGES.

This is the name given to the two old cottages, possibly three or more centuries old, close to the Gospel Oak at Mortimer's Cross. The investigation as to the origin of the title has so far been fruitless, although reference has been made to members of Heralds' College. Blue mantle is the title of one of the English pursuivants-at-arms. This officer was instituted either by Edward III. (1327—1377) or Henry V. (1413—1422), and so styled in allusion to the robes of the Garter, or, as some suppose, to the colours of the arms of France.

DEMESNE.

Demesne is situated about one-third of a mile north of Pyon Wood. Mr. W. Stephens of the Leathers, Aymestrey, gamekeeper at Yatton Court, one of the oldest natives, states that he has recollections as a youth of seeing the

*The Rev. Preb. Elliot supplies me with a much more probable derivation of Credenhill, given to him by the late Canon Phillott. *Caer-din*, from *Caer*, a camp, *din*, a camp on a hill. Hill, a subsequent redundancy. Crida's Hill is purely conjectural.

charred remains of some strongly timbered large and old looking dwelling. At present the site is occupied by the most fin-de-siècle farm buildings of the latter part of the nineteenth century, including a French barn with a semi-circular roof of corrugated galvanized iron.

MONKS' BOWLING ALLEY.

This is the name by which a small level grass plot, just large enough for a bowling green, is known. It is enclosed by fir trees of the growth of not more than two centuries or thereabouts. It is just above the summit of Rock Hall Quarry, and at the back of the Crown Inn, Aymestrey. No information can be obtained as to the date of origin of the name of this small grass plot. There is a tradition of a Monastery at Yatton, or Eaton, at the bottom of the hill, on the opposite side of the river.

TUMULUS? Near the north-west corner of Pyon Wood is an elevated knoll close to the lane, about fifty yards distant from the footpath leading to Demesne. This knoll may possibly be natural, but if so, its northern slope has been most regularly curved by denudation. The regularity of the curve is so striking as to strongly suggest suspicions of a large artificial tumulus. It has not been recorded on either the Ordnance Survey, or in the Archæological Survey of Herefordshire, but we know that it did not pass unobserved by some surveyors of both the above Surveys.

Since the above was in the press the Rev. Preb. Sidebotham has forwarded the following particulars of the Aymestrey Night Bell :—

THE AYMESTREY NIGHT BELL.

A legend may be mentioned connected with Aymestrey, preserved in the form of a story which was published in the *Iris* magazine about 1828, by the Rev. Edward Baines, Vicar of Yalding, in Kent, late fellow of Christ's College, Cambridge, the son of a former vicar of Caynham, near Ludlow, under the title of "The Aymestrey Night Bell." It relates to a piece of land, the rent of which was to remunerate a man for ringing a bell in the Church tower at a certain hour every night, for the benefit of any stray traveller, who might be led astray by a "will o' the wisp" in the wood just across the Lugg, called Pokehouse (the abode of Puck). The sum produced, however, was so small that, in course of time, no one could be found to ring the bell, and it is more than a century since it was rung. There is still a hole in the north-east corner of the floor of the ringing chamber, through which one of the bell ropes was brought down into the porch for the purpose.

Before he bids *adieu* to this pretty village, the visitor is recommended to walk to the top of Pokehouse wood, and view it from the south-eastern prospect. The village will be seen nestling round the towered Church in the centre, the river, as it glints through the foliage, forming a charming frame to the picture ; whilst looking in a north-westerley direction, the extent of the Lugg valley, with its surrounding wooded heights, is seen to perfection.

H. CECIL MOORE.

THE WHITE ROSE OF YORK.

By Sir Herbert Croft.

The decisive engagement fought at Mortimer's Cross on Candlemas Day, 2nd February, 1461, secured the throne of England to the rightful heir, the Duke of York; and one who there fought on the side of the White Rose, by name Richard Croft, was a resident at Croft Castle, in the vicinity, and it is not, perhaps, altogether inappropriate that I, his lineal descendant, should read this paper on the site of the battle fought 435 years ago.

I propose to divide my paper into two heads. First, to explain the reasons for this battle, and of the Wars of the Roses; and second, to point out the results of this battle as affecting, in the future, the Royal Dynasty of England. I am glad to say that the Rev. Joseph Barker has kindly promised to add some account of the Battle of Mortimer's Cross, of which, as a neighbour, he is well acquainted with the details and traditions.

1st.—The badge of the White Rose for the Yorkists was taken in friendly controversy by some law students in the Gardens of the Inner Temple, to which I belong, and the other party took the Red Rose for Lancaster. Here you have no conception how strong the feeling in Yorkshire is still for the White Rose, but in this county it is hardly ever mentioned, as so few of the leading families—the men who fought for it—have any longer any representative here.

In both Yorkshire and Lancashire the white and red roses are still the badges of those counties. I have put down from Haydn the following dates and incidents to explain the origin of the Wars of the Roses. King Richard II. succeeded his grandsire, Edward III., in 1377, and was in 1399 deposed by his first cousin, Henry, who was the eldest son of John of Gaunt, third son of Edward III., by Blanche, heiress of Lancaster; and in 1399 Henry IV. succeeded Richard II., his deposed victim. This succession was to the prejudice of Roger Mortimer, a Herefordshire man, and then owner of Wigmore Castle, not far from Mortimer's Cross. For Philippa, daughter and heiress of Lionel, Duke of Clarence, married Edmund Mortimer, Earl of March, and their son Roger, Earl of March, was the representative of his grandsire, Lionel, Duke of Clarence, the second, but eldest survivlng son of Edward III. after the death of the Black Prince. And it is to be remembered that this Roger Mortimer, Earl of March, was declared heir presumptive to the throne in 1385, while the childless and weak King Richard II. still reigned. Roger had a daughter, Anne Mortimer, and she marrried Richard, Earl of Cambridge, son of Edmund, Duke of York, who was fourth son of Edward III. By Anne Mortimer, his wife, Richard, Earl of Cambridge, had a son, Richard, Duke of York, who married Cicely Nevil, daughter of Ralph, Earl of Westmorland, and in right of his mother, Anne Mortimer, openly claimed the throne of England as representative of Lionel, Duke of Clarence, in 1449, when Henry VI., the great grandson of John of Gaunt, Duke of Lancaster (Clarence's younger brother) was still on the throne.

In 1455 attempts were made to effect a compromise, with a view to avert a

Civil War. Blessed are said to be the peacemakers, and those who tried then to compromise this feud should have our praise, although they failed to do so, for in the Wars of the Roses which followed and lasted 30 years—from 1455 to 1485—there perished by battle and wounds 12 princes of the blood, 200 nobles, and 100,000 gentry and common folk; and the check to England's development and advancing prosperity was ruinous, and long felt.

On 23rd May, 1455, the Wars of the Roses began by the defeat of the Lancastrians at the first battle of St. Albans, Herts. After this a truce was made, and Richard, Duke of York, was declared successor to Henry VI. The war was renewed, and the Yorkists, under Richard, Duke of York, defeated the Lancastrians at Northampton, and took Henry VI. prisoner, and the Duke of York was then declared heir to the throne, but fell into an ambuscade near Wakefield, and was put to death on 30th December, 1460. His son Edward, now Duke of York, continued the struggle, and was installed as King Edward IV., 3rd March, 1461, after the Victory at Mortimer's Cross on the previous 2nd of February. Edward IV. then defeated the Lancastrians at Towton on 29th of March, 1461, but was himself deposed in September, 1470, by the Earl of Warwick, the King Maker, who restored Henry VI. to the throne. The victorious Edward IV., however, at last defeated the Lancastrians at Barnet on 14th April, 1471, where the King Maker, Warwick, was killed; and finally, on the 4th of May, at Tewkesbury, the Lancastrians were again defeated by Edward IV., and Prince Edward, son of Henry VI., and of Margaret of Anjou, was taken prisoner by Sir Richard Croft. He, trusting to King Edward IV.'s Royal Proclamation that the lives of prisoners should be spared, gave up his prisoner, who was killed by the orders of the Dukes of Clarence and of Gloucester, if not by their hands. According to the recent edition of the Paston letters, Sir Richard Croft was knighted by King Edward IV., with others, on the field of Tewkesbury. The struggle between the houses of York and Lancaster ended with the death and defeat of Richard III., at Bosworth, in 1485, and then a happy termination was effected by the marriage of Elizabeth of York, daughter and heiress of Edward IV., with Henry Tudor, who was crowned King Henry VII.; and so ended a generation of civil wars.

2nd.—In my second and last head I must be content to briefly point out how the Wars of the Roses affected the Dynasty of England. Neville, Earl of Warwick, the King Maker, backed up Edward IV., until he became King, but was consulted by that King about his marriage. Edward IV. paid a visit to Jacquetta, the Duchess of Bedford, and her second husband Wydeville, Lord Rivers, at their home, Grafton, in Cambridgeshire. Now Edward was a very handsome man, and he had been often urged to marry into some Royal or Princely family, but he was a great flirt, and in no hurry to do so. Foreign rulers were not very eager to seek an alliance then with Edward IV., whose lasting possession of the Crown of England was as yet a matter of some uncertainty. Moreover, though King Henry VI. was weak and a great invalid, and at times insane, yet in his lion-hearted wife, Margaret of Anjou, Edward IV. had still a fighting antagonist of the greatest courage and resource. Both France

and Burgundy inclined to aid her, and she had foreign soldiers to help her to recover the Throne for her son, Prince Edward of Lancaster, a prince of promise, who got Warwick to change again and help the Red Rose by espousing his daughter, Anne Neville, whose elder sister and co-heiress had married George Duke of Clarence. To return, however, to Edward IV. and his visit to Grafton. He then met for the first time Elizabeth, the beautiful daughter of his hostess, the Duchess of Bedford, and Wydeville, Lord Rivers, who is always styled Elizabeth Woodville, but she was really then Lady Gray, and the widow of Sir John Gray, a Knight who lost his life fighting for Lancaster at the first battle of St. Albans, 23rd May, 1455. Edward was, like many other men before the Wars of the Roses, and a good many since that time, very susceptible to the beauty of a woman. Elizabeth, Lady Gray, made a capture of his heart when she entered the hall with her hair—a woman's glory—flowing down her back, and reaching to the ground, and she had in each hand a son by her late husband. And (says Burke in *Royal Descents*), "She, a woman of great beauty and accomplishments, seized so favourable an opportunity to solicit him (Edward IV.) to reverse the attainder, and to restore the Gray estates to her destitute sons. Her tears, or rather her charms, prevailed." Edward not only promised at once to reverse the attainder, and to restore to her boy the estates, but also sought to console her as a lover, and to protect her in every way. But Elizabeth resisted him for some time, though she did eventually consent to a secret marriage at her mother's house, Grafton. For Edward it was then a decidedly dangerous experiment to marry one so much beneath him while his power remained so unsettled, and without the advice of his Council. But love conquered, and about the end of April, 1464, while his friends were assembling to renew the War of the Roses in Northumberland, Edward stole down to Grafton from Stony Stratford, where he had gone under the pretence of hunting.

"You must wake and call me early, call me early, mother dear,
"For I'm to be Queen of the May, mother."

And early on the 1st of May, 1464, the marriage ceremony between Edward IV. and Elizabeth, Widow Gray, was performed in the presence of her mother, the Duchess of Bedford (who would have ranked, even in these days, as a very clever matchmaker), by the domestic chaplain, with two female servants, and the clerk of the officiating priest, as witnesses. After a clandestine honeymoon of six days, for the Duchess wisely only allowed the happy pair to meet after she had ascertained that the whole household had retired to rest, Edward returned to London, and his intention was to join the Army, which he had ordered to meet him in Yorkshire; but by this time, and before he set out for the North, the victories of Hedgeley Moor and Hexham had put an end to the war.

For the next six years—1464 to 1470—King Edward IV. cared more for his wife than for the affairs of State, and was nearly lulled into a fatal sense of security, when he suddenly discovered that the energetic Queen Margaret of Anjou had managed to secure the aid of the Earl of Warwick by an alliance between her son and his daughter.

Edward IV., at last aroused, had to fight in 1471 at Barnet on the North

road, where again a fog favoured him, and there, also at Tewkesbury shortly afterwards, the Lancastrians were thoroughly defeated; and for the remaining twelve years of his life Edward IV., with his now acknowledged Queen, Elizabeth, reigned unopposed. He died when only about 40, quite worn out, and left two sons by Elizabeth, and four daughters. His eldest son reigned a few days as Edward V., and then was murdered in the Tower, together with his younger brother, Richard Duke of York, by the Duke of Gloucester, their uncle, who then reigned as King Richard III. Some call him a murderous ruffian, and though he was either an accessory before the fact to the murder of his brother's boys in the Tower, if not the actual murderer, and also at least an accessory to the murder of Prince Edward of Lancaster after Tewkesbury, still Richard III. could fight, and had ability, and an undeniable backbone, and was altogether without the inglorious weakness of Edward IV., which so nearly cost him his throne.

Richard III. then sought to marry Anne Neville, widow of Prince Edward of Lancaster, but her brother-in-law, George Duke of Clarence, whose wife Isabella was the other coheiress of the late Earl of Warwick, kept her in concealment in London. Eventually Richard discovered her in the disguise of a cook-wench, and forcibly married her, and so got that grand castle of Middleham, in North Riding, where she had a son, and was then shut up there by Richard until she mysteriously died. Then Richard, it is said, desired to marry his niece, Elizabeth of York, eldest daughter of Edward IV., although he had proclaimed all his brother's children, by Elizabeth Wydeville, illegitimate, as he denied the secret marriage at Grafton. The Lancastrians, however, had now rallied, and acknowledged as their leader Henry Tudor Earl of Richmond, a Welshman, claiming through his mother, and the Somersets, a descent from John of Gaunt Duke of Lancaster, third son of Edward III., by his (Lancaster's) third marriage with the widow of Sir Otho de Swynford, which marriage was made legal by Act of Parliament, after their son's birth. Then came an end to Richard III.'s short reign of only two years, as he was killed at the battle of Bosworth in 1485.

Henry VII. had no valid claim to the Throne: because although John Beaufort, Earl of Somerset—the natural son of John of Gaunt and Catherine Swynford—had been legitimised as above mentioned, yet, says Burke, the very Act of Parliament, which conferred that favour, had also in express terms made him, and his posterity, incapable of succeeding to the Throne of England, and if that Act was valid in one part, surely it was also valid in the other. Henry readily expressed his willingness to marry Elizabeth of York, and such a marriage is said to have been contemplated by her father, Edward IV., but, of course, without the Throne if his sons had lived.

By this time everyone was sick of fighting, and so Henry VII. became King, and married Elizabeth of York, and was very unkind to that beautiful Queen. Thus the White and Red Roses were at last united, and Elizabeth had a son, Prince Arthur, but notwithstanding this she was not crowned for 18 months after her marriage.

Henry VII. had only a couple of Pretenders to deal with, and the final fight of all was against Lambert Simnel at Stoke, near Newark. Here on June 16th, 1487, the adherents of Lambert Simnel, who personated Richard, second son of Edward IV., and claimed the Throne, were defeated by the Royalists, under the Earl of Oxford. Sir Richard Croft was made a Knight Banneret on the field of Stoke for gallantry in the field, and was afterwards Treasurer of the Household to Prince Arthur and his wife, Katherine of Arragon, at Ludlow Castle; but there Prince Arthur died of fever, and after some delay his brother Henry, now Prince of Wales, and afterwards King Henry VIII., obtained a dispensation, and married his brother's widow. The Throne of England, however, descended to the Stuarts by the marriage of Margaret Tudor, daughter of Henry VII., and Elizabeth of York, with James IV., of Scotland, and not through any child of Henry VIII., who had no grandchild. However, Henry VIII.'s daughter Elizabeth had a prosperous reign of 45 years, and left the Crown to her cousin, James I., of England, and VI., of Scotland, the first of the ill-fated Stuarts. Luckily James I. had a daughter, Elizabeth, who married the King of Bohemia, and she had a daughter, Sophia, who was the wife of the Elector of Hanover, and on her Protestant descendants the Throne of England was settled in the days of Queen Anne. And at the beginning of the 18th century, in 1714, the son of the Electress Sophia became King of England as George I., the first of the Guelph line. King George I. was a German, and not a lover of England, but his great-great-great grand-daughter, Queen Victoria (who is 12th in descent from Henry VII. and Elizabeth of York) is very English, and excellent in every relation of life.

MAY GOD SAVE THE QUEEN!

EDWARD III. = PHILLIPA of Hainault.

- 2nd son, LIONEL, D. of Clarence d. 1368. = ELIZABETH DE BURGH.
  - PHILLIPA *or* Philippa. = EDMUND, E. of March.
    - ROGER = ELEANOR HOLLAND.
      - ANNE = RICHARD, E. of Cambridge.
        - RICHARD D. of York. = CICELY NEVIL.
          - EDWARD IV. 1461 to 1483. = ELIZABETH WOODVILLE.
            - ELIZABETH = HENRY VII.
- 3rd son, JOHN, D. of Gaunt, d. 1399. = (1) BLANCHE of LANCASTER. = (2) CONSTANCE of Castile. = (3) KATHERINE SWINFORD.
  - HENRY IV. d. 1413. = MARY DE BOHUN and JOAN of Navarre.
    - HENRY V. d. 1422. = CATHERINE of France. = OWEN TUDOR.
      - HENRY VI. = MARGARET of Anjou.
      - EDMUND TUDOR. = MARGARET SOMERSET.
        - HENRY VII. = ELIZABETH of York, which united the houses of York and Lancaster.

PEDESTAL COMMEMORATING THE BATTLE OF MORTIMERS' CROSS.

THE BATTLE OF MORTIMER'S CROSS.

By the Rev. Joseph Barker.

There are but very few, I opine, of the wayfarers who pass the little "Three Horse Shoes" inn at the junction of the two roads from Kingsland to Aymestrey, and turn perchance to read the inscription on the stone Tuscan pedestal erected there in memory of the great battle of Mortimer's Cross,

> Who could tell us all about the war
> And what they killed each other for.

And we must account too, I suppose, for the scanty records we possess of those cruel battles between the houses of the White and Red Roses, and the few details we get of those frequent and fierce engagements, to the circumstance of men in those days being more taken up with the use of pike and sword than with the pen; and it may be that even our best chroniclers, the Monks, in those most troublous times, went less frequently on their walks abroad, and kept close inside their religious houses, trembling at the din of war.

The inscription on the monument if you "approach and read (for thou canst read") is this:—"This pedestal is erected to perpetuate the memory of an obstinate, bloody, and decisive battle fought near this spot in the Civil Wars between the ambitious houses of York and Lancaster, on the 2nd February, 1460, between the forces of Edward Mortimer, Earl of March, afterwards Edward IV. on the side of York, and those of Henry VI. on the side of Lancaster. The King's forces were commanded by Jasper, Earl of Pembroke. Edward commanded his own in person, and was victorious. The slaughter was great on both sides, 4,000 being left dead upon the field, and many Welsh persons of the first distinction were taken prisoners, among whom was Owen Tudor, great grandfather of Henry VIII., and a descendant of the illustrious Cadwallader, who was afterwards beheaded at Hereford. This was the decisive battle which fixed Edward IV. upon the Throne of England. He was proclaimed King on the 5th of March following. Erected by subscription 1799."

The inscription upon the pedestal faces the scene of the battle which occurred a short distance north of this site. The accompanying illustration is reproduced from a photograph by Mr. Fredk. E. Rogers, of Eardisland, taken from a northern aspect, as the pedestrian walks from Mortimer's Cross towards Kingsland village.

This battle of Mortimer's Cross was the sixth of the twelve which was fought during the Wars of the Roses, the first battle taking place at St. Alban's, May 23rd, 1455, and the last at Tewkesbury, May 4th, 1471. And many of the noble families aud gentry of our North Hereford would join the side of the Yorkists with their retainers, for as a youth Edward, Duke of York, lived at Ludlow Castle, and was, therefore, a friend, or at least a neighbour, of the Mortimers of Wigmore Castle, and Crofts of Croft Castle, and both these families, we know, fought for him.

Wigmore would of itself supply a principal portion of the soldiery, for from

the time of the Conquest, when it was granted to Ranulph de Mortimer in reward for his important services, Wigmore had been the head of the famous Barony of the Mortimers, Earls of Marche, and was reputed one of the most ancient Honours in England, having twenty-one manors that owed suit to the Honour-Court, holden there once every six weeks. All the land wherein these manors lay, is called Wigmore-land and had two constables; it gave too its name to one of the Hundreds of our county.

No doubt the men of Lucton, Yarpole, and Croft were led to Mortimer's Cross by Sir Richard Croft from that old border castle which stood, according to family tradition, on the top of Croft Ambrey from the Saxon times, and no better site than the Ambrey for a border keep could be found.

The following is an account of this battle by Hall in his Chronicle of 1548 and 1550, and taken from the edition of 1809, p. 251:—"The Erle of Marche, so commonly called, but after the death of his father, in dede and in right very Duke of Yorke, byeng at Glocester, heryng of the death of his noble father, and lovyng brother, and trusty frendes, was wonderfully amased, but after cōfōrt givē to him, by his faithful lovers and assured alyes, he removed to Shrewsbury, and other townes upon the river of Severne, declaryng to them the murder of his father, the jeopordye of hymselfe, and the unstable state and ruyne of Realme. The people on the Marches of Wales which above measure favored ye lynage of the lord Mortimer, more gladly offered him their ayd and assistence, then he it either instantly requyred, or hartily desired, soo that he had a puyssant army, to the number of xxiii M., redy to go agaynst the quene, and the murderer of his father. But when he was settyng forward, newes were brought to him, that Iaspar, Erle of Pembroke, halfe brother to Kyng Hēry, and Iames butler, Erle of Ormond and Wylshyre, had assembled together a great number, both of Welshe and Irysh people, sodainly to surprise and take him and his frendes and as a captive to convey him to the quene. The Duke of York, called Erle of Marche, somewhat spurred and quickened with these noveltyes, retired backe, and mett his enemies in a fair playne, nere to Mortimers Crosse, not farre from Herford east, on Candlemas Day in the mornyng, at which tyme the sunne (as some write) appered to the Erle of March, like iii sunnes, and sodainly joined all together in one, and that upō the sight thereof, he toke suche courage, he fiercely set on his enemies, and thē shortly discōfited: for which cause, men imagined, that he gave the sunne in his full brightness for his cognisance or badge. Of his enemies were lefte dead on the ground iii M & viii C. The Erles of Pembroke and Wilshyre fled, and Syr Owen Towther, father to the sayd Erle of Pembroke, which Owen had married Kyng Henrie's mother, with David Floyde, Morgan ap reuther, and divers other, were takē and behedded at the citie of Herford."

It needs not to give any details of the Battle of Mortimer's Cross, as the summary of an excellent paper on the battle by Mr. Flavell Edmunds has already appeared in our *Transactions*, in Volume 1870, pp. 1-3. Moreover, a more detailed copy is to be republished. We must not fail, however, to draw attention to the Battle Field Oak, which for near a thousand years "has braved the battle and the breeze." The Battle Oak stands not more

than two hundred yards from the Mortimer's Cross Inn, close by the Blue Mantle Cottages, at the opening to Hereford lane, which is indeed a portion of the old Roman road. The tree is probably, it has been said, "the only one remaining on the field of battle which was there on that 'bloody Candlemas Day' (February 2nd, 1461), so glorious for Herefordshire, which placed the young Lord of Wigmore upon the throne, and was so fatal to the Lancastrians. The tree occupies about the centre of the Lancastrian position, and may, therefore, very reasonably be supposed to have given its shelter to Sir Owen Tudor and his staff for the night before the battle. It now forms the boundary mark of the four parishes of Kingsland, Lucton, Aymestrey, and Shobdon, and may certainly be said to figure on more legal documents than any other tree in the county. It has a circumference of 14 ft. 2in., is quite hollow, and for the most part dead, though it has still living branches to the north and east."

I am sure I shall be pardoned for drawing the special attention of the members of the Woolhope Club to this glorious old oak, and repeating this notice of it which they will find in the same Volume of *Transactions*, 1870, p. 307. We cannot but rejoice that this noble monument of past times still lives and flourishes, yea, bears fruit. But time hastens to destroy even what man would spare; and within our own recollection, and the life-time of our fathers, how many of the most aged and venerable trees have fallen beneath his scythe: and more wait but the "little sickle of a moment" to cut them from the roll of things that are.

Than a tree, a grander child earth bears not.
What are the boasted monuments of man,
Imperial column, or triumphal arch,
To forests of immeasurable extent,
Which time confirms, which centuries waste not?
Oaks gather strength for ages, and when at last
They wane, so beauteous in decrepitude.
So grand in weakness. E'en in their decay
So venerable! 'twere sacrilege t'escape
The consecrating touch of Time. Time saw
The blossom on the parent bough. Time watch'd
The acorn loosen from the spray. Time pass'd
While springing from its swaddling shell, yon Oak,
The cloud-crown'd monarch of our woods, by thorns
Environ'd, 'scaped the raven's bill, the tooth
Of goat and deer, the schoolboy's knife, and sprang
A royal hero from his nurse's arms.
Time gave it seasons, and Time gave it years,
Ages bestow'd and centuries grudg'd not:
Time knew the sapling when gay summer's breath
Shook to the roots the infant Oak, which after
Tempests moved not. Time hollowed in its trunk
A tomb for centuries; and buried there
The epochs of the rise and fall of states,
The fading generations of the world,
The memory of man.

—*Amœnitates Quernecæ.*

BATTLE FIELD OAK, OR GOSPEL OAK, AND BLUE MANTLE COTTAGES.

This oak tree being a boundary tree of the four parishes of Kingsland, Lucton, Aymestrey, and Shobdon, may also be called a "Gospel Oak." No doubt portions of the Gospels and Psalms have been read under its boughs when the Parishes went "beating the bounds."

The accompanying representation of the Battle Field Oak is taken from the south-west aspect. It is reproduced by permission from a photograph by Mr. Went, of Wigmore, and it also shows the south end of the two Blue Mantle Cottages which are situated about two hundred yards south of Mortimer's Cross Inn.

At Mortimer's Cross-roads is a milestone which gives the following distances in miles:—London 146, Leominster 6, Presteign 8, Ludlow 10, Tenbury 13, Hereford 17, Aberystwith 75. An ordnance bench-mark on the milestone indicates, on reference to Map XI., N.E., an elevation of 320·3 feet.

No satisfactory explanation can be given as to the origin of the title "Blue Mantle" to these Cottages. Mr. George W. Marshall, *Rouge Croix*, a member of our Club, in reply to my enquiries does not think it at all likely that the Blue Mantle Cottages would have anything to do with the Pursuivants of the name. He adds that probably Thomas Franche, or else his predecessor . . . Coller, Gent, held that office at that period—no more can be found by reference to *Noble*.

I have also enquired, without any success, from Edward Bellasis, Esq., *Lancaster*, Herald's College, E.C.

H. CECIL MOORE.

THE BATTLEFIELD OAK OR GOSPEL OAK AT MORTIMERS' CROSS.
SOUTH END OF THE BLUE MANTLE COTTAGES.

THE GOSPEL YEW.

NOTE BY MR. GEORGE PIPER.

AT the junction of the parishes of Bosbury, Castlefroome and Canonfroome stands a venerable Yew tree of great antiquity, which has been known, time out mind, as the "Gospel Yew." It stands in the boundary fence of the Fishpool Coppice, at the south-west corner of a tillage field, part of the Old Birchend Farm, and near to the fifth mile post on the road leading from Ledbury to Bromyard—the field is known as "The Gospel Yew:" it has no other name.

Parochial Perambulations on Holy Thursday, were derived from the terminalia.

The parochial boundaries, commonly those which marked the limits of jurisdiction appertaining to the founder of the Church, were distinguished by trees, called Gospel-trees; because the clergyman (the representative of the Propheta of Du Cange, the old name of the reader on this occasion) read the Gospel of the day on or near them. The processionists carried a cross, or crosses, and staves. Boys were taken in order to be flogged at the boundaries, for the purpose of infixing in their memories. It was an old Celtic practice. for we are told upon the authority of Martin, that in the Isles and other parts of Scotland, "boys that the boundaries might not be mistaken," were subjected to this discipline upon the spot in a severe form. 2 Fosbroke. 652.

"The boundaries of the township and parish of Wolverhampton are in many points marked out by what are called Gospel Trees, from the custom of having the Gospel read under or near them by the clergyman on the parochial perambulations. Those near the town were visited for the same purpose by the processioners before mentioned, and are still preserved with the strictest care and attention."—*Shaw's Hist. Staffordshire.*

The following is from *Herrick's Hesperides*—

"Dearest, bury me
Under that Holy-Oke, or Gospel Tree;
Where (though thou seest not) thou may'st think upon
Me, when thou yeerly go'st Procession."

—*Brand's Popular Antiquites.* Page 109.

The Battle of Mortimer's Cross has been published in *Transactions* 1870, page 2, being an extract from a paper by Mr. Flavell Edmunds. An account of the battle is given in "Visits to Fields of Battle in England of the Fifteenth Century" by Richard Brooke, 1857, and more recently another in "Battles and Battlefields in England" by C. R. B. Barrett, 1896. By special request of many members of our Club, and with the cordial approval of the family of the late Mr. Flavell Edmunds, extracts from his paper read on March 26th, 1851, before the members of the Hereford Literary and Antiquarian Society, are now reproduced.

THE BATTLE OF MORTIMER'S CROSS.

By Flavell Edmunds.

One of those great epochs, which mark the triumph of a principle in a dynasty, is the accession of the House of York to the English throne, in the fifteenth century. Of that event, one of the most important predisposing circumstances was the great battle of Mortimer's Cross, the "bloody Candlemas Day" of local tradition. As the last battle in our beautiful county, so long vexed with the clang of arms, while it is incomparably the most important of Herefordshire battles, it possesses a local as well as a general interest.

Singularly enough, the story of this great and important battle has not been told, with either care or fulness of detail, in any of the histories which are familiar to ordinary readers. Hume, Rapin, Lingard, Macintosh, the Pictorial History—not to mention the compendiums which find their way into our schools—content themselves with a bare general notice, not in all cases accurate. The pillar which was erected on the spot in 1799, "to perpetuate the memory" of the battle, bears the following inscription:—"This pedestal is erected to perpetuate the memory of an obstinate, bloody, and decisive battle, fought near this spot, in the civil wars between the ambitious houses of York and Lancaster, on the 2nd day of February, 1460, between the forces of Edward Mortimer Earl of March, afterwards Edward IV., on the side of York, and those of Henry VI. on the side of Lancaster. The King's forces were commanded by Jasper Earl of Pembroke; Edward commanded his own in person, and was victorious. The slaughter was great on both sides; 4,000 being left dead on the field, and many Welsh persons of the first distinction were taken prisoners, among whom was Owen Tudor, grandfather to Henry VIII., and a descendant of the illustrious Cadwallader, who was afterwards beheaded at Hereford. This was the decisive battle that fixed Edward IV. on the throne of England: he was proclaimed king on the 5th March following.—Erected by subscription, 1799."

Of the two dates mentioned there is an error in each. The year of the battle is given as 1460 instead of 1461, and the proclamation of Edward is asserted to have taken place "on the 5th March following," whereas the historians agree that the ceremony of proclamation was performed in Westminster Hall on the 3rd of that month, although the coronation did not occur until the 29th of June.

Daniell, who compiled from Sir Thomas More and others, notices only the prodigy of the triple sun, to which I shall hereafter return. Edward Halle, a painstaking writer of the reign of Edward VI., with a sight of the original edition of whose rare work I have been kindly favoured by a friend; with the better known Stowe, and Speed, are the only writers—so far as I have been able to ascertain—who supply the details of the battle; while no one has indicated its consequences.

The year 1460 had closed in gloom upon the prospects of the House of York. At the fatal battle of Wakefield green, fought on the 30th of December, Richard Duke of York had perished, and his head, surmounted in mockery with a paper crown, frowned above one of the gates of York; his youngest son, the Earl of Rutland, was barbarously murdered by Lord Clifford in the pursuit; and many of the staunchest Yorkists in the north were dead or in prison. The young Earl of March, having just raised an army among his Herefordshire friends and tenants, lay at Gloucester, probably waiting for orders from his father, when the heavy tidings reached him. For a moment he was thunderstruck,—"wonderfully amazed," says Halle,—but his stern spirit soon recovered the shock, and he set himself to work out an ample revenge: "After comfort given to him by his faithful lovers and assured alyes," (says that historian,) "he removed to Shrewsbury and other townes upon the river of Severne, declarying to them the murder of his father, the ieopardye of himselfe, and the vnstable state and ruyne of the Realme." The name of Mortimer had long been dear to the people of the marches, or boundaries; and they flocked to the banner of his young and handsome son, which flouted the winter winds from the keep of his ancestral castle of Wigmore. To quote Halle,—"The people on the marches of Wales, which above measure favoured ye lynage of the lord Mortimer, more gladly offered him their ayd and assistance than he it instantly required or hartely desired." A roundabout way, this, of saying that they were even more willing to answer the summons than their young lord was to utter it. Probably they really came in somewhat too large a number to his standard, considering the impoverished state of his finances. In a few weeks his army swelled to the number of 23,000 men—the largest force yet mustered in that fatal "War of the Roses," which was so shortly to reach its culminating point. He was about to march northward to revenge upon Queen Margaret the slaughter of Wakefield green, when an enemy suddenly showed himself in the rear.

While Edward was mustering his friends and retainers, the Lancastrians were not idle. Wales had been friendly to the House of Lancaster during the sixty years which had elapsed since Henry IV. consented to treat as an ally the chief (Glyndwr) whom he was unable to crush. Afraid of the young Earl of March, Queen Margaret had sent Jasper Tudor Earl of Pembroke, and James Butler Earl of Ormond and Wylshire, to attack him in the rear, so as to crush him, or at least to keep him employed while Margaret made her way to London. As Butler brought with him into South Wales a horde of Irish, while the name of Tudor speedily assembled thousands of the Cymry, each no less anxious to gratify their national animosity to the Saxon, than to plunder the rich domains of the Mortimer, a formidable host soon burst across the border, and joined the

Welsh troops of the Lancastrian king, which garrisoned Leominster. This reinforcement induced the Lancastrians to act at once upon the offensive—they drove the Yorkists from their posts, on Cursneh-hill and Eyton, and prepared to strike what might have proved a vital blow at the Yorkist faction, by attacking Edward's paternal castle of Wigmore.

This unwelcome news reached the future king in time to prevent his march into Yorkshire. He suddenly faced about, and by rapid marches succeeded not only in throwing his army between the Lancastrians and Wigmore, before they dreamed of his presence, but almost surprised them in their camp at Kingsland. This was on Candlemas eve. Next morning the Lancastrians marched forth from their entrenchments, determined at once to revenge the surprisal of the previous night, and to crush the young earl in whom the hopes of the Yorkists centered. They did not proceed far before they met their foe; for Edward felt that nothing but victory could save him from destruction.

The Yorkists were posted across the road to Wigmore, on the "fayre plain near Mortimer's Cross,"—since called the Great West Field. Halle has, oddly enough, placed it "a few miles to the east of Hereford," whereas it lies about 20 miles N.W. of this city. It was early morning, and the hazy condition of the atmosphere produced one of those phenomena—striking enough still, although now well understood—called parhelia—the appearance of mock suns along with the real luminary.

To the eyes of the wondering Yorkist, whose faces were towards the south-east, there appeared three suns. The prodigy amazed all who beheld it, and still greater grew their wonder when (in the words of Halle) "the iii sunnes sodainly ioined al together in one." Edward "improved" the circumstance as adroitly as did his ancestor William, when he converted his fall, while stepping ashore at Pevensey Bay, into a formal "seisin" of the soil. "Yonder three suns," exclaimed Edward, "are the three Lancastrian leaders, Pembroke, Tudor, and Wylshire, whose glory shall this day centre upon me." The prophecy proved a true one.

The Yorkist army was posted with care, forming a centre with extended wings; while the Lancastrians moved to the attack in three separate bodies. Edward's left wing being protected by the river Lugg, the first attack was directed against his right wing. The Lancastrian vanguard, under the command of the Earl of Pembroke (son of Sir Owen Tudor and Queen Catherine, widow of Henry V.), rushed with headlong force upon the weaker wing of Edward's army, which gave way, and fled. Pembroke was so eager to pursue his advantage that he chased the flying Yorkists for three miles, only returning from his mad enterprise to find that the battle had been lost and won in his absence. Edward left his right wing to shift for itself, and poured down the whole of the rest of his army upon the enemy, who were already confused by the headlong haste of Pembroke. Upon the half-naked Irish, fell the heavy blows of the Herefordshire men, whose bills made such frightful havoc that the Irish speedily fled. Flushed with so important a success, the Yorkists fell with redoubled fury upon the Welsh, with whom every Herefordshire man doubtless felt that he had a long

account to settle for past forays. Deserted by his son Pembroke, and left by his Irish ally to bear the whole brunt of the battle, the aged Sir Owen Tudor still fought long and bravely. At last, borne down by numbers, his decimated band was driven into the village of Kingsland, there to meet with a new enemy. The Lancastrian garrison having left Leominster, which was a strong Yorkist town, the friends of the Mortimer mustered, armed, and sallied forth to aid him in his hour of need. They did so effectually; for Sir Owen Tudor, hemmed in by foes in front and rear, was obliged to yield himself prisoner.

All this had passed when the hair-brained Pembroke returned from his bootless pursuit. Enraged at his own folly, more anxious than ever to crush the boy leader, whose coolness and skill had turned *his* error to so terrible an account, Pembroke did all that leader could to retrieve the day; but in vain. With difficulty he succeeded in rejoining Ormond, and in inducing the combined forces to renew the battle. To no purpose did Welsh and Irish rush with tumultuous bravery upon the Yorkist line: the stout arms, and the heavy bills, of the men of Herefordshire proved victorious, after a second battle, as long and as fiercely contested as the first. At sunset the Lancastrian army no longer existed: Halle says 3,800 of their bravest men lay dead or dying upon the field, while Edward's loss did not exceed four or five hundred. Sir Owen Tudor and four other Welsh chiefs were prisoners—Pembroke and Ormond were fugitives. After nine hours of incessant fighting, the White Rose was triumphant, and Edward, at the age of 20, had made for himself a reputation as a military leader.

Next day, at Hereford, the young Earl tasted the first draught of revenge for the murder of his father and brother: the aged Tudor, (whose grandson 25 years afterward ascended the throne as Henry VII.,) "paid the dying debt" for Richard of York, being beheaded in this city along with eight other less distinguished Lancastrians.

While at Hereford, Edward learned that his great general, the king-making Warwick, had been beaten by Queen Margaret at St. Alban's; but in a few days he nevertheless contrived to effect, near Gloucester, the junction of his forces with the remnant of Warwick's army. Thus defended, he marched to London—was chosen king in a public meeting of citizens, held in St. John's Field, Clerkenwell—proclaimed—and was again on the march to meet his foes, all in the brief space of six weeks. The dreadful slaughter of Towton crushed the Lancastrians in the north as effectually as that of Mortimer's Cross had in the west, and for twenty years Edward reigned over England.

Permission to reproduce the following article has been given by the author, and by the Editor, Mr. J. E. Harting, of the *Zoologist*:—

CURIOUS EXPERIENCES IN BIRDS' NESTING.

By Dr. R. Williams (of Kingsland, Herefordshire.)

As I have resided for many years in a part of Herefordshire favourably situated for observing the nesting habits of our commoner birds, several curious instances have come under my personal observation which I think are worth recording.

In May, 1889, whilst strolling through a small wood with a keeper, I discovered a Blackbird's nest situated in a depression in the ground, in just such a position as a Sky Lark's might occupy. The keeper remarked that he had found several other Blackbirds' nests in this wood in similar positions. Within a few hundred yards of the first nest we found two Thrushes' nests, also on the ground, the edges of the nests being level with the surface. The wood abounded in thickets and small fir trees; but these more favourable sites contained very few Blackbirds' or Thrushes' nests. On enquiry, I learnt that the proprietor, having found that this wood was a nesting stronghold of these species, had made systematic raids on their nests in consequence of the havoc made by the birds on his fruit. I think this fact suggests why these birds had departed from their usual habit in their choice of nesting sites. Profiting from experience, they had selected safer positions.

As regards the Common Sandpiper, I think the following facts will show that this species also profits by experience, and occasionally varies its choice of nesting sites. In May, 1886, just when these birds were commencing to sit, we had a very heavy rainfall, heavier than any remembered by my father, who is over eighty years of age. The land on each side of the river running near my house was under water. The Common Sandpiper usually nests on patches of gravel thrown up by the water, and more or less covered with docks and other weeds. These places being flooded, the nests were swept away and destroyed. On the subsidence of the flood, the Sandpipers built again on their old sites, only to find their nests swept away by another flood. In the nesting season of the following year (1887), wishing to secure a few clutches of Sandpipers' eggs, I searched in the usual places for a whole morning without success. But as I observed only single birds and no pairs, I concluded the hens were sitting somewhere in the neighbourhood. The next day I accidentally came upon a Sandpiper's nest containing four eggs, the nest being placed at the foot of a willow fully 100 yards from the river. This discovery put me on the right track, and I found six more nests in various positions, all a long way from the river. Two were under bushes, two in grass fields, and in each instance on the highest part of the respective meadows. One was situated by a rack close to the keeper's house some forty yards from the river. It was at least thirty feet above it, on the side of a very steep ascent. Another nest occupied a most curious position: the Sandpiper had built on the head of a pollard willow, and the nest

was only discovered by an angler striking the tree and flushing the bird. From May, 1886, the date of these floods, until 1889 the Sandpipers continued to nest at some distance from the river. In my opinion this proves conclusively that the birds remembered former calamities, and made use of their dearly-bought experience by choosing positions inaccessible to the highest flood. In 1889, however, I found the birds had resumed their usual nesting sites close to the river.

I once saw a Wood Pigeon's nest placed in the branch of a tree resting on the ground, the nest being only raised a few inches from the ground, with the grass rising above it.

Moorhens often select odd nesting-places. Some years ago I found a nest in a hawthorn-bush near a pool, the nest being placed some ten feet from the ground. In August, 1889, I saw another nest placed in the midddle of a large pool. The water was exceptionally low, being only some nine inches in depth. The bird had laid a foundation of sticks at the bottom, and built up the nest so that it stood at least a foot above the water's level. It was a very substantial structure and quite different from the usual nests built by these birds.

Towards the end of April, 1888, I had a curious experience with regard to a Carrion Crow's nest. Whilst strolling along the river Arrow I noticed a nest of this bird placed high up in a large poplar. The nest evidently contained well-fledged young birds, judging by the noise they made. These the parents were busily employed in feeding. Whilst passing the nest shortly afterwards I noticed that a Kestrel and the two parent Crows, evidently quarrelling, flew out of it. A fortnight later when repassing the nest I saw a Kestrel fly from the tree, and then I noticed that there was a large nest in the same tree placed some twenty feet below that of the Crows. This I concluded was the Kestrel's nest. I was surprised to see nothing of the parent Crows, as it was too early for the young birds to have flown. The next day, however, the mystery was solved. I sent my groom up the tree to get the Kestrel's eggs; but on his climbing the tree we were surprised to see a Kestrel leave the higher nest. This was found to contain five very handsome Kestrel's eggs. My man had used the lining of the nest to pack the eggs in, and this I found to consist of the pen-feathers of the unfortunate young Crows. The Kestrel had not only annexed the Crows' nest, but had evidently eaten the young birds. Some three weeks later the female Kestrel was shot by the owner of the land. I sent my man to examine the nest again, and he found a second clutch of four eggs exactly resembling the first clutch. I have both clutches in my collection.

In 1892 a fact came under my observation tending to prove that Cuckoos hunt for nests wherein to deposit their eggs before they are ready to be laid. My son informed me one day that he knew where a Cuckoo was going to lay. He said he had seen a Cuckoo fly out of a hedge, which on examination he found to contain a Hedgesparrow's nest ready for eggs. The boy's expectation was realised. He visited the nest repeatedly, and one day announced that the Hedgesparrow had begun to lay. Three days later he brought me the contents of the nest, consisting of one Cuckoo's egg and the clutch of Hedgesparrow's eggs.

I have at various times met with eggs of different species in the same nest. I was once shown a Nuthatch's nest in a hole in an apple tree close to a cottage door. On opening the hole I found three Nuthatch's eggs, and four Coal Tit's eggs lying in the nest of the latter bird. Beneath this was lying the Nuthatch's nest consisting of the usual collection of leaves, bark, &c. The owner of the place said that a pair of Nuthatches had for years nested in this hole, but this year it was taken possession of by a pair of Coal Tits. Then the Nuthatches arrived and drove the Tits away, and had evidently commenced to lay, when, for some reason, the owner shot the female Nuthatch. The Tits then returned and reoccupied the nest they had already built.

In 1894 I found a Blue Tit's nest in a hole in an apple tree, the female bird lying dead beneath it. My son cut out the nest, and found it contained ten Blue Tit's eggs and one Nuthatch's egg. Some little time afterwards I received six more Nuthatch's eggs from the same hole. The birds had finished laying in spite of the enlarged hole, which they had plastered up with mud.

In 1893 I found that a Stock Dove had taken possession of and laid one egg in a hole in a tree which had frequently been used as a nesting place by a Barn Owl. About a week later a Barn Owl flew out of the hole, and ten days later my son found that the Owl was sitting on four of her own eggs and that of the Stock Dove, having driven the latter away.

I have met with other curious combinations of eggs in the same nest, such as Jackdaws' with Starlings', Starlings' with Stock Doves', Robins' with Starlings' (the nest being in a hole in a tree), Great Tits' with Redstarts', Great Tits' with Tree Sparrows', Whitethroats' with Lesser Whitethroats', and Moorhens' with Coots'.

I once found a Coal Tit's snug nest built in an old Thrushes' nest.

A little girl once brought me a Whitethroat's nest containing a tiny egg about as big as a "caraway comfit." She said she had watched the nest for some time, and finding that no more eggs were laid, and that the bird continued to sit, she brought the nest away. Could this be the abortive attempt of a hen without a mate?

In 1890 I found a Kingfisher's nest under unusual conditions. The bank selected had been worn away by the river until it had come close to the footpath, and underneath this the nest had been placed. The eggs, which were hatching out, lay in the bare soil of the hole. This is the only example of the kind I have met with, as in my experience the Kingfisher always makes a lining of bones before commencing to lay.

The Wood Warbler usually makes a domed nest; but I once found a nest of this species the top of which was formed by the root of a tree.

In 1886 a keeper pointed out to me what he thought was a Jay's nest. His son climbed the tree to examine the nest, from which a large bird flew out. To our astonishment, he brought down five warm Pheasant's eggs, and it was undoubtedly the old Pheasant which had flown out. Later the keeper showed me some birds which were the offspring of a cock Pheasant and a domestic hen. He then showed me a still more curious thing: taking me to a box, he lifted the lid, and here I saw a cat suckling some tiny blind ferrets.

In 1890, whilst walking near the river Lugg, I heard a Carrion Crow making a great outcry in an adjoining field. On approaching the spot I found that the bird was making frantic darts at some object near her nest, which was placed in an elm at least sixty feet from the ground, and which, as I knew, contained young. Presently I saw something, which I eventually identified as a large Stoat, run down the trunk, pursued by the old bird. The Crow came out victorious in the encounter; but I was astonished to find that a Stoat could climb to such a great height.

In the spring of this year (1896) my son went to a large rookery, containing at least five hundred nests, to get a few clutches of eggs. Curiously enough, the first nest he examined contained four eggs of the Tawny Owl.

Some years ago I found a Jay's nest in a very curious situation: in a small standard oak there was an old Squirrel's dray, and a foot above this was the nest of a Ring dove. The Jay's nest was placed between the two, being built upon the Squirrel's dray, so that the Ring Dove's nest formed its roof.

Woolhope Naturalists' Field Club.

SECOND FIELD MEETING, TUESDAY, JUNE 23RD, 1896.

VISIT TO THE WORKS OF THE PROPOSED BIRMINGHAM WATER SUPPLY FROM THE ELAN VALLEY IN WALES.

ON Tuesday, June 23rd, the Club visited the Works in the Elan Valley, near Rhayader, for the future water supply of Birmingham from Wales. Their magnitude, the good organisation which prevails over every department, the courtesy of the various officials of each section who described the details of the work under their superintendence, the engineering ability displayed in the project, and in combating the various unknown, not wholly unexpected, contingencies as they presented themselves, could not fail to keep the mind of the visitors unceasingly interested. Their ardour was not diminished by the occasional damping of their clothes by showers of rain, perhaps we may venture to say it was inspirited. Permission to visit the works having been received from Mr. E. Antony Lees, the Secretary to the Elan Supply Water Department, the chief resident engineer, Mr. G. N. Yourdi, had made the arrangements, so essential when the hours are limited, in such perfect order, that without delay the visitors passed on from one section to another. The company was large, nearly ninety in number, and we believe that they derived in the few hours at their disposal, a more comprehensive grasp of the great and ingenious scheme of Mr. Mansergh than is generally obtained by a visit of much longer duration. A notice of this visit would not be complete without an expression of thanks to Mr. Yourdi and his staff. To mention one instance alone: the road across the railway at the lodge leading to Cwm Elan bridge, impracticable in the early morning for our carriages, was repaired for their transit, so that the programme could be carried out in its entirety.

The question was asked: How can a visit to engineering works of man be comprehended within the scope of a Naturalists' Field Club? To answer in a few words:—An engineer has been defined as one who "directs the power and resources of Nature for the use of man." Surely it is the duty of the members of a society whose express objects are to investigate our Natural productions, and the effects they have on the prosperity and happiness of the community, to trace the triumphant art of the engineer in storing up in abundance such an essential to our daily life as Water. Moreover, the Naturalist holds communion with Nature in the very ground on which he treads. Sermons are to be found in the rock-ribbed hills,

cleavages of the slates, the deeply cut ravines, the gorges, the boulders striated by attrition and by glacial action, buried under many feet of deposit, the extraordinary effects of erosion by water displayed in the Pot-holes under the weir at the locality of the Submerged Dam at Careg Ddu, and far more strikingly developed at the Pen-y-gareg Dam, two miles beyond Cwm Elan.

At a fitting opportunity the President made remarks on the Physiography of the country, and presented to each member three plans—which respectively showed—*(a)* a ground plan of the locality, the route to be traversed, with an outline of the Caban Côch Reservoir when full; *(b)* a diagram of the Watershed; and (*c*), plans and sections of the Reservoirs and the Dams. Mr. Tom D. La Touche, Superintendent of the Geological Survey of India, gave an address on the "Pot-holes and the Erosion of Rock-basins"; Rev. Augustin Ley contributed remarks on the Botany of the district. A few notes on the Ornithology and Fauna of the locality were supplied by Mr. R. Lewis Lloyd, late proprietor of the greater part of the water-catchment, and for many years a local resident. Meteorology in Herefordshire was ably treated by Mr. H. Southall, who very appropriately chose for his text, "The remarkable deficiency of Rainfall in Herefordshire for nearly ten years, with particulars of the extreme dryness and general mildness of the winter and spring of 1895-96, and other meteorological phenomena, including the very severe Frost of February, 1895."

Wisely has it been said, "Better for man were he and Nature more familiar friends."

> "It may be deemed unmanly, but the wise
> Read Nature like the manuscript of heaven,
> And called the flowers its poetry. Go out!
> Ye spirits of habitual unrest,
> And read it when the fever of the world
> Hath made your hearts impatient, and, if life
> Hath yet one spring unpoisoned, it will be
> Like a beguiling music to its flow."
>
> —*N. P. Willis.*

As regards the business of the day, five new members were elected. The names of two gentlemen were proposed to be balloted for at the next meeting.

The President announced that he had received, for presentation through the Club to the Museum, Roman coins found at Kenchester, given by Mrs. Cooper-Key, widow of Rev. H. Cooper-Key, who was President of the Woolhope Club in 1870; also some silver Roman coins found at Kenchester, given by Mr. Walter Pilley.

The following members attended:—The President (Mr. H. Cecil Moore), Judge G. H. Lea, Dep. Surgeon-General W. Perry, Count Lubienski Bodenham, Revs. A. Bannister, H. A. Barker, T. M. Beavan, C. Black, C. Burrough, W. S. Clarke, J. E. Grasett, R. Harington, E. J. Holloway, Preb. W. Lambert, A. Ley, H. B. D. Marshall, M. Marshall, W. E. T. Morgan, T. P. Powell, F. S. Stooke Vaughan, M. G. Watkins, and H. T. Williamson, Messrs. W. E. Britten, E. Du Buisson, J. Carless, T. Carver, E. L. Cave, Geo. Child, R. Clarke, J. Holmes, W. J. Humfrys, T. Llanwarne, G. H. Marshall, H. Marshall, W. Pilley, Scudamore Powell, C. Warre Prescot, H. H. Pumphrey,

M. J. G. Scobie, H. Southall, E. Stephens, H. G. Sugden, J. P. Sugden, J. R. Symonds, A. Watkins, and J. H. Wood, M.B. Mr. Thos. Hutchinson (Honorary Secretary), and Mr. James B. Pilley (Assistant Secretary). Visitors by invitation of the Club.—The following members of the Town Council: Messrs. E. E. Bosley, W. Boycott, J. Davies, E. C. Gurney, J. H. Jacob, A. Johnson, H. Rogers, E. Stooke, and F. Williams; Mr. Parker, City Surveyor, and Mr. Parlby, Superintendent of the Gas Works. Other visitors: Messrs. R. Bamford, S. Beeson, John Bulmer, W. Cecil Gethen, J. H. G. Harris, Charles Hatton, John Hatton, Arthur Holcroft, W. Hewitt, W. G. Lloyd, H. Longhurst, Geo. Marshall, Herr Rouwenhorst Muller, John Mackay, Charles E. A. Moore, W. Pritchard, jun., Captain R. A. Smith, Dr. A. B. Simpson, W. P. Symonds, and R. H. Symonds-Tayler.

A VISIT TO THE WORKS OF THE PROPOSED BIRMINGHAM WATER SUPPLY FROM THE ELAN VALLEY IN WALES.

By H. Cecil Moore, President.

A long continued drought had but recently been broken by the fall of very partial showers when, at an early hour on Tuesday, June 23rd, with the barometer showing a pressure of 30 inches at Hereford, the members of this Club, with their visitors, started by a special train to visit the works in process of execution for the water supply of Birmingham from a watershed whose greatest elevation is 2,120 feet. For an intelligent grasp of the whole scheme the President presented each member with three drawings containing a plan of the whole watershed, sectional drawings of the dams and reservoirs, and a plan of the route over the Works. Fully aware that they were travelling from a district whose average annual rainfall twenty years ago was estimated at nearly 30 inches, reduced, taking the average of the last nine years, to about 25 inches, to a range of hills in Radnorshire where the yearly average is 68 inches, the visitors took the precaution of providing themselves with such light waterproof coats as the heat of the summer permitted; the wisdom of this forethought was eventually proved. Passing through our beautiful county in which the winding river Wye formed many a pleasing feature along its course of 29 miles from Hereford to Hay, 21 miles from Hay to Builth, and 15 miles from Builth to Rhayader, making a total of 65 miles from Hereford (or exactly the same distance as from Hereford to the mouth of the Wye), the town of Rhayader was reached, punctual to the programme, at 9.45. Mr. Hope Edwards, proprietor of the Royal Lion Hotel, was equal to the occasion, and eighty-five seats were provided in his carriages in a manner creditable to the little town, and to himself in particular.

The road from Rhayader to the Elan Valley in the south-west passes under the railway bridge, and soon is seen upon the right-hand the *old* coach road in a north-western direction to Aberystwith, a hilly road which, at the distance of three miles and a half from this junction, has attained a height of 1,600 feet, gradually declining to 1,200 feet near Pont ar Elan five miles and a half distant. This road will be referred to hereafter, and is only noticed here with the view of cautioning the cyclist against it, and of recommending it only to the good pedestrian who is fit for a twenty mile walk down the Elan Valley from Pont ar Elan along the course of the Reservoirs back to Rhayader.

The road to the Works is direct, and for the first mile and a half is hilly, and so narrow as only here and there to allow vehicles to pass each other, but after this distance has been traversed, the new road made by the Birmingham Corporation is entered; this road is good and broad, and runs nearly parallel with their new railway line, which is in connection with the Cambrian Railway. At the distance of two miles and a half from Rhayader a small rivulet named Nant Madog flows across the road, and fifty yards beyond it, the railway line is seen to

have been cut through a small elevated knoll, the site of Capel Madog, reputed traditionally to have been the residence of a Monk and lay brethren representing the Cistercian Abbey of Strata Florida in Cardiganshire, the greater part of whose possessions of 21,000 acres, known as the Grange of Cwmdeuddwr, after passing through many hands, is now the property of the Corporation of Birmingham.

Immediately opposite this site of Capel Madog has been recently erected a new hotel called the Elan Valley Hotel, a convenient halting place for visitors from Llandrindod, Builth, or elsewhere, situated as it is but little more than half a mile from the new Elan Village. To see the Works properly the visitor cannot do better than make his headquarters for a few days at this hotel. The coffee-room is lofty and spacious, and capable of seating fifty at dinner, provided notice is previously sent. The hotel has bedroom accommodation for thirteen, counting double beds and single beds. The proprietor is Mr. D. E. Williams, of the Ivy Bush, Carmarthen, and the house is under the management of his son, Mr. J. F. Williams, Junior, and his wife. Elan Village is situated on the opposite (or Breconshire side) of the river Elan, and consists of wooden huts extending in a long straight street nearly half a mile in length. It forms the headquarters of the eleven hundred or more workmen employed on the works connected with the formation of the various reservoirs in the valleys of the Elan and Claerwen, and is capable of extension as necessity may demand.

The approach to the village is occupied by a few important institutions. On the left hand side, the first building, of red brick, is the Baptist Chapel erected in substitution of the chapel at Careg-Ddu, close to the site which will be occupied by the Submerged Dam whence the flow to Birmingham will commence. The first service was held in this Chapel on Sunday, September 15th, 1895. Contiguous to the Chapel is a substantial building—the Prison: next in order come a few wooden huts used as Stables. On the right hand side a zigzag road of approach conducts to the Fever and Infectious Diseases Hospital, in a situation partially screened by a wood of gnarled and weather-beaten oak trees, on an elevation one hundred feet above the road. Crossing the railway the next building on the right hand is the Doss-house, or quarantine, a wooden structure, where, we were informed, every candidate for employment on the works is kept, for a very reasonable charge, "like a gentleman at his own hotel," and to the question whether a married man might take his wife with him, we received the reply that "if a gentleman is married he must leave his wife behind, there being no accommodation for his lady." The candidate during his residence has to go through the ceremony of a bath for his personal comfort, whilst his clothes are undergoing the process of disinfection. He has to pay threepence for his night's lodgings, and for his board according to his demands. The building contains the dwelling apartments of the caretaker in a central position, and two large bedrooms with nineteen beds in each, one bed being occupied by the superintendent of the dormitory, who, from his power to expel any too offensive or too objectionable member, is familiarly known as "The Chucker-out."

From the Radnorshire side of the river, the Elan being the boundary from Breconshire until its junction with the Claerwen, which river thence constitutes the boundary between the two counties, the approach to the Elan Village in Breconshire, is over an elegant suspension bridge nine feet in width, and forty yards in length. From a double chain of twisted wires on each side, making in the aggregate the thickness of a man's wrist, are suspended at intervals of six feet, 19 rods of one inch diameter, whence depends a lattice parapet of iron bars. The chains form a graceful concave curve, and after passing over iron blocks, supported on upright baulks of 15 inches scantling, are fixed to massive strainers on each bank. The river, churning adown the valley in a loud key upon its rocky rugged base, here presents an irregular bed of water-worn rocks, with massive fragments strewn about, as they have been brought down the stream in successive floods, which have been known, after the breaking up of ice and melting of snow, to reach a height of 10 feet.

An inspection of the various types of huts for the workmen, the Recreation room, the Reading room, School-house, and Mission room, Water supply, Drainage system, provision in case of fire under the regulations of a well-drilled Fire-Brigade, the Canteen or municipal public house on the lines of the Gothenburg system, the stores and Commissariat supply, the model Hospital, and the excellent arrangement and order prevailing throughout, convince the visitor that in this secluded valley, begirt with wooded hills, penetrated by the babbling river Elan, presenting an exquisite blending of woodland and river scenery, the city which claims to be the best governed city in the kingdom has justified its claim. The inhabitants under its enviable régime have here settled in pleasant places, even in Arcadia.

Our party was due at the Suspension Bridge at half-past ten, but owing to a delay of half-an-hour in shaking into their places in the carriages, did not arrive until eleven o'clock. Here we were met by Mr. C. A. Cooke, resident engineer, in charge of the Masons' yard, who acted as our Director, and conducted us from one official to another. The huts of the engineering staff, artificers, mechanics, paymasters, &c., occupy the front of approach to the works, and we soon found our thoughts transferred from a contemplation of the beauties of the Elan Valley to the very busy hammering, drilling, and toiling of man's every day life here. The large and long building in the centre of the workshops is the warehouse for the Portland cement, which, on arrival in bags from the Medway, here undergoes for two or three weeks the process of cooling, as it is spread in trays, thus rendering it free from the liability to cracking due to the presence of quick lime in its ingredients. This cooling process slakes any free lime which the cement may contain.

In the year 1892, after twenty-two days' consideration in Committee of both Houses, the Parliamentary sanction was obtained (the Royal assent being finally given on June 27th) by the Corporation of Birmingham for the appropriation of the estate of the Elan Valley, 12½ miles in length from north to south, and 8½ miles from west to east, embracing a watershed within its parting lines over an area of 45,562 acres, or about 71 square miles. The highest elevations above

Ordnance datum along the lip of the basin are 2,120 feet draining into the River Claerwen on the south, and 1,949 feet on the west draining into the same river, whilst the heights above the River Elan are 1,873 feet on the north-west, 1,718 feet on the north-east, and 1,752 feet on the east, over which watershed the mean annual rainfall, computed from the rain gauge of Mr. R. Lewis Lloyd, at Nantgwyllt, about 768 feet above mean sea-level, is about 68 inches, or 55 inches from an average of three consecutive dry years. From these data it has been estimated that a produce of 100 million gallons a day from the watershed may be relied upon, to secure which, during periods of prolonged drought, a storage of 18,000 million is required, which will provide a daily allowance to Birmingham of 73 million gallons, and a supply of 27 million gallons daily into the river Elan through, or in times of great floods over, a dam at Caban Côch, (to be constructed between Y Foel Hill in Radnorshire and Cnwch Hill in Breconshire, across the extreme gorge or outlet of this extensive basin), as compensation to Hereford, and other communities along the banks of the river Wye, who have been hitherto unceasingly drawing their water supply from these natural sources unimpounded by any artificial obstruction.

Seventy-three million gallons is the ultimate supply contemplated, requiring the construction of six of the dams, three on the Elan river and three on the river Claerwen. At present, however, only three of the dams are being constructed, Caban Coch, Pen-y-Gareg, and Craig Goch on the river Elan. These will impound 10,860 million gallons, and will supply 27 million gallons as daily compensation into the river, and the same amount to Birmingham, which will probably satisfy that city for the next thirty or forty years.

The commencement of this stupendous work, the design of the engineer Mr. James Mansergh, the construction of which is in the hands of the resident engineer, Mr. G. N. Yourdi, dates from August 29th, 1893, so that we, who were familiar with the Elan Valley in its original natural beauty, reviewed the transformation scene after a period of three years less two months.

From the latest reports we were glad to learn from the monthly reports that only three fatal accidents have occurred amongst the men employed, the lowest number of which was 926, whilst at the end of last May there were 1,174, and that the expenditure up to March 31st, 1896, was £215,549 3s.*

The erection of dams for impounding water and for purposes of irrigation dates from remote antiquity. Of all that we can recall to mind in the course of our reading none has equalled in magnitude the great dam of Mareb or Saba, identified with Sheba, whose Queen visited Solomon. Saba is about two hundred miles north-east of Sanaa, the capital of Turkish Yemen in Arabia. The catastrophe of the bursting of this extraordinary *barraye*, referred to in the Koran, is supposed to have occurred about A.D. 120.

Its ruins still exist, and from measurements taken by Monsieur d'Arnaud, who visited them in 1843, it consisted of a wall connecting two hills by a construction two miles in length, one hundred and seventy-five paces wide, and one

*The total expenditure to March 1st, 1897, was £333,652 5s. 6d., and to March 31st, 1898, was £475,511 4s. 8d.

hundred and twenty feet in height, with openings at different levels, and a connection of dykes for irrigating the plains. This dam is believed to have been built by Lokman the Adite 700 years before the time of Solomon, or 1,700 B.C.

The following reference is recorded on Page 7 of the preliminary discourse of "The Koran," by George Sale, printed for Thomas Tegg, 72, Cheapside, 1844.

"The first great calamity that befell the tribes settled in Yaman was the inundation of Aram, which happened soon after the time of Alexander the Great, and is famous in the Arabian History. No less than eight tribes were found to abandon their dwellings upon this occasion, some of which gave rise to the two kingdoms of Ghassan and Hira. And this was probably the time of the migration of those tribes or colonies which were let into Mesopotamia by three chiefs, Becr, Modar, and Rabîa, from whom the three provinces of that country are still named Diyar Becr, Diyar Modar, and Diyar Rabîa. Abdshems, surnamed Saba, built the city from him called Saba, and afterwards Mareb, made a vast mound or dam (*Pocock, Specimen Hist. Arab.*, p. 57), to serve as a basin or reservoir to receive the water which came down from the mountains, not only for the use of the inhabitants, and watering their lands, but also to keep the country they had subjected in greater awe by being masters of the water. This building stood like a mountain above their city, and was by them esteemed so strong that they were in no apprehension of its ever failing. The water rose to the height of almost twenty fathoms, and was kept in on every side by a work so solid that many of the inhabitants had their houses built upon it. Every family had a certain portion of this water distributed by aqueducts. But at length God, being highly displeased at their great pride and insolence, and resolving to humble and disperse them, sent a mighty flood, which broke down the mound by night while the inhabitants were asleep, and carried away the whole city, with the neighbouring towns and people." (*Geogr. Nubiens.*, p. 52).

The proposed barrage of the Nile at Assouan, below the great Cataract, will measure close upon a mile and a quarter from bank to bank. The originator is Sir W. Garstin, K.C.M.G., and in the scheme is included another barrage at Assiout.

The original tanks at Aden were probably built in the seventh century at the time of the second Persian invasion. In the process of centuries they became filled up with detritus and *débris* washed into them in time of torrential floods from the hills above. In 1858 the writer, at that period Lieutenant of the Royal Engineers, Bombay, was engaged in their restoration under Captain H. St. Clair Wilkins, R.E., and Captain Fuller, R.E.: since that period they have been altered by additions in number, in depth, and in area, and exhibit a succession of cisterns of grotesque irregular shapes and capacities, every nook and corner of the precipices presenting a solid base being taken advantage of, so arranged that the overflow of one reservoir empties into its lower neighbour. These tanks, however, although of world-wide reputation, and of inestimable value in a district where, according to statistics, dated 1858, nineteen years after our occupation of Aden in 1839, a heavy storm occurred once in three years, are on a comparatively small scale, perhaps capable of holding in the aggregate, when the

whole design has been completed, not more than thirty million gallons of water.

In our own country the supply of large populations from distant sources is of comparatively recent date. Glasgow set the example by obtaining in 1859 its supply from a natural lake, Loch Katrine, 27 miles distant. Manchester has its supply from Thirlmere Lake, a distance of more than 100 miles. Liverpool recently accomplished its supply by impounding the waters in an enormous reservoir at Vyrnwy in North Wales, a distance of 68 miles from the city. The supply of Birmingham from the river Elan is an undertaking still more colossal, the distance being 73½ miles, and the aqueduct is to be constituted of 13½ miles in tunnels—seventeen in number—having a gradient of sixteen inches in one mile, 23 miles in seventeen separate stretches of "cut and cover" work, that is to say, in trenches covered over, and 34½ miles of a double row* of iron pipes, 44 inches in diameter, to conduct the water through syphons, with a gradient of three feet in one mile, across the valleys of the Wye, Lugg, Teme, Severn, and Stour, &c., where the ground falls, as it does in 11 places, below the hydraulic gradient line. Of the numerous lengths of iron piping the longest measures 17 miles and 574 yards. Over the lower rivers these pipes will be carried on bridges. A length of 347 yards of aqueduct on arches is also designed. Of the 17 tunnels the shortest will be 190 yards, and the longest, between Dolau and Bleddfa, 4 miles 18 chains, or 4 miles 396 yards, being 228 yards shorter than the Severn Tunnel which is 4 miles and 624 yards long, 2¼ miles of which are under the Severn river.

It has been already stated that the first provision demanded for Birmingham is a daily supply of 27 million gallons, and a similar daily supply as compensation into the river Wye. To obtain this it is considered that three reservoirs on the river Elan will suffice, augmented, if necessary, by a tunnel one mile in length communicating with the river Claerwen, with its inlet from Dol-y-Mynach Reservoir, and its outlet above the Submerged Dam at Careg Ddu. Should the population of Birmingham increase, it is estimated that a daily supply of 73 million gallons may be obtained by the addition of three impounding reservoirs on the river Claerwen. The surface of the service Reservoir of the city of Birmingham, when filled, is at an elevation as high as 600 feet above ordnance datum. This great elevation of Birmingham augments the difficulty of its supply, and limits the sources thereof. The intake being fixed at 770 feet above Ordnance datum, which is 70 feet above the bed of the river at the base of the Caban Côch Dam, has been secured in the following ingenious manner, thereby obtaining a fall of 170 feet in the total length of 73½ miles. Across about the middle of the largest and lowest Reservoir a Dam will be constructed, whose top surface will be at the level of 780 feet. This Dam is termed "The Submerged Dam," because its summit will be submerged 40 feet below the surface of the reservoir when completely full at a depth of 820 feet. The Corporation hope that it will justify its claim to its name, and always remain submerged; but if, after a protracted drought, the Reservoir should ever fall so much as 40 feet below its top level when full, then the summit of the Submerged Dam will be visible. The

*The double row of iron pipes are for the first instalment only. Ultimately six rows of pipes will be required.

ingenuity of this conception, and its unique construction, will be apparent from the fact that, when this intermediate Dam is *not* submerged, the daily compensation of 27 million gallons to Birmingham will be limited to a draught upon the waters impounded above it, whilst the daily compensation to the river Wye will be limited to the parts below it.

It must be borne in mind that the daily compensation water to the Wye at Caban Côch will always be drawn from the bottom of the Caban Reservoir, except when the water actually overflows the Dam.

The river Elan, rising in Cardiganshire, flows a length of 12 miles before it joins the Claerwen at Aber Elan, near Nantgwyllt. An inspection of the plan of the watershed which was presented to each member of our party, shows the direction of the Elan from the north-west, thence its southerly course until its junction, nearly at right angles with the Claerwen, the course of which river it assumes whilst it retains its name of Elan. Advantage has been taken of its issue through a rocky gorge between two hills, Y Foel on the north in Radnorshire, and Craig Cnwch on the south in Breconshire, at a place called Caban Coch. Here the first and lowest Dam is to be constructed, reaching from hill to hill, impounding the waters above in a series of Reservoirs.

Still continuing under the guidance of Mr. Cooke, the party was conducted to the Dam at Caban Coch, where Mr. Sidney C. Lewis, the engineer in charge of this section of the works clearly explained the details.

THE DAM AT CABAN COCH.

Looking southwestwards up the river Elan from an elevation on the site of the proposed Dam, the observer finds himself as it were in the vortex of a funnel down which at times the wind blows with the force of a hurricane, as the hills close in at the gorge through which flows the Elan. Here the first and lowest Dam is to be constructed, reaching, when completed, a length of 200 yards between Craig Gigfran on the north in Radnorshire, to Craig Cnwch on the south in Breconshire, impounding the waters above in a series of Reservoirs up the valleys of the Elan and Claerwen respectively. Upon the south side of the river in Breconshire, the foundations of the Dam, now nearly completed upon this same side, will rest upon a base of solid rock which will be excavated by blasting operations to a depth of from 20 to 30 feet below the bed of the river, and the excavations will be continued until a basement of solid rock has been reached, free from any splittings or cleavages which might affect its security. The large masonry blocks which are stacked around in all directions are in readiness for poising into their positions by the aid of the 10 ton lifting power and other travelling cranes, upon a bed of concrete formed of Portland cement, and finely ground grit, prepared upon the works out of the hardest and sharpest local rocks. The height of the dam will be 120 feet, its width at the base will be of similar dimensions, gradually diminishing to its summit. The bed of the river at this place is 700 feet above Ordnance datum, thus the summit of the Dam will be 820 feet above that datum.

The following comparisons will best enable us to appreciate the magnitude of the Dam at Caban Coch. The total length of Hereford Cathedral, outside measurement, is 342 feet, the height to the top of the nave is 64 feet, to the top of the lantern 96 feet, to the top of the leads covering the tower 140 feet, and to the top of the pinnacles 165. The length of Broad street from its north end so far as the Free Library and entrance to the Cathedral Close is 200 yards, which is the same length as the Caban Dam. A mass of masonry of this length has to be constructed, whose height (including the 20 to 30 feet of foundations) shall be equal to the top of the leads of Hereford Cathedral tower, and only 28 yards short of twice the length of the Cathedral. And as regards the breadth of the monolith like superstructure, the base of 120 feet is only 20 feet shorter than the greatest breadth (140 feet) of the Cathedral at the central transepts.

As regards the extremities of the Dam, the same rules and precautions of extending them until they are wedged into solid rock will be followed. A great advance has been made upon the south or Breconshire side where the fine section of solid rock is exposed on the right bank. The diversion of the river to the opposite side by the coffer dams will be maintained until this Breconshire side of the Dam has made sufficient progress to make a culvert in it, through which the stream will be diverted to this side of the river, on the completion of which the excavations on the north or Radnorshire side of the river will be commenced, finally making a culvert on that side also, thus having two culverts during the construction of the Dam. On its completion these culverts, through which the compensation water to the Wye will be delivered, will be protected by iron bulkheads against their mouths. A shaft from each culvert will lead to a subway in the upper part of the masonry structure, from which the sluices will be regulated. The culverts will be 16 feet in diameter.

The large yard extending up the valley for half a mile on the Breconshire side is the Masons' yard for the Stone dressers. The best stone is obtained from the quarry on the Radnorshire side. The various lines of railway take it in waggons to the dressing yards, where it is prepared for the purpose for which it is best adapted. Much of the finer surface dressing of the stones is done by the manual labour of the stone cutters. There is, however, to be seen upon the works an ingenious stone-dressing machine, patented by Mr. Trier, of Brunton and Trier, made by John Spencer and Co., of the Atlas Machine Tool Works, Keighley, Yorkshire, by which two surfaces of the hardest rock, when previously prepared by the stone-cutter to within four inches of its proposed surface, can be simultaneously dressed to a remarkable degree of finish.

Many members of our party would willingly have tarried here to investigate the more minute details of work in this busy scene, but it was necessary to proceed. Thanking Mr. Lewis for his kind and comprehensive explanation, our party advanced again under the directorship of Mr. C. A. Cooke. The Elan being very low the authorities had considerately caused a plank to be placed across the river, which saved us from retracing our steps by our road of approach,

or otherwise from making a long détour through the stone dressing yard, and thence crossing the river over one of the wire-swing foot bridges 50 yards in length. These wire-swing bridges are a peculiar feature in this district. All we need say at present is, that the first venture across one of them is rather intimidating, until one has got accustomed to its vertical and horizontal swinging motions.

Having crossed the river we found ourselves on the old road to Nantgwyllt and Cwm Elan, whilst we espied our carriages 120 feet above us on the new road which had been opened two or three days previously for vehicular traffic. On the right hand we passed a small homestead now converted into the Abernant Stores; a massive block of stone, split by a mountain-ash tree grown within a cleavage of the rock, stands sentinel before this dwelling. The next two houses on the left successively are Tan-y-Foel and Ty-bach, the former of which has been highly favoured by photographers, judging from its often forming the foreground of a picture with the gorge at Caban Coch in the background. In less than half a mile we had arrived at Nantgwyllt Church, a plain and small rectangular building, whose windows, protected by shutters, carried the old-fashioned diamond-shaped leaded panes, and whose interior fittings displayed as pew sittings the lofty boxes which have almost faded out of one's recollection. The roof on the north side is covered with a profusion of Blechnum fern. The apex at the west end has a bell turret surmounted by a wooden cross. The site of this Church will be submerged by 90 feet of water. For an illustration of this Church see "The Vale of Nantgwyllt"—by R. Eustace Tickell, Virtue and Co., 1894.

The road leading south from the Church conducts by Gro Mill to Nantgwyllt (the wild brook), distant a little less than one mile, situated close to the junction of the river Elan with the Claerwen. This plain, massive, charmingly situated mansion, formerly the residence of the poet Shelley in his earlier married life, is now occupied by Mr. G. N. Yourdi, the superintendent resident engineer. Its site will be submerged by 60 feet of water. Continuing our westerly course from Nantgwyllt Church, at a curve of the road to the north-west we pass by the Nantgwyllt Post Office. The recently erected wooden huts here on the left are the Offices of the Engineering staff, after leaving which we get upon rising ground overlooking an old weir upon the river, at the distance of one mile and a quarter by road from the Dam at Caban Coch. The name of this place is Careg Ddu, (the Black Rock), so named from a prominent mass of rock on the opposite side of the river which has been partly excavated. The rectangular building on the opposite bank is the old Baptist Chapel, not yet demolished; the broken up ground surrounding it is the old burial ground. When the writer visited the spot nine months ago, the burial ground contained several mounds, and 14 upright monuments, on which the earliest date he could find was 1849. The coffins and the monuments have been recently removed and re-interred, due compensation to the families having been given by the Corporation. This site has been selected for the position of the Submerged Dam. Having crossed the river by the timber footbridge our director, Mr. Cook, placed us under the guidance of Mr. A. P. Maddocks, assistant engineer, who officiated in the absence of Mr. Charters, the engineer in charge of this section of the Works. Having called upon us to mount

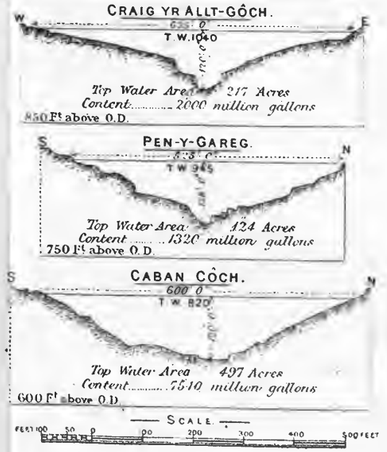
to a tramway at an elevation of about 30 feet above the foundations of the Submerged Dam, and to cross the yawning chasm upon a plank nine inches wide fixed within the narrow gauge of the tram, the strength of the party rapidly diminished in number, although the President, whose thoughts were perhaps wisely kept to himself, led the way. To the assembled party Mr. Maddocks explained the details.

THE SUBMERGED DAM.

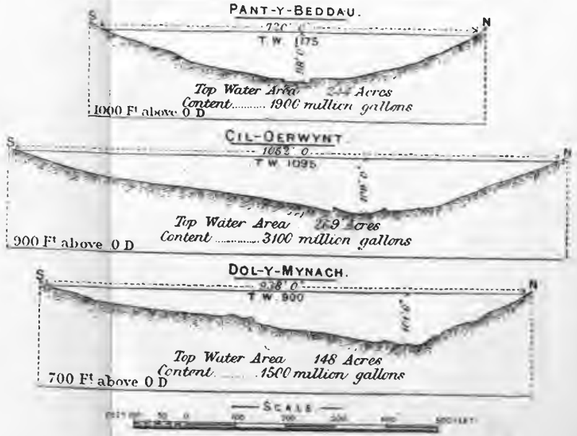
This Dam is now having its foundation filled with massive rocks, "plums" as the navvies call them, lowered into positions on to the concrete bed, the space between each rock being afterwards filled with concrete and well rammed by manual labour, so as to make a substantial structure with the minimum of interstitial spaces. The concrete being mixed, is turned over three times in the dry state, followed by three times overturning in the wet state. The excavation of this southern extremity of the Dam is now nearly completed: it will be wedged into the cavity of the solid hard close-textured slaty rock which has been blasted away and prepared for its reception. The same principle of culvert will be adopted as has been already described in the Dam at Caban Côch. The culvert will be 18 feet 6 inches or 19 feet in diameter. The top of this Dam will be at a level of 780 feet above Ordnance datum. Whenever, after a protracted drought, the level of the Reservoir has fallen 40 feet from its maximum surface of 820 feet, *i.e.*, down to 780 feet above Ordnance datum, the top of this Submerged Dam will be in view, and thenceforward the daily compensation of 27 million gallons a day will be a draught upon only the Reservoir below this Dam, the waters above it remaining impounded for the draught of 27 million gallons daily to Birmingham, until the next flood again causes the submergence of the Dam, and covers the entire surface of the Reservoir extending from Pen-y-Gareg Dam, two miles further up the river, to the Dam at Caban Côch, two miles lower down. This Submerged Dam will be surmounted by a bridge on seven segmental arches, 48 feet from centre to centre, upon which will be conducted the road to Nantgwyllt, and elsewhere across the reservoir. The opening of the tunnel opposite is the commencement of the issue to Birmingham—the tunnel passes under the hill called Y Foel for a length of more than 7,000 feet, or nearly one mile and a third, and its exit is on the hillside below the Dam at Caban Côch. Up to the present date 320 feet at this end has been penetrated, and 250 feet at the Caban Côch extremity. The conduit will be built of blue brick and concrete, whose sectional area, in the clear, is equivalent to a circle nine feet in diameter. At this extremity a tower will be erected with filtering screens to prevent extraneous matters passing into the aqueduct.

It was originally contemplated to augment the Elan supply, in the first instalment of the Works, by introducing water from the Claerwen in times of great drought, by a tunnel from Dol-y-Mynach, emptying above the Submerged Dam. Upon further consideration, however, this scheme has been abandoned. It is considered that this first instalment of the work, whose cost is estimated at £3,500,000, consisting of the three Reservoirs on the river Elan, namely the Craig-Gôch, Peny-y-Gareg, and Caban Côch, will suffice for 20 or 30 years hence.

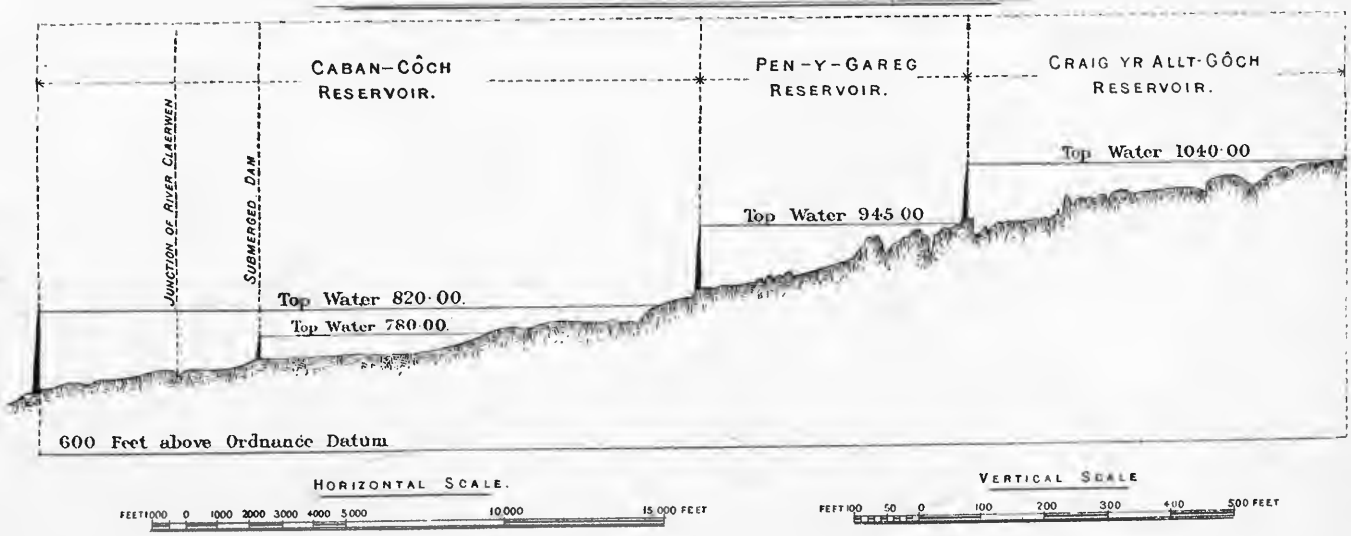
SECTIONS ON CENTRE LINES OF ELAN DAMS.



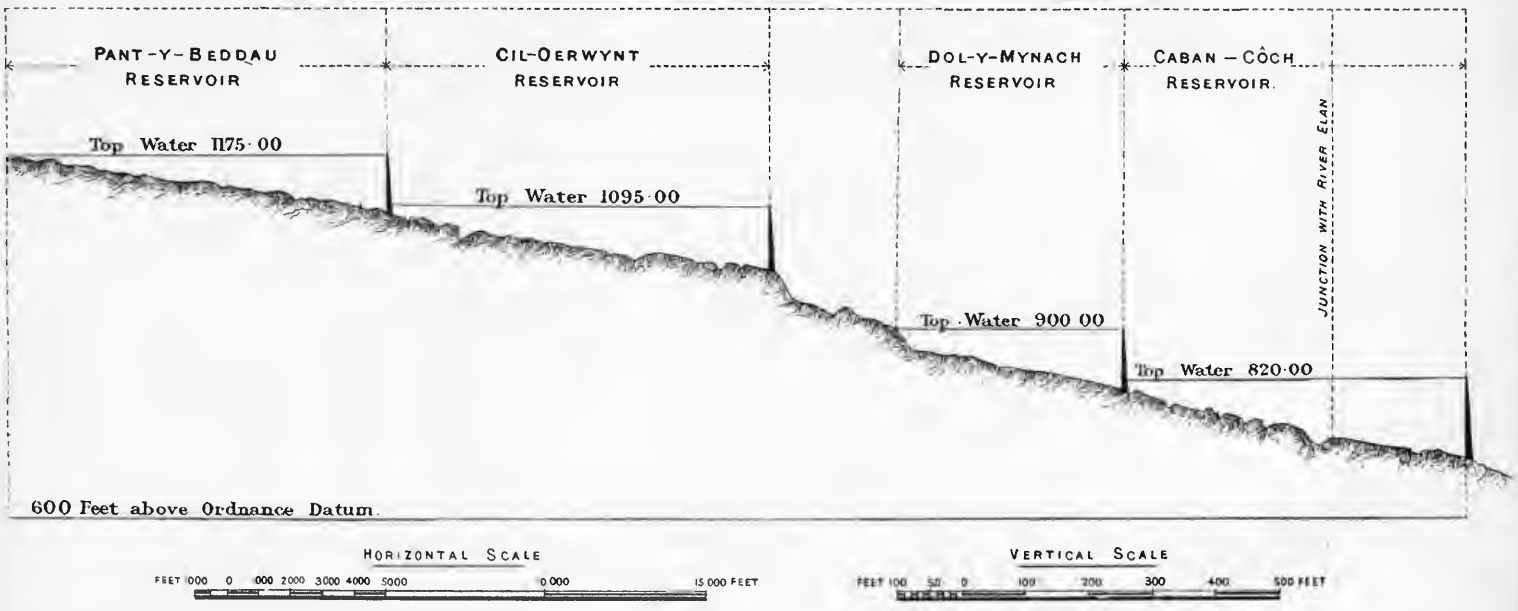
SECTIONS ON CENTRE LINES OF CLAERWEN DAMS



LONGITUDINAL SECTION SHOWING ELAN RESERVOIRS.



LONGITUDINAL SECTION SHOWING CLAERWEN RESERVOIRS.



The following measurements and data will furnish better than words the capacity and magnitude of the various reservoirs :—

Name of Reservoir.	Contents in gallons.	Area in acres.	Height in feet.	Elevation in feet above Ordnance datum.
Caban Côch, principally on the Elan Valley, but also partly on the Claerwen	7,540 million	497	122	820
Pen-y-Gareg, on the Elan Valley	1,320 ,,	124	128	945
Craig-Gôch, on the Elan Valley	2,000 ,,	217	120	1,040
On the River Claerwen :—				
Dol-y-Mynach	1,500 ,,	148	101	900
Cil-Oerwynt	3,100 ,,	269	109	1,095
Pant-y-Beddau	1,900 ,,	244	98	1,175

Or a total of 17,360 million gallons forming a superficial area of water, when all the reservoirs are completely full, covering 1,499 acres.

The following are the proposed lengths of the dams :—On the Elan river: Caban Côch, 600 feet; Pen-y-Gareg, 525 feet; Craig-Gôch, 625 feet. On the Claerwen river: Dol-y-Mynach, 938 feet; Cil-Oerwynt, 1,052 feet; Pant-y-Beddau, 720 feet.

The party, having by this time grasped some idea of the design, after a grateful vote of thanks to Mr. Maddocks, assembled to make a closer inspection of the tunnel. At the dinner hour, between one and two p.m., reports of blasting operations were heard, which are also conducted at the breakfast hour, between eight and nine a.m., and after the men have finished their day's labour; so as neither to cause any interruption at irregular hours, nor to endanger the safety of the workmen and visitors.

Directions and cautions to miners as to the use of Noble's gelignite, gelatine dynamite, dynamite, and other nitro-glycerine explosives employed for blasting, are conspicuously posted at the entrance to the Tunnel. Manual labour, occasionally assisted by the steam-drill, is chiefly depended upon in drilling the holes for the charges, wooden tools being used for the tamping.

So soon as the inspection of the Tunnel had been completed, the company assembled on the heights overlooking the excavation of the Careg-Ddu Dam, and the President made some remarks on the Physiography of the country.

THE PHYSIOGRAPHY OF THE DISTRICT.

By H. Cecil Moore.

The district we have passed over to-day is as interesting from its geological features as it is notable for the magnificent catchment area in which we are now assembled. The first half of our journey to day was over that system so familiar to us as the Old Red Sandstone of Herefordshire, and whilst we have been descending in the geological series of formation we have been ascending

from Hereford 189 feet 3 inches above sea level (as marked on the jamb of our Market Hall), to this elevation of 770 feet, where we now stand at the mouth of the aqueduct for the Birmingham supply. Those who were looking out of their carriages would have observed the transition from the Old Red Sandstone about a mile after leaving the Railway Station at Erwood. The character of the soil is conspicuously different and reminds us of the Upper Silurian soil in the district of Woolhope. The line of demarcation is well defined. About half way between Boughrood and Erwood Railway Stations the line crosses the small tributary Bachhowey, which separates the Upper from the Lower Ludlow rocks; if the course of the Backhowey be followed for about two miles the visitor will see remarkable contortions of these rocks at the waterfalls of Craig-y-pwll-ddu (the crag of the black pool). Travelling northwards from Erwood, just before reaching Aberedw, a fantastic grouping of gigantic rocks upon the right hand presents a remarkable resemblance to the masonry circumvallation tier upon tier of a fortified hill, like a miniature Gibraltar, and the horizontal stratification of the Upper Ludlow tilestones, due to disintegration of the softer parts from weathering, forms a marked feature. Near Mynnd Aberedw the Aymestrey Limestone takes up its normal position of Middle Ludlow. Near Builth we come upon a protrusion of igneous rocks, consisting successively of Felspathic trap, Felspathic ash, and Greenstone; Wellfield, two miles north of Builth, being on a narrow bed of Llandilo flags of the Caradoc or Bala series of the Lower Silurian between two rocks of Greenstone east and west. The river thence for four or five miles crosses over calcareous shale with rubbly concretional structure, representing the upper flags and shales of the Wenlock series, through six miles of which stratum the river Ithon flows by Disserth, before emptying into the Wye, upon its left bank, five miles north-west of Builth. One mile of Denbighshire flags and shales of the Upper Silurian are crossed at Newbridge, whence for the remaining seven miles to Rhayader the river Wye traverses sandstones and conglomerates of the Lower Silurian. Surely, within one day's march, a sufficient variety to satisfy the most grasping geologist.

The iron and sulphur and saline waters of Builth and Llandrindod owe their qualities to the iron pyrites and other mineral constituents in the erupted volcanic masses in their neighbourhood.

For a record of fossils found in the district of Builth see *Transactions*, 1865, pp. 133, 134, being Part 6 of the earlier issues of our *Transactions* in pamphlet form.

We have now brought our observations of the crust of the earth upon which we have to-day travelled up to the vicinity of Rhayader. We will now follow a section of ten miles in length bisecting the watershed of the rivers Elan and Claerwen in a direction across the basin running from south-east to north-west. Commencing three miles south-east of the dam at Caban Côch, following the argillaceous slates with beds of thin grit, we find at Cefn-y-gamrhiw, through Craig-y-cnwch and Gro-fawr, thick bedded sandstones and conglomerates remarkable for their occasional sudden development, the slates passing rapidly into sandstone and coarse conglomerates, with a few calcareous concretions and

large subnodular masses in the line of the strike of the upper slaty beds. This brings us to a *fault* near the river Elan above the dam at Caban Côch, and to the blue argillaceous and arenaceous slates of Cefn craig-y-Foel, thence across the river Elan a second time, continued along this section over Tyn-y-faen, Bryn-y-gwal, Nant Brythgwm, Esgair gris, near Lluest Abercaethon, Clawdd du mawr, Esgair Cormwg, Banc-trappau-Dwrgwn, Esgair Llwyd, Disputed ground, Trisn-y-gwr, Bwrllwmau Elan, and Cefn-banc-hir close to the sources of the rivers Elan and Claerwen. These Caradoc or Bala and Lower Llandovery rocks, consisting of shales banded with thin sandstones, with thick beds of coarse sandstone, and conglomerates, some of the beds covered with tracks of Annelida, are continued hence onwards for the next 17 miles or more as far as Cardigan Bay.

In 1879 Professor Lapworth gave the title "Ordovician" to this series, a very appropriate name from its continuity over the territory of the Ordovices.

The only reference to this district which I can find in Woodward's "Geology of England and Wales," 2nd edition, 1887, is on page 92, where he writes: "Above the Cardiganshire group (Metalliferous-slate group, 2,000 feet, and Aberystwith grits of Sedgwick 1,000 feet), come the Plynlimmon grits, 1,000 feet, forming a line of high country in the centre of Wales, including Plynlimmon. These grits are probably an arenaceous development of the Tarannon Shales, and the Cwm-Elan conglomerates and Rhayader Pale Slates belong to the same series."

The *fault* above referred to lies between Tan-y-Foel and Caban Côch Dam, and follows the line of the streamlet which discharges into the Elan just below Tan-y-Foel, passing almost under the shop, previously mentioned, at Abernant stores. It crosses the Tunnel aqueduct about 900 yards from its eastern extremity, its direction being N.N.E. to S.S.W. by W., to the river Elan about 200 or 300 yards west of the Caban Côch Dam; thence down the valley along the course of the river Elan for about a mile. The fault is not observeable to any extent upon the right bank. Professor Green and Mr. Topley discovered signs of it again on the left bank of the Claerwen above Aber Elan, where it re-appears under the tennis court at Nantgwyllt. A little higher up the river Claerwen are several faults which may be in continuity thereof.

Immediately above Abernant, the bedding planes of the grits and slates are almost vertical, and exhibit many contortions and curious foldings, but in order to properly inspect them a good deal of stiff climbing is necessary. Mr. Eustace Tickell, engineer in charge of the Pen-y-gang Dam, informs me that the most marvellous instances of contortion within his knowledge are to be seen in the bed of the Claerwen near Cwm Clŷd, above half a mile above the Rhiwnant stream, and near an old lead mine.

Mr. Tickell has called my attention to an interesting exposure on the right bank of Nant-y-gro, above the Mason's yard on the right bank of the Elan, where the temporary railway has been cut on the hill side. He writes:—"The trend of the hill side is here nearly at right angles to the cleavage, and the slopes have been rounded into smooth curves by the passage of ice. In the cutting referred to the edges of the slates can be seen bent backwards in the direction of the

glacier, and in some places I have found a striated boulder of grit imbedded in the crushed slate."

A fine example of a small terminal moraine may be seen on the Claerwen, nearly opposite Nant-y-Gader. It is clearly shown on the map in Mr. Tickells' charmingly illustrated book, "The Vale of Nantgwyllt" (Virtue & Co., 1894), by a sharp indentation of the top water contour of Cil-Oerwynt Reservoir near its upper end. Mr. Tickell informs me that the rocks in this neighbourhood are much striated, and he strongly recommends the Claerwen Valley in preference to the Elan from a naturalists' point of view, the geology being much more varied, and the birds have not been disturbed as in the Elan Valley, where the Water Supply Works now exert a preponderating influence.

In "Records of the Rocks," Mr. Symonds expresses his belief, on page 136, that there is a trap dyke running from the Drygan, a hill 2,120 feet high, close to the source of the Rhiwnant, across the hills to Cefn Craig-y-foel, which disturbs the strata, and that lead ore occurs thinly along its strike. As regards the lead ore, there is a disused mine up the valley beyond Cwm Elan. And at the present time lead ore is being extracted from the mines at Nant-y-carw up the Claerwen Valley. There used to be lead mines at Craig Rhiwnant and at Craig Dalrhiw on each bank of the river Rhiwnant which falls into the Claerwen half a mile west of Dol-y-Mynach.

You will have observed when we were at the Dam at Caban Côch the mixture of extremely hard conglomerates and grits of the Lower Silurian series, on the south, or Breconshire side of the river. Again you will have noticed the closely grained texture of the rock on the north side of the Dam, in Radnorshire, from which quarry the best stone is obtained for its construction. In this quarry is a vein of quartz six feet in thickness. At Careg-Ddu, where we now stand, the Pot-holes in the bed of the river indicate the homogeneity of the rock in this locality, and the excavation which you have crossed shows an exposure of excellently hard blue slate in many places of large extent, and free from splitting. In fact, if the bed of the river and southern extremity at Caban Côch had been similarly free from cracks, we should have found much more progress made with the excavations at that locality.

As regards fossils you will not expect to find many of them in these palaeozoic rocks—nothing probably beyond traces of Annelida, soft-bodied animals which are seldom preserved in a fossil state, such as earthworms, sandworms, tubeworms, &c. and occasionally a few Graptolites of the division of Hydrozoa which present a pleasing variety of form, and which range from the base of the Ordovician system to the summit of the Silurian series. This Ordovician system demonstrates the period of culmination of the Graptolites.

Here we now see man busy making this extensive excavation in hard slaty rock with machinery and tools of the latest up to date pattern, yet how insignificant is his work compared with the upheavals, deposits, erosions, and denudation of æons of the work of Nature, with her tools of wind, rain, frost, snow, ice wedges, alternations of heat and cold, streams, rivers, and glaciers. Even to day Nature holds no armistice: this shower of rain is carrying material down the

river past Hereford into the Bristol Channel. That the configuration of the remarkable and extensive basin of this catchment is due to glacier action and denudation from the effects of ice, frost, and rain, is evident. Proceed four miles higher up the course of the river and you will find yourself in the hollow of an extensive basin with a diameter of three miles, the barrier of which in the west is the elevated and rounded plateau which separates the Elan from the Claerwen, and constitutes their watershed. See the plan presented to you. Where we now stand, with this forbidding rampart of shattered slaty rock within our reach, is a valley connecting two of the smaller enclosed basins.

The remarkable erosive power of water is exhibited not only in the Pot-holes below us, but in the narrow clefts in solid rocks as you proceed up the course of the Elan, especially marked at Pont-yr-hyllfan (the bridge of the awful place) and in numerons other localities. At Pont-yr-hyllfan the channel has become so narrowed by erosion that it is difficult for any one to believe that a horse could possibly have been carried by the current through so narrow a chasm,—a fact which has occurred. Another curious testimony of the power of water is exhibited at that locality—just above the single baulk which spans the river there—the stony bed of the river is dry for a length of about twenty yards, a subterranean passage having been excavated by hydrodynamic pressure, aided by stones set revolving as it were by a drilling machine in the cavity: moreover there is another cavity, oblique to the watercourse, the extremity of which cannot be reached by a twenty-feet pole.

For evidence of detritus and moraines brought down by torrents and glacier action, look at that clay-like surface soil opposite, overlying the rocks which recently covered these excavations at Careg-Ddu: as you follow it higher up the hill the deposit attains a depth of fifteen to twenty feet. Observe here and there a boulder peeping out of the deposit. If you will go a little higher up the hill you will find that a heap of fifty to a hundred boulders met with in this excavation have been stacked together. These boulders are of grit, and have come down from the beds in Nant Hirin which empties into the Elan nine miles distant, or about a mile and a half beyond Pont-ar-Elan. If you examine them you will find striations marked upon them; in some cases their surfaces are quite polished, due to friction under an enormous weight of travelling frozen snow. The average size of the boulders in this collection is about that of a four-and-a-half-gallon barrel.

The two rivers Elan and Claerwen both have their source from the high moorland east of Cefn Banc Hir, near which is a place marked on the Ordnance Map as Geifas, close to a triangular station with an elevation of 1,873 feet. The Elan takes a circuitous north-easterly course, and the Claerwen takes a south-easterly circuit, the rivers maintaining a distance apart of from three to five miles for more than half their course before their junction at Aber Elan; the length of the Elan before its union being 12½ miles, and that of the Claerwen 12 miles. These rivers are computed to supply between one-sixth and one-seventh of the water passing through Hereford, and that the very best. The purity of the water is established by reason of its freedom from pollution by manured land or sewage from villages, the whole population of the area not exceeding 180, and the sheep

averaging 1¼ to the acre. The softness of the water is a great recommendation, not only for its saponifying quality, but also for its power of diminishing scaling in boilers. The Birmingham Corporation have purchased manorial rights over the area, thereby securing control over the few lead mines in the Claerwen district, with which area, however, there will be no necessity to interfere for several years hence. The city of Birmingham is fortunate in having acquired for their water supply a watershed peculiarly adapted by nature for their demands; in truth, an ideal and extensive catchment area.

The daily compensation supply of 27 million gallons will be determined by a gauge to be fixed within 300 yards of the Dam at Caban Côch. It is not anticipated that the city of Hereford will be otherwise than benefited, when it is known that during the year 1894 the daily average flow of the river Elan near Caban Côch was calculated at twelve million gallons. We learn from an article in the *Hereford Times* of January 9th, 1892, that during the winter month of December, 1891, the consumption of water in Hereford was 25,200,000 gallons, of which the railway companies took 2½ million gallons, and the brewers and maltsters a few hundred thousand gallons. Probably the consumption will increase yearly with an increased population, nevertheless, upon the present statistics, 650,000 gallons may be considered a fair daily average.

Moreover, the Wye will be exempt from the floods which have sometimes caused both alarm and damage. The interests of the Salmon Fisheries have also been favourably considered, and the beneficial cleansing of the river by artificial spates has been guaranteed by a provision in the Bill that one-fifth of the 27 million gallons daily compensation shall be occasionally reserved each day for a fortnight, and discharged during forty-eight hours together with the daily allowance.

I must call your attention to some instructive letters which have recently appeared in the *Hereford Times* from Mr. John Lloyd on the subject of "The Welsh Water Scheme for London" in the issues of March 14th, 21st, 28th, and April 4th, also a further series on "The distinguishing features of the Wye and the Usk," see May 2nd and May 9th, 1896. In the *Transactions* of our Club, 1869, page 151, are some particulars of the daily flow of the river Wye under the bridge at Hereford, compiled by a member of our Club, Mr. Curley, C.E., then City Surveyor, from which Mr. John Lloyd has computed the number of millions of gallons in 24 hours, which table is here reproduced for the information of our City authorities, whom we have been glad to welcome in our outing to day.

TABLE SHOWING THE DAILY FLOW OF THE RIVER WYE UNDER THE BRIDGE AT HEREFORD.

Height above Summer level.	Cubic feet per minute.	Million gallons in a day of twenty-four hours.
1	177,000	1,590
2	233,420	2,098
3	296,880	2,668
4	353,250	3,175
5	413,140	3,713

Height above Summer level.	Cubic feet per minute.	Million gallons in a day of twenty-four hours.
6	476,550	4,283
7	553,185	4,972
8	635,100	5,708
9	696,193	6,257
10	766,000	6,885

When the river is above 10 feet high it spreads over the banks, and measurements of its flow cannot be reliably determined.

A few words should be said about the rainfall here. The annual rainfall in Herefordshire averages now throughout the county from 25 to 30 inches, whilst the average rainfall here is 68 inches. Why this difference? We have a long elevated hilly region in Wales running parallel with our western coast from St. David's Head by the heights of Plynlimmon 2,481 feet, Snowdon 3,571 feet, thence onward across the Menai Straits to Anglesea. If you will ascend on a clear day one of those heights near our present *locale*, you will see a continuous succession of billowy elevations on the horizon as spurs of the higher mountains on this their eastern side. The Welsh call these spurs "esgairs," from the name signifying a shank, or leg. The hills receive from the Atlantic their vapour-laden winds after passing over Ireland. In their course from west to east, they precipitate their vapour of supersaturation in rain, or in winter in the form of snow, leaving a diminished quantity for falling upon the more easterly parts, as is found to be really the case. Compare the annual rainfall of 165 inches in the Lake district on the western coast with 20 inches at Lincoln on the east, or again: compare the annual rainfall of 86 inches at Fort William, the south-western end of the Caledonian Canal, near Ben Nevis, with 46 inches at Loch Laggan, twenty miles east, and 24 inches at Culloden at the north-eastern end of the Canal.

Most probably the rainfall was greater in earlier days before the destruction of numerous forests in this district in the time of Edward I. It is well known that vegetation conduces to climatic changes. Witness for instance the increased rainfall in Scinde, and other desert districts in India, owing to the national propensity of the Briton for tree-planting, insomuch as to have created a proverb amongst the natives of India—"Wherever the British go there rain will come."*

The survey of this large undertaking of the Birmingham Corporation recalls to my mind, whilst considering the comparison of the rainfall on our west and east coasts, the grand and ingenious work executed in the Madras Presidency by the Engineer Officers Prendergast, Hasted, C. J. Smith, and others. On the lower western coast near Travancore the rainfall of 170 inches or thereabouts is superabundant, and originally much water ran to waste into the sea. The river Periyar has been dammed upon its western side, and its course

*Witness again the peninsula of Aden. I have statistics of the rainfall in Aden from 1834 to 1846, from which it appears that a heavy storm occurred triennially. The experiment was tried of planting trees in the gaol-yard, which were duly watered by the prisoners with undrinkable brackish water. The meteorological record of the ten years 1850—1859 gives an annual rainfall averaging 3.31 inches. Soon after the completion of the Reservoirs more trees were planted. The average annual rainfall of the eleven years 1885—1895 is 5.086 inches, as given in a letter in the *British Medical Journal* for October 31st, 1896, page 1318. H. C. M.

diverted so as to perform the duties of irrigation, and to afford fresh sources of water supply over the more arid midland and eastern districts, eventually falling into the river Cavery which empties into the sea upon the eastern coast.

The greenery of the treeless hills as you proceed higher and higher up the course of the river and its tributaries, is evidence of moisture, notwithstanding the protracted drought we have experienced. To-day we welcome these repeated showers of rain, although they interfere a little with our intended arrangements—probably on our return to Hereford we shall find that they have had no rain whatever. There are many bogs on these hills due to accumulated water which cannot escape, but remains upon impermeable strata where it slowly undergoes evaporation.

The few inhabitants of these small homesteads, whose occupation is that of shepherds on a large scale, and agriculturists on a small scale, grow principally oats and vegetables. They cut peat for their fires. Dr. Richardson, the local medical man, informs me that he has seen at Dol-folau, on the way to Pen-y-Gareg Dam, a peat fire which has not been relighted for thirty-six years—as long as the tenants have resided there; the peat fire is kept smouldering during the night by a little skilful manipulation. It is from the rivers Elan, Claerwen, and Irfon, which fall into the Wye upon its right bank, that the peaty-coloured water is supplied, which is seen sometimes passing the Wye Bridge at Hereford, seventy miles distant from us. The clay-coloured water is from the floods of the river Ithon which enters the Wye upon its left bank, five miles north-west of Builth.

The Ordnance Survey Geological maps for this district are 56 N.W. and 56 S.W., and, for the Sections, Sheet No. 5 should be studied.

When the President had concluded his remarks, delivered in view of the Pot-holes under the Weir at Carreg-Ddu upon the proposed site of the Submerged Dam, he called upon Mr. La Touche for his paper.

POT-HOLES AND THE EROSION OF ROCK BASINS.

By Tom D. La Touche; Superintendent, Geological Survey of India.

These excavations, variously called pot-holes, giant's kettles, or giant's cauldrons, are, as is well-known, produced by the whirling action of boulders and pebbles set in motion by the powerful eddies of mountain torrents, whereby the rocky bed of the stream is gradually worn into a series of round holes, often of considerable width and depth. The conditions necessary for their production appear to be: firstly, a sufficiently rapid fall in the bed of the stream; and, secondly, that the rocks should be in fairly thick beds and of homogeneous texture, for thin-bedded rocks are merely torn away piecemeal, and form a series of jagged edges in the stream bed. Pot-holes are produced in very various kinds of rocks, gneisses, granites, limestones and sandstones, almost everywhere, in fact, when the conditions I have named are present. Occasionally they are of very large

dimensions, 10 or 12 feet in diameter and as many in depth. On the plateau of Bahia, in Brazil, an explorer, Mr. Allen, measured one, "elliptical in outline, 18 feet long, 9 or 10 feet in width, and 27 feet deep, with smoothly-worn sides." I shall refer to these pot-holes of Brazil further on.

The chief interest of these excavations to my mind lies in the fact that each of them is a true rock basin, that is, a depression in the bed of a stream surrounded on all sides by solid rock. About the formations of rock basins in general, some of them being miles in length and width and hundreds of feet in depth, controversy has raged for many years; many eminent geologists, among whom Professor Ramsay was foremost, asserting that they are produced by the ploughing action of enormous glaciers, while others, unable to allow that ice could exert any ploughing action of the kind, though it certainly smooths the rocks over which it flows, maintain that the larger rock basins, at any rate, are due to unequal subsidence or upheaval of the rocky floor of the valleys in which such basins are found. The difficulty in accepting the glacial origin of such basins has been that, so far as we know, the mere motion of the ice over a rocky surface does not impart to it any power of excavating the rock to the depth required. On the other hand, it seems difficult to postulate a special subsidence in order to account for every rock basin in existence; and, above all, the fact that these basins, if not entirely confined to districts that have been highly glaciated in former times, are yet of most frequent occurrence in such districts, has to be accounted for.

It seems to me that in these pot-holes we find an agency which, under certain conditions, might result in the formation, I do not say of all rock basins, for there is no doubt that many, especially the larger, have been formed by changes of level, but of some of the smaller ones, so apparently connected in some way with former glacial conditions. We have only to imagine that the drilling action, which we see here resulting in the formation of isolated holes, should by some means or other be moved about from one point of the rocky floor to another, just as a rapidly revolving drill, moved over the surface of a piece of wood, would in time produce a hollow of any required depth and size. It is here that the peculiar conditions afforded by the presence of a glacier would, it appears to me, come into play. The melting of the surface ice on a large glacier gives rise to numerous streams, often of considerable volume, which, after flowing into channels cut in the ice itself, plunge sooner or later into crevasses and carry down boulders, which must be driven with immense force against the rocks beneath the glacier. The edges of the crevasses are quickly cut back by the falling water, and thus the battering action of these *moulins*, as they are called, is not confined to a single point, but moves slowly backwards. Moreover, the crevasses, by altering their position from time to time, change the point of attack of any particular *moulin*, and if we remember that a very large number may be in action simultaneously over the area occupied by the glacier, it seems at any rate possible that, given a sufficient lapse of time, a ceaseless battering of this kind would produce a hollow in which water would collect after the retreat of the glacier. It should be mentioned that this drilling action can only take place beneath the middle portion of the glacier, for the streams on its surface never reach its lower end; moreover,

the rocks forming the floor of the valley are there protected by the mass of *débris* carried down by the glacier, so that if denudation of any kind is going on beneath it and, we know from the turbid state of the water that issues from beneath the end of the glacier, that such must be taking place, a rocky barrier with a depression behind it, a rock basin in fact, must be formed.

It is not necessary that a lake, that is, a hollow filled with water, should always be left on the retreat of the glacier; for, in many cases, the amount of moraine matter brought down by the glacier would be sufficient to fill up any hollow that might have been formed, especially if the retreat of the glacier took place slowly. This, I believe, has frequently been the case in the Himalayas, where the amount of moraine stuff brought down by the glaciers is exceedingly great, and may account for the fact that lakes, lying in true rock basins, are very seldom met with in that region.

The pot-holes to which I referred just now as occurring in Brazil present some puzzling features. Mr. Allen, as quoted by Sir H. Howorth in a letter to Nature, of November 9th, 1893, p. 30, says :—"At frequent intervals there were irregular holes in the rocks, usually nearly filled with water, to which the inhabitants give the name of 'caldeiraos.' . . . Nearly all of the considerable number examined proved to be genuine pot-holes, and some of them were of great size. . . . These pot-holes often occur out on the plain, far away from any high land, and they are sometimes found excavated on the summits of slight bulgings in the plain, or even on the top of a hill."

The first condition which I put forward as necessary for the production of pot-holes, namely, a fall sufficient to give rise to violent eddies, is apparently wanting in that region, and it appears that, although Professor Agassiz, the great authority on glacial phenomena, was of opinion that signs of glacial action were present in abundance in Brazil, the researches of subsequent observers have shown that all the phenomena attributed by Agassiz to glacial action could be accounted for by ordinary subaerial denudation. It is possible that these pot-holes in Brazil may mark the course of streams that have disappeared in consequence of the denudation of the high ground that gave rise to them, but without knowing more of the present configuration of the country and the changes that have taken place, it would be rash to offer a definite opinion.

Such small examples of pot-holes as we see here may seem a slight peg on which to hang such an hypothesis as I have put forward; but when we reflect that the stream, small as it is, in which they occur, has in course of time excavated the enormous valley in which we stand, now to be converted, by the enterprise of the people of the great city of Birmingham, into a series of true rock basins, for who can doubt that the dams which we see arising around us, will be as permanent as the solid rock on which they are founded, when we reflect, I say, on the stupendous results brought about in Nature by causes which seem to us insignificant, it does not perhaps appear so unreasonable that the cause I have mentioned should be sufficient to account for some at least of the rock basins so frequent in our hemisphere.

Leaving the site of the Submerged Dam, an interval of nearly two hours remained until the appointed time for resuming seats in the carriages near Cwm Elan Bridge for the return journey. Notwithstanding the downpour of a heavy shower, fortunately of short duration, several members explored the Elan Valley, a few of the best walkers succeeded in getting as far as Pont-yr-hyllfan, near the site of the next higher Dam at Pen-y-Gareg.

The distances by river may be given roughly as follows :—

	MILES.
From the Dam at Caban Côch to the junction of the Claerwen	1
From the junction of the Claerwen to Cwm Elan Bridge	1
From Cwm Elan Bridge to the bend of the river at Pont-yr-hyllfan	2½
From Pont-yr-hyllfan westward to the Dam at Pen-y-Gareg	½
From Pen-y-Gareg Dam to the western bend	½
From the western bend northwards to the highest Dam at Craig-Gôch	2
From Craig-Gôch Dam to Pont-ar-Elan	2

making a total distance of nine miles and a half from Caban Côch to Pont-ar-Elan, the Bridge over the river Elan which, as before mentioned is five miles and a half distant from Rhayader by the old coach road to Aberystwith. Along the irregular and wild channels of the river, pot-holes and narrowed clefts in the hard rocks exhibit on a small scale the erosive power of water, assisted by detritus and rocks brought down by floods and melting of winter snows, strikingly illustrated in the rocky chasms near Pont-yr-hyllfan (the bridge over the ugly or horrid place) and Pen-y-Gareg, preparing the intellect for understanding the marvellous power of water in the formation of the cañons in other countries, with which we are familiar from drawings and from descriptive accounts by travellers.

In the early part of this article mention was made, on page 153, of the *old* road to Aberystwith, and it was promised that it would again be referred to. To a good pedestrian, well shod for rough roads, moorland, with slightly boggy lands, the following twenty-miles walk is recommended. Starting from Rhayader, pass under the railway bridge near the station, and take the first turn on the right hand two hundred yards beyond it. The writer has driven in a two-wheeled light cart as far as within a short distance of Pont-ar-Elan, the bridge over the Elan, marked on the Ordnance map as 5 miles from Rhayader, and 24½ miles from Aberystwith. The road is in places very rough, and there are occasional stretches on the verge of precipitous declivities, too narrow to allow two vehicles to meet or pass each other, but the prospects are pleasantly varied as the ascent is made to an elevation of 1,600 feet, near the milestone denoting Aberystwith 26 miles, Rhayader, 3½ miles, declining to 1,200 feet, when the pedestrian quits the road for the short stretch of moorland to Pont-ar-Elan. This road should not be attempted by cyclists, although the writer has known it cycled over by two well-known amateur experts, Messrs. Bird and Carslake of Birmingham.

Having arrived at Pont-ar-Elan, cross over the bridge. From Pont-ar-Elan to the uppermost dam at Craig-Gôch the two-miles walk is over soft verdure of turf, which, in a few places, must be carefully examined after heavy rains. The treeless expanse of moorland, bounded at the distance of a couple of miles by rounded elevations of table land, presents a picture of sylvan peace and solitude,

relieved by the appearance, in five or six places, of a maimed mountain ash, rooted in the rocky bank of the river, struggling, unsheltered, to survive each furious assault of the winds, by the occasional bleating of a mountain sheep, or by the echoes of the ubiquitous cuckoo crying his name to the hills around. Even a few scattered Scotch fir trees encircling a homestead do not detract from the sombreness of the solitude.

When you have walked down the stream southwards about one mile from Pont-ar-Elan, a modern looking farm building with a slated roof will be seen about a quarter of a mile distant on the opposite or eastern side; it is named Lluest-cwm-bâch, near which is a B.M. 1,152 feet. You soon pass close by a more cozy looking thatched building on a small knoll (B.M. 1030.9) on your right-hand, begirt with a few Scotch fir trees, apparently of about sixty years' growth, appearing as an oasis in the desert, these being the only trees with the exception of say half a dozen weather beaten isolated stumps of mountain ash, rooted amongst the rocks of the river bank; the name of this farm is Lluest-Torclawdd, and through the grounds flows the rivulet Nant Torclawdd. Half a mile further south, on an elevation with B.M. 1158.8, is another farm, Hirnant, through which another rivulet flows which we may call Nant Hirnant. When you have proceeded about two miles from Pont-ar-Elan, the deep ravine of the river may, if necessary, be crossed by a footbridge of a very uninviting aspect, it being formed by a single timber baulk, with a slender quivering pole as a parapet. Avoiding the footbridge, and continuing the walk near the right bank for another half-mile, the larger stream Calettwr may be forded, except in heavy floods, and the upper Dam will be reached at Craig-Gôch. The total length of the walk from Rhayader to the upper Dam is fully 7½ miles.

In only a few localities are you called upon to beware the light-green carpet of Bog-Moss, so deceptive to any one unaccustomed to moorland; of which Wordsworth writes:—

> "An amphibious place
> Unsound, of spongy texture, yet withal
> Not wanting a fair face of water-weeds,
> And pleasant flowers."

Amongst which latter may be mentioned the delicate blossoms of the bright-green leaved Butterwort, *Pinguicula vulgaris*, an insectivorous plant with viscid leaves, and that other always interesting plant Sundew, *Drosera*.

The course of the river Elan from Pont-ar-Elan is more or less tortuous from north to south for the first four miles, the last mile of which is bounded on its left bank, or eastern side, by Craig-yr-allt-Gôch, a red-coloured cliff, and Coed-yr-allt-gôch, at the southern extremity of which wood the river bends at almost a right angle to the east for the distance of one mile. The Pen-y-Gareg Dam is situated at nearly the centre of this reach, and the two tributaries, Nant Hesgog and Nant-y-Blymbren empty upon the left-bank. Pont-yr-hyllfan is situated at the eastern bend of this reach, and a little more than one mile south of Pont-yr-hyllfan a third tributary, Nant-dol-Folau, falls, in a series of pretty cascades, into the river on its left bank. From Dol-Folau farm a footpath over the Foel hill conducts to Elan Valley hotel.

Upon the western side of the river the drainage system of the watershed is conducted to its right bank by the three following tributaries successively:—Nant Calettwr, rising three miles westwards, augmented in its course by numerous streamlets, and finally debouching opposite the northern end of Craig-yr-allt-Goch; Nant-Gris; and Nant-Brithgwm, at the western bend of the reach opposite the southern extremity of Coed-yr-allt-Gôch. Still further south we have the brook Nant Methan rising near the Ordnance survey pole, 1,736 feet, two miles and-a-half westwards, emptying south of Cwm Elan bridge; and five hundred yards further south another contribution to the river upon the right bank is supplied from Cwm Coel.

Below the Submerged Dam the ravine at Llanerchi contributes a small collection discharging near the disused Baptist chapel at Careg Ddu. In the steep bed of the stream here is exposed a huge table of slate rock, deeply marked with striations, like the slickensides of a geological fault, due to the attrition at some remote period of its overlying layer. Six hundred yards below the junction with the river Claerwen (clear white), the ravine between the heights of Gro Hill, 1,435 feet and Allt Gôch, 1,502 feet, collects the drainage in the Nant Gro, which flows by some small circular foundations of large stones between Gro-bâch and Gro-isaf, at the extremity of the Stone-masons' yard. They are apparently of great antiquity and are suggestive of Celtic hut-circles. They will come within the area of submersion when the Caban Côch reservoir is full.

At the present time the line of railway on the Works is completed as far as the upper Dam at Craig-Gôch, and wooden buildings are being erected in its immediate neighbourhood for the smiths and artificers. The train takes its departure about five o'clock in the morning, from near the Suspension Bridge at Elan village. The detachments detrain *en route* at their respective localities of employment, and the workmen are ready to commence their day's work at the upper Dam by six o'clock. The familiar name given to the railway course is "The Rout." The old mountain road here partakes more of the character of a cart track, with signs of occasional use, than is worthy to be dignified, as upon inquiry we found it was, at least by the native we accosted, with the title of the turnpike road! About one hour should be allowed for the walk by road and by the permanent way over the railway sleepers from Craig-Gôch to the excavations for the Dam at Pen-y-Gareg, allowing occasional leisure intervals for examination of the rocks and scenery.

The parting line or lip of the basin to the west appears to be about two or three miles distant, the opposite side of the watershed draining into the Claerwen Valley. Leaving behind the excellent sheep-grazing lands and treeless hills surrounding Craig-Goch, and travelling southwards down the stream, the wooded slope below a larger farm building at Pen-y-Gareg, wooded down to the deeply cut ravine in which the river flows, bursts suddenly into view as charming as it is surprising. Here is the site selected for the Pen-y-Gareg Dam. Passing onwards, the view from the railway looking down upon the busy scene of toilers amongst the drills, travelling cranes, and other huge machinery in motion at the excavation of the Pen-y-Gareg Dam demands another halt which is irresistible. Fully three

hours should be allowed for leisurely walking, allowing for haltings on the way for retrospective views, from the upper dam at Craig-Gôch to Cwm Elan bridge. On the homeward journey from Cwm Elan, if time permits, the pedestrian is recommended to cross the river at Careg-Ddu to appreciate the warmth and beauty of Craig-y-Foel as seen from the office of the engineering staff above the Submerged Dam.

The dip of the slaty rocks in the course of the walk from Pont-ar-Elan to Caban-coch is perplexing in its variability. The most conspicuous contortions are exposed upon the Radnorshire side of the river, best viewed from the Caban Dam, and close to it.

The walk from Rhayader by the *old* Aberystwith road to Pont-ar-Elan, thence, following the Elan downwards as far as the upper Dam at Craig-Gôch, to the Elan Valley Hotel may be computed at 15 miles. Or, starting from Elan Valley Hotel as Head Quarters, the walk by the *new* road to the upper Dam at Craig-Gôch and back would be 15 miles, which may be considerably shortened and varied by taking the footpath at Dol-Folau farm, midway between Pen-y-Gareg and the Submerged Dam, and returning to Elan Valley Hotel over Y Foel Hill.

THE WIRE SWING BRIDGE.

The Wire Swing Bridge has been before alluded to as a common feature of this district. The name is appropriate. A little recklessness displayed by a party traversing it may easily put it into such vibratory motion as to precipitate them all into the river.

The Wire Swing Bridge is one of the most simple of footbridges, being constructed of eight strands of ¼ inch wire, running through transverse oak joists of 2-inch scantling, supporting a 12-inch tread of platform formed of two 6-inch wide planks, 1½-inches thick, four of the strands on each side of the tread. The bridge is further strengthened by six strands of the same wire running through vertical pillars of 2-inch scantling, which are dovetailed and pinned at intervals into the transverse joists; the pillars are also further connected to the joists by oblique struts outside. These six strands of wire, three on each side, form the parapets of the bridge.

The estimate for a bridge is readily calculated—let us take for instance the wire swing bridge at Aber Elan, near Nantgwyllt, where the river is 50 yards wide. There will be required :—

Two strong upright oak baulks, 10-inches square, at each end, for the strainers .. .. 4 baulks
One ladder of approach of 8 steps with 1 foot rise, at each end .. 2 ladders
Fourteen lengths of ¼ inch wire, 50 yards each ... .. 700 yards
Add for contingencies.... ... . 100 yards
or a total of 800 yards ¼ inch wire
Thirteen transverse oak joists of 2-inch scantling 4 feet long, supporting the platform ... ... 13 oak joists
Forty-two ditto ditto 3 feet long—intermediate ditto ... 42 ditto

Thirteen transverse oak joists of 4 feet long—for pillars—*on each side* 26 oak joists
Thirteen ditto, struts, 2 feet long ditto—*on each side* ... 26 ditto
Two lengths of 50 yards plank, 6-inches wide, 1½-inches thick ... 100 yards
Twenty-six wooden pins for pinning the pillars below the joists.
Twenty-six screws for fixing top ends of struts to pillars.
Twenty-six iron pins, six inches long, with bolts and nuts.
One gross of copper nails for fixing the platform to joists below.

The width of the platform (including 4 wire strands on each side), is 2 feet.
The top wire of the parapet is 3 feet 4 inches above the platform.
The platform is from 8 to 10 feet above the ordinary level of the river.

RARE BIRDS.

Some rare birds have their habitat here. Commingled with the confusion of noises from the picks, stone hammers, hand drills, the rapid tap, tap, tap (20 taps in 5 seconds or 240 taps in one minute), of the steam drill in its revolutionary motions, clanking of chains from the travelling cranes, whistling of the steam engines, noise of the trollies upon the gantries discharging their loads into the depths below, occasionally outdone by blasting operations echoed and re-echoed from rock to rock, suggestive of a bombardment by artillery, the peaceful cooing of the Stock Dove, not to be confounded with the Rock Dove of our cliff coasts, is heard from the cliffs three hundred feet or more over our heads. These birds probably nest in cavities in the rocks, as they do in Dorset, in Devon, and at Flamborough Head in Yorkshire. Before these water works were commenced the Raven used to breed in its very favourite haunt, Craig Gigfran (the Raven's Rock) on the Radnorshire side, close to Caban-Côch. Dr. Richardson informs us that they have transferred their nesting places to higher up in the valley. A pair of Ravens nested this year in the rocks above Dol-Folau, and their nest was, as usual, taken.

This grand bird deserted the Stanner Rocks between Kington and Old Radnor, also the Pillar rock at Symond's Yat, when the railways were being made at those places. It has become so rare in our country that we look to the local residents at Rhayader to spare no pains to preserve it from extermination.

At this time of year the Cuckoo is heard calling his name over the almost treeless moorland as high up as Pont-ar-Elan. The female perhaps lays her eggs in a nest of one of the pipits.

The following notes have been received from Mr. R. Lewis Lloyd, recently owner of this property, and for many years a resident here :—"The rare bird, the Kite, is to be seen now and then. The Buzzard is very common. Black-game, Grouse, and Heron are numerous, and Curlew are very numerous. Of Waders, so classed in Yarrell, there are a great number, such as Common Snipe, &c. Of rarer birds I have killed two Solitary Snipe and several Water-rails. Of other birds we had Merlins, and a chance Hobby; Peregrines now and then; Goosanders in winter; Hen Harriers, always a few; Hawfinches by chance in 1887, and one year since that date; a few Kingfishers; Pied Flycatchers common. I have twice seen Sea Swallows." To-day we saw the beautiful bird, the Pied Flycatcher.

As regards the rarer animals of the Fauna, Mr. R. Lewis Lloyd writes: "I remember any quantity of Polecats, but none of recent years. Marten cats were common; in one year my keeper caught more than twenty in traps. I think there are a few there now, but of late years, as there are so few left, we desisted from attempting to catch them.

Dr. Richardson, of Rhayader, informed us that a Pine Marten (*Mustela martes*) was killed two years ago near the town. This large weasel, although holding its own in the wilder parts of Scotland, is nearly exterminated in England.

The Pine Marten is the only British Marten. The Beech Marten (*Mustela foina*) is said never to have been killed in England. See the paper on the Marten by E. R. Alston, in *Zoological Transactions*, June 3rd, 1879.

THE FLORA.

When the waters overwhelm the lower parts of these valleys birds and the fauna generally will simply migrate to a residence on a slightly higher elevation. Not so with all the flora. The trees in the lower part of the valley will be submerged, but some on the higher ground will be spared to form here and there pleasing objects in the landscape bordering the reservoirs. The Rev. W. Lisle Bowles thus refers to them in his graceful poem descriptive of this locality under the title of "Coombe Ellan," published in 1801:—

> And mark the old and mossy oaks
> Emboss the mountains' slope; the wild ash
> With rich red clusters mantling; or the birch
> In lowly glens light-waving.

As regards the oak trees, it was particularly observed how weirdly grown and stunted they were, as if thwarted in their earlier growth, on each side of the gorge at Caban Côch, through which, as through a funnel, the winds must blow in times of storm with great velocity and pressure; their weather-beaten trunks, covered with moss and lichen, indicate that they have experienced a rough time, whilst their dimensions betoken an age on the average of only about a century. There are older trees, for instance some fine spruce firs, on the approach to Nantgwyllt, one of which has a girth of 24 feet at a height of five feet from the ground. In company with a local resident, Mr. Stephen Williams, of Rhayader, the traces of an immense ancient forest were pointed out by him extending high up the hills. We know that after the death of Llewellyn, the Abbey of Strata Florida (Ystrad Flur, the blooming plain), about ten or twelve miles west of Nantgwyllt, was burnt, and that the whole surrounding country was wrapped in flame. We must also bear in mind that much devastation of woods and forests was committed by decree of King Edward I., who, "in order to prevent any more rebellious attempts of the Welsh, cut down all the woods in Wales wherein in any time of danger they were wont to hide and save themselves."

The usual plants of mountain and moorland are found here, such as the Sundew, *Drosera*; the delicate purple flowering Butterwort, *Pinguicula*; Hare's tail Cotton grass, *Eriophorum vaginatum*; Scotch asphodel, *Narthecium ossifragum*; Fir Club-Moss, *Lycopodium Selago*; Yellow Pansy, *Viola lutea*; Wood Horse-

tail, *Equisetum sylvaticum*; Cross-leaved Heath, *Erica tetralix*, var *flore alba*. Amongst numerous others may be mentioned *Vicia Orobus*, Wood bitter Vetch; *Habenaria chlorantha*, greater Butterfly Orchis; *Corydalis claviculata*, white climbing corydalis; *Convallaria majalis*, the Lily of the Valley, in the wood one mile north of Cwm Elan, opposite Dol Folau; and on the rocks in the Nant Dol Folau, *Hymenophyllum Wilsoni*, the Filmy Fern.

Dr. Richardson lent an annotated catalogue of British plants met with in Radnorshire, which copy was passed to Rev. Augustin Ley for perusal. Mr. Ley exhibited a beautiful Woodrush, new to Britain, *Luzula pallescens*, Wahl., gathered on June 17th, near Presteign, Radnorshire. Mr. Ley was engaged all day studying Rubi and Hieracia, and discovered a few hitherto unrecorded from Radnorshire. Among the brambles was *Rubus infestus*, W.; and among the hawkweeds, *Hieracium auratum*. As regards the plants seen on the day of our visit, June 23rd, he has made the following remarks:—"The dry hot season has brought everything at least three weeks forward. Brambles, roses and hawkweeds, usually in flower in the middle of July, were flowering freely. *Trollius europæus*, globe flower, occurs in several places on the Elan. *Vicia orobus*, the mountain vetch, was already in seed above Cwm Elan, along the river Elan. Fox glove in full flower, one specimen found of a pure white. *Narthecium ossifragum*, the Scotch asphodel, in full flower. *Sedum telephium*, live long, on rocks in the Elan Valley above Cwm Elan. *Verbascum thapsus*, common mullein, in the gardens at Cwm Elan. *Myosotis repens*, a mass of flower in some of the ditches."

In bidding *adieu* to the Elan Valley, rather than throw up our hands in despair at the approaching obliteration of some of its teachings of nature, we would hopefully exclaim, "Elle se recoupera. Le roi est mort, vive le roi," as we contemplate the prospect seven years hence, say in 1903, of a series of serpentine reservoirs, extending for a length of nearly 10 miles along the Elan Valley, with a new and broad highway, crossing the submerged dam over seven segmental arches, substituting for the old trackway a new coach route, or a healthy cycling or pedestrian road from Rhayader towards Aberystwith: or, when the six or seven miles of reservoirs up the Claerwen valley have been formed, the introduction of a new route to Strata Florida Abbey (10 to 12 miles distant), at present inaccessible to a stranger, or at least dangerous without a guide familiar with the mountain paths. The mountain climber need not complain, for there would still remain open to him a mountainous tract from eight to fifteen miles in breadth and sixty miles in length, including Plinlimmon, northwards, past Machynlleth to Cader Iris, and thence to the hills of the more northern parts of Wales. What a grand spectacle of lake scenery will be then presented to view in these two valleys! In the time of maximum floods what a picturesque cascade will be formed overflowing the summit at Caban Côch for a length of 600 feet! An overflow of three feet, as calculated by Mr. Mansergh in his report, would represent 7,000,000,000 gallons in the twenty-four hours. The dam at Lake Vyrnwy is 1,100 feet long, and 85 feet in height. The height of the Caban waterfall will be 120 feet. The President of the Woolhope Club has promised to keep himself, if all be well then, in telegraphic communication with a local resident. with a view

of organising a special field meeting to view the grand spectacle at any hour of the day or night, for its duration can only be expected to be transitory, and of rare occurrence.

For the best detailed account of the Birmingham Water Supply, illustrated with maps, from the pen of the designer and engineer, Mr. Mansergh, the reader is referred to an excellent folio work, price 25s., published by Virtue & Co., 1894, entitled "The Vale of Nantgwyllt," by R. Eustace Tickell, embellished by twelve charmingly bold copperplate etchings. In the same work is given an account of the poet Shelley's connection with Cwm Elan; and his residence in 1812, "embosomed in the solitude of mountains, woods and rivers, silent, solitary, and old," at Nantgwyllt, living his short-lived love with his first wife, Harriet Westbrook, aged sixteen, with whom he eloped at the age of nineteen. In 1814 Shelley had "devoted his burning soul" to Mary Godwin. Alas! in 1816, poor Harriet Shelley drowned herself in the Serpentine. In 1822, Shelley, leaving to posterity his poems, was drowned in the Mediterranean. The opening of the next century will find the site of Nantgwyllt, the wild brook, submerged by 60 feet of water; the site of Cwm Elan, (the Roe Valley), the residence of the poet's first love, his cousin Harriet Grove, submerged by 40 feet of water; and the site of the little Nantgwyllt Church submerged by 90 feet of water.

Mr. Tickell's work concludes with an historical account of the Grange of Cwmdeuddwr, by Stephen W. Williams, author of "History of the Cistercian Abbey of Strata Florida," of "The Abbey of Cwm-hir," and numerous other works. Mr. Williams traces the history of this property from its grant in 1184 by Rhys ap Gruffydd, Prince of North Wales, to the Abbot and Convent of Cistercian Monks of Strata Florida, its lease from the Crown, after its suppression in 1539-40, to the Devereux family, its acquisition by Sir James Croft, of Croft Castle, and Thomas Wigmore, of Shobdon, its tenure in 1578 by the Powells, by Thomas Johnes, by Mr. Thomas Grove, uncle of the poet Shelley, in 1792, by Robert Peel in 1815, by the fourth Duke of Newcastle in 1835, by General Sir William Loftus Otway in 1844, by Mr. Richard Dansey Green Price, and by Mr. Robert Lewis Lloyd, until it has finally become the property of the Corporation of Birmingham.

In concluding this report, I take the opportunity of expressing my thanks to the numerous officials connected with the works; to Mr. Mansergh for an illustration of the watershed, reservoirs, and dams, &c.; to the Chairman, Mr. Lawley Parker, for sanction of reproduction of the said drawings; to Mr. Anthony Lees, the Secretary, for helping me in every way whenever it fell to my lot to conduct a party over the works; to Mr. Stephen Williams, of Rhayader, for the first introduction to the works, and to the officials:—to Mr. G. N. Yourdi, for much assistance, always courteously rendered, whenever visiting the works; and to the following local resident engineers for varied information upon every subject in which I was making enquiries:—Mr. Cooke, in charge of the masons' yard; Mr. Lewis, engineer at Caban Côch Dam; Mr. Maddocks, at Careg-Ddu; Messrs. Tickel and Stillingfleet, at Pen-y-Gareg Dam; Messrs. Lloyd and Friedberger at Craig Gôch.

H. CECIL MOORE.

ON THE REMARKABLE DEFICIENCY OF RAINFALL IN HEREFORDSHIRE FOR NEARLY TEN YEARS ENDING MIDSUMMER, 1896.

Together with some particulars of the extreme dryness and general mildness of the Winter and Spring of 1895-6, and other meteorological phenomena including the very severe frost of February, 1895.

By H. Southall.

The subject of my paper is a somewhat wide one, embracing at least three questions of sufficient interest to be treated separately; but as no account has yet been given to the Club of the winter of last year, it was thought better that some notice should be taken of it at the present time, even if the sources of our water supply including rainfall and storage may seem more important or appropriate in connection with our visit to the site of the new Birmingham Water Supply from the Elan Valley in Wales.

Let us then in the first place inquire how we stand in this part of England and Wales as regards Rainfall. Observations have been regularly recorded in Herefordshire since the beginning of 1818, or for a period of more than 78 years. With the exception of the nine years (1843-1851 inclusive) when the observations were taken at Titley these have all been made in the southern parts of the county, and are fairly comparable. The fall at Titley as well as at The Rocklands, near Ross, being slightly in excess of that at the more central stations.

The following table is a summary of the results as well as other details respecting the observers and their stations, height above sea level, &c.

Date of Observations.	No. of Years.	Height above sea level.	Average fall per year.	Observer.	Locality.
1818 to 1842	25	485 feet	30·66 inches	Capt. Pendergrass (the late)	Poole Cottage, Much Dewchurch
1846 to 1852	12	597 ,,	31·25 ,,	R. B. Boddington Esq., (the late)	Burcher Court, Titley
1853 to 1881	29	97 ,,	33·06 ,,	J. M. Herbert, Esq., (the late)	Rocklands, nr. Ross
1859 to 1863	5	150 ,,	28·48 ,,	H. Southall	Friends Place, Ross
1864 to 1895	32	213 ,,	29·86 ,,	Ditto	The Graig, Ross
1867 to 1886	20	213 ,,	31·86 ,,	Ditto	Ditto do.

Taking the 20 years (1867-1886) just preceding the setting in of the present dry cycle, as a basis of comparison for the Ross district we shall be able to judge the deficiency of rainfall which commenced in January 1887, and which has continued (with some breaks) to September 2nd, 1896, even thus having lasted up to now for nearly ten years.

The following shews the fall of rain in inches per year since 1887 at Ross, with difference from average each year:—

1887.	22·57	— 9·29	Every month deficient except May and Nov., slightly above.
1888.	30·01	+ 1·15	Wet March, July and Dec., very wet November.
1889.	27·91	— 3·95	Very wet spring (March, April and May) slight excess Oct.
1890.	22·53	— 9·33	Every month dry except Jan. and July, when slight excess.
1891.	33·57	+ 1·71	Oct. very wet, May, Aug. and Dec. above average.
1892.	22·81	— 9·05	Dry throughout, except July an average.
1893.	20·13	— 11·73	Exceedingly dry till Dec., when slight excess.
1894.	32·63	+ 0·77	October wet (May, Aug. and Nov. slightly so).
1895.	25·96	— 5·90	(Jan. and Nov. wet), Feb. May and June very dry.
Total	241·12	— 45·62	

Or a deficiency in nine years of 45·62 inches. If to this we add deficiency January 1st to July 15th, 1896, of 9·54 inches, we have a total deficiency of 55·16 inches from January 1st, 1887, to July 15th inclusive 1896.

This is in round numbers equivalent to 5,571 tons per acre. Now the catchment basin of the river Wye is put down at 1,609 square miles, equal to 1,029, 760 acres. The County of Hereford contains 860 square miles, equal to 550,400 acres, or a trifle more than one half the extent of the former.

By a simple calculation therefore we have the deficiency of water deposited in the shape of rain and snow for the period above named (omitting minor figures.)

County of Hereford ... ... 3066 million tons of water.
Catchment Basin Wye ... 5737 ,, ,, ,,

This means for the larger area a quantity no less than 1,285,088 million gallons, or more than 1¼ billions. A cubic mile of water weighs 4095 million tons, so that it would occupy in bulk nearly one and half cubic miles of space. A prodigious volume truly.

We will now see whether this large decrease has been distributed regularly over the different months or whether it has affected one season of the year more than another. The annexed tables show some rather singular facts. Table A shows the amount of deficiency or excess of each individual month compared with average (1867 to 1886), and Table B the average of the total during the same time for each month in the year.

It will be seen at once that March, July, August, and October scarcely differ from the average, and that November shows even a slight excess caused by the heavy fall in 1888 of 8.17 in. The diminution in April and May likewise would be greater but for the exceptionally wet spring of 1889.

The greatest deficit is in February, September, and January, when instead of the average of 9·23 only 5·06 appears to have been registered, or little more than half the usual amount.

The deficiency is much more marked in the winter and autumn months, and during the time when evaporation is least active, and when also there would be the greatest retention of moisture in the soil from percolation.

The winter months being 62 per cent of average.

,, spring ,, ,, 93 ,, ,,
,, summer ,, ,, 89 ,, ,,
,, autumn ,, ,, 88 ,, ,,
Whole year ,, 83 ,, ,,

The question may now be asked, Have we any similar or parallel instance on record of so prolonged a drought. To answer this I have examined the records and find that the following fluctuations appear to have occurred.

1818 to 1827.	10 years	28·44 in.
1828 to 1853.	26 ,,	31·46 ,,
1854 to 1865.	12 ,,	26·46 ,,
1866 to 1886.	21 ,,	31·74 ,,
1887 to 1896 July	9½ ,,	26·30 ,,

The 12 years 1854 to 1865 were so dry that it was thought that the rainfall was diminishing. The 21 years immediately following had however nearly the same fall as the 26 years preceding. Whether we are now at the end of the series remains to be seen, but there is little doubt that before long the balance will be on the other side. One thing is certain that while continued drought produces great inconvenience, on the other hand wet seasons are not favourable to agriculture or conducive to comfort.

Perhaps before concluding it may be well to say something of the spell of exceedingly dry weather we are now experiencing.

The first five months of 1896 were quite the driest on record.

Rainfall January to May inclusive—Jan. ·37, Feb. ·24, March 2·24, April ·81, May ·18=3·84 inches. For the same five months the

Ten wettest years,	1886.	17·72	Ten driest, 1896.	3·84 in.
	1828.	16·31	1893.	7·11 ,,
	1869.	16·20	1864.	7.23 ,,
	1867.	15·67	1870.	7·23 ,,
	1843.	15·42	1854.	7·26 ,,
	1841.	14·97	1855.	7·31 ,,
	1889.	14·86	1892.	7·55 ,,
	1872.	14·37	1832.	7·65 ,,
	1819.	14·28	1839.	7·77 ,,
	1856.	13·57	1863.	7·72 ,,
Average 10 wet years		15·337		7·067

Thus 1896 is little more than half the next driest year, and little more than one-fifth of 1886. I propose to treat in a separate paper of the frost of 1895.

TABLE A. DEPARTURE FROM AVERAGE RAINFALL IN EACH MONTH, 1887—1896.

Average.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1867—86	3·27	2·69	1·82	2·01	2·23	2·36	2·94	2·66	3·27	3·03	2·86	2·72	31·86
1887	— ·54	—2·29	— ·32	— ·80	+ 14	—1·41	—1·26	— ·71	— 77	— 75	+ ·14	— ·72	— 9·29
1888	—2·58	—1·59	+2·02	— ·31	— ·89	+ ·36	+3·12	— 26	—2·48	—2·12	+5·31	+ ·57	+ 1·15
1889	—2·43	—1·40	+1·46	+3·63	+1·58	—1·95	— ·67	— ·43	—1·21	+ ·74	—1·77	—1·50	— 3·95
1890	+ ·34	—2·01	— ·91	—1·00	— ·11	— ·48	+ ·39	+ ·26	—1·65	—1·78	— ·81	—1·57	— 9·33
1891	—1·36	—2·68	— ·03	— ·48	+1·50	+ ·99	—1·24	+2·24	—1·90	+3·67	+ ·16	+ ·84	+ 1·71
1892	—1·37	— ·52	— ·93	—1·09	— ·56	— ·45	+ ·16	+ ·01	— ·91	—1·14	— ·31	—1·94	— 9·05
1893	— ·97	+ ·05	—1·61	—1·81	— ·57	—1·28	— ·02	—1·29	—2·38	— ·94	—1·64	+ ·73	—11.73
1894	— ·54	— ·45	— ·48	+ ·15	+ ·73	— ·60	— ·34	+ ·31	+ ·51	+1·93	+ ·43	— ·88	+ 0·77
1895	+1·13	—2·65	+ ·31	+ ·59	—1·80	—1·43	— ·35	— ·44	—2·26	— ·34	+1·94	— ·59	— 5·90
1896	—2·90	—2·45	+ ·42	—1·20	—2·05	— .17	—1·86	—1·61	+2·66	— ·18	—2·16	+ ·75	—10·75
													—60·00
													+ 3·63
												Total Deficiency...	56·37

TABLE B.

	Average 1887—1896.	Average 1867—1886.	Difference between 2 periods
December	2·16	2·72	— ·56
January	2.15	3·27	—1·12
February	1·09	2·69	—1·60
Total three Winter months ...	5·40	8.68	—3·28
March	1·81	1·82	—0.01
April	1·78	2·01	—0.23
May	2·03	2·23	—0.20
Total three Spring months	5·62	6·06	—0·44
June	1·72	2·36	—0·64
July	2·92	2·94	—0·02
August	2·63	2·66	—0·03
Total three Summer months ...	7·27	7·96	—0·69
September	1·82	3·27	—1·45
October	2·95	3·03	—0·08
November	3·24	2·86	+0·38
Total three Autumn months	8·01	9·16	—1.15
Total whole year	26·30	31·86	—5·56

H. SOUTHALL, The Graig, Ross.

ON THE LATE EXTRAORDINARY SEASON 1894-5, INCLUDING FROSTS, WINDS, AND EFFECTS ON VEGETATION.

BY H. SOUTHALL.

YOU have so many times permitted me to allude to exceptional weather that in attempting to describe some of the leading characteristics of the atmospheric conditions during the last 12 months there may be some danger of repetition or reiteration. Such however is the diversity of our English climate that no two seasons resemble each other, except perhaps in the general aspects which they present of excess or deficiency in some special particular such as temperature, rainfall, or electrical conditions. For instance winters which may be selected for their severity or mildness, and grouped together in consequence, may nevertheless differ very much in some other respects, and often do so as to the time of greatest coldness, and as to the district in England where this is most felt.

Occasionally Scotland and the South of France and Ireland scarcely experience some of *our* keenest frosts, while on the other hand we not unfrequently hear of heavy snowfall and exceptionally cold weather in the above named districts when central England is not affected by it.

In many years the variations from the mean are not sufficiently remarkable to be noticed specially; this however can hardly be said of the last three years, which include the remarkable droughts of the early spring and summer months of 1893 and 1895, as well as the severe frost of last winter.

The winter of 1894—5 has been so remarkable, that it may be worth while to record a few particulars of it whilst still fresh in our memory. Coming so soon after the almost equally exceptional winter of 1890—1, an account of which may be found in the *Transactions*, Vol 1890—1892, page 343 to 348, it may be interesting to notice their special features and to compare one with the other as regards the accompaniments of each. To go back a few years many will remember that the three following winters of 1878—9, 1879—80, and January 1881, were specially severe. The first named succeeded a warm and wet season which lasted till nearly the close of October, and then a very protracted period of cold followed, lasting throughout the year 1879, and causing that summer to be one of the coldest and gloomiest on record, so that for 14 months there was only one week in February and one week in March at all warm for the season.

In the following year 1880, the frost lasted till the first week in February. The end of that month and the first fortnight in March were very warm, as also were August and September. October and part of November were again cold, but December was warm, and it was not until January that we had a real taste of winter. The snow-blizzard of the 18th January, 1881, blocking many of the railways and other roads for several days, and the spell of intense cold from 7th to

27th January which was associated with it, and which in some places was so destructive to evergreens and tender shrubs, are by no means as yet out of mind.

Following immediately on these three consecutive cold winters were three very mild ones, 1881—2, 1882—3, and 1883—4. The first of these followed a very cold October and a very warm November, and there was scarcely any frost to speak of. The summer and autumn months notwithstanding proved to be cold and wet. The next winter had scarcely any cold weather till March, which, however, was unusually severe throughout. The summer was again cool, wet, and unfavourable for farmers. The winter of 1883—1884 was so exceptionally free from frost that even in January there were only two nights when any was recorded, and then less than half a degree on each night, and it was not till the east wind set in near the close of April that we had any frost of consequence. The summer this year, unlike the two preceding ones, was characterised by beautiful and enjoyable weather, and could not have been better for both hay and corn harvests. The warm weather lasted beyond the middle of September, and the maximum temperature in August exceeded 80° in eight days.

The next four years 1885—6—7 and 8 had each of them very cold and late springs, 1886 being very cold from mid January till mid March. 1887 was specially cold in March, April and May.

The summer was as fine as in 1884, but much hotter in June and July, and with scarcely any rain (except from two thunderstorms) from June 4th to August 15th.

Having so fully described the great Frost of 1890—1 already, (*Transactions*, 1892, p. 343) I will not go over the ground again, but briefly allude to the character of the following winters so as to lead up to that of the present year.

The winter of 1891—2 was not specially remarkable. There were short spells of some severity in December, 1891 (17—26) accompanied by dense fog. January 1892, 9—16, with deep snow, February (14—20) with further considerable falls of snow and March (2 to 14) almost continuous sharp bright frost. The three months ending May 25th, had a very deficient rainfall, only 2·16, or about one third of the average. The winter of 1892—3 was remarkable for the absence of rain in December and January. From December 5th, 1892, to January 25th, 1893, 52 days, only 1·25 in. rain fell, being about one-fourth of the usual quantity. A very severe frost set in on Christmas Eve, and lasted till January 16th, or for 24 days; the river Wye was frozen over to bear in places. The great drought from March 3rd to July 4th, 1893, succeeded after an interval of five weeks nearly constant rain. In 1894 the only frost worth mentioning was that of the beginning of January; on the morning of the 6th, 22 degrees of frost were registered at Ross, the maximum of the day before having been only 15·6 at 2 p.m., accompanied by a strong biting east wind. This frost was very destructive to tender vegetation, and in the Scilly Isles, where they did not suffer much either in 1890—1, or in 1895, it was said to have done more damage than any for 40 years. The spring was very favourable to plant growth which was particularly forward, as also in 1893, but on May 20th, and two following nights the frost and strong N.E. winds did much damage to the fruit blossoms and early potatoes. The apple trees especially,

which were in remarkably fine blossom, were mostly done for as regards the crop.

And now as to the Great Frost of the year 1895. The month of November, 1894, was very mild: there was no frost till the 30th, and then lesss than two degees at four feet from ground. The day temperature was also quite high for the time of year: December also gave no indication of what was coming, Christmas being fine and warm. On the 30th a slight frost with a little snow. It continued cold up to January 12th, when, after a dense fog and rime frost which continued till evening, it became warmer with thick snow which lay 6½ inches on morn of 13th. A rainy period of eight days with warmer weather during which 3·60 inches of snow and rain were deposited seemed to indicate the departure of the frost, but it again set in on the 22nd and was very severe on the 26th, and from this time till March 9th was continuous, not a single night having been without. The 24 days ending February 18th formed one of the coldest periods this century.

The month of February indeed as a whole had a lower temperature than any as far back as 1771 and probably much longer still. February, 1895, also resembled that of 1891 in being almost rainless.

1891, Rain ... ... ·01 on 1 day.
1895, ,, ... ·04 ,, 2 days.

From the 18th February the frost continued with lessened severity till March 8th and even on to the 19th, but the sun soon made itself felt by day, and a temperature of 65·7 on the 22nd, quite a high record for March, was a great contrast to that of February 6th when 22·8 was the maximum reached. The coldest nights were February 8th and 9th, when the readings at 4 feet were respectively 4·5 and 4·4 with a temperature of 3° on the grass.

Much lower temperatures were recorded to the north and east of us. Thus —17° was at Braemar, and —11° at Buxton, —13° at Esthwaite, Lancaster. The mean temperature of the British Isles was 7° below the average in January, and in February, 11° to 14° below the average.

The distribution of atmospheric pressure was that of high barometer to the north and low barometer to the south, being just the opposite of the normal conditions, and causing consequently strong polar winds.

The effect of the cold on both old and young people was very perceptible in the higher death rate. On March 2nd the weekly returns showed 1,448 deaths from diseases of the respiratory organs against an average of 503.

Frosts in Stevenson's screens 4 feet from ground
— 17 Braemar.
— 13 Esthwaite.
— 8 Bromley and Ketton (Rutland).
— 5 Loughboro.
— 2 Bury St. Edmunds.
— 0·3 *Tenbury, Orleton.
— 0·0 Aberdeen.

*The mean temperature at Orleton of the whole month of February was only 24°.1, or no less than fifteen and a half degrees below the average, and two and a half degrees lower than January, 1881, which previously held the record of the coldest month of recent years.

Frosts in Stevenson's screens	+ 6·0 Aberystwith.
4 feet from ground.	+17·5 Llandudno.
	+21·6 Torquay.
	+ 7·3 London.

The thermometer at one foot below surface was below freezing point from February 11th—23rd, an interval of 13 days.

Ground frozen to depth of 17 inches.

The Greenwich records show the following records of minima below 10° viz.:

Jan. 10th, 1820	0·0	Jan. 5th, 1867	6·6
,, 20th, 1838	—4·0	Dec. 25th, 1879	9·8
,, 8th, 1841	+4·0	Feb. 7th, 1895	9·6
Feb. 11th, 1845	7·7	,, 8th, 1895	6·9
Dec. 25th, 1860	8·0		

No record at Greenwich for 81 years, of four consecutive days with so low a mean temperature as February 6th, 7th, 8th and 9th, 19°, 18·3, 18·9, 18·4.

As regards the effect of the frost on vegetation. It appears to have killed outright almost all the clumps of Pampas Grasses, Wallflowers, Kniphofias or Tritomas, Penstemons, many Standard Roses, Berberis, most of the New Zealand Veronicas, especially the large specimens of Traversi, which had seemed to escape previous hard winters. It killed to the ground Cistus, Rock Roses, Laurustinus, and Escallonia.

Many plants however which seemed much injured are already throwing out vigorous growth from the roots, and at the present time the greatest danger is from the drought which has now continued for two months at Ross; only ·40 in. has fallen in 57 days, which has only once been equalled in my experience, viz., in 1893, but, as the present is six weeks later, the greater heat and sun power render it much more burning. The thunderstorms of yesterday, June 22nd, which caused a fall of 2·20 inches at Worcester in two hours never reached Ross.

SHORT NOTES ON EARTH TEMPERATURES AND BURST WATER PIPES.

By H. Cecil Moore.

Owing to the indisputable fact (see *Frosts of January and February, 1895*, p. 11), of ice being found in mains laid at a depth of more than 3 feet, and their consequent fracture, it was for a time considered by many practical observers that the whole system of water-pipe laying would have to be changed so as to meet the exigency of another similar visitation of severe frost, and that the pipes would have to be relaid at a depth of more than 3 feet from the surface. Fortunately such an expensive outlay for our citizens is no longer imperative.

Observations extending over a twelvemonth, and based upon an accumulation of facts, have given us the following consolatory assurance which has been so forcibly stated on page 136 of *Symons's Monthly Meteorological Magazine* for 1896:—"Looking back over all the thermometric records, we adhere to our original opinion that, at no spot in England, did the natural soil in its normal conditions become frozen at the depth of 2 feet."

The solution of this contradiction may be explained in more than one way:—The turning of the water into ice in pipes at a depth of 3 feet, may have been due to arrested circulation of the water in places where the main has been less than 2 feet from the surface, as is often the case in crossing over bridges: or, the pipes may have got chilled below freezing point by water forced into them at a temperature close to freezing point, thus chilling the soil between the pipes and the surface ground from both above and below; or, from the service pipes and from the fire hydrants having the cold conducted down to the mains, the metallic pipe being an excellent conductor of both heat and cold.

Hence then in extreme frosts it seems necessary to keep the water in circulation:—be careful the Water Committee do not catch you keeping your water tap running!

Remedies for the protection of the hydrants, and the more exposed pipes, must be carefully adopted. All hydrants and valves must be frequently inspected, and kept thawed. Mr. John Slatter, writing from Whitchurch, Oxford, to the *Meteorological Magazine* (1895, p. 75) reports that he suffered no inconvenience from the frost, although the pipe to his pump ran horizontally from the well, in a northern exposure, to a length of 35 feet, and not more than 15 inches below the surface. He attributed his immunity to the fact of his pipe being laid in a homogeneous mass of ashes, a bad conductor of either heat or cold.

The best method, when the mains come near the surface, is that adopted by the Cranleigh Water Company, who suffered no inconvenience during the severe frost. See *Symons's Meteorological Magazine*, 1895, p. 58: "The mains were laid to a depth of 2 feet to the top of the sockets of the pipes, and in the few parts of the system whose it was impracticable to do this, the main was wrapped with felt

or flannel, passed through a larger pipe, and the ends of this made secure." A somewhat similar method has been recently applied over Wye Bridge, Hereford, and in other places where the main is near the ground surface; the main is further protected in a wooden trough.

The frost of January and February, 1895, has received close observation by Mr. R. C. Mossman, F.R.S.E., in his paper "The Frosts of 1895 in Scotland" in Journ. Scot. Met. Soc., in which he shows that, as regards mean temperature, out of 132 years only five Januaries were colder, and only one February, 1855: and that, for the two months, the mean temperature for 1895 (30°1), was the lowest for 132 years.

Woolhope Naturalists' Field Club.

THIRD FIELD MEETING, LADIES' DAY, THURSDAY, JULY 30TH, 1896.

THE GORGE OF THE TEME AT DOWNTON.

WHEN the members on the Ladies' Day visited the Gorge of the Teme at Downton, the carriages from the Feathers' Hotel, Ludlow, conveyed them, by the permission of Lord Windsor, through the private drive of Oakly Park. The best view of Ludlow Castle is to be obtained from this drive along the course of the river Teme. It was observed that some of the Araucarias along parts of this drive had succumbed to the severe frosts of January and February, 1895, and others had severely suffered. On approaching the house after a drive of nearly two miles, some magnificent oak trees were observed. Measurements of the old oak trees are to be found in *Transactions*, 1868, page 151. Of the most ancient oaks, however, there are but few remaining. Mr. Reason, the head-gardener, passed the tape round one nearest the house which, two years ago, had been rent nearly down to its base, its shattered fragment still lying prostrate, and calculated its original girth as 30 feet at five feet from the ground. Conifers flourish and grow rapidly here. The following trees attracted the most attention: a Cedar of Lebanon which had lost a bough in a storm six months ago, a Cedrus atlanticus, an Abies canadensis, douglasii, and a Cedrus grandis (which was estimated to be 130 feet in height), a handsome Sweet Chestnut twelve feet in girth, a fine tall Lime and an Acer. A Wellingtonia of about fifty years' age had attained a lofty growth. In the park the river Onny forms its junction with the Teme. The approach to Bromfield Church from the park is through an avenue of Cypress trees.

The Rev. W. Selwyn, vicar of Bromfield, met the members at the churchyard, and the Rev. W. Gilchrist Clark very kindly explained in detail the architectural features and history of the Church. The earliest portion dates probably from the foundation of the adjacent Priory in 1158. The present tower and the Early English aisle date from the 13th century. Alterations were made in the 14th century. From dates cut in the handsome oak roof of the nave it appears to have been built in 1577, and renewed in 1658. The elaborate painting on the ceiling of the chancel, the colours of which are remarkably well preserved, was executed by John Francis in 1672. Other beautiful works of art are a lofty carved oak Triptych occupying the east end of the chancel, an elaborately worked altar cloth, and the west window of the nave. The massive oak lich gate at the western entrance to the churchyard was erected by his widow in memory of G. A. Selwyn, Bishop of New Zealand, and afterwards of Lichfield.

Resuming their seats in the carriages, the party drove to Downton Castle, and, alighting, made their way down the hill to cross the Teme over Downton Bridge. The "Downton Walks" were open to the members to-day by special permission from Mr. A. R. Boughton Knight. This beautiful Gorge of the Teme in Herefordshire has been frequently visited by older members of the Club, and was favoured by our mycologists in their Fungus forays. For measurements of the finest trees, see *Transactions* 1868, page 152. For an account of Bringewood Forest and Furnace, written by Dr. Bull, see *Transactions* 1869, page 54, and for the description of the Gorge from Downton Bridge to Hay Mill, see page 61 of the same volume. Other references to this locality are to be found in *Transactions* 1879, page 174; 1884, page 178; 1889, page 379, &c.

The little more than a mile of the "Downton Walks" from the Castle bridge to the Bow bridge is exquisitely charming. The walks are private, but are, on specified days, open to the public, who unfortunately have not honestly appreciated the indulgence; ferns and other plants which formerly existed here have been exterminated. Entering by the wicket on the left bank, close to the Castle bridge, the visitor finds himself on the walks originally designed by Mr. Richard Payne Knight, (a grandson of the great iron-master Richard Knight), who completed the building of Downton Castle in 1778. These walks bear witness to the taste for natural scenery which he taught in a Poem of three books published in 1794 under the title of "The Landscape," addressed to his friend and neighbour, Mr. Uvedale Price, of Foxley, near Weobley, who had in the same year published his "Essays on the Picturesque." In his poems he shows his great objection to formal rules in landscape gardening, as laid down and practised by his predecessors Humphrey Ripton, and "Capability Brown."

At a short distance from the entrance the walk penetrates a cavern of considerable size in the rocks, beyond which the river suddenly bursts upon one in picturesque beauty, in contrast to its aspect below the bridge, by flowing through a more narrow channel confined within rocky banks, a variety of trees and irregular varying outlines adding fresh charm to the picture. A rustic building, an open moss house, is situated about half-a-mile further up the stream, and close by is a mill called the "Hay Mill," a very favourite spot for painters. A rustic footbridge is constructed over the river below the mill, and in order to get the best picture of the mill and the weir above it, the visitor should cross the bridge and proceed up the opposite bank for a few yards.

Still proceeding up the stream from Hay Mill, the walk leaves the river for awhile, to return to it again, and cross it over a bridge of one arch, styled the "Bow bridge," whence a lane conducts to the village of "Downton-on-the-Rock."

The walk may be extended up stream under the precipitous rock near Bow bridge so far as the main road, where carriages, previously discharged near Downton Castle, may be conveniently met and re-entered for return to Ludlow through Burrington and Aston.

The seven miles drive to Ludlow over Burrington Bridge, crossing the celebrated Leintwardine fishery, thence along the valley of the denuded anticlinal between Gatley Long Coppice and the fir trees on Bringewood Chase, which

anticlinal is exhibited in the section accompanying Mr. Moore's paper on the Geology of Aymestrey, through Aston, to an elevation of 906 feet at Gorsty, revealed in the clear atmosphere a charming picture of Herefordshire scenery, with the wooded heights of Juniper Hill and the High Vinnals, over 1,000 feet on the right; a picture varied by the descent through Mary Knoll wood over the Shropshire boundary into Ludlow. The acreage of woodland has been extended during the lifetime of Mr. Boughton Knight, who has, so we were informed, planted as many as six million trees.

The Ordnance maps, on the scale of six inches to one mile, for this district are: Herefordshire 2 N.E., 2 S.E., 3 N.E., 3 N.W., 3 S.E., and 3 S.W.; on the scale of one inch to one mile, new series, Sheet 181; and for Geology consult No. 55 N.W.

The following attended:—Members: Mr. H. Cecil Moore (President), the Hon. and Very Rev. James Leigh, D.D., Dean of Hereford, Sir Herbert Croft, Count Lubienski-Bodenham, Deputy-Surgeon General W. Perry, Rev. J. Barker, Mr. A. E. Boycott, Rev. W. S. Clarke, Mr. Trueman J. Cooke, Dr. Alfred J. H. Crespi, Mr. Luther Davis, Mr. Edward Du Buisson, Mr. Charles Fortey, Mr. G. H. Hadfield, Rev. C. S. Hagreen, Dr. Benjamin Hall, Dr. John W. Hinings, Mr. F. R. Kempson, Mr. John Lambe, Mr. Richard Lewis, Rev. F. O. Philpotts, Mr. Scudamore Powell, Mr. J. Probert, Mr. H. G. Sugden, Mr. J. P. Sugden, Mr. Alfred Watkins, and Mr. James Pilley, Assistant Secretary. Visitors:—Ladies: Mrs. Auchmuty, Miss Auchmuty, Miss Baker, Miss J. Barker, Miss Blackmore, Miss M. Boycott, Mrs. Britten, Miss Britten, the Misses Carless (two), Miss Chapman, Miss Davis (Lincolnshire), Miss A. Davis (Malvern), Miss Monica Durrant, Miss Friend, Mrs. Hagreen, Mrs. Hall, Miss Hargreaves, Mrs. Herbert, Mrs. Hinings, Miss Hinings, Miss Jacob, Miss Frederica Jones, Mrs. W. C. Lloyd, Miss Derham Marshall, Mrs. H. C. Moore, Miss Morris, Mrs. Perry, Mrs. Philpott, Mrs. S. Powell, Mrs. Probert, Miss Schaap (Holland), the Misses Shaw (two), Mrs. Hatton G. Sugden, Miss Walther (Germany), Mrs. Alfred Watkins; and Gentlemen: Colonel Pulley (Commanding the 3rd Ghoorkas), Messrs. Auchmuty, W. C. Blake, W. R. Diamond, Lacon Lambe, Derham Marshall, C. Morrison, and H. E. Wood.

The following notes were contributed on

DOWNTON CASTLE AND THE VALLEY OF THE TEME.

By the Rev. Joseph Barker, Vicar of Eardisland.

The site of Downton Castle may be truly called one of the most picturesque in England. Standing upon a terrace on the north side of the river Teme, the mansion, somewhat in the resemblance of an ancient castle, is elevated about one hundred feet above that river, towards which the ground gradually falls. It was built in 1774 by Mr. Richard Payne Knight, M.P. for Ludlow and author of "The Landscape," a poem; "The Progress of Civil Society," a didactic poem, in six books; and "An Analytical Inquiry into the Principles of Taste." Of the mansion, in this latter work, Mr. Knight takes the following notice: "It is now more than thirty years since the author of this enquiry ventured to build a house ornamented with what are called Gothic towers and battlements without, and with Grecian ceilings, columns, and entablatures within; and though his example has not been much followed, he has every reason to congratulate himself upon the success of the experiment; he having at once the advantage of a picturesque object, and of an elegant and convenient dwelling; though less perfect in both respects than if he had executed it at a maturer age."

After Mr. Knight quitted his mansion in 1810 to reside in a cottage in another part of the grounds, it was occupied by his brother, Mr. Thomas Andrew Knight, author of a "Treatise on the Culture of the Apple and Pear, and on the manufacture of Cider and Perry;" also of several ingenious communications to the President of the Royal Society on the principles of vegetation. Of this Mr. Thomas Andrew Knight, as most members of our Woolhope Club well know, there is a most interesting memoir in the first part of *The Herefordshire Pomona*. He was born at Wormesley Grange, and spent, with his brother, nine years his senior, the earlier years of his life in the retired seclusion of that part of Herefordshire. He was one of the original members of the Herefordshire Agricultural Society, and edited the *Pomona Herefordensis* containing coloured engravings of the old cider and perry fruits of the county, "with such new fruits as have been found to possess superior excellence." This was published in 1816, and copies now can be rarely met with. Mr. Thomas Andrew Knight became "President of the Royal Horticultural Society of London," and honorary member of many other societies in Great Britain and other countries, and after a most useful and active life he died in 1838, and was buried on the south-west side of Wormesley Church, not far from his early home.

The grounds of Downton are said to be a happy exemplification of the ideas contained in "The Landscape," and in an article in the *Gentleman's Magazine* (1797, Part I., pp. 473—475) the writer tells us, "Nature has done that which he (Mr. Knight) has not suffered the hand of art to spoil. The ground falls rapidly from the house into a beautiful little valley, at the bottom of which

is a wild and impetuous stream, and immediately from the opposite bank rises the hill again, clad with rich wood in a variety of shapes to its very summit, and opening at parts into rude sheep-walks, the whole formed out of a waste which formerly went by the name of Bringwood Chase."

In a note we are told that Sir Robert Harley was, July 16th, 1604, made Forester of Boringwood, *alias* Bringwood, Forest, with the office of the Parkership and custody of the forest or chace of Prestwood for life. Sir Robert was born at Wigmore Castle, 1579.

The walks at Downton from the stone bridge, known as the Downton bridge, below the Castle by the river Teme, which comes out of Radnorshire, to the Alpine bridge and mill at the other end of the gorge, for about a mile, are most wild, rich, and charming. The ground rises from each side of the stream in very various and irregular forms; and it is everywhere clothed with brushwood and timber; and the river, having a considerable descent and being confined within a narrow course, ripples over a succession of low falls. The scenery indeed combines great variety, and is all of the picturesque kind. These grounds are neither adorned with urns, obelisks, temples, nor inscriptions; a rocky cave, a grot, and a bath, with benches and seats, disposed in places where you are invited to rest and examine the surrounding scenery, are almost all that can be enumerated in which the hand of art has intermeddled; yet they will not fail to surprise and enchant the lover of inartificial landscape. "To his mind," said the editor of the *Cambrian Traveller's Guide*, "which improved these delightful scenes, may they long afford enjoyment, and then even as himself has wished"—

> "Here, on thy shady banks, pellucid Teme,
> May Heaven bestow its last poetic dream;
> Here may these oaks, in life's last glimmer, shed
> Their sober shadows o'er his drooping head,
> And those fair Dryads whom he sung to save,
> Reward their poet with a peaceful grave."

Gleanings in this paper are from an article in the *Gentleman's Magazine*, 1797, Part I., and from the *Cambrian Traveller's Guide*, 1813.

MOLLUSCA.

The following notice of Mollusca found in the Gorge at Downton is contributed by Mr. A. E. Boycott:—

Hyalina cellaria
,, *nitidula.*
,, *pura.*
,, *crystallina.*
Patula (Helix) rotundata.
Fruticicola (Helix) hispida.
Tachea (Helix) nemoralis (with varieties *castanea* and *rubella*).
Tachea (Helix) hortensis.
Arianta (Helix) arbustorum.
Clausilia perversa (rugosa).

And in the river in the Gorge:—

Ancylus fluviatilis.
Limnæa peregra.

Moorhens were of course abundant, and just below the Bow Bridge I put up six wild ducks.

At Wigmore Castle on my way, I saw one *Lycaena argiolus;* it is early for the second brood of this butterfly.

ARTHUR E. BOYCOTT.

Mr. W. C. Blake found a nest of the Dipper or Water Ouzel. He also exhibited an egg of the Chaffinch, the only one found in the nest. The colouring was of the normal type, with bolder markings than are usually found on eggs of this species. The small size was abnormal, not being larger than a marrow pea, and the egg was abnormal in shape, being nearly round.

Mr. James Pilley saw the Gray Wagtail, a more rare bird than the Pied or Common Wagtail.

The party became so scattered over the grounds that no opportunity was afforded of reading a paper on "Lundy Island," by Dr. Crespi.

Woolhope Naturalists' Field Club.

FOURTH FIELD MEETING, FRIDAY, AUGUST 28TH, 1896.

DROITWICH.

The programme of the Fourth Field Meeting of this year on last Friday attracted a large company of members and their friends to Droitwich to learn something of its salt springs, baths, and geology. The members were met at Droitwich railway station by Mr. Frederick Smith, who conducted them over the largest and oldest Works in the town in the hands of the Salt Union, Limited; and Mr. John Humphreys, from Birmingham, had actually made this opportunity (how it was achieved by a man so occupied in professional engagements is a problem too intricate to solve here,) of giving the members the benefit of his observations on the Botany and Geology of the locality, for which they will long feel grateful. Before they had left the platform he showed a plant of *Hyoscyamus*, and in a few minutes' walk had taken them to the river Salwarpe to display upon its banks a luxurious growth of *Lepidium latifolium*, a salt-loving plant, and *Atriplex rosea*. In a paper which he read after luncheon, he enumerated a host of sea-shore and salt-marsh plants growing here in the centre of England.

Time did not permit a visit to the Pumps where the brine is pumped up from the deep brine pits which underlie the lower and older parts of the town; their general position and course is soon learnt by the visitor above ground from the loss of perpendicularity in various buildings and in parts of the same buildings, and a conversation with some of the older residents will elicit that there are localities where the subsidence of the ground has reached eight or ten feet in their lifetime, and if the visitor will ascend in company with a native to the churchyard of Dodderhill, only ten minutes' walk from the centre of Droitwich, he will see advantageously the plan of the subsidences of ground, cracked walls and saddled roofs.

The brine is pumped up from a depth of 140 to 200 feet by powerful steam-engines. If these are allowed to rest for 48 hours, the brine makes its way to the surface. The temperature of the brine when pumped is 60° Fahr.; its density is 1,250, and it contains upwards of 22,000 grains of solid matter in each gallon, or about 5½ ounces in every pint. 100 lbs. of brine yields 27 lbs. of salt.

Upon arrival at the Works, attention was first directed to the Reservoir, where a large supply of brine is kept in reserve for contingencies. Mr. Smith here explained its composition, and exhibited specimens of Rock Salt from Stoke Prior, four miles north of Droitwich. Some of these were as transparent as crystal, others were more or less red coloured in proportion to the admixture of

iron protoxide. Crystallised salt specimens were also shown of various sizes in accordance with the duration of the process of cooling after the brine had been boiled in vats; the more gradual the process, the larger would be the crystals. If the evaporation was rapid fine crystals were produced, as in table-salt. The boiling point of brine is 226° Fahr. The finest salt, *i.e.* when the evaporation is most speedy and the temperature highest, is drawn from the pans two or three times in twenty-four hours. When the temperature is very low, it may take ten days or more for the crystallization to be effected. Each crystal appears in the form of a quadrangular pyramid, varying according to the heat used for the evaporation. As the salt crystallizes in the pans it sinks to the bottom, from which it is removed and shovelled into wooden moulds, whence it issues, when cool, in the pillar-form familiar to us.

Mr. Smith conducted the party, explaining to them every detail as they visited the large shallow pans where the brine is boiled over huge furnaces, assisted in some instances by the economical employment of steam, to its preparations as salt in moulds for domestic purposes, and in other forms for curing, and for agricultural purposes. Salt is said to be used with much advantage as manure for our grain crops. It is also said to improve the potato crop and to secure it from disease. About 200,000 tons of crushed rock salt are used annually in the kingdom for agricultural purposes. "Pan-scale," or "picking," the incrustation upon the pans left after boiling, when ground into powder, is recommended to graziers as a dressing upon light sandy soils.*

The statement printed in the programme that the brine at Droitwich was ten times stronger than ordinary sea water gave rise to much questioning; it was discredited, and was considered an impossibility. The President was supplied with the following table of analyses of various saline waters which prove this remarkable fact, and only render it the more astonishing that so many persons should travel to foreign lands to obtain relief for their muscular and nervous pains and infirmities by baths in saline waters, when they possess mineral waters at home, whose constituents are far more potent in medicinal virtues. An inspection of the table will also show that traces of Iodide and Bromide Salts have been found by at least two analytical chemists.

The following

ANALYSIS OF THE PRINCIPAL SPRINGS

of a kindred nature to those at Droitwich, made by the most eminent chemists of the day, shows that the Droitwich brine is from ten to twelve times stronger than the ocean, and it contains in every gallon 20,000 grains of saline constituents in excess of that possessed by any other known waters, and from these facts an estimate may be formed of the powerful, and curative properties of the Droitwich brine.

*For the special uses of salt for agricultural purposes, and the approximate quantity to be used per acre for the various crops, application must be made to The Agricultural Department, Salt Union, Limited, Winsford. Rules are given adapted to the condition of the soil, the seasons, and the nature of the crops. The proportion of dressing varies from 3 cwt. to 12 cwt. per acre. Several applications, in moderate quantities, give better results in most cases than a heavy application at one time.

COMPARATIVE ANALYSIS GIVING THE AMOUNT OF SOLID CONSTITUENTS

contained in an imperial gallon of water in each of the following springs, showing that the Droitwich spring contains, within a fraction, 20,000 grains of solid constituents over and above the largest quantity of saline matter contained in each gallon of water from the other European mineral springs:—

	Chloride of Sodium.	Chloride of Potassium.	Chloride of Magnesium.	Chloride of Calcium.	Carbonate of Lime.	Carbonate of Magnesia.	Carbonate of Iron.	Carbonate of Soda.	Sulphate of Lime.	Sulphate of Alumina.	Sulphate of Soda.	Sulphate of Magnesia.	Bromide of Magnesia.	Silicate of Soda.	Iodide of Sodium.	Protoxide of Iron.	Total Salts to an Imp. Gallon.
Droitwich, by Herapath	21761.872	...	2.560	...	...	...	...	...	91.120	14.400	342.720	...	...	...	.208	...	22212.880
,, Horner	21585.5	...	16.8	...	...	...	...	...	363.7	...	407.0	...	...	...	...	...	22373.0
,, Daubeny	16910.	...	...	...	...	...	...	...	...	...	402.5	...	...	...	...	...	17312.5
,, Northcote	19392.570	...	...	...	...	33.501	...	115.123	307.282	...	309.097	...	Trace	...	...	Trace	20157.573
,, D. T. Taylor	21509.77	...	101.22	...	...	...	...	...	302.15	...	319.50	...	Trace	1.36	Trace	...	22234.000
Buxton—Dr. Lyon Playfair	2.420	2.500	.114	7.773	4.543	...	...	5.801	2.323	.240	...	...	...	...	...	.198	20.579
Bath—Sir C. Scudamore	...	...	16.000	...	...	...	...	...	95.00	...	9.000	...	...	...	...	...	140.000
Cheltenham—Dr. Faraday.	970.00	...	...	12.000	16.00	...	...	...	145.00	...	37.00	124.00	...	...	...	...	1292.000
Harrogate (West)	...	...	17.75	16.75	...	...	...	11.	...	...	6.50	...	...	...	...	...	288.
Leamington (West)	.236	...	32.660	205.610	...	...	...	...	...	...	403.980	...	...	...	...	...	1059.950
Scarboro'—Dr. Thompson.	407.700	...	3.880	...	9.970	...	...	...	147.120	...	...	22.410	...	...	...	...	209.740
Mount D'Or—Lee	25.360	...	...	...	24.150	8.220	...	35.00	...	6.820	8.500	...	...	...	...	.170	114.360
Carlsbad—Berzelius	25.720	...	...	...	100.500	...	.278	96.950	...	...	198.690	...	...	...	...	...	496.071
Marienbad—Berzelius	79.750	...	...	...	36.860	25.480	1.650	96.160	...	...	350.730	...	...	...	...	...	649.750
Baden—Loweg	127.160	...	...	...	...	...	...	...	100.000	...	25.000	25.550	...	...	...	...	340.000
Ischl—Lee	130.000	...	...	...	...	...	...	...	...	...	...	66.700	...	...	...	...	2368.000
Kissengen—West	2223.000	...	71.100	7.800	...	...	...	6.4	...	...	19.9	...	...	...	...	...	884.
Sea Water (Channel)	645.6	...	34.3	174.7	...	...	...	...	...	...	...	...	...	...	...	...	
Schweitzer	1946.029	55.089	263.651	...	2.372	165.123	...	...	101.116	...	...	2.085	...	...	...	...	2536.000

The St. Andrew's Brine Baths were visited. Here there is accommodation in separate private baths for 22 men and 22 women. The warm and hot baths are given at a temperature varying from 90° to 106° Fahr., or, under medical supervision, with caution and judgment of the attendant, at a temperature as high as 110°. The swimming bath of pure brine, only diluted by the steam required to heat it to a temperature of 80°, is 85 feet long, 37 feet broad, with a depth varying from 3½ feet at shallow water to six feet at the deepest end. The human body cannot sink in a water of this density. Cautions are given not to put the head under water because its pungency may produce such irritation of the nostrils and eyes as to produce sneezing as severe as from an attack of influenza. The transparency of the brine was exhibited in a glass tumbler, and the information was given that it would act as an emetic if swallowed. The first baths were opened to the public in 1836.

The Town possesses a Cottage Hospital, an accommodation long and anxiously demanded, to which admission is obtained by subscribers' tickets, every subscription of one guinea entitling a patient to lodgings, baths, and medical attendance (not including board) for two weeks, the board being provided by the matron at a charge of 10s. 6d. per week. It was opened in 1892.

Salt-baths are beneficial to sufferers from ailments of either a rheumatic or gouty origin, and more especially that anomalous form known as "rheumatic gout." In an address delivered by Dr. S. S. Roden, of Droitwich, at the Jubilee Meeting of the British Medical Association at Worcester in August, 1882 (see *Brit. Medical Journal*, November 18th, 1882), he writes :—"In all the stages of rheumatic gout, the disease appears to derive benefit from the brine ; in its early and even most acute stages, it yields very speedily to the baths, and even in its most chronic forms, when all possibility of cure has passed away, great relief and comfort is experienced, the benefit continuing for months. After rheumatic gout comes rheumatism, in all its forms, except, perhaps, the most acute, or where the temperature exceeds 100° Fahr., or where acute cardiac or pericardiac mischief is present. The different forms of rheumatic neuralgia, sciatica, lumbago, etc., and of chronic gout, gouty thickenings, all respond readily to the influence of the hot brine. I must not omit to notice the surprising rapidity with which large dropsical swellings of joints, thecal and bursal distensions, will often diminish and disappear ; and even, not unfrequently, those distressing contractions of the hands and fingers, and of the knees and larger joints, yield to its influence, provided the distortion has not been of too long standing."

The Salters' Hall, one of the many munificent gifts of Mr. John Corbett, capable of holding 1,500 persons, used as an assembly room for entertainments, with separate quarters for a reading room, was inspected. It stands in the centre of the town close to The Raven, the old Manor house, a good specimen of gable timber framed architecture, converted into an excellent hotel, where the members and their visitors sat down to lunch about forty in number.

After luncheon the following papers were read and discussed :—"The Geology and Botany of the Droitwich District," by Mr. John Humphreys, F.L.S. ; "Droitwich and its Salt Springs," by Dr. Crespi ; "The Geology of Colwall

District, with notes of discovery of brine in the parish," by Mr. Edward Conder ; and "Contributions towards a Fauna of Herefordshire—Mollusca," by Mr. Arthur E. Boycott.

When the papers and the consequent discussion were concluded, the members adjourned, by invitation, to Impney, to visit the grounds and residence of Mr. John Corbett, where, in his absence, they were hospitably received by Miss Dungey, who pointed out many of the rare and valuable art treasures and pictures. Impney was in the family of the Corbetts in the reign of Edward I. The present mansion, erected 1869—80, is of dressed red brick and Bath stone in the castellated style of the period of Francis 1st and Lewis 13th from designs of M. Troquois, of Paris, and R. Phene Spiers, F.R.I.B.A. The river Salwarpe flows through his beautifully laid out grounds of nearly 200 acres in extent, which are generously open to the public every Wednesday afternoon.

It was pleasing to view again "the Reading Girl," the marble statue which caused such attraction when in the Exhibition of 1862, and has now found a resting place within the walls of Impney. Amongst the numerous paintings were valuable pictures by Titian, Rembrandt, Holbein, Van Dyck, Cooper, Herring, Frith, Turner, Gainsborough, Sir Joshua Reynolds, and others.

The following were present :—The President, Mr. H. Cecil Moore ; Members, Count Lubienski-Bodenham, Captain R. H. de Winton, Dr. T. A. Chapman, and Dr. A. Crespi, Revs. J. Barker, Preb. W. Elliot, E. R. Firmstone, E. J. Holloway, H. B. D. Marshall, H. North, and R. Wood ; and Messrs. J. Edy Ballard, C. J. Blathwayt, Arthur E. Boycott, J. Carless, Luther Davis, Gilbert Davies, C. Hardwick, J. Lambe, H. J. Marshall, H. Southall, J. P. Sugden, F. R. Wegg-Prosser, and Mr. James B. Pilley, Assistant Secretary, with the following visitors : Mr. John Corbett, whose business engagements only permitted him to arrive in time to see the guests, who had been so hospitably received at his mansion at Impney by Miss Dungey ; Messrs. D. W. Bishop, F. L. Blathwayt, Rev. F. C. Cardew, H. J. Davies, W. Davis, F.R.G.S., from Malvern, T. Gilbert, John Humphreys, F.L.S., Rev. H. Kingsford, of Shoulton, Hon. Sec. of the Worcester Archæological Society, James Nott, R. S. Patterson, and Frederick Smith, of Droitwich. Mr. John Green, of the estate office, Impney, was unfortunately prevented by an accident from being a guest of the Club.

NOTES ON THE GEOLOGY AND BOTANY OF THE NEIGHBOURHOOD OF DROITWICH.

By John Humphreys, F.L.S.

The town of Droitwich is situated upon the upper division of the Trias called Keuper Marl. In examining a geological map of England, we shall find a long strip coloured red, extending from Sunderland in the north to Exmouth in the south, running directly through the heart of England, including the greater part of Worcestershire, Warwickshire, Staffordshire, Cheshire, and Lancashire. This geological formation is termed "The Trias," or New Red Sandstone. It consists principally of sandstone varying from dark red to white, pebble beds, and red marl. The greater part of the county of Worcester is covered with its deposits, stretching from the Lickey southwards in one continuous sheet, hemmed in on the west by the palæozoic rocks of the Malvern Hills. The south-east of the county is occupied by the Lias, which obtrudes itself like a wedge at Hanbury, and again south and east of Droitwich, embracing the town on two sides. The northern boundary is formed by the Lickey and Clent Hills, and it may be interesting perhaps to mention that in a limited space on the Lickey we have represented formations of Archæan, Cambrian, Silurian, Carboniferous, and Permian ages.

Archæan rocks crop out in the bed of the stream at Barnt Green; the Bilberry and Rednal Hills are adjudged by Professor Lapworth to be of Cambrian age. Llandovery rocks appear near the Asylum at Rubery, and in the woods to the right of the Monument near Kendal End is a patch of Woolhope Limestone. Coal measures occur at Rubery, and the Beacon and Clent Hills represent rocks of Permian character. Thus within an easy walk may be noticed, as perhaps nowhere else in England, rocks of such various ages.

The Trias derives its name from being formed of three divisions, the middle beds being absent in England. They are Bunter, Muschelkalk, and Keuper. The Bunter, or lower beds, are composed of soft red sandstone and quartz conglomerate. The Keuper, or upper beds, are made up of white sandstone and red marl, and red marl and thin bands of white sandstone with rock salt. Many have been the theories for the formation of the Trias, and it is quite evident, from the variety of its deposits, that the New Red must have been formed through countless ages, under most diversified climatic and local conditions. There is little doubt that the Bunter rocks were formed in a huge fresh water lake, extending from Warsaw in the east to western England (for at that time Great Britain was united to the Continent by a continuous stretch of land), and from Sweden to Central France, a lake some 2,000 miles in length. Mighty rivers rolled down their contributions of pebbles, gravel, sand, and mud, from the erosion (probably by glaciers), of mountains, whose very roots have ceased to exist. These were distributed over the floor of the lake, as

the Rhone distributes the moraine rubbish and glacial mud on the bed of the Lake of Geneva. We have pebble beds several hundred feet thick on the upper slopes of the Lickey, some of great size representative of the Bunter division. The Keuper sandstone lies underneath and to the south of the town of Bromsgrove. It consists of fine white or reddish sandstone, which is extensively quarried for building purposes at Rock Hill and Hill Top. Keuper Marl, which varies in thickness from 500 to 2,000 feet, stretches from the summit of Rock Hill over the south of the county, and is well exhibited in road cuttings near Droitwich, and in the Midland Railway cutting at Worcester, on the city side of the tunnel; and it is in this division that the rock salt and brine springs occur.

The great Triassic lake, from successive deposits through countless ages, became partly filled up; and whereas in the Bunter period there is evidence of a moist climate prevailing, in the Keuper an arid climate prevailed, so that the rivers ceased to flow, and the waters began to dry up from excessive evaporation. The remaining waters in the deeper portions of the lake became saturated with mineral salts contributed by glacier, river, and stream, and when supersaturated the salts were deposited on the floor of the lake as rock salt and gypsum. Thus the lake, which in Bunter times was fresh, in course of ages, from climatic and other conditions, became converted into a salt lake. We have the same conditions prevailing at present in the district of the Caspian, and in the Great Salt Lake of America; wherever in fact a lake has no outlet, and where the evaporation is greater than the supply of water. One great reason for supposing that the Droitwich salt was not a marine deposit, is the almost entire absence of the salts of magnesia, which are invariably present in sea water, and also of iodine and bromine.

Sir Charles Hastings, in a very exhaustive paper on "Droitwich and its Brine Springs," gives the result of boring at Droitwich to the strong brine as follows:—Stratum of mould, 3 feet; red marl, 40 feet, which abounds with brackish water; marl, 130 feet. This marl is quite dry, but penetrated with perpendicular veins of gypsum. Then we come to strong brine ten feet deep, and the rock salt is underneath this river of brine. The native brine is beautifully transparent, and contains 26 per cent. of pure salt, while sea water contains only 2 per cent. Near the Salwarpe, on its southern bank, the same authority declares that the water in the wells at a depth of 12 feet is quite brackish from the presence of salt. The deposits of rock salt are of immense thickness; in Cheshire, 42 yards below the surface, there is a bed 26 yards thick, separated by ten yards of rock from another bed 40 yards in depth. These are insignificant compared with the salt mines in Poland and Hungary, and Cardova, the mountain of rock salt in Spain, six hundred feet in height. It is usually more or less red-coloured owing to the presence of iron, although I understand that the Stoke rock salt is as clear as crystal. Brine is met with at Droitwich at a depth of 170 feet, while at Stoke Prior it is 330 feet. Mr. John Corbett has sunk four wells at the latter place, which have been bored to a depth of 1,000 feet, at a cost of £100,000, producing a practically inexhaustible supply of brine. The brine is supposed to be formed by running water dissolving the salt from the surface of

the rock salt to the point of saturation. Knowing that Dr. Crespi intends reading a paper to-day on "The Droitwich Salt Springs," I refrain from going into further particulars.

FOSSILS.

The fossils of the New Red Sandstone are comparatively few; it cannot boast of the abundance of life of the Old Red Sandstone, as revealed in your Ledbury beds, and by Hugh Miller in Cromarty,—those strange buckler-plated fish with their oar-like propellers. A singular fish, *Dipteronotus cyphus*, has been discovered in quarries at Rock Hill, Bromsgrove, with remains of plants in an unrecognisable condition; in other parts of the Keuper Marl reptilian remains, in the shape of bones and teeth of land lizards and crocodiles, have been found. The Bunter beds on the continent, near Strasburg, have given remains of ferns, calamites, cycads, and coniferæ, indicating the plant life of the period. But I would like to draw your attention to two fossils of peculiar interest. The first is the Labyrinthodon, whose extensive remains have been found in England and the continent in Triassic measures. The Labyrinthodon was a huge Batrachian, a monstrous toad-like creature, which has left not only its bones and teeth, but also the imprint of its feet petrified in the hardened mud, as distinctly as on the day it dragged its ugly carcase over the soft mud on the borders of the lake. In the neighbourhood of Warwick have been exposed very fine impressions in the Keuper sandstone, the hind foot measuring 8 inches in length and 5 in breadth, and the fore foot 4 inches long and 3 wide. Both jaws were armed with formidable conical teeth. At Watchet, in Somersetshire, on the southern borders of the lake, have been discovered the remains of a small animal about the size of a mouse, described as a Marsupial by Sir Richard Owen, and named the *Microlestes*. This has the proud distinction of being the oldest warm-blooded animal at present known to science which has inhabited this planet. The pattern of its teeth is peculiar, with wide shallow crowns, surrounded with low cusps of enamel. There is only one animal now alive which possesses a tooth of a similar pattern, the *Ornithorhyncus platypus*, or Duck-mole of Australia, a singular creature with a bill like a duck, webbed feet, and body covered with warm fur. It lives an amphibious life, subsisting on aquatic vegetation, grubs and beetles. In natural history it has a class assigned to itself, being, with the Echidna, the only representative of the Monotremata. The female lays eggs about the size of a pigeon's egg, which are protected by a tough parchment-like covering, and this, with the internal structure, indicates its reptilian affinity. It is a veritable link between reptiles and mammals.

It would almost appear that in the singular Platypus we see,—probably but little altered during the millions of years which have elapsed since Triassic times —an almost direct descendant of the Microlestes; for isolated as Australia was in early geological time, it escaped to a great extent the fierce struggle for the survival of the fittest of the older continents, and life has never developed there beyond Marsupials.

The Trias will ever be memorable for the commencement of the mighty change in the order of life; side by side with the clumsy and horrid Labyrinthodon appeared the tiny Microlestes, with its small body and larger brain; henceforward the battle would rage between the mammal with its specialised brain, and the reptile with its gigantic body; and geological history has recorded how, though the air, the land, and the water, were peopled with reptiles of greater size and development, through the Trias, the Oolite, and the Chalk, yet the small mammals ever increased in variety and number until, when the great Chalk Ocean receded, and the Eocene period dawned, the age of reptiles had passed away, and the tide of mammalian life had set in, differentiated into the forms of the present day.

MARINE PLANTS OF DROITWICH AND DISTRICT.

Anyone who has collected the flora of central Worcestershire must have been impressed with the presence of the numerous marine plants growing in the heart of England, so many miles distant from the sea coast. It is now generally admitted by geologists that in comparatively recent geological times Wales was separated from England by a shallow marine strait, which occupied to a great extent the valley of the Severn, and as its waters washed the foot of the Malvern Hills, Sir R. Murchison designated it the Straits of Malvern. There is evidence of its presence all down the Severn Valley in the terraces of gravel on each side of the river, at a considerable height above the present bed, and in the erosion of the Red Sandstone Cliffs at Bridgnorth, and also below Stourport. As the land became elevated the sea gradually receded, leaving the valley occupied by a marine estuary, which has left traces behind, not only in sand and gravel and pebbles, but also in accumulations of broken shells. The late Edwin Lees states that the sandpit at Northwick, near Worcester, abounds with fragments of broken-up shells, in almost as great quantities as at Weston-super-Mare, or on the sands at Tenby. As the land rose farther salt marshes occupied the ground lately covered by the sea all down the banks of the Severn, wherein flourished all the salt-loving plants, and though the marshes have been drained for cultivation we still have surviving in the county marine plants which tell the story of the Malvern Straits and Estuarine period. On the sand dunes of Hartlebury Common we still find Buck's horn plantain, *Plantago coronopus*, *Erodium maritimum*, Sea Storks-bill, *Erodium cicutarium*, Hemlock leaved Storks-bill, and Naked stalked Teesdalia, *Teesdalia nudicaulis*. Edwin Lees, in his Botany of Worcestershire, mentions many marine plants growing in the Severn Valley, which have survived since the estuary receded:—Sea Stork's Bill, *Erodium maritimum* at Hartlebury Common, Habberley Valley, and Trimpley Green, near Kidderminster. Burnet Rose, *Rosa spinosissima*, on sandy soil near Kidderminster; narrow leaved Hare's Ear, *Bupleurum tenuissimum*, on Welland Common; Callous fruited Dropwort, *Œnanthe pimpinelloides* at Powick; Lachenal's Parsley, Water Dropwort, *Œnanthe Lachenalii*, Defford Common, and Welland and Longdon marshes; Salt-Marsh Brookweed, *Samolus*

Valerandi, Defford and Fladbury; Sea-Dock, *Rumex-maritimus*, Longdon Marshes and Severn, near Worcester; Salt Marsh Club Rush, *Scirpus maritimus*, Longdon marshes; Shore weed, *Littorella lacustris*, Longdon marshes. But the river Salwarpe and Droitwich Canal below the town are exceedingly rich in marine specimens, where they flourish in the salt water discharged into the river and canal from the Saltworks: the following are mentioned by the same authority:—Salt Marsh Club Rush, *Scirpus maritimus;* Reflexed Meadow Grass, *Poa distans;* Broad-leaved Pepperwort, *Lepidium latifolium;* Narrow-leaved Pepperwort, *Lepidium ruderale;* Wild Celery, *Apium graveolens;* Saltwort, *Glaux maritima;* Sea Orache, *Atriplex rosea;* Sea Sandwort, *Spergularia marina.* I have found *Lepidium ruderale* at Tardebigg, eight miles nearer Birmingham, on the side of the Canal, the seeds doubtless having been carried thither by passing boats.

Section of Geological Strata at STOKE PRIOR.

Brown and a little Green Marl.

50ft.

First Hard Green Marlstone, 50ft. 6in. with water below it.

Marl.

170ft. 6in.

Second Hard Green Marlstone 172ft. with water below it.

Marl with perpendicular veins of Gypsum.

Brown Red and Green Marl with veins of Rock Salt.

330ft.

First Bed of Rock Salt mixed with Marl, 330ft. 6in.
Brown Marl with Seams of Rock Salt, 334ft.
Rock Salt nearly Red cont. 25per cent. Marl, 344ft.
Green Marl, 345ft. 6in.

Red Marl with veins of Rock Salt, 358ft.

Rock Salt with 25 per cent. Marl. 365ft.
Red Marl with veins of Red Rock Salt, 367ft. 6in.

Red Rock Salt with from 7 to 20 per cent. Marl.

Red Marl with flesh coloured Rock Salt.

430ft. 6in.

Rock Salt with from 7 to 20 per cent. of Marl proved 30ft. but not passed through.

460ft. 6in.

450ft. 6in. 46 pp.

Section of Geological Strata at DROITWICH.

246 feet deep.

DROITWICH AND ITS SALT SPRINGS.

By Dr. Alfred J. H. Crespi.

A good many eventful years have sped since, as a very little boy, I first passed through Droitwich on my way to Cheltenham, and now for twenty years and more I have generally gone through it from four to twenty times a year, so that I can speak with some knowledge of its appearance: and I must confess that a more unprepossessing little place, as seen from the railway, it would be hard to find. The railway is however about the worst possible spot from which to make the acquaintance of the quaint old town, and greater familiarity corrects the first unfavourable impression. Droitwich is not beautiful, and it would be absurd to pretend that it is; nevertheless, the country round it is wonderfully rich, fertile, and picturesque, and the town is sufficiently ancient to satisfy the most exacting antiquary; while its salt springs or wyches are connected with one of the oldest industries in the country.

Salt works existed at Droitwich in Roman times, and from the departure of the conquerors of the world to the present hour the wyches have yielded vast quantities of strong brine. In Heptarchy days, Kenulph, kinglet of Mercia, having first cut off the hands and put out the eyes of his brother kinglet, Egbert of Kent, tried to propitiate Heaven by endowing with ten salt furnaces at Droitwich, the great Church which even then made Worcester famous. Two hundred years later a far worthier wearer of a crown, the unhappy Edwy, Over Lord of All England, tried to purchase the Church's sanction to his marriage with Elgiva, his second cousin, by giving it five more Droitwich salt furnaces. But this time the Church refused to be gracious. Salt from Droitwich gave a pleasant flavour to many an insipid dish in Anglo-Saxon times, and it is probable enough that Alfred the Truth Teller and many of his successors got their salt from the inexhaustible springs of Wich, the name which Droitwich continues to bear in legal documents. A single powerful brine spring will yield a thousand tons of pure salt weekly: while the district supplies at least two hundred thousand tons of the best salt in the world every year, and the springs still pour forth their treasures in undiminished prodigality. Nash stated in 1779 that the net salt duties of the Empire amounted to about £240,000, and of this Droitwich contributed £75,000. In spite of modern discoveries of salt veins all over the world, Droitwich salt maintains its reputation as the best and purest in Europe. No costly shafts are required, no mining operations in the bowels of the earth. The brine actually comes up of its own accord, and has been known to overflow. The Wyches are in the middle of the town, and rise from a depth of 200 feet, through beds of New Red Sandstone and Gypsum. Considering the importance of the industry and the value of the brine treatment in many complaints, it is surprising that the Roman Salinæ, the Saxon Wych, and the more familiar Droitwich, has only a population of 5,000, to whom, however, fluctuations

in the price and prospect of salt are more important than international complications and changes of government.

In this part of England, the prevailing geological formation is the Upper and Lower New Red Sandstone; it extends for miles round the coal basin of the dingy and unattractive, though geologically interesting, town of Dudley. The lower division of the New Red Sandstone is not of great commercial importance, though in places containing quarries of soft building stone, but the upper division is of incalculable value, for it is the inexhaustible storehouse of household salt, and to salt we owe half the enjoyment of our food, and the very existence of many important industries. At Stoke Prior, three miles north-east of Droitwich, there are extensive and magnificent salt works, and a shaft has been driven to a depth of 460 feet; it has pierced four beds of rocksalt, the thickness of these beds amounts altogether to eighty-five feet. This is, however, insignificant compared with the vast deposits of Cheshire, where the upper bed measures 78 feet, and the under exceeds 120; while in Spain and in Poland, beds of still greater thickness are known, and at Cordova the rock salt deposits have a depth of hundreds of feet.

Many theories have been framed to account for the deposit of salt: they are ingenious, like most scientific theories, but unsatisfactory. Some geologists think that salt is a volcanic product ejected from below; others that it is the precipitate of a deep ocean overcharged with saline matters; and others hazard a guess, for it is nothing better, that it is a vast deposit from sea-water lakes, which were cut off from the main ocean by accidental barriers or walls, much resembling the familiar tropical salt water lagoons of our day, and from which in time the sun evaporated the redundant water, leaving an ever increasing accumulation of salt. Many objections can be urged to every one of these theories. The volcanic is not supported by any existing parallel case, and though volcanoes, which are generally near the sea, often deposit a crust of salt on the margin of their craters, they never, as far as is known, eject vast quantities of saturated brine. The second theory, in like manner, falls to the ground, since it is impossible to conceive of a vast deposit of salt as the result of a surcharged ocean. The lagoon theory is more plausible, and might, under certain circumstances, account for the deposits, were they small and thin; but beds of salt extending 200 miles, and hundreds of feet in depth, would require evaporation to be carried on through almost innumerable ages. Still this, after all, may be the true explanation.

It may also be doubted whether the remarkable purity of Droitwich salt is compatible with its being deposited from evaporated sea water.

The late Mr. Bainbrigge, an eminent Droitwich surgeon, mentioned that the saline springs of Droitwich were stronger, that is, more nearly saturated, than any others in Europe. His table gives the solid constituents of the following seas:—

Mediterranean ...	410	grains in 10,000
English Channel	380	,, ,, ,,
German Ocean...	325	,, ,, ,,

Baltic ...	168	grains in 10,000
Dead Sea	2,460	parts in 10,000 of water
Droitwich Brine ...	4,000 to 4,200	,, ,,
Other British salt springs from ...	1,500 to 2,500	,, ,,

John Leland, in the reign of Henry VIII., visited Droitwich, and inspected the salt works. He was astonished at the activity of the place, and asked a salter how many furnaces they had. The man "numbered them to an eighteen score," adding that "every one paid yearly to the King six shillings and eightpence," a large sum in those days. "Making salt is a notable destruction of wood," he continues, "six thousand loads of young polewood, easily cloven, being used twelve-monthly, and the lack of wood is now perceivable in all places near the Wyche, or as far as Worcester." About 1662 coke began to be used at Dudley for smelting iron-stone, and before long coal made the salters of Droitwich independent of wood, which, in those days of bad roads and defective water communication, could not be conveyed far. No large woods remain quite close to Droitwich, though Wyre Forest, near Bewdley, is only ten miles off. There is, however, an enormous amount of park and hedgerow timber, and the country quite up to the town is singularly beautiful, the dearth of trees being about the last thing the visitor would complain of.

I have candidly admitted that at first sight Droitwich is not attractive in the same sense as Cheltenham, Leamington, and Tunbridge Wells are attractive, but the country round is charming, and new roads are being cut and lined with handsome villas.

It is very strange to find handsome half-timbered houses, of the sort for which Worcestershire is famous, of great antiquity remaining in good preservation, and in the very heart of the town; they have survived the changes of centuries. The most beautiful of these is near St. Peter's Church, and was the residence of the historian Nash. It well deserves a pilgrimage.

Well-founded complaints are heard that less care and thought are given to making our watering and health resorts attractive than on the Continent. A lady once told me that she was not surprised that our pleasure towns were deserted by all except those of our own countrymen who could not afford to go abroad, while no foreigner ever came to England for change. Besides a warmer and pleasanter climate and brighter sky, she added that continental towns were made greatly more attractive—their promenades, music, concerts and company being superior to anything in England. If Bournemouth, Eastbourne, Cheltenham, and Clifton do not satisfy the wealthy Englishman, what can Droitwich offer? Well! it has a park that for beauty surpasses anything I have ever seen, and it has a band equal to that of any other watering place.

No description would be complete that did not say something of the industry that has made the place famous. The process is almost too simple to be interesting. The brine is pumped up and stored in large reservoirs; from them it goes through pipes into open, shallow, evaporating basins, called salt pans, perhaps 20 feet by 10; the newer ones are circular and better constructed, so that evaporation is more rapid. Under the pans huge fires are kept up to evaporate

the water. A man armed with a large wooden rake scrapes the salt from the middle of the basins to the edges, where are standing a number of moulds, each large enough to hold a saltbrick. The mould is put on end in the pan, and filled with wet salt scraped from the bottom; it is then carried to a drying chamber, where it is subjected to a high temperature. Evaporation is rapid, and when the contents of the moulds are dry, the bricks are easily turned out, and piled up in a store chamber. The steam hanging over the town comes from the salt pans, which are open to the sky; nevertheless the air is not damp, nor are the residents and the salters unhealthy, so that Droitwich does not suffer from its occupation and atmosphere. Mr. John Corbett, formerly M.P. for Mid-Worcestershire, and his agent, Mr. Green, have been doing a great deal for the place and its trade by introducing the most perfect modern appliances, and building costly public institutions. To the Salt-King Droitwich owes its splendid St. Andrew's brine baths. The town has always had many benefactors, and some almshouses, founded a couple of centuries ago, are perfect, and no honest broken-down labourer could wish for, or have, better quarters in his declining years.

Droitwich is attracting general attention as a health resort, and sufferers from gout and chronic rheumatism are flocking to it for treatment. This summer the place is said to be absolutely packed, and the accommodation already provided threatens soon to be insufficient.

Important and well-planned additions have been made to the Raven, once the Manor House, now a hotel, a most picturesque timbered house, and some large boarding-houses have been built. And there is a new hotel, The Worcestershire, with accommodation for 100 people. The brine springs are credited with almost miraculous efficacy. I remember when a lad, and before beginning to study medicine, making the acquaintance of an elderly lady in Birmingham—who had often gone to Droitwich for the baths. Her first visit must have been paid forty years ago. She derived great benefit. Ten years ago I sent a gouty patient up, who had resisted all the remedies I could think of, and, to his delight and my gratification, a stiffness of the right shoulder, that had come on after falling from a tree upon his arm, and which had practically crippled him, yielded to frequent baths. He is now working hard, and without inconvenience, whenever his penchant for cider, mead (the favourite Dorset drink), and beer leaves him leisure and inclination for less pressing duties. Last Tuesday I saw him, and he told me that he was in perfect health.

The discovery of the most striking virtues of the Droitwich brine was accidental, and occurred during the cholera visitation of 1832. Many deaths had taken place, when it occurred to some one to put certain sufferers in salt pans, and it is asserted that every one treated in this simple fashion recovered. At any rate, whatever the cause of their recovery, the reputation of the brine treatment was made, and before long a small Bath Company was formed. Since then the waters have grown in repute, until many persons of high rank, one indeed a member of the Royal Family, have gone to Droitwich, and derived such decided benefit that they have returned again and again.

The chief efficacy of the water is in cases of gout and chronic rheumatism;

in these complaints baths artificially heated—for the brine does not come up from a sufficient depth to be warm—are taken once or twice a day, with almost immediate advantage. The brine is mixed with an equal quantity of fresh, hot water, or in some cases with three times as much. After sufferers from rheumatic gout have had several baths, their skin becomes exquisitely soft and velvety, and the water in which they have bathed contains traces of urate of soda, which some learned physicians assert must be dissolved out of the tissues by the solvent properties of the brine. The fact is curious, and calls for extended experiment and investigation; for if the brine actually dissolves out the urate of soda from the tissues of gouty patients, its value as a remedy in these crippling and painful complaints is obviously enormous. Brine tanks go to Malvern, fourteen miles off, where unsuccessful attempts have, it is said, been made to give invalids, who flock to that pretty place, the benefit of Droitwich brine baths, without the trouble of going to the neighbourhood of the Wyches. The main difficulty in carrying on the brine treatment at Malvern, or anywhere else at a distance, is the heavy carriage of the brine, so that the temptation is almost irresistible to put it in the baths in homœopathic doses. The brine is also said to have its properties prejudicially affected by the evaporation of the gases it contains when just pumped up.

At Droitwich there are some excellent hotels, more particularly the Raven and the Worcestershire; the former has, as I have mentioned above, been greatly enlarged. There are also very extensive brine establishments, so that the visitor can obtain everything he needs. The St. Andrew's baths are enormous, and fitted with the most perfect modern appliances. They were only opened ten summers ago, and in the spring of 1888 they had to be made three times as capacious, so great had been the run upon them. They include private bathing places, and large and convenient swimming-baths. There is a want at Droitwich of medical homes for invalids, similar to those that have made Malvern, Matlock, and Buxton popular. Sufferers find it better to take the brine baths under the systematic supervision of medical advisers.

Good private establishments are numerous where great skill is shown in the management of the inmates.

Of late the prosperity of the town has enormously increased. Mr. Corbett has built a large establishment for the accommodation of invalids. Wealthy proprietors like Mr. Corbett can do much when, like him, they have experience, capital, and knowledge. A most beautiful park has been laid out, and still there remains a good field at Droitwich for enterprise and capital.

THE GEOLOGY OF COLWALL DISTRICT, WITH NOTES OF DISCOVERY OF BRINE.

By Edward Conder.

The Malvern Hills ridge which, in part, Colwall joins, seems to have been forced up in a solid state on a line of fracture, having heated masses upheaved from the position they once occupied. Through this mighty upheaval we have the edges of entire formations turned up to the surface, and they now lie exposed for us to read their contents in distinct layers. Quartz, mica, hornblende, felspar, chlorite, &c., are the mineralogical ingredients of the Malvern rocks. In the Worcestershire Beacon, near Colwall, varieties of rock may be collected, some of which are Syenite and others granite.

The lower part of the parish is formed by the Old Red marls. Taking a section from the Geological Survey from the southern base of Brockhill Copse, near New Court, up to the Wyche, commencing with the Old Red marl, the successive layers follow in order thus:—The Downton sandstone, Upper Ludlow shale, white and grey sandstone, grey shaley sandstone, thin Aymestrey limestone, thick bed of grey argillaceous shale of the Lower Ludlow limestone in solid beds and bands, Wenlock limestone, Wenlock shale, Woolhope limestone, and thin beds of sandstone and shale called Upper Llandovery or Caradoc up to the syenite of the hill at the Wyche.

The whole of the limestone and shales as above described and first called by Sir Roderick Murchison Upper Silurian, run parallel with the Malvern range of the Malvern Syenite for many miles. The whole of the bedding can be crossed and seen on its turned up edges or outcrops. The lowest, called Llandovery bed, is the highest in local position, having been lifted up by the upheaving force of the crystalline stone upon which it lies in close contact. As we descend the hills to the Old Red Marls, each bed we meet with is later in date with regard to formation.

The appearance of the Upper Silurians at the south and west part of the parish is associated with an upheaval quite distinct from the upheaval of those beds closely related to the Malvern Range: for instance, the lower beds such as the Llandovery, the Woolhope, and the Wenlock, are not seen until we get to the adjoining parishes of Eastnor or Ledbury.

The intervening bedding between the two sections of the Upper Silurians consists of the lowest of the Old Red Sandstone which we proved by the deep well boring at Schweppe's Factory at the depth of 1,160 feet.

We understand that the upper beds of the Old Red Sandstone are seen in the great elevations of the Black Mountains and the Brecon Vans; therefore, what was the original thickness of the whole?

Here the inquiry strikes us, what denuding forces were at work in the parish of Colwall? With regard to the detritus that lies on the surface of Colwall, which is entirely composed of fragments of the Syenitic stone, and the upper beds of limestone and shale, we might ask the question, is this an instance of glacial action, or merely the waste material brought down by storm which is still going on? In some places it is 30 to 50 feet deep. Of a condition of things when the country was very low, and an arm of the sea extended from the Mersey to the Dee, and up to Gloucester, forming the great body of water called in our locality the Malvern Straits, which gave its tides to the great valley of the Teme, and rolled up its waters into the farthest point in this parish (remnants of which are the Colwall and Cradley Brook, a tributary of the Teme), the proofs are clearly seen by the great beds of sand evidently deposited by water.

Now as to the discovery of brine. I may say that a similar geological section may fairly be taken from Schweppe's Water Works, as the Brockhill section. These works are on the north side of the railway, between the station and the tunnel, and just outside the Ludlow formation on the Old Red Marl. Messrs. Schweppe and Co. have sunk an Artesian well to the depth of 1,246 feet. The first 40 feet was dug in the usual way for a well about six feet diameter through detritus and marl. They then commenced boring, placing iron pipes as they went down through the Old Red Marl, coming across thin seams of sand stone, grey and mottled, to a depth of 1,160 feet; after that limestone, apparently Aymestrey; then to a further depth, when, at 1,246 feet, a liquid brine came up, and has flowed since that date, February, 1895, at the rate of one pint a minute. The boring was stopped at this depth. Mr. Wickham has assisted me in this paper. He has a good knowledge of the geological formation of the district, and thinks the brine comes from a bed of rock salt, over which is flowing a body of water taking up the salt and making brine, which, by the hydrometer, seems to be one-fourth less rich in salt than the sea.

Is it not a discovery in the geological world that rock-salt or brine should in England be associated with such old rocks as the Upper Silurians? not only in England, but even in Europe; for we are informed by our Geological writer Geikie, that only in the Punjaub in India is rock-salt found with these rocks in the old world. We learn that in New York State, Michigan, and Ontario, in America, all the brine they find in their great salt works comes up from the Upper Silurians, or with rocks associated with them. If the foregoing is correct, the incident in Colwall must be a discovery.

I send samples taken by myself at various times as the boring tackle was lifted up to clear out the *débris* from the punching tools, all smashed almost to powder, in a soft state but now hard. When, however, the diamond drill was used at the depth of 1,160 feet, the cores came up in a solid state to a further depth of 1,246 feet.

The Rev. J. D. La Touche, to whom I sent a specimen of the hard cylindrical block, replies:—"There can, I think, be little doubt that the specimen you send is from the upper beds of the Aymestrey Limestone. It is full of fossils, but they are in such a fragmentary state that they cannot be easily

identified." With reference to the brine, he says :—"The deposit of salt belongs not to the Silurian beds, but to those above them."

If the Section from the Geological Survey is examined, and the distance calculated, it is clear there must be a sharp angle in the dip of the Aymestrey limestone, or it would have been found before sinking down 1,160 feet.

The specimens from the borings sent by Mr. Conder were as follows :—

1. A crystallized sandstone from various depths, down to 1,160 feet, containing in its substance two small white deposits exhibiting lime.

2. Cornstone from the lower beds of Old Red Sandstone, containing plenty of lime ; from a depth of 1,160 feet.

3. A compact hard stone, with a little lime interspersed throughout its composition from a depth of 1,200 feet, collected on November 26th, 1894.

4. A cylindrical block of $2\frac{3}{4}$ inches diameter, a closely textured heavy homogeneous mass containing only faint traces of lime, dated February 2nd, 1895, from a depth of 1,246 feet.

GENERAL REMARKS.—ORIGIN OF SALT.

By H. Cecil Moore.

With reference to the origin of Salt the theory of its volcanic origin has long ago been abandoned. The Mineral waters found often associated with volcanic districts are, as a general rule, sulphates, carbonates, or ferruginous, and oftentimes of a high temperature, the mineral matter under these circumstances being more fully dissolved.

In Salt, we have to deal with a chloride, under the name of chloride of sodium, or as modern chemists call it, sodium chloride. For its origin we must go back to the earliest formation of the earth, and of the oceans formed by the condensation of the steam and alkaline vapours which encircled its supposed molten sphere during the process of gradual solidification of its crust. From the earliest "gathering together of the waters" called seas, and of dry land bringing forth "grass, the herb yielding seed, and the fruit tree yielding fruit," there has been a never-ceasing transference of solid material washed from the land into the Sea, and a mutual interchange of practically pure water from the sea by evaporation : this vapour, condensed by climatic changes, falls upon the land as rain, charged more or less with the constituents of the atmosphere. This cycle of interchanges has continued in perpetuity, every river being the receptacle for all soluble matter derived from the constituents of the rocks and soils over which all its tributaries flow.

Fresh water, before perfect commingling, being of less specific gravity, floats upon the more concentrated water of the Ocean ; the soluble constituents gradually sink, the chemical mixture of carbonates of soda with chloride of calcium and magnesia will increase the chloride of sodium, hence the sea has become of greater specific gravity now than it was in ancient days, and this saltness is always increasing.

Chloride of Sodium is the *principal* constituent of all the great land-locked lakes, called Seas, *e.g.*, the Aral sea which receives into it the rivers Amu Daria *(Oxus)*, and the Sir Daria *(Jaxartes)*; the Caspian Sea (whose surface is 83 feet below that of the Black Sea), which receives the Ural and the Volga, the largest river in Europe ; and the Dead Sea (the surface of which is 1,300 feet below that of the Mediterranean), which receives the river Jordan. We have numerous instances also in Asia, Africa, and America, of dried-up seas, covering enormous areas, some of which are composed of Salt of as yet unfathomed thickness. The most gigantic of these is the great Salt-Lake of Utah, which has an area of 2,000 square miles, a relic of an old lake, a large proportion of whose floor constitutes the Utah desert. Fresh water shells are found 1,000 feet above its present level. There is the great salt Persian desert, south of Teheran, extending for miles, dangerous in localities where the process of precipitation has not yet been completed to solidification. On a smaller scale, we have in the south of Abyssinia

a salt lake only seven miles across cut off from the bay of Tajoura by a bar of lava, half of the lake filled with a solid sheet of salt, the offspring of evaporation. On a still smaller scale the same results are seen on numerous coral islands. Before the Suez Canal was made, a bank of salt 16,000 acres in extent, and 10 inches in thickness, was exposed in the so-called Bitter Lakes, formerly far below the level of the Red Sea, and now again overwhelmed. In numerous places the formation of salt beds is going on before our eyes.

The standard specific gravity of pure water is 1,000; the average specific gravity of the salt water of the Mediterranean is 1,027; the specific gravity of the Dead Sea is as high as 1,250.

Salt water varies in its composition. The following analysis is given of the salt water of the British Channel in grains per gallon of 70,000 grains :—

	Grains per gallon.
Chloride of Sodium	1964·165
Chloride of Potassium	53·585
Chloride of Magnesium	256·655
Bromide of Magnesium	2·044
Sulphate of Magnesia	16·069
Sulphate of Lime	98·462
Carbonate of Lime	2·310
Iodine and Ammonia	traces.
	2393·290

Of which 2,393 grains of mineral matter it is seen that nearly 2,000 grains of chloride of sodium (common salt), are contained in a gallon of sea water; and that the proportion of solid matter reaches 3½ to 4 per cent.

The brine springs of Droitwich yield about 25 per cent. of chloride of sodium, and contain upwards of 22,000 grains in each gallon, or about 5½ ounces in every pint. An imperial gallon weighs 12·07 pounds avoirdupois, and contains 3·13 pounds of salt.

From an able paper by G. W. Shrubsole, F.G.S., in the Proceedings of the Dudley and Midland Geological Society, Vol. 4, No. 1 of December, 1878, we read that*

The Baltic Sea contains	4	parts salt in	1,000 of water.
The Black Sea ,,	15	,,	,,
The Atlantic Ocean ,,	35	,,	,,
Mediterranean ,,	38	,,	,,
Red Sea ,,	43	,,	,,

An analysis of 48 river-waters of Western Europe by Bischof gives an average of 21 parts of mineral matter in 100,000 of water.

*A more recent computation by Mons. Henri Leon is given in *Chambers' Journal*, April 24th, 1897, p. 270.

In the Black Sea there are	17	grammes of saline matter in every	1,000.
In the Atlantic ,,	32	,,	,,
In the Mediterranean ,,	43	,,	,,
In the Caspian ,,	62	,,	,,
In the Sea of Azov ,,	118	,,	,,

The Dead Sea is 10 times more salt than the Atlantic.

In the *Quarterly Journal* of the Chemical Society, Vol. 11, p. 72, we find the following

COMPOSITION OF THAMES WATER AT LONDON BRIDGE IN GRAINS PER GALLON OF 70,000 GRAINS.

Carbonate of Lime	8·1165
Chloride of Calcium	6·9741
Chloride of Magnesium	·0798
Chloride of Sodium	2·3723
Sulphate of Soda	3·1052
Sulphate of Potash	·2695
Silica	·1239
Insoluble Organic Matter	4·6592
Soluble Organic Matter	2·3380
	28·0385

The process of evaporation, causing saturation and precipitation, is perpetually going on in all quarters of the earth. In a water containing carbonate of soda with lime and magnesian salts, the greater part of the carbonate of magnesia remains in solution, and carbonate of lime is precipitated with a small quantity of the magnesia. On the evaporation of water containing carbonate of lime with magnesian salts of sea water, the carbonate of magnesia remains held in solution, and the sulphate of lime is precipitated as gypsum. In the process of evaporation of salt water it is found that sulphate of lime requires only 37 per cent. of the water to be removed, whilst chloride of sodium requires as much as 93 per cent. : hence sulphate of lime (gypsum) is deposited before Rock Salt, its point of saturation being much sooner reached than that of chloride of sodium. When lakes dry up the materials dissolved become gradually more concentrated; eventually deposits accumulate at the base, of which deposits the most conspicuous are Rock Salt and Gypsum, a hydrous sulphate of lime. This throws light upon the occurrence of beds or veins of Gypsum, in association with Rock Salt, as we find at Droitwich and elsewhere. Numerous observations support the theory, in which Mr. Humphreys confesses his belief, that the Rock Salt and Gypsum of Droitwich were originally deposited in a large lake or lagoon near to, and possibly at one time connected with, the ancient Malvern Straits. For the origin of Salt let any one not yet convinced consult any up-to-date Geological publication. See for instance "The Student's Lyell," by Judd, 1896, pages 321, 322. See also the first chapter of H. B. Woodward's "The Geology of England and Wales," 2nd edition, 1887.

Reference was made by Mr. Humphreys to the absence of fossils in the rocks of the neighbourhood of Droitwich, possibly due to the intense salinity being inimical to animal life. Professor Lapworth in his address (1891) on the Geology of Dudley and the Midlands, delivered to the Midland Union of Natural History Societies, stated:—"Geologists believe that the TRIAS was not laid down like chalk in an Ocean, or like the Oolites and LIAS in shallow seas, but was spread abroad in a desert area like the Sahara, or in a saline depression like the Caspian

and its surroundings. And hence we have the natural explanation of the existenee of the Salt basins in the Triassic formation; as at Droitwich in Worcestershire, and Nantwich and other places in Cheshire, and also of the curious fact that the Triassic rocks are practically barren of fossils." Mr. J. E. Ballard has contributed quotations from "The Microscope," by Jabez Hogg, 6th edition, page 577, of the occurrence of Artemiæ (Entomostraca) in the salterns where the brine is deposited, corroborated by W. B. Carpenter in "The Microscope," 2nd edition, page 588, where he describes this beautiful animal under the name of the "brine shrimp."

It is not strictly true that no life can be sustained in salt water of as great density as that of the Salt Sea or Asphaltic Lake, now called the Dead Sea. Some inferior organisms inhabit the lake; a coral has been obtained from it, and infusoria were found by Ehrenberg in its mud.

In the province of Galicia in Austria, the area of Rock Salt has been computed at over 10,000 square miles; the fields being worked chiefly at the towns of Wieliczka and Bochnia.

Gypsum is found as selenite, and when it occurs in massive blocks it is employed in sculpture under the name of Alabaster. Plaster of Paris is made from Gypsum.

Salt is of extensive use in the manufacture of various products, amongst which may be mentioned hydrochloric acid, sulphate of soda, carbonate of soda, caustic soda suitable for making soap, chloride of lime for bleaching linen and cotton cloth, and as a disinfectant for contagious miasmata. It also enters into the processes for obtaining sal ammoniac, glass, corrosive sublimate, &c. It is so essential to the existence of man and beast that the Salter's Company adopted for their motto the fitting words, "Sal sapit omnia."

Amongst the many uses of salt is that of a fire-extinguisher. Take 20 lbs. of common salt, and 10 lbs. of sal ammoniac, *i.e.*, muriate of ammonia, or as it is more commonly called in the present day hydrochlorate of ammonia. Dissolve them in 7 gallons of water, and when completely dissolved, bottle the solution in vessels made of very thin glass. Throw the vessel into the flame, taking care to break it.

N.B.—Be careful not to be too near for fear of suffocation by the dense fumes of the chlorine vapour which extinguishes the flame.

The brine at Droitwich is pumped up at a temperature of 60° Fahr. The warm springs of Bath have a temperature of nearly 120° Fahr. Although not pertinent to salt springs, it will be pardonable to refer in a few lines to the earliest record of the discovery of hot springs. This occurs in the *Revised* Version of the Bible, in Genesis chapter xxxvi., verse 24, where "hot springs" is substituted for "mules" in the *Authorised* Version, so that the Text reads:—"And these are the children of Zibeon, Aiah, and Anah: this is Anah who found the hot springs in the wilderness, as he fed the asses of Zibeon his father." This Anah was father of one of Esau's wives, and he had another name Beeri, illustrious, and related to *Beer*, a well of water; he was afterwards known as Beeri the Hittite. Any Hebrew scholar of the Bible will be interested in an able article on

"The earliest recorded discovery of thermal springs," by Prosser James, M.D., in the *Journal of Hydrotherapeutics*, Vol. 1, No. 1, 1887, published by the Scientific Publishing Company, Limited, 22, Buckingham-street, Strand, W.C., in which the writer attempts to locate the spring.

With reference to the recent discovery at Colwall of Salt in a geological formation different from that of the New Red Marls, or upper portion of the Triassic rocks, as in Worcestershire and in Cheshire, we have a few other records in our own kingdom, *e.g.*, the salt springs at Woodside, at Moira in Leicestershire, at Netherton, Cradley, Hawn, &c., in the Coal Measures; and at Keswick they are in the Lowest Cambrian Slate. Abroad, the springs of Wurtemburg are in the Muschelkalk; of Switzerland and Bavaria in the Lias; of Cordova in the greensand; and the great salt mines of Wieliczka in Austria are in the Tertiary formations.

It was very unfortunate for the speculators, and beyond the expectation of any geologist, that salt water should have been struck at Colwall. What a successful enterprise is the contemporaneous sinking for water of the Messrs. Flower, of Stratford-on-Avon, on the opposite side of the Malvern range, and not many miles south of Droitwich. For the first 600 feet the boring was through various coloured beds of marl and gypsum, and the last 200 feet through various coloured beds of sandstone. The well is sunk to the depth of 804 feet, and water of first-class quality and purity is lifted therefrom through a pump of $7\frac{1}{2}$ inches bore, fixed 150 feet below the surface, at the rate of 8,000 gallons per hour.

For a well-reasoned answer to the question, "Was the sea always salt?" see an article on "The Geology of the Sea," in *The Geologist*, 1860, Vol. 3, p. 241, by the editor, S. J. Mackie, F.G.S., F.S.A., his deductions being based upon the observations of Mr. Sterry-Hunt, of the Geological Survey of Canada, on the subjects of the Chemistry of the Sea, and of Rocks. The article concludes thus:—"The first ocean was highly charged with various salts, chiefly chlorides of calcium and magnesia; with the continued action of atmospheric waters bringing down carbonate of soda to the sea, a chemical process has been constantly carried on, by which the chlorides of calcium and magnesia have been gradually but continuously diminished, and the quantity of chloride of sodium, or common salt, proportionately increased, and consequently the saltness of the sea is greater now than in its ancient state, and has been constantly increasing from the remotest times unto our own."

MOLLUSCA OF HEREFORDSHIRE.

Mr. Arthur E. Boycott read an introduction to what promises to be an excellent contribution on the "Mollusca" of the county, prepared by Mr. Ernest W. W. Bowell and himself. They have devoted many years of study to this subject, and have, in their official capacity of Curators of this branch of Fauna in The Museum, classified its valuable collection of Land and Freshwater shells of the Kingdom.

The total number of British species, we are informed, is about 127. Messrs. Bowell and Boycott have recognised 91 species in Herefordshire, or 75 per cent.

The fringe of the subject could only be treated in the limited time, but sufficient was said by Mr. Boycott to convince the members that much was to be learned from the study of the generally-despised snails, and the dwelling houses which they construct; enough it is hoped to stimulate other members to assist these gentlemen in their investigations.

The complete paper will give in detail the distribution, variation, etc., of the various species in Herefordshire arranged systematically. We hope the paper will be completed in time for publication in the present Volume of the *Transactions*.

Woolhope Naturalists' Field Club.

ANNUAL MEETING, NOVEMBER 19th, 1896.

The Annual Meeting for the election of President and Officers for 1897 was held in the Woolhope Club Room on the 19th inst. The following were present:—Mr. H. Cecil Moore (President), Rev. Preb. Wm. H. Lambert, Rev. H. B. D. Marshall, Rev. M. Marshall, Captain R. H. de Winton, Messrs. B. St. John Attwood-Mathews, J. Edy Ballard, J. Carless, Gilbert Davies, James Davies, F. R. Kempson, R. Lewis, H. Southall, H. G. Sugden, J. P. Sugden, and James B. Pilley (Assistant Secretary).

Mr. Moore was re-elected President, and the Rev. J. Barker, Mr. F. R. Kempson, the Rev. H. T. Williamson, and Dr. J. H. Wood were elected Vice-Presidents. Rev. Preb. W. H. Lambert was elected on the Central Committee, vice Mr. O. Shellard, resigned, and Mr. James Davies was elected Auditor. There was no further change in the constitution of the Committee.

The Volume of *Transactions* for 1893-1894 was laid on the table and distributed to each member present. It was resolved that Mr. James B. Pilley (the assistant secretary) call the attention of those members who had omitted to pay their subscriptions, due January 1st, 1896, to Rule xii.—"That any Member whose annual subscription is twelve months in arrear shall not be entitled to any of the rights and privileges of membership; and any Member whose annual subscription is two years in arrear may be removed from the Club by the Central Committee."

Notice of an alteration and addition to Rule ix. was introduced by Mr. Thos. Hutchinson, to be brought forward as a proposition at the next general meeting of the Club. Rule ix. is as follows:—"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." The alteration proposed is—for "next meeting" read "next annual general meeting." The proposed addition at the end of this Rule is as follows:—"The number of ordinary members shall be limited to 200, and until the existing membership is reduced to that number no new member shall be elected. Provided nevertheless that at any time the President and Central Committee may propose any candidate whose scientific or other qualifications entitle him to become a member."

The following were elected members:—Mr. Robert Evans, of Eyton Hall, Leominster; Dr. C. S. Morrison, of Burghill; and Mr. Ernest T. Woodward, of

Goodrich. Mr. Bellerby was proposed and seconded, to be balloted for at the next meeting.

A proposal by Mr. H. Southall, that an extra meeting of the Club should be held during the winter months, was referred to the Central Committee for their consideration, with recommendation for its adoption if possible.

Mr. Edy Ballard exhibited several trays containing, out of his collection of about one thousand specimens, a selection of nearly 400 flint flakes, discovered by him during the last few years in the parish of Wellington Heath, near Ledbury. The selection contained various forms of scrapers and flakes, and several cores from which they had been struck; also several flints that had apparently been used for boring holes, and two fragments of flints with ground surfaces. The flints denote an antiquity of the neolithic age. A few remarks upon this subject will be found in *Transactions* of the Woolhope Club, 1894, page 191.

Information has been sent by Mr. W. C. Ashdown, F.Z.S., of a magnificent specimen of the White-tailed Eagle, *Haliaëtus albicilla*, having been swept into Shropshire by the gale, and shot in the dusk by Mr. Gordon on November 7th, at Dinchope, near Craven Arms. Mr. Ashdown says it is an immature bird, and that its plumage is simply perfection. This bird does not attain its full plumage till the fifth or sixth year.

Mr. Ashdown has left Hereford, to his own benefit it is hoped, but certainly to the regret of naturalists in Hereford, who have highly appreciated his knowledge of British birds, and his skill in setting them up in attitudes true to nature. His address now is—45, High Street, Shrewsbury

Dr. Wm. Howells writes from Church House, Talgarth :—"It is generally understood that rapacious birds mate and breed early in the year, and that their breeding period is comparatively brief. This is more or less true of the Orders Accipitres and Striges, and also applies to the family Corvidæ. As a striking and unusual exception I saw, last Tuesday evening, November 10th, at 4.45 p.m., a young Tawny Owl (*Syrnium aluco*), perched on a ruined cottage within reach of my hand. Its only cry was the usual clicking note "kee-wick": its head was covered with grey down, and elsewhere over the body bunches of it were interspersed with maturer feathers."

"On November 10th I saw a solitary Martin *(Chelidon urbica)* flying about among the rocks above Bracelet Bay, near Swansea."

THE SURVIVAL OF ROMAN PLACE NAMES.

By F. Haverfield, Christ Church, Oxford.

The survival of Romano-British place names is a matter of considerable interest to the antiquary as well as to the historian. They form a part of the small legacy which we English in England have inherited from the Kelts who preceded us. In Herefordshire there appears to be only two such cases of survival. Ariconium, usually and plausibly located at Bolitree and Weston-under-Penyard, near Ross, probably survives in Archenfield. Magnae (or whatever was the nominative of the form known to us only in the dative Magnis), may probably be traced in the name of a West Saxon tribe which occupied much of Herefordshire, the Magesaete. The oldest form of their name, as given in a document of A.D. 811, is Magonsaete, that is the dwellers at Magon. The word is compounded like Dorsaeta, the dwellers at Dur(novaria) and in the land of the Dur(otriges), now Dorset, and other Saxon place and tribe names. The evidence on the matter is set forth in the annexed letter written at my request by Mr. W. H. Stevenson, Fellow of Exeter College, Oxford, who is perhaps the first living authority on the subject of English place names. I desire particularly to call attention to the fact that there is old and definite evidence in favour of the derivation, because mere similarity of modern forms goes for little. Nothing has been a greater source of confusion in the study of Romano-British topography than the attempts made for it—and worst—by Camden, to identify apparently similar words without tracing their history. It is absolutely necessary in all cases to research, and I believe that no better work could be done by local archæologists than a detailed examination of the significance, the origin, and the various forms and proper use of their local place names. How long, for instance, has the name Watling-street been applied to the Roman road from Wroxeter through Leintwardine to Kenchester? Watling-street is of course an old name in itself: is it an old name as used of this particular road? I cannot find out that any county historian has paid the least attention to the point. Yet as the road is in many places a boundary, it is almost sure to be mentioned in some charter or map or terrier or estate-survey. So far as is known at present there is nothing to determine whether the name is old or was invented for this road by some antiquary (say) in the seventeenth century. There was at that time a good deal of such inventions: to this day there are two Morecambes competing inventions for the site of the Bay Morecambe mentioned in "Ptolemy," one on the Solway, the other near Lancaster. Watling-street, in Herefordshire, may be a similar invention—we need evidence of its age to decide. The matter is an important one. The meaning of the name is notoriously obscure, and one of the first conditions for deciphering it is a knowledge of its proper use. Was it applied only to one or two roads, or to many? At once we come to the question, how old is the name in Herefordshire?

[The oldest reference which I know to the use of the name "Watling-street," in Herefordshire, is in Horsley's *Britannia Romana*, p. 388. 'The country people near Wroxeter give the name Watling-street to the way which goes through the middle of Shropshire into Herefordshire (as I apprehend) to Kenchester.' Horsley's book was published in 1732. I confess I should like older and more distinct testimony. As the road forms in some places a parish boundary, and often (I should imagine) an estate boundary, deeds, terriers, and charters should exist which would take us back far beyond 1732.]

I now subjoin Mr. Stevenson's very valuable letter on the forms of the name of the Magesaete :—

The earliest form of *Magesœtan* is in an original charter of 811 (Cartul. Saxon., i. 462 line 1) : 'on Magonsetum æt Geardcylle' (Yarkhill, co. Hereford). *Setum* is dat. pl. of *Sete* (W. Sax. *sæte*). This form is important, and I think supports the derivation from *Magn(is)*. A like form occurs in a 14th cent. copy of a Glouc. charter (C.S. ii. 152), which I believe to be genuine: '*in Magansetum* iiii. manentes [hides] in Briencandafelda.' The latter is a corruption or misreading of O.E. letters representing a form of Irchingfield, as the Gloucester chartulary says that the grant was in *Erchenefeld*. In 959 (CS. iii., 242, 20) it is *pagus Magesœtna* (gen. pl. of Magesætan.) This charter shows that Staunton-on-Arrow and Hay, county Hereford, were in the district of the Magesætan. Chronicle 1016. *Magesœtan* (dat. pl., the people, not the district), 1041. Roni Magesetensium (comes); Florence of Worcester, ed. Thorpe, i., 265. This chronicler (i., 289), says :—Et quia civitas Wigornia, tempore quo regnabant Brytones vel Romani in Brytannia, et tunc et nunc totius Hwicciae vel Magesetaniae metropolis extit famosa, &c. Here *vel* must be copulative, since Hwiccia and Magesaetan were not identical. Flor. (i. 238) has a list entitled 'Nomina praesulum Magesetensium sive Herefordenium.' "

This letter has only elicited the following reply from an honorary member, Mr. Wm. Phillips, of Shrewsbury :—

WATLING STREET IN SHROPSHIRE.

The suggestion of Mr. Haverfield that the application of the name Watling-street to certain Herefordshire roads may be an invention of the 17th century imposes upon the antiquaries of that county the necessity for investigating the authority for its use. I ventured to remark under the above date that the frequent occurrence of the name on the Ordnance Map of Shropshire imposed a like duty on the antiquaries of this county. Without presuming to undertake the task, I may point out that so far as the employment of the name for designating the road running east from Uriconium, still the high road to London, it can claim at least 700 years usage. Wombridge Priory, which stood near Oakengates, founded by William de Hadley with Seburga his wife and Alen their son, about 1136, was situated in Hadley Wood, which wood is described in the Chartulary of that Priory as "Bounded on one side by a rivulet, which divided the said wood from the King's adjacent Forest; on another side, by a rivulet, called Sprung-

wella-broc; on a third side, by 'Watlingstreet'" (Eyton, vii., 353). In a later grant (1259) to the same Priory, by Hamo le Strange, "Watelyngstret" occurs as a boundary of property. In a Charter of Edward I. (c. 1300) is defined the boundary of the Royal Forest of Wellington and Morfe, which also mentions "Watlingestrete." By a reference to the Chartulary of Wombridge Priory, of which abstracts have appeared in the *Transactions* of the Shropshire Archæological Society, there will be seen many instances of the use of the name in reference to the same road, which cover a distance of 10 miles or more. Vol. ix., 307, 309, 332, 351, 354; vol. xi., 325, 326, 329, 335.

Whether the name is applied to other undoubted Roman roads in Shropshire I am not at present able to state. That which, leaving Uriconium on the south, crosses the river by a bridge over the Severn, and branches in three directions, one of which traverses the Stretton Dale to Bravinium, has many features confirming its Roman use, if not original construction; but I have seen no ancient authority for their being called Watling-street. The last-named branch is called in ancient deeds *Bot-street*.

W. P.

ABUNDANCE OF LARVÆ OF ACHERONTIA ATROPOS, (THE DEATH'S HEAD MOTH).

All the periodicals devoted to subjects of Natural History record a more than usual abundance this season of the larva of Acherontia atropos (the Death's head moth) in numerous parts of the Kingdom. In Herefordshire several have been seen.

A FEW NOTES ON FUNGI IN THE ALPS.

By T. Howse.

I spent the month of September this year with my daughters for the purpose of studying the geology of the district where I passed most of the time—Finshaut, a village near the Tête Noire, between Vernayaz and Chamouni.

This season has, in Switzerland, as all travellers know to their cost, been an exceptionally rainy one; consequently fungi were very abundant, and I regretted that I had not brought Fries and my paint-box with me. *Boletinus cavipes* of Kalchbrenner was fairly abundant in the woods above Finshaut, and between that village and Servan. I have not noticed it in Switzerland before; it occurs frequently in the Eastern Alps and Hungary. I sent some specimens to Canon Duport, which he much appreciated. *Cortinarius traganus* was plentiful. I find this species nearly everywhere in the Alps. There were many other *Cortinarii* and *Boleti*. Archæologists visiting this district should inspect the rock sculptures in the village of Servan. The perpendicular side of a huge rock in the middle of the village is covered with curious sculptures—rings, round holes, crosses, triangles, &c. Similar sculptures, but not in such numbers, are to be seen on some of the dolmens in Brittany, and I think too, at Stonehenge. Servan lies at the beginning of the Trient Valley, which is the only easy means of communication between the Valais and the Chamouni district. These sculptures are accounted for by the theory that this rock was a meeting-place for the different tribes of these districts, and where probably sacrifices were offered. The geology of the neighbourhood is very interesting. Carboniferous strata are wedged in and crumpled up in the crystalline gneiss and other rocks, and the neighbouring valleys show a regular sequence sometimes inverted of the Trias and the other Secondary strata. I brought back some good fossil ferns from the Carboniferous shales on the Col de Balme.

Bad weather drove us from Finshaut to the Lake of Thun. In the course of my travels I have never seen so many or so large a variety of fungi as on the shores of that lake. We stayed at Spiez, and in the woods behind the hotel, or in those in the direction of Wimmis, I noticed a very large number of Cortinarii: Cortinarius violaceus, bolaris, fulgens, &c. Armillaria aurantius, many curious Hydna, and most of the larger Clavariæ, Clavaria formosa, aurea, &c., besides a large number of other Fungi.

Whilst searching the woods near Wimmis, I met an Englishman also looking for Fungi. He told me, but I have forgotten his name, that he had lived formerly near Hereford, and knew many members of the Woolhope Club. I thought I had met with a fellow worker, but he was only looking for mushrooms, which the landlady of his hotel had told him grew in those woods, and of which he had secured some fine specimens. I visited this landlady a few days afterwards at Gunten, on the opposite shore of the lake. She described the woods in the

neighbourhood as being very rich in Fungi. Amongst others Amanita caesarea was to be found there. Time, unfortunately, would not allow me to look for it. I would recommend any mycologist visiting Switzerland to stop at the Pension du Lac at Gunten, a comfortable cheap inn with pension 5 to 6 francs a day, with a mycological landlady, and Amanita caesarea in the woods close by. If he is a geologist he will find further excitement in visiting the Justis Thal, where the Schrattenkalk is topped with nummulitic rock, and fossils are to be found in the Neocomian strata below. In the narrow gorge cut through the Flysch behind Gunten are fine granite erratics, and there is a good local geologist, a carpenter, in the village of Merligen.

THE BRITISH MYCOLOGICAL SOCIETY.

At a Committee Meeting on December 17th, it was resolved that the Woolhope Club become subscribing members (10s. per annum) of the British Mycological Society, founded on September 19th, 1896, under the auspices of the Yorkshire Naturalists' Union.

Mr. George Massee, of the Royal Herbarium, Kew, is President of the Society, Mr. Charles Crossland, Halifax, is the Treasurer, and Mr. Carleton Rea, B.C.L., is the Honorary Secretary, his address being 34, Foregate Street, Worcester.

THE EARTHQUAKE OF DECEMBER 17TH, 1896.

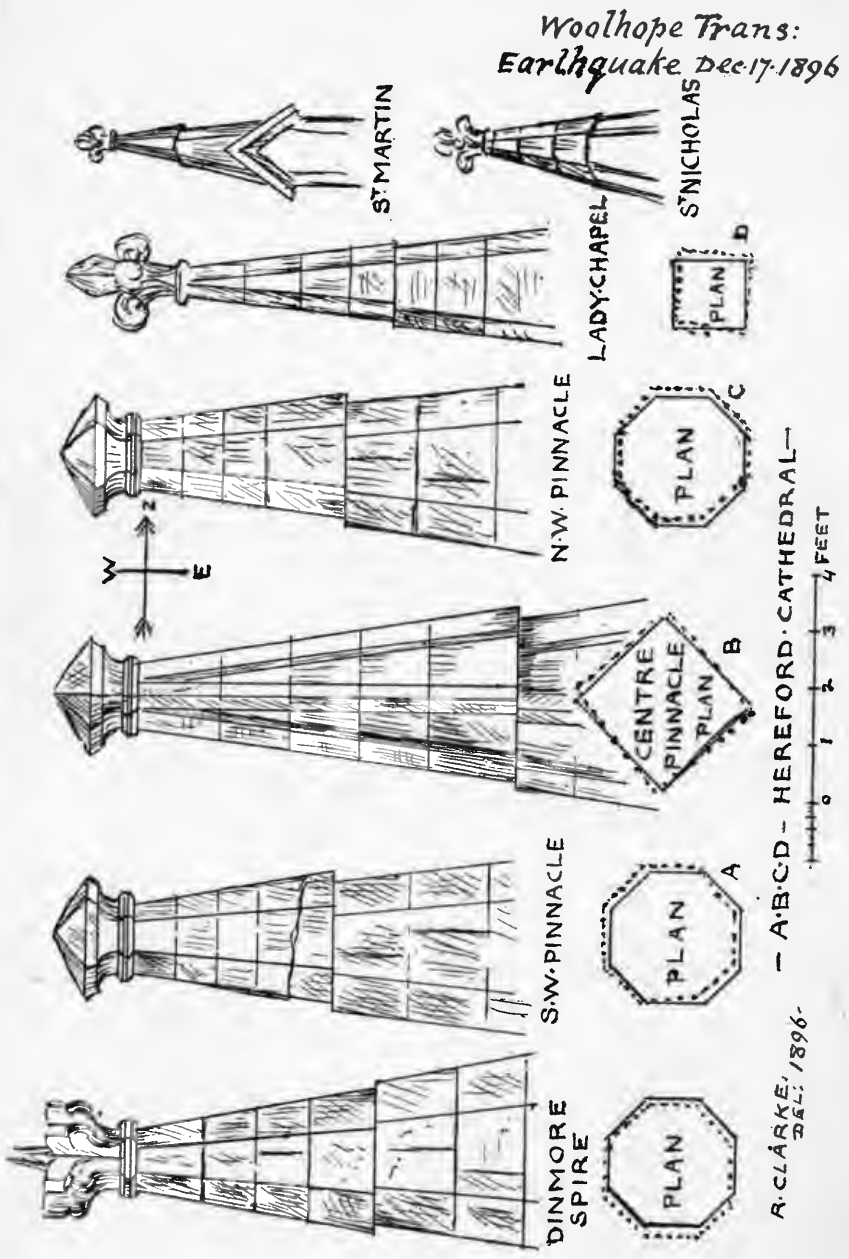
OBSERVATIONS COMPILED BY H. CECIL MOORE, ROBERT CLARKE, AND ALFRED WATKINS.

ALTHOUGH the effects of this important shock were felt over a large part of England, the region of greatest disturbance was in the neighbourhood of Hereford.

Mr. Symons, in his Meteorological Magazine for January, 1897, judging from the reports of a large number of accurate observers, and taking the rate of progress of the earth wave at 30 miles a minute from Hereford as a centre, puts down the time of the shock (within 30 miles of Hereford) at 5.32 a.m. He gives a list of reports from places between 30 and 60 miles from Hereford, all within one minute of 5.33; between 60 and 90 miles distant within one minute of 5.34; between 90 and 120 miles distant within one minute of 5.35, and 120 to 150 miles distant within one minute of 5.36.

Professor John Milne states, "If we draw two lines from Monmouth, one running north to Kendal, and the other in a north eastern direction to the Wash, and then a third line from Kendal in an easterly direction to Scarborough, we enclose an area within which between 1833 and 1873 no less than 159 shocks have been recorded. The most unstable portion of this district is, according to the recent researches of Montessus de Ballore, in its south-western apex, on or near to the southern slope of the Welsh Mountains, and in the middle of the Severn Valley."

The 1896 shock having left behind direct evidence of the area of greatest severity in the shape of actual damage to buildings, it is thought that a careful record and plan of such damage in the county of Hereford may be of much service to seismologists in locating the "unstable portion of this district" more accurately than Montessus de Ballore seems to have done. A list of actual damage to buildings has, therefore, been drawn up from written and newspaper reports, and from many personal and local enquiries (A. W.) throughout the county. The damage chiefly consisted of overthrown or damaged chimneys, with a few cases of cracks in walls of buildings. Cracked or falling plaster and broken windows have not been included. These instances are marked on the map with a red cross. It might be argued that places within easy distance of Hereford would naturally be more fully investigated than those on the borders of the county, and that the red crosses would, therefore, be thicker in the centre of the county. The reply to this is that many of the blank spaces on the map (Eardisley, Burghill, Allensmore, Sutton, for instance), have had as full investigation as the places where red crosses are thickest. That the region of maximum action only extended beyond the borders of the county in one direction is indicated by the fact that no serious damage to buildings could be ascertained in the following towns:—Monmouth, Abergavenny, Hay, Kington, Presteign, Knighton, Leominster, Ludlow, Tenbury, Bromyard, Malvern, and Ledbury, all distant 14 to 24 miles



from Hereford. At only one of the belt of towns encircling Hereford viz., at Ross, was actual damage reported, and this line of maximum action is continued beyond Ross at Weston-under-Penyard, Kerne Bridge, Lydbrook, and as far as Gloucester, where several fallen chimneys were recorded.

Damage at Hereford.—The city suffered more damage from the shock than any other place in England, it being the most populous place in the region of maximum action. Scarcely a street escaped without fallen or damaged chimneys, and out of the eight principal churches four suffered substantial damage. In East-street the greater part of a stone-tiled roof slipped down into the yard below. In many cases the chimneys fell through the roof, but no personal damage resulted, although at Bullingham a ceiling fell on the head of the occupier. Where the damage was so general, almost covering the whole area of the city, it would serve no useful purpose to give exact localities, but it should be mentioned that no buildings were damaged at Hampton Park and Tupsley, and that there was less damage in the Widemarsh district than in other parts. If the number of damaged chimneys had been estimated the day after the shock, the estimate would probably have been 40 to 50. But many others were found to be so severely shaken that they had to be rebuilt. Careful enquiries (H. C. M. and A. W.), have been made from the following masons and builders as to the number of chimneys rebuilt in consequence of the earthquake:—Farr, Lloyd, Watkins, Davies, Bevan and Hodges, Taylor, Andrews, Lewis, Cooke, Bowers. The total number of chimneys repaired is 218.

The following details of damage to churches are from personal (R. C.) survey:—

Hereford Cathedral: The West Front.—The upper ends, about five feet, of the three pinnacles were turned round on a vertical axis, the displacement being from one to two inches at the corners. The two outer pinnacles were also moved off their respective beds towards the N.E. The pinnacle facing the South was also cracked through one of the bed stones.

Lady Chapel.—One of the square tapering pinnacles on the north side was also lifted off its bed, and turned round on a vertical axis. The dotted lines on the plan shew the displacement.

Tower.—The finial on the S.W. angle of the tower was broken; but this was in a decayed state before.

Interior.—The arched mouldings inside the Cathedral, above the large South Transept window, were cracked, and portions fell to the floor; some large pieces of mortar from the groined ceiling also fell.

St. Martin's Church.—The octagonal tops of the pinnacles on this Church were all displaced in the same way as the Cathedral pinnacles. The spire was also badly cracked from East to West, but as it had already lost its upper part, through being struck by lightning, it required little force to do this.

St. Nicholas' Church.—The upper portion of the octagonal pinnacle, on the North side of the East end, was thrown down, and the middle part was rotated in the same direction as the Cathedral pinnacles. The top of the pinnacle fell clear of the building on the East side.

Dinmore Manor Chapel Spire.—This is a well-built 13th century tower with a 14th century spire. The upper part, 4 feet 6 inches, was lifted up and turned round, and also thrown 4 inches off its bed towards the S.W. The weight of the stone work displaced is about ten hundredweight. Dinmore Manor Chapel is 6 miles N.N.W. from Hereford.

Dinmore Manor House, within fifty yards of the spire, having several tall and slender brick chimneys, escaped damage. Some crockeryware inside was upset.

The damage done to the above buildings appears to be confined to turrets and pinnacles tapering to a point, usually safe against an ordinary storm. The effect, in nearly all cases, seems to have been a rotation on a vertical axis, accompanied by a lateral displacement from the bed.

Region of Maximum Action.—At Dinedor Rectory, a new building, all the chimneys (8) were knocked down and had to be re-built, but no damage in surrounding cottages is recorded. At Fownhope the damage appears to have been greater than at any other collection of houses outside Hereford. About 10 damaged chimneys were recorded at the time, and as a personal inspection (A. W.) gave the impression that the damage was greater in proportion to the number of houses than at Hereford, enquiries were made from the two Fownhope builders (Messrs. Stone, and Ford) as to the number of chimneys repaired or re-built. The number was 22 in a parish of 1,000 inhabitants, which is a larger ratio than the 218 damaged chimneys at Hereford (population about 20,000).

The Woolhope Valley.—Fownhope lies on the edge of the pear-shaped ring of hills which enclose the Woolhope valley of elevation. There is evidence of actual damage encircling these hills, viz., at Larport, Dormington, Stoke Edith, Putley, Much Marcle, How Caple, and Brockhampton, although curiously enough there was no damage at the villages of Mordiford and Mordiford Frome.

It is natural to speculate whether "the most unstable portion of this district" is not still connected with the ancient upheaval which gives its name to the Woolhope Club. If a circle of 6 miles' radius be struck having the Haugh Wood as a centre (the central point of the ancient upheaval), it will include by far the greatest earthquake damage in the county. Even leaving out the damage done at Hereford (for so large a collection of houses might make the comparison unfair) there are 65 instances of damage within the circle compared with 36 parishes in the rest of the county.

Another interesting point is the circle of red crosses round the upheaval of Shucknall Hill.

Various Parts.—Two detached groups of red crosses will be noticed on the map, one in the Madley district, the other at and near Westhope and Dinmore Hills. On the whole, houses which sustained damage were in low-lying positions, but there were plenty of exceptions to this. No uniformity could be noted (A. W.) as to the direction in which chimneys fell, even when near together. In some instances they appear to have been thrown clear of the roof.

Personal Reports.—These (collected by H. C. M.), are too lengthy for publication in full, and as Dr. Davison, of Birmingham, is compiling information

from a much larger number of reports, it is not well to draw hasty conclusions. Most local reports agree as to the loud roaring or rumbling noise accompanying the shock, and describe it as awful, terrible, or terrific. Professor Milne describes the cause of the noise to be the rubbing together of two rock surfaces, while a new fault is being created or an old one extended, and states that those who heard the noise were not many miles removed from its origin. Many observers thought the noise came from one direction and died away in another. Probably it is impossible when indoors to locate the direction of a sound, and if a sound gradually increases and then dies away it gives the impression of being a travelling sound. Of six Hereford observers two described the sound as coming from the S.W., two from N.E., one from W., and one from N.N.E. The Town Clerk describes the sound as "a heavy grinding sound." Several observers speak of a noise like a crash or an explosion. The estimations of the duration of the shock vary from 2 to 30 seconds.

It may serve a useful purpose and aid the accurate record of future shocks to reprint the questions drawn up by Dr. Davison. One report in reply to these questions—that of Canon Hilary Willson, O.S.B., of St. Michael's Cathedral Priory, Belmont, near Hereford—is a model of careful observation, and being made under peculiarly advantageous circumstances, is probably the most valuable individual report of the shock. It is, therefore, given in full :—

Dr. DAVISON'S LIST OF QUESTIONS.

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 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 two or more maxima of intensity or series of vibrations ; and, if so, what was the interval between them and the order of their 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? (g)* What was the apparent direction of the shock? and how was it determined?

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*) Did the instant when the sound was loudest precede, coincide with, or follow, the instant when the vibrations were strongest. and by how many seconds? *(f)* Did the sound change in character at or about the time when the vibrations were strongest?

8. A list of as many other places as possible where the earthquake was noticed would be most useful, together with answers for each place (if possible) to questions 6 and 7.

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, the notes relating to each shock being kept separate.

REV. CANON WILLSON'S REPORT.

1. St. Michael's Cathedral Priory, 2½ miles distant S.W. from Hereford. Rev. Canon Edward Hilary Willson, O.S.B.

2. One of 26 seated in the stalls of the Cathedral Choir, engaged in the chanting of Matins.

3. 5.32½ a.m., according to observation of one who looked at the Choir Clock as soon as the shock was over. The Clock had been set by Post Office on the day before, *i.e.*, December 16th.

4. (*a*) Yes, some think for 2 or 3, others for 3 or 4, seconds. (*b*) About 6 or 8 vibrations, lasting at the most two seconds. (*c*) No one observed any tremulous motion after the shock was over, but the creaking of roof and shiver of walls may easily have diverted attention. (*d*) Some of us thought we felt two distinct shocks. The first, which was only slight, seemed to be the culmination of the tremulous motion, and lasted at the most one second or less. It was followed, at the interval of not more than 1 second, by a violent shock consisting of 6 or 8 vibrations, lasting at most 2 seconds. It seemed to cease as suddenly as it came, and not to die away. (*e*) In the first shock vibrations as distinct from the precedent tremulous motion were not noticeable. The shock seemed to be over in one thud. In the second and severe shock the last vibrations seemed to be fiercest. *(f)* The motion seemed to be sideways rather than upwards, though with some degree of upward movement admixed. It seemed to come from S.W. to N.E., or from S. to N.

5. The first shock (if divisible from the second), was not more than 1 second. The second shock, at an interval of one second from the first, was not more than 1 to 2 seconds.

6. (*a*) Every window in the Cathedral seemed to rattle, the walls seemed to shiver from base to summit, and the roofs of both Nave and Choir creaked and strained in a terrifying manner. One who looked up at once saw the roof twist

somewhat from S.W. to N.E. (*b*) The floor of wood below our feet seemed to sway somewhat, not much. (*c*) Some who looked observed that the Sanctuary lamp, hung by a chain 50 feet long, did not sway at all. (*d*) Nothing throughout the Church or Monastery fell except one cracked globe, and some minute particles of plaster from ceilings. (*e*) Nothing of this nature happened. The whole buildings are well founded and well built throughout. They have stood as yet only 36 years.

7. (*a*) Yes. As of a tempest or hurricane coming up from S.W., but as it neared us it became more like a rush and a roar, and at moment of shock as of thunder or cannon immediately below our feet. (*b*) It preceded the first slight shock by two or three seconds; and preceded the second or principal and real shock by 4 seconds at the most. (*c*) So far as we could tell in the din and confusion, it ceased with the end of the principal shock. (*d*) It certainly grew louder in intensity, but seemed to cease suddenly. (*e*) As far as I can say, the sound was loudest when the vibrations were strongest, *i.e.*, at least of the series of 6 or 8 vibrations. It was difficult, however, to distinguish the sound of the effect upon our Roof, &c., from the sound of the cause. *(f)* The sound changed when the tremulous motion passed into the real shock and vibrations. See (*a*).

9. One member of our Community, who is of a highly nervous temperament, on entering the Choir at 4.50 a.m., fancied he heard a noise as of rats skurrying away, and at the same time he felt the ground (boarded floor) move slightly. He looked into the side chapel to see if rats were there. Half an hour later, *i.e.*, at 5.20 a.m., he fancied he heard and felt the same, and turned round so sharply in his stall as to frighten his neighbours. His observations were not the result of any expectation. He had never before experienced an earthquake.

Five members of the establishment who were in bed in the Monastery at the time of the real shock, were awakened by it. They say that the walls shook, windows rattled, beds seemed to be jerked up from S.W. to N.E., or from S. to N.

The Cathedral Church stands E. by N. to W. by S.

The Monastery at right angles to it faces W. by S.

The above Report is made out from Notes taken on the morning of the occurrence, to which additional notes have been made within a few days after consulting other witnesses.

EARTHQUAKE DECEMBER 17TH, 1896.

DAMAGE TO BUILDINGS.

PARISH.	PLACE.	DAMAGE.	AUTHORITY.
Aconbury	The Court	chimney damaged ..	A. W.
Aston Ingham ..		2 chimneys	H. T.
Ballingham	Ballingham	chimneys	H. C. M.
Bishopswood ...	Foot of Ley Hill ...	chimney	A. W.
Brockhampton ..	Pear Tree Green ...	1 chimney	H. C. M.
Lower Bullingham...		2 chimneys	A. W.
Canon Pyon... ...	Lawton's Hope ...	chimney	A. W.
,,	Westhope Hill (N.W. side)	2 chimneys	A. W.
How Caple	Church	pinnacles shifted ...	A. W.
Cradley		2 chimneys	H. T.
Little Dewchurch ..	Broadlands	1 chimney	A. W.
Much Dewchurch ..	Near Wormelow ...	1 chimney Mr. Shaw's 1 chimney Mr. Green's	A. W.
Dinedor	Rectory	all the chimneys, 8...	H. C. M.
,, ...	Rotherwas House ..	chimney	A. W.
Dinmore	Chapel of St. John ...	top of spire disturbed	R. C.
Docklow		chimney	H. T.
Dormington	Court	building cracked, one chimney, and chancel wall of Church	H. C. M.
Eardisland	Village	1 chimney	A. W.
,, ...	Burton Court	chimney	A. W.
Eaton Bishop ..	Blacksmith's shop ...	building cracked ...	A. W.
Fownhope	Village	2 chimneys in all had to be re-built...	A. W.
Hampton Bishop ..	House beyond Carrots	1 chimney	A. W.
Hentland	Hoarwithy	2 chimneys	A. W.
Hereford Parishes ..	Whole of the City ...	218 chimneys, 4 churches, damages	H. C. M. A. W. R. C.
Holme Lacy ...	Holme Lacy House ...	parapet	R. C.
Holmer	Copelands ...	chimney and walls...	A. W.
Hope-under-Dinmore		2 chimneys ...	H. T.
King's Pyon... ...		1 chimney	A. W.
Kinnersley		slight damage to chimney	A. W.
Llanwarne	Lyston Court	chimney	H. C. M.
Lugwardine	Longworth	chimney, also masonry arch cracked .	H. C. M.
,, ...	Hagley	chimney	A. W.
,, ...	Wilcroft	chimney	A. W.
Leominster	Wintercott (out parish)	chimney	H. T.
Madley	Town House	floor collapsed ...	A. W.
,, ...	Shenmore	chimney	A. W.
,, ...	Fields Place	low shed collapsed ...	A. W.
,, ...	Lulham	chimney	H. C. M.
Much Marcle ..	Bounds Farm	chimney	A. W.
,, ...	Church	cross cracked ...	R. C.
Mordiford	Larport Court	chimneys shattered..	A. W.
,, ...	Checkley Common ...	chimney	A. W.
Ocle Pychard ...	Orphanage	chimney	A. W.
Puddlestone ...		chimney	H T.

PARISH.	PLACE.	DAMAGE.	AUTHORITY.
Putley		2 chimneys	H. C. M.
Ross	Town	5 chimneys	A. W.
Stoke Edith	Buildings in Park grounds ...	3 chimneys	H. C. M.
Stoke Lacy	Stoke Hill	chimney ..	A. W.
Stretford	Rectory	chimney ...	A. W.
Upton Bishop ..	Foxhall	2 chimneys ...	H. C. M.
Weobley	The Marsh	chimney	A. W.
Weston Beggard ...	Vicarage ...	several chimneys .	A. W.
,, ,, ...	Shucknall Hill... ...	2 chimneys	A. W.
Weston-u.-Penyard	Weston Lodge ...	2 chimneys	H. C. M.
Withington	Court	chimney	A. W.
,, ...	Thinghill Court ...	chimney	A. W.
,, ...	Lock	chimney	A. W.
,, ...	Near Station	house cracked ...	A. W.
Woolhope	Crown Inn	chimney	A. W.
,, ...	Broadmoor Common ...	chimney	A. W.
Yarkhill	Vicarage	chimneys	A. W.
,, ...	Newtown	chimney	A. W.
,, ...	Monksbury Court ..	chimney	A. W.

The initials H. T. signify that the damage was reported in the columns of the *Hereford Times*.

The whole of this report is written without knowledge of the contents of Dr. Davison's book on the Hereford Earthquake.

P.S.—The Map to accompany this report had already been printed, with red crosses indicating localities where damage has occurred; since however the map and report were printed the following particulars, taken from the numerous reports supplied to Dr. Charles Davison, have been kindly forwarded to us by that gentleman.

The ten parishes not recorded above are:—Ashperton, Much Cowarne, Hope Mansel, Kingstone, Ledbury, Marden, Norton Canon, Sellack, Staunton-on-Wye, and Wormesley; the corresponding crosses have been added.

PARISH.	PLACE.	DAMAGE.
Ashperton ...	Pixley Court	walls of house cracked.
Much Cowarne ...	Parish	chimneys of 3 cottages damaged.
Hope Mansel ...	Church	a long crack in the west wall.
Kingstone ...	Village	walls cracked but no serious damage.
Ledbury ...	Town	walls of houses cracked. No report of fall of any chimney.
Much Marcle ...	Green Farm	bricks off chimney.
,, ...	Nuttalls	bricks off chimney.
Marden	The Vauld	2 chimneys, reported by *The Leominster News*.
Norton Canon ...	Hyard Sarnesfield Cottages	2 chimneys.
Sellack	Marsh	chimney damaged.
Staunton-on-Wye ...	Kilkington Farm ...	chimneys shaken, some bricks fell.
Wormesley	Outhouse, Grange House	chimney fell.

Woolhope Naturalists' Field Club.

APRIL 23RD, 1897.

THE early Annual Meeting, for fixing the dates and localities of the Field Meetings of the year, was held in the Woolhope Club Room, on Friday, April 23rd, at which the following were present:—Mr. H. Cecil Moore, President; Mr. T. Llanwarne, Mayor; Vice-Presidents, Rev. Preb. W. H. Lambert and Mr. James Davies; Members, the Revs. J. O. Bevan, E. R. Firmstone, E. J. Holloway, H. B. D. Marshall, and M. Marshall; Messrs. H. C. Beddoe, A. E. Boycott, J. Carless, G. Davies, W. Pilley, H. G. Sugden, J. P. Sugden, and James B. Pilley, the Assistant-Secretary. The Honorary Auditor (Mr. H. C. Beddoe), presented the general financial statement ending December 31st, 1896, which showed a balance in hand of £15 18s. 9d. The Assistant-Secretary's report showed that there had been during the past year 231 members on the books. Five members had been struck off in consequence of neglect in paying up their arrears. One death had occurred in the person of Mr. J. J. Merriman, who had been a member for 29 years. Twelve members had resigned. The attendance at the four Field Meetings amounted to 260, or an average of 65 for each meeting. The income for the year was £110 10s., but the total liabilities of the Club could not be discharged, owing to the large amount of subscriptions unpaid. Mr. Edward Bellerby, manager of the National Provincial Bank, was elected a member. Dr. John H. Harrison, of Orchardleigh, Ledbury, was proposed.

PROPOSED ALTERATION OF RULE IX.

The following addition to Rule ix., of which notice had been given at the last General Meeting, was proposed:—"The number of ordinary members shall be limited to 200, and until the existing membership is reduced to that number no new member shall be elected. Provided nevertheless that at any time the President and Central Committee may propose any candidate whose scientific or other qualifications entitle him to become a member." The subject was well discussed. The fear of the Club losing its character as a body organised for the pursuit of scientific studies and degenerating into a mere picnic club, owing to the promiscuous election of candidates, without inquiring into their scientific qualifications or aims, was overcome by the hope that amateurs would be stimulated by the example and energy of the older members, and thereby an incentive to scientific pursuit might be established. The proposition was not carried.

PRESENTATION OF BOOKS TO THE LIBRARY.

The thanks of the Club were voted to Dr. T. A. Chapman, late Medical Superintendent of our County Asylum, for the Annual Records of Rainfall in the British Islands from the year 1877 to 1895, various odd numbers of the Meteorological Record, South Italian Volcanoes by Messrs. Johnston-Lavis, &c., and it was resolved the Club should annually subscribe 10s. for the Annual Records from the year 1896 inclusive.

ARCHÆOLOGICAL SURVEY OF HEREFORDSHIRE.

The Rev. J. O. Bevan and Mr. James Davies, joint authors of the Archæological Survey of Herefordshire, recently published, informed the members that they were already well advanced with the Mediæval Survey of Herefordshire, Part II., and that they had inundated the county with several hundred copies of a circular, asking for records of mediæval objects, and enclosing a form of a Return to be filled up, and forwarded to them. Thanks were voted to these gentlemen for their many years' devotion to the work which they had been the means of publishing, and especially for their promises to continue the Survey by the compilation of the Norman and Mediæval remains. For this object, as this portion will be more expensive than the Archæological Survey, of which the expenses of printing were discharged by the Society of Antiquaries, London, and as two maps will be required, one for the county, the other on a larger scale for the city, assistance from the funds of the Club were offered, and it was expected that many contributions would be received from many individual members. Messrs. Bevan and Davies, however, undertook the publication of Part II. entirely upon their own responsibility, and at their own expense.

It was resolved that the Club should purchase copies from the Society of Antiquaries of the following five counties, of which the Archæological Survey had been completed, viz.: Kent, Hertfordshire, Cumberland, Lancashire, and Essex, and those of Westmoreland and Surrey when published.

PROPOSED FIELD MEETINGS.

The Field Meetings for the year were fixed as follows:—

May 21st, Friday.—Wormesley, and The Butt House, Kings Pyon.

June 17th, Thursday.—The Olchon Valley and the Black Mountains.

July 29th, Thursday.—Ladies' day, Tewkesbury.*

August 27th, Friday.—Wyre Forest and Bewdley.

When the general business of the Club was concluded, the President gave an address.†

*This fixture of Tewkesbury was afterwards altered to Dudley.

†The President's Address will be found at the end of the *Transactions* of the year 1897.

Woolhope Naturalists' Field Club.

First Field Meeting, Friday, May 27th, 1897.

WORMESLEY AND THE BUTT HOUSE, KING'S PYON.

On Friday, May 21st, for the first Field Meeting this year, the members trained to Moorhampton, whence they walked over Ladylift, Burton Hill, and Garnstone Hill by Wormesley Grange, and over the site of the ancient Priory to the Butt House Farm, thence back by Wormesley Church, through Foxley Park, to Moorhampton, a charming walk of ten miles. Sheet 198 of the Ordnance Survey, price 1s., on the scale of one inch to one mile contains the entire walk; on the scale of six inches to one mile the four following sheets, price 1s. each, would be required: Herefordshire, 25 N.E., 25 S.E., 26 N.W., and 26 S.W. In the earlier part of the day the atmosphere was hazy, but as the day grew older the air improved in clearness, and consequently the distant ranges of hills stood out exposed to view at a greater advantage.

Shortly after leaving Moorhampton Station traces of Offa's Dyke were seen a few yards left of the lane leading to the Clay Pits at the base of Ladylift. The ascent of Ladylift was made direct from the Clay Pits; the acclivity was found a severe test to some of the party, and very welcome was the rest under the clump of Scotch Fir trees on the summit. Here the gratifying surprise of a picture, most refreshing to the eyes, awaited the party. In the immediate foreground was what, at first sight, might have been mistaken for a mirage in the representation of a light blue coloured reservoir of six acres area, reflecting upon its unruffled surface the azure canopy of an Italian sky. Upon closer inspection the delusion was unfolded in the display of an unbroken area of six acres of blossoming bluebell squill *(Scilla nutans)*, originally called hyacinth. Here and there were scattered about isolated patches of the same beautiful blossom.

The Foxley Valley enclosed within heights timbered to the summit, with a gap between two neighbouring knolls, filled up with the tower and spires of Hereford in the background, forms a pleasing picture from this elevation.

From Ladylift Cen. 931·0, Sur. 932·5 (Sheet xxv. S.E.), at the triangulation station of the Ordnance Survey, the walk was continued nearly one mile northwards to an elevation of 963 feet on Burton Hill, thence north-easterly to Garnstone wood on Garnstone Hill. In a clear atmosphere the prospect from the heights embraces the Malvern Hills, the Clee and other hills in Shropshire, the Radnorshire Hills, the Black Mountains, and from one position is seen one of the Brecon Beacons. In the immediate foreground the villages of Weobley,

Sarnesfield, and Dilwyn lie as on a map, whilst Burton Court beyond Eardisland forms a prominent feature in the landscape.

On Ladylift the *Blechnum* fern is very abundant and of remarkable size. Moonwort (*Botrychium lunaria*) is also found there. On Burton Hill, *Asplenium dilatatum* is found.

In August, 1888, the members of the Club crossed the direction followed to-day as they proceeded from Brinsop Court via Wormesley Church to Weobley —see *Transactions* 1888, page 243. On that occasion a paper on Weobley Church was read by the late Rev. Canon Phillott (see page 249) in which reference is made to Colonel Birch, whose marble monument presents an imposing feature in the chancel. The following fragment of Herefordshire history has since that period come into possession of Mr. William Phillips, honorary member of the Club, copied by permission of Colonel Cotes, of Pitchford Hall, near Shrewsbury, and sent by Mr. Phillips for publication as a supplement to Canon Phillott's paper.

"We ye Minister and Churchwardens of ye Parish of Weobley in ye County of Hereford. At ye Chancellors Generalls held in ye Citty of Hereford on ffriday the Seventeenth of November 1693 doe Present as ffolloweth.

Imprimis Wee Present John Birch Esq for Erecting a Monument in the chancell of ye Parish Church of Weebley afores'd In Memory of John Birch of Garnston in ye said Parish, Esq, lately Deceased, without a License first had and obtained from yo'r Lo'p or from yo'r Consistory Court for ye Diocess of Hereford.

Ite. Wee Present and say, That ye Dimensions of ye s'd Monument are in Length 13 ffoot & 10 inches on ye outside of ye Grates. And in Breadth from ye North wall of the Chancell 4 ffoot 9 Inches. Besides Two Stones (which cannot well be taken up by reason the Iron Grates w'ch encompasse the s'd Monument are let downe through holes Pickt through ye edges of ye s'd Stones) the one of which is in Breadth w'thout ye Grates 2 ffoote & 9 Inches, and the other 3 ffoote, soe y't ye said Monument with ye s'd Two stones take up in Breadth from ye north wall of ye s'd Chancell Seaven ffoot & nine Inches which wee humbly Conceive to be an Encroachment upon ye said Chancell.

Ite. Wee present ye Inscription Engrav'd upon ye Pedestal of ye Monument to be in the words ffollowing:—

In Hope of Ressurrection to Eternal life
Here is deposited ye body of
COLL. JOHN BIRCH
(Descended of a worthy ffamily in Lancashire).
As ye Dignities he arrived at in ye Field and ye Esteem Universally yielded him in ye Senate House
Exceeded ye attainments of most, soe they were but the moderate and just rewards of his Courage Conduct Wisdome & Fidelity, none who knew him denyd him ye Character of asserting & vindicating the Laws and Liberties of his Countrie in War, and Promoting its welfare and prosperity in Peace.
He was born ye 7th of Aprill 1616
and died a member of ye Hon'ble House of Comons
being a Burgesse for Weobley
May ye 10th 1691.

Part of which Inscription wee Conceive to Reflect upon the Justice of King Charles ye first, of Ever blessed Memory, & to justifie ye Late, Impious & unparalleld Rebellion against *Him*.

Ite. We present John Birch Esq for enclosing & shutting up ye Chancel of ye s'd Parish of Weobley from ye Nave or Body of ye Church thereof by Wainscot Shutters with a Barre and Iron Boltes, which never being done before, wee Consider to be offensive.

Lastly. Wee Present ye s'd John Birch for detaining & keeping ye Key of ye s'd Chancell from us ye Minister & Churchwardens altho demanded of ye s'd John Birch by which means wee are debarr'd from having Recourse to the Vestery where our Bookes of Accounts and ye utensiles of the Church are pr'serv'd & kept.

STEPHEN LEWIS Vicar ibid.

17th Novr 1693.

A Copy of Our Presentment at ye Visitation."

Transcribed by W. Phillips, from a M.S. preserved in the muniment room of Pitchford Hall, co. Salop,

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In accordance with the programme of the day, which had been so accurately timed by the Rev. H. B. D. Marshall, Wormesley Grange was reached at 12.30, and the site of the ancient Priory was traversed en route to the Butt House.

At the Butt House is to be seen the old timbered dovecot, figured in the volume of the *Transactions* of the Club for 1890, see also page 12 of the same volume. The middle compartment of this structure is reputed to have been a Mews for falcons. Early in January, 1896, a few days before the sale of Mr. Powell's effects, one of the panels of this pigeon house, bearing upon it in raised letters, initials, and the date 1632, was stolen; to secure its restoration several members expressed their readiness to aid in a subscription. At the Butthouse Farm the unexpected provision of luncheon by the Vicar of King's Pyon, the Rev. H. A. Barker, and Mr. T. Tomkins Galliers, of Wistaston, was gratefully acknowledged, and after a paper on Wormesley Priory, read by the Rev. R. Hyett Warner, the return journey was made by Wormesley Church, through Foxley Park and Gardens, along the Ladylift Ride back to Moorhampton.

Mr. T. Tomkins Galliers accompanied the party throughout the entire route, having walked over the hill from Wistaston to meet the members on their arrival at the station. His local knowledge comprised every most sequestered dingle, and every fine tree, shrub, or fern, every spot whence the most picturesque view could be obtained to the greatest advantage. His family has lived in the neighbourhood for several generations, and consequently he retains some of the traditional lore of the district. He pointed out the Old Red Sandstone and Cornstone quarries used in the building of Garnstone Castle, the "Raven's Causeway," the terraced declivity (probably the vestiges of a vineyard), near Wormesley Grange, the old fishponds and watercourses, and in the garden of Wormesley Grange, and at the base of one of the hop kilns, one incised and two or three other stones of the 13th century, two stone stoups and other relics from the ancient Priory, the site of which is only discernible by the inequalities of the

ground, although, according to Robinson, in his Manors and Mansions of Herefordshire, some remains were standing in the year 1718.

Mr. Galliers gave the following local legend respecting the formation of the two pyramidal elevations known as Robin Hood's Butts and Canon Pyon Hill. Robin Hood was bent upon the destruction of the monks at Wormesley, for which object he set out with Little John, each carrying a spadeful of mould. Upon arrival at King's Pyon they met a cobbler loaded with shoes upon his back, from whom they inquired the distance from Wormesley. The cobbler, suspicious of some evil design, or, may be with an eye to business by selling some of his boots, informed them that: "If they were to wear out all the shoes he had on his back and as many more they would not reach the place," whereupon the two travellers abandoned their purpose, and, in an evil temper emptied their spadefuls upon the spots which now form Robin Hood's Butts and Canon Pyon Hill. This legend is a version of a legend connected with divers other places, with a difference of the characters introduced.

We now publish the following contribution of

NOTES ON WORMESLEY CHURCH.

By Rev. A. Relton.

This Church, which consists of chancel and nave, with small bell turret, having two bells, is in the main much older than the now entirely vanished Priory, formerly existing near the site of the Grange. Thus the Parish Church, the House of God for the use of the parishioners, was anterior to and has survived the Monastic Institution. This is shown by the massive walls with the narrow window piercing them at the West end of the North side, the large simple font, and the main doorway on the South, all of which are of Norman work, dating back at least to the twelfth century. Other points of interest in the Church are: A stone coffin lid, incised with a floriated cross, similar to those in Hereford Cathedral and in Brinsop Church, now forming part of the pavement at the West end—the blocked up Priests' doorway on the North, and a smaller doorway also on the North also blocked up, which may have been the entrance to a staircase leading to a rood loft. The edifice is, for the most part, in a very fair state of preservation, a new roof, both external and internal, having been placed on it some few years since, but the North wall requires considerable attention, and that at no distant date, being in many places much perished.—A. Relton, Perpetual Curate of Wormesley and Vicar of Brinsop.—For a few further Notes on Wormesley Church, see *Transactions* 1888, page 244.

Of the massive monuments in Wormesley Churchyard one is to the memory of Richard Payne Knight, who built the present mansion of Downton Castle, near Ludlow. He was born at Wormesley Grange in 1750. He was eminent as a classical scholar, and assisted Sir Uvedale Price in his essay on the Greek and Latin pronunciation. His father was the Rev. Thomas Knight, and his grandfather, from whom he inherited the estate of Downton, was an iron master in Coalbrookdale. Richard Payne Knight died in 1824, and bequeathed to the British Museum a collection of works of art and antiquity, valued at £50,000.

Another of the monuments is to the memory of Thomas Andrew Knight, a brother of Richard, who was born at Wormesley Grange in 1759. He was a student of vegetable physiology, and in 1795 he published "Inheritance of disease among Fruit Trees, and the propagation of debility by grafting." In 1797 he wrote "Culture of the Apple and Pear, and the Manufacture of Cider and Perry," which was re-printed in 1800. In 1809 he published "Pomona Herefordensis." In 1820 he was elected President of the Horticultural Society. He died in 1838. For a representation of Wormesley Grange, a portait of Thomas Andrew Knight, and for a sketch of his work in the orchard see "The Herefordshire Pomona," pp. 29 to 38, with appendices pp. 39 to 46.

Leaving Wormesley Church the walk was continued towards Foxley Park, the prospects towards the east from the lane being much admired before entering Foxley Park between Poles Wood and Bach Wood. Foxley Park, Lawns, Gardens, and Ladylift Ride present a varied mingling of nature and art. They were designed by Sir Uvedale Price, an accomplished scholar, and author of several works, of which the most meritorious, "An Essay on the Picturesque," London, 1794, has gone through several editions. The woods upon the estate were planted by him about 1790. There are some magnificent oak trees upon this estate.

After luncheon at the Moorhampton Hotel the business of the Club was done. Dr. Harrison, of Ledbury, was elected a member.

The President made some remarks respecting the site of Offa's Dyke.

It was resolved that the President's address, pointing out the methods of pursuing the investigations of some of the subjects recommended by the British Association, by placing within the reach of every member, desirous of aiding in the investigations of any one or more subjects, the schedules and forms adopted, be published separately in pamphlet form, and a copy sent to every member.

The following members were present:—The President (Mr. H. Cecil Moore), the Revs. H. A. Barker, Sir George H. Cornewall, J. E. Grasett, E. J. Holloway, W. Ireland, H. B. D. Marshall, R. T. A. Money-Kyrle, F. O. Philpott, W. R. Shepherd, R. Hyett Warner, and M. G. Watkins, Judge Harris Lea, Major J. E. R. Campbell, Drs. Scudamore Powell and J. H. Wood, Messrs. J. H. Barrett, R. Clarke, James Davies, G. Davies, Luther Davis, G. H. Hadfield, F. R. Kempson, R. Lewis, H. J. Marshall, T. C. Paris, John Riley, W. H. Steward, H. G. Sugden, J. P. Sugden, E. T. Woodward, T. Hutchinson, Hon. Sec., and James B. Pilley, Assistant Secretary; and the following visitors:—General Smyth, the Rev. Alfred Relton, Messrs. G. Brierley, J. B. Croft, T. T. Galliers, and F. Herbert.

NOTES ON WORMESLEY PRIORY.

By Rev. R. Hyett Warner.

In those good old times upon which some of us look back with such fond regret, the Prior and Canons of Wormesley were patrons of the living of Almeley. This historical link between my parish and a vanished institution of the past, slender though it be, may perchance palliate my temerity in offering to the Club these few scattered notes. The late Canon Phillott some years ago read a short paper on Wormesley, printed in the *Transactions* for 1888, p. 248, but the subject was not dealt with so exhaustively as to leave no room for more detailed information.

The foundation of Wormesley Priory carries our minds back to one of the darkest periods of our English annals; to the latter years of the reign of one of our sovereigns whose waxen effigy may be seen at Madame Tussaud's Exhibition, but which ought rather to be in the Chamber of Horrors. The country was given over to civil strife, the Church had grown corrupt, and the Crown of England had been shamefully laid at the feet of Rome. But as there were brave laymen to defend with their swords the sacred cause of freedom, so there were not wanting noble Churchmen who sought to keep the lamp of religion burning on the altar. Whether the extension of the monastic orders was the best means for accomplishing this end it is hard for us in these days to say, but it was undoubtedly thought to be the best means at that time.

The Priory of Wormesley, according to the best authorities I have been able to consult, was founded at the end of the reign of King John, for Austin or Augustinian Canons. This Order, which owed little more than its name to the great African Bishop, was formally recognised by Pope Alexander IV. in 1256, though they are said to have had houses in England as far back as the reign of Henry I. The Augustinians shared with the Dominicans and Franciscans in the enthusiasm stirred up by the mendicant Friars, but soon yielded to the same subtle influences which sealed the fate of all these brotherhoods. The special variety of them settled at Wormesley followed the rule of Saint Victor, wearing a black gown with white scapulary in front and a bone at the end of of it to remind them of their mortality. Many learned men belonged to this Order, among others Erasmus, and Martin Luther, the solitary monk who shook the world. The Founder of the Community at Wormesley, it appears from a register formerly in the possession of Bishop Booth, was Gilbert Talbot of the celebrated family of that name. In the Harleian MS., 2129, it is said that Gilbert Talbot, Lord of Longhope, second of that name, was buried in the said Priory with this epitaph :—

"Gilbert Talbot gift (gist) yci
deu de sa alme ayet merci."

In a hurried examination of this MS. I failed to decipher this epitaph completely, but Lord Hereford kindly sent me the foregoing transcription, meaning—

Here lies Gilbert Talbot.
May God have mercy on his soul.

On the same page, however, I made out clearly :—Gilbert Talbot lyeth under the same stone with his grandfather Gilbert.

The ashes laid beneath this stone link the little Priory with a race whose fame shines forth in 'our rude island story' and in the pages of our great dramatist, who tells—

"Where valiant Talbot above human thought
Enacted wonders with his sword and lance."

Here they rested until the Dissolution scattered the little company to the winds. The head of the Shrewsbury family vainly petitioned Henry that the house might be spared as the resting place of his race.

Although Gilbert Talbot was the Founder of the Priory, its chief builder and benefactor was Stephen de Ebroicis. He gave to the Canons his mills on the river Arrow and lands in Lyonshall, or Linhales as it was spelt, for the health of his soul, and for the souls of Isabella his wife, father and mother, predecessors and successors. His bounty included besides the advowson of Lyonshall Church, now in the patronage of the Bishops of Worcester. These gifts were for the support of three chaplains at Wormesley, but the number was increased by subsequent benefactions. Stephen's deed of gift is very strict in requiring all the Lyonshall farmers and tenants to bring their corn to be ground at the Prior's Mill; if any tenant should be detected taking his corn to any other mill, the Prior was to seize the corn and the sack, and the guilty person was to be at the mercy of the said Stephen and his heirs. It will be remembered that this peculiar method of getting custom was one of the great grievances of the people at the time of Wat Tyler's rebellion. The tolls at the mills were so oppressive that querns or handmills were largely used, and gave rise to very unseemly strife; at St. Alban's, for instance, the Abbot's officers seized the querns, and they were used for pavement in the Abbey Church, and having been broken to pieces by the infuriated people the fragments were afterwards brought back, when they came, too late, to plead for the life of their unfortunate leader, who perished on the gallows. And indeed it was no trifling matter in those days to quarrel with an order of men who had the Popes of Rome and thirty legions at their backs. You remember how Sir Ingoldsby Bray sought absolution from Pope Gregory for killing a page—a mere trifle; for twisting his wife's neck, rather more serious; and for slaying a gallant knight, a brave son of the Church, no light matter; but when he filled up the measure of his iniquities by confessing to the murder of a bare-footed friar, *then* the wrath of the suceessor to St. Peter broke out :—

"Now thunder and turf! Pope Gregory said,
And his hair raised his triple crown right off his head,
Now thunder and turf! out and alas!
A horrible thing has come to pass!
What! cut off the head of a reverend Prior
And say he was *only* a bare-footed Friar!"
"What baron or squire,
Or Knight of the Shire,
Is half as good as a holy Friar?

O turpissime !
Vir nequissime !
Sceleratissime ! quissime ! issime !
Never I trow, have the Servi servorum
Had before 'em
Such a breach of decorum,
Such a gross isolation of morum bonorum,
And won't have again sœcula sœculorum ! "

Among the sources of revenue accruing to the Priory may be mentioned the titles derived from livings granted to the community by successive benefactors. King Edward I. " of his special grace " granted permission to Gilbert Talbot, a descendant of the Founder, to convey to the Prior of Wormesley the advowson of the Church of Credenhill, then valued at 10 marks, or six pounds thirteen shillings and fourpence. The Prior and Canons were also patrons of the little Church of Wormesley itself which was confirmed to them by Peter, Bishop of Hereford, but in such wise that the service of the Church should not suffer ; which meant that the Prior should provide a competent *Vicarius* for the duty. Edmund, son of King Henry III., presented to the Priory the advowson of the Church of Dilwyn, and other benefactors that of the Church of Almeley. As Vicar of that parish I may be pardoned for reciting the deed conveying the Church and land adjoining. On the 10th October, 1381, more than five centuries ago, a distinguished company assembled at Almeley, apparently for the purpose of attesting the deed, which, in English, is to the following effect :—

" To all the faithful of Christ to whom this present writing shall come John Bromwych, John de Eyasford Knights and Philip Holgot eternal greeting in the Lord. Whereas we deem it worthy and meritorious to promote divine worship, and, as we are in duty bound, to assist with our entire devotion those who serve God devoutly with our gracious favour, and the fulness of a more ample benefit ; for this reason it is we make known to you all by these presents that we have given and granted to the Prior and Convent of the Priory of Wormesley one acre of land in Almeley, together with the advowson and all the right of patronage of the aforesaid Church to the Prior and Convent and their successors in perpetuity ; from the chief lords of that manor in respect of services due therefrom. In testimony whereof our seals are appended to this deed ; These being witnesses Nicholas de Audley, Richard de la Beere, John Burley, Kynasdus de la Beere, Robert Whyteney, Knights, and others. Given at Almeley 10th October, fourth year of Richard II."

Referring to one of these witnesses Lord Hereford suggests that Kynasdus de la Beere* represents Sir Kynard de la Bere of Kinnersley, father of Sir Richard, one of whose daughters married Sir John Devereux of Frome. Lord Hereford adds that by his will dated on the Thursday before Gregory the Martyr, Sir William Devereux directed his body to be buried in Wormesley Priory. He was a direct descendant of the Sir William Devereux who fell in the battle of Evesham in 1265.

Being thus patrons of several parishes in the county it was a matter of some importance that a fit and proper person should be chosen as Prior. The Registers have preserved the names of some of these Priors, but I have been unable to discover anything of interest about any one of them. We can but hope that they were luminaries in this sequestered part of the kingdom.

Among the documents preserved in the Harleian MSS. relating to

*A member of this family of de la Beere is joined with others in a commission from the Bishop of Hereford to cite Swynderby the martyr.—*Foxe's Acts and Monuments.*
The family of de la Bere was connected by marriage with the Talbots, Harleys, Baskervilles, and other distinguished families.

Wormesley, is one which recalls the name of a family not less famous in our history than that of the Talbots—the Mortimers Lords of Winforton and Wigmore. Roger Mortimer confirmed in the year 1304, the gifts of Walter Muchegros and John L'Estrange and other benefactors of the Priory. After reciting their grants, the deed conveys benefactions of his own, including the right to dig gravel, and other privileges, on lands situate on his manor of Winforton on the Wye and at Hay, but which are too numerous for recital here. The deed was attested at Chirk Castle, near Ruabon, one of the seats of the Mortimer family. This Roger Mortimer was apparently either father or uncle of the Mortimer who played such an important part in the reign of the unhappy Edward II. It will be remembered that he joined the Queen and barons against the King, and that a fine of a thousand pounds was set upon his head ; that he is supposed to have procured the king's murder in Berkeley Castle, and was subsequently surprised by the young King at Nottingham Castle by means of an underground passage, now known as Mortimer's Hole, and being conveyed to London was hanged at Smithfield. But although Roger Mortimer came to this tragical end, his race did not vanish from the stage of history, or cease to play a part in those stormy times. His great grandson married the heiress of Lionel, third son of Edward III., and a second marriage into the house of Plantagenet brought the Mortimer family into the line of succession to the Crown. As though some evil genius or fate, such as Greek tragedy bewails, hung over the family, this second marriage of Anne descended from Mortimer with Richard, grandson of Edward III. was the occasion of the sanguinary wars of the Roses, which stained the soil and disgraced the name of England. What part, if any, Wormesley took in these shameful quarrels history does not record, but as it was largely indebted to the Mortimer family it probably followed the fortunes of the White Rose.

As the name of Talbot and Mortimer bring Wormesley into connection with the stirring events of English history, so the name of another benefactor links this Priory with what has been finely called the Homeric age of English Literature. Among the charters or deeds transcribed in the Harleian MS. (6726), is a transcript of the endowments of the prebend of Wellington. Relying upon the learned work of Mr. Ward, relating to the Metrical Romances preserved in the British Museum, I find that this deed was attested by Walter Map and Milo de Muchegros, both of which names occur in deeds relating to lands in Wormesley. In another MS. of the same collection Walter Map appears in two documents as the granter of lands to Wormesley Priory. In the first draught of these notes, following previous investigators, I was led to identify this Walter Map of Wormesley, with the celebrated writer of Henry the Second's reign, the friend of Giraldus Cambrensis, and of Thomas à Becket. Mr. Ward who appears to have gone thoroughly into the matter, is of opinion that it would not be safe to do more than conjecture that the brilliant satirist belonged to the Maps of Wormesley. It seems however highly probable. He was a Herefordshire man, born in 1143, and the Priory was founded about 1190, and it is certain that a line of Walter Maps lived at Wormesley, between 1155 and 1240. An

interesting fact, however, for which I am indebted to Mr. Ward's work, already referred to, brings the poet appreciably nearer to Wormesley. A romance writer of the same age, named Hue de Rotelande, who lived at Credenhill, has some lines in which he refers to Walter Map. Writing in the Norman French of the time, and speaking of his own line in literature he says, "I am not the only one who knows the art of lying; Walter Map knows well his part of it :—

Sul ne sai pas de mentir lart
Walter Map reset ben sa part."

As Credenhill and Wormesley are not far apart, it seems probable enough that the two romance writers were neighbours and friends. Beyond this it seems we cannot safely go. As a writer Map was known for his Latin satirical poems in which he attacked the vices of the clergy of his time, but we are more indebted to him for giving form and meaning to the floating Arthurian legends which had become popular since the publication of Geoffrey of Monmouth's history. To him we owe the stories of the Holy Grail, Merlin, and Lancelot. "All their old charm is left," writes Professor Morley, "intensified in the romance of Launcelot, "but all is now shaped in a legend of man's spiritual battle, and a lesson on the "search through a pure life alone for the full revelation of God's glory on earth." Although the claim of Wormesley to any share in the fame of Walter Map may be as shadowy as the legends of King Arthur himself, yet we may be pardoned for cherishing the belief that these beautiful creations of genius are not wholly unconnected with these meadows carpeted with wild hyacinth, through which the poet may have wandered long centuries ago as we have done to-day.

It should not be omitted that Walter Mapes, the poet, was Archdeacon of Oxford, and Rector of Westbury-on-Severn, and that one of the benefactors of Wormesley was Nicholas, son of Walter Mapes, whence some conclude that the father of Nicholas could not have been the Archdeacon, as clergymen were not at that time permitted to marry. This difficulty will not appear insuperable to serious students of ecclesiastical history.

Lord Tennyson, in his 'Becket,' introduces Walter Map as conversing with the great Chancellor.

Walter Map.—"Is the world any the worse for any verses if the Latin "rhymes be rolled out of a full mouth; or any harm done to the people if my jest "be in defence of the Truth ?"

Becket —

Ay! if the jest be so done that the people
Delight to wallow in the grossness of it,
Till Truth herself be shamed of her defender,
Non defensoribus illis, Walter Map.

One more extract from the Harleian Collection must suffice. By a deed therein recited the Lady Basilia of Tillington gave sixty marks to form a Chantry at Wormesley for prayers and masses for the soul of Paganus de Bourhall, her husband of happy memory. These Chantries were all suppressed by Act of Parliament in the last year of Henry VIII. and the first of Edward VI. In the preamble of the Statute, it was stated that the revenues of these Chantries were

to be used for the erection of Schools, the augmentation of the Universities, and the relief of the poor. This, however, was never done, and the pious bounty of the lady of Tillington fell to the lot of one of Henry's courtiers.

The name of Wormesley Priory frequently occurs in the Patent Rolls, taxation records, and other public state papers of the Plantaganet period, and much useful information might be gleaned therefrom by anyone who had the requisite leisure. The common seal which was used by the Convent in their deeds is described by Dugdale as oval, small, but neat, with the legend *Commune sigillum capituli ecclesiæ Sancti Leonardi de Wormeleye.* An impression of this seal in blue wax was in the Augmentation Office in Dugdale's time, the documents of which are now in the Public Record Office in Chancery Lane, but is not at present accessible.

The yearly revenue of the Priory at the Dissolution amounted to £83 10s. 2d. Most of the Priors received a yearly pension of £13; the Prior of Wormesley received £20. There were seven Canons who would receive a new gown apiece, and a small sum of money, adapted to those rules of strict austerity to which the religious Orders were bound, but which for a long time they had grievously neglected.

Time forbids me to speak of muniments once in possession of the Dansey family of Brinsop; of Pope Gregory's Bull and other deeds. I would gladly speak of a letter from Richard Warncombe, dated at Wormesley in 1535, in which the writer asks for the adjournment of a lawsuit as counsel would not come to Hereford, "forasmuch as the citye is so vexed with the plage, there is none wolle come there as Jesu knoweth who cease the said plage when his wille is."

According to *Tanner's Notitia* the site of the Priory was granted 37 Henry VIII. in exchange for other lands to Edward Lord Clinton, whose name appears in several State Papers as one of the Council of Edward VI., and as Lord Admiral in the reign of Elizabeth. Later on I find Richard Payne Knight, Esq., described as the proprietor of Wormesley Priory, of the certified value of £4 8s. 4d. Of this family there are several sepulchral monuments in the churchyard of Wormesley, and the Grange is now owned and occupied by G. Boughton-Knight, Esq.

Of the Priory nothing now remains as it stood in old times; but Mr. Galliers, who accompanied our party this morning, remembers that many years ago there were remains of the old Grange belonging to the Priory still standing. The present residence, he tells us, was built of the stone of the Priory, and one or two incised stones of early English work, formerly part of the building, are to be seen on the lawn; "which things are an allegory."

The little church is of plain construction with an ancient font in the south-west corner, and a vestry curtained off in the north-west. On the south side is a Norman arch over the entrance of the eleventh century. The present vicar, the Rev. A. Relton, informs me that of the tithe appropriated to the Priory, as above mentioned, nothing remains, and three acres of land represent the ancient income of the benefice as distinct from modern additions.

And now that old world has passed for ever away like as a dream when one awaketh, or as a tale of which it may be said :--

"When the huge book of Faery-land lies closed,
And those strong brazen clasps will yield no more."

OFFA'S DYKE IN HEREFORDSHIRE

By H. Cecil Moore.

Offa's Dyke does not commence, as has been so often erroneously stated, at the deep gully leading down to the Wye, situated east of the Russian Cottage, but at a spot about 250 yards west of that cottage, where it forms in the present day, the boundary between the parishes of Bridge Solers and Byford. The Dyke is here cut through by the Hereford and Hay road at the distance from Hereford of 6¾ miles, and 13¼ miles from Hay.

This position is 2½ miles west of Kenchester, the Camp occupied by the Romans under the name of Magna. The Dyke can be traced more or less for about one mile in a N.N.W. direction between Bishopstone Hill and Byford Hill, but its prolongation cannot be traced over Mansel Hill. See Ordnance Map, Herefordshire Sheet xxxii., N.E., on the scale of six inches to one mile. Two miles further north it can be traced from a brook at the bottom of the Valley, then across the Hereford and Hay Railway, where the line is in a cutting crossed by an occupation bridge, 300 yards on the Hereford side of Moorhampton Station. It proceeds in a northerly direction through the grounds of Upperton Farm, and is continued a few yards west of the lane leading to the Clay Pits at the bottom of the hill below the clump of Scotch fir trees at Ladylift. It ought to be marked on Sheet xxv., S.E.

From the Clay Pits to Lyonshall, about six miles north-west, through the intermediate parish of Sarnesfield, no trace of the ditch has been found. If the Dyke had been prolonged from the Clay Pits in a true northerly direction, it would have passed successively through the parishes of Yazor, Weobley, Dilwyn, Eardisland, Pembridge, Shobdon, Aymestrey, Wigmore, possibly along the eastern fringe of Letton and Walford, Adforton, and would have left Herefordshire in the parish of Leintwardine. It happens that in the parish of Pembridge, a ditch called "The Rowe Ditch," of similar proportions to Offa's Dyke, can be traced northwards for the length of a mile. Reference will be made to the Rowe Ditch hereafter, and also to what is known as Grim's Ditch.

According to authorities, including the Ordnance Maps, the next appearance of Offa's Dyke, after its disappearance at the Clay Pits on the western base of Ladylift, occurs near Holme Marsh, in the parish of Lyonshall, Sheet xvii., S.E., a distance of six miles N.N.W. On Sheet xvii., N.E., it is shown 500 yards west of Lyonshall Castle, and again near Titley Junction; passengers proceeding from Titley Junction towards Kington may, from the right-hand windows of the train, when about 300 yards distant from the station, view a short length of it in the valley, until the ditch reaches the river Arrow in the parish of Titley; it is here of small proportions and not well defined. The direction of the Dyke here is N.N.W., and its situation is 3½ miles west of the above-mentioned Rowe Ditch. Whatever the Rowe Ditch may have been, it is evident that the Dyke on the

west was eventually the main line of demarcation or frontier line which goes under the name of Offa's Dyke, because, south of the pools near Eywood, after a sudden deviation almost due west, a ditch of undoubted military character, assuming at times a formidable depth, can be traced for the length of two miles, embracing the commanding heights, 1,245 feet, of Rushock Hill, south of Knill Garraway, thence contouring under the western crest of Herrock Hill, whence it descends, and, leaving Herefordshire, enters Radnorshire, in which county its prolongation northwards lies west of the heights of Burva Camp, Sheets x., S.E., and x., S.W. The Dyke assumes occasionally the form of an embankment when such a form is more suitable to the configurations of the ground surface.

The above constitutes all that is known of the traces of Offa's Dyke in Herefordshire, and the most important feature gathered from its observation is that it is always upon the western side of any advantageous declivity, a convincing proof of its being executed by the tribes (the Mercians) in power upon the east. It formed, as Captain Morgan, R.E., wrote in *Transactions*, 1883, page 58, "a well-made, admirably-designed, and skilfully executed military work," so far as opposing an obstacle, at least temporarily, against the raiding of cattle, &c.

The absence of any vestiges in Herefordshire below Bridge Solers leads to the conclusion that the river Wye formed the boundary from that place southwards, possibly to the mouth of the river. Yet, notwithstanding the formidable natural features of the scarped, sometimes inaccessible, left or eastern banks of the river in Gloucestershire for many miles above its mouth, we find traces of Offa's Dyke running generally parallel to the river, and always upon its eastern side. This leads to the surmise of a double line of defence here, such as a skilful general would be careful to secure for himself if he were advancing into the country from the estuary as a base for his supplies, or, in the event of his having to oppose an enemy in command of the estuary advancing up the river. We must bear in mind that it was in King Offa's reign that the first irruption of the Danes into Britain took place. *Ingr. Sax. Chron.*

The following are the places marked "Offa's Dyke" in the Ordnance Map in Gloucestershire. Commencing at Slimeroad Pill on the river Severn, the Dyke traverses the peninsula of Beachley by Sedbury Park and Buttington Camp down to Tallard's Marsh on the Wye, about half a mile below the railway bridge at Chepstow. A small portion exists near Tutshill, opposite Piercefield Park above Chepstow. Running from Llancaut cliffs on the south to Banygor rocks on the north, opposite the Wyndcliff it isolates the summit of the peninsula at Llancaut. About one mile appears in Tidenham Chase, and still further northwards about one mile and a half opposite Tintern Abbey, maintaining a course tolerably parallel with the river, and at an average distance of about half a mile east of it. Between St. Briavels and the Wye, opposite Bigsweir, about half a mile is met with, and occasional traces of it, about one mile in total length, exist between Newland and the river. Eastwards of Symond's Yat, Coldwell rocks, and Rosemary Topping, a short length is found in the parish of English Bicknor, close to Lydbrook Junction of the Severn and Wye railway,

opposite to Welsh Bicknor on the other side of the Wye in Herefordshire. From this spot to the re-appearance of Offa's Dyke at Bridge Solers the distance by the river, including many sinuosities, is 45 miles.

There are traces of other earthen embankments in the lower parts of the peninsula between the Severn and Wye, some of which may have been of earlier date than Offa's Dyke, in connection with the concentration of the Roman forces in this important district contiguous to their settlements at Caerwent, Caerleon, Blestium, Glevum, and Ariconium, and to their iron forges in the Forest of Dean. The strong triple or quadruple line of entrenchments in the wood, extending from the steep, almost perpendicular escarpments of Symond's Yat rocks above the railway station to the inaccessible heights of Coldwell rocks, may have been of later date. The late Mr. W H. Greene, of Newport, wrote frequent articles to the *Chepstow Advertiser*, in the year 1893, notifying several discoveries by him of unrecorded military earthworks along the lower course of the Wye. To sum up, in conclusion, the earthworks are there to the present day; in the absence of documentary or traditional evidence, their date of origin and objects are purely conjectural.

THE ROWE DITCH.

It has been stated that if Offa's Dyke had been continued due northwards from its position at the base of Ladylift it would have passed through the following parishes in succession:—Yazor, Weobley, Dilwyn, the western fringe of Eardisland, Pembridge, Shobdon, possibly Letton and Walford, Aymestrey, Wigmore, Adforton, and Leintwardine, where traces now exist of the site of the Roman settlement known as Bravinium. It has, moreover, been stated that there is a ditch still existing in the parish of Pembridge which is called "The Rowe Ditch."

The Rowe Ditch commences half a mile west of the village of Pembridge. Crossing Curl brook, proceeding northwards, between Byletts and Moseley Common, Sheet xviii., N.W., where it has the character of a huge embankment fifteen feet high, it assumes the form of a ditch when on lower ground. It is crossed by the Leominster, Kington, and Radnor railway half a mile west of Pembridge railway station, and after a total course of more than a mile it terminates south of the river Arrow. Upon the north side of this river it re-appears at Leen farm, and extends northwards for about a mile and a quarter into the parish of Staunton-on-Arrow, finally terminating, in the form of a ditch near Milton Cross. Sheet xi., S.W. Its total length is nearly two miles and a half.

A personal exploration of part of the ground, added to an extended enquiry from local residents interested in the subject, have failed to bring to light any traces of its prolongation northwards through any of the previously mentioned more northern parishes between its terminus near Milton Cross and Leintwardine. There is neither history nor local tradition respecting this so-called Rowe Ditch, although its proportions are as large as many existing portions of Offa's Dyke.

A continuation of Rowe Ditch southwards from Byletts by Pitfield farm, Longwood Bar, and Tibhall, or a total length of two miles (Sheets xviii., N.W., xviii., N.E., and xviii., S.W.), would have conducted to a place called Grim's Ditch, a quarter of a mile north-east of Sherrington farm, where there is an irregular shaped ancient looking boundary stone of the parishes of Pembridge, Dilwyn, and Eardisland, upon which are inscribed the letters P.D.E. There is, however, nothing beyond the ordinary modern hedge ditch to be found here, nor any traces of an embankment.

A still further prolongation of the line southwards would have conducted by Weobley Union Workhouse, (Sheet xviii., S.E., and on Sheet xxv., N.E.), after passing near the Ley, would have reached Burton Hill, the northern angle of the range surrounding Foxley, of which range Ladylift, on Sheet xxv., S.E., forms the southern angle.

In the previous part of this paper, Offa's Dyke has been traced from the river Wye northwards to this same locality, the Clay Pits at the base of Ladylift, hence it appears quite possible and probable that the Rowe Ditch may, in earlier days, have been the original extension of Offa's Dyke, and that our older antiquaries, Camden and Sir Samuel Rush Meyrick, were not wrong in their reckonings that Offa's Dyke passed through Pembridge, Shobdon Park, by Letton and Walford, to Leintwardine, although in the present day we can find no vestiges beyond the length of nearly 2½ miles at Pembridge. From the end of Offa's Dyke at the base of Ladylift to the commencement of the Rowe Ditch near Pembridge is 7 miles.

How then are we to account for the obliteration of traces of the Dyke? We have the observed agencies of weathering, and the march of civilization and agriculture, demanding the levelling of embankments, or the filling in of ditches, extending over a period of more than eleven hundred years, or, as Dugdale in his "Antiquities of Warwickshire" more quaintly sayeth in reference to a place in that county called *Grimeshill field*, or *Grimstoke*, near Coleshill. "Tract of Time hath thus overshadowed its very Ruins with the common arable land." To this must be added the historical fact chronicled by Speed that Marmodius, King of the Britons, in alliance with the Saxons of the north, south, aud west, broke down on a certain St. Stephen's Day, the banks of the Dyke, and filled up great part of the ditch.* Could any reader of ancient British history connect this successful foray of the Britons with *this* locality, it would clear away some of the mist; but, really, when we fail to see in the present day any vestiges of either the Castle of Hereford or of the mound upon which it stood, as represented on old pictures, a building which we know to have been in existence

*An "Essay on the life and institutions of Offa," by Rev. H. Mackenzie, 1840, gives the following references for fuller particulars of Offa's conquests:—*Matth. Westm.*, 275—9; *Chron. Mailros*, 138; *Saxon Chron.*, 61; *Brömton*, 770; *Hen. Huntingdon*, 343; *Flor. Wig.*, 778; *Hoveden*, 409; *Sim. Dunelm*, 107, 118; *Watt's ed.' Matth. Paris*, 975; *Holinshed*, b. 6, ch. 4. I shall be grateful if any member will help me with any one of the above works on loan: documentary evidence is firmer land than the treacherous ground of tradition or supposition.

Offa's return was speedy, and his revenge was decisive. "Entering Wales with a large army he conquered Marmodius, and all his associates in the field, and made all their hostages his vassals and slaves," and *probably* extended his line of demarcation further westwards.

less than three hundred years ago, one ceases to be astonished at the occasional obliteration of Offa's Dyke.

In the *Archæologia Cambrensis, 1850*, the Archdeacon of Cardigan asserts that the Dyke was older than Offa, basing his assertion upon the grounds that in more than one place it was "visibly cut through by Roman roads," and consequently he will not accept more than that the Dyke was "adopted" by Offa, and not executed by him.

How are we to account for the existence of two dykes? As our north-western frontier of India has advanced over hundreds of miles during the last forty years, lines of demarcation being again and again extended, surely we may credit the powerful King Offa of Mercia during his reign of about* 40 years with more than one extension of his principality. The eye of a military officer making a reconnaissance of this district can readily take in the situation. If the Rowe Ditch ever was originally Offa's Dyke, owing to its more easterly situations, it would most probably be the one executed in an earlier part of his long reign; the line forms a favourable frontier; it would embrace the elevations of Croft Ambrey Camp and Shobdon Hill. As Offa extended his territory towards the west, he would have included Wapley Camp, and the greater elevations of Herrock and Rushock, making upon their western slopes as a mark of demarcation and barrier against raids the defensive works now existing under the name of Offa's Dyke, in opposition to the contiguous hilly districts of Bradnor Hill, Hanter Hill, Stanner Rocks, Old Radnor, and New Radnor, as intricate a region on a diminutive scale as the mountain ranges of the various Khels or tribes of the Afridis between our north-western frontier of India and Afghanistan.

Etymologically the only derivation I can suggest for Rowe Ditch has been given me through Mr. F. Haverfield, of Christ Church, Oxford, from F. York Powell, Regius Professor of Modern History, Oxford; viz.: From the Old English raw=a row or line. We have, however, in our county another "Rowe Ditch," which dates only from the 17th century, namely the line of embankments leading from St. Martin's street to the river Wye, which were used in the siege of Hereford in 1645.

With reference to the derivation of Grimsditch, the Rev. Joseph Barker, of Eardisland, has supplied me with the following suggestions which are worthy of some consideration:—In Dr. Adam Littleton's Latin Dictionary, dated 1735, we find Grīmīni; m. Plin. lege *grumi* vel *grumuli* vel *Grimili*, Gloss. LANDMARKS. Again; Grumus, mi; m. Col. à Gero; congeries terræ, Perot. terræ collectio minor tumulo. Fest. à Gr. *θρομβος*. An hillock of earth, a lump; a clot, clotter or cluster of anything; clotted blood. Grumulus, li, m. dim. Plin. *θρομβιον*, a little hillock, an hop-hill, mole-hill, or ant-hill, a bed in a garden.

When first I saw the Rowe Ditch it was at the most northern portion of it which exists in the parish of Staunton-on-Arrow in the form of a deep ditch, and I associated it with a system of drainage of the low marshy district in connection

* Offa succeeded Ethelbald in A.D. 755; as regards the date of his death at Offa-leia or Offley, chroniclers are at variance; Speed says 29th July, 794; *Ingr. Sax. Chron.*, 794; *Mailros*, 796; *Matth. West*, 797.

with the river Arrow, constructed in comparatively recent years; such system as obtains in Lincolnshire and in Holland; the embankments acting as causeways over low marshy ground. But when I saw, near the Byletts, its southern portion, upon higher ground, assuming the proportions of a rampart 12 to 15 feet high, and thick enough to offer substantial resistance to artillery of the modern day, I was led to the conviction of its military character. Although the barrier could be readily scaled by man, the raiding enemy in his foray would find it no easy matter to drive cattle down its steep exterior slope, even had he succeeded in getting them so far as surmounting the rampart upon its interior slope. It is not easy to drive cattle *down* hill.

REFERENCES.—"Remarks on a line of earthworks in the parish of Tidenham, Gloucestershire, known as Offa's Dyke, by George Ormerod, D.C.L., F.R.S., F.S.A., of Tyldesley and Sedbury Park," 1859.

Also, *Archæologia*, Vol. xxix., page 8, for "Antiquities at the mouth of the Wye," by Ormerod. *Polychronicon*, by Ralph Higden (Gale-Scriptores 1, page 194). *Offa's Dyke*, by Captain Morgan, R.E. *Transactions of the Woolhope Club*, 1883, page 55. Ordnance Survey Maps, Herefordshire and Gloucestershire, on the larger scale of six inches to one mile. *Archæologia Cambrensis*, frequent references.

Woolhope Naturalists' Field Club.

SECOND FIELD MEETING, THURSDAY, JUNE 17TH, 1897.

OLCHON VALLEY AND THE BLACK MOUNTAINS.

THE atmosphere was favourable to-day for distant views, and the weather was all that could be desired for the walk of eight or nine miles from Llanveyno, where the carriages were left, through Olchon Valley, thence over the Black Mountains, a range extending from the Hatteral Hill at its southern extremity to Pen-y-begwm, the top of the Beacon, 2,219 feet high, but not the greatest altitude of the range, at its northern end over-looking, and about three miles distant from, Hay.

The botanists and ornithologists succeeded in finding some rarities, as will be observed when their records are printed.

The members trained to Pandy, having entered Monmouthshire when crossing the boundary line here formed by the river Monnow, shortly before reaching Pandy station. Carriages from the Angel Hotel, Abergavenny, were in readiness to take the party to Llanveyno, a distance of about seven miles. Close to Pandy station is Allt-yr-ynys (the hillside over the island), in Herefordshire, which was formerly the seat of the Cecil family. The following remarks are taken from an article, "Holiday Notes on the Welsh Marches," in *The Scottish Antiquary*, Vol. vii, No. 26, September, 1892, by the editor, Rev. A. W. Cornelius Hallen, page 64:—"Though not ennobled till Queen Elizabeth in 1571 created her trusted councillor William Cecil, Baron Burghley, the Cecils held a good position as country gentry, owning the estate of Alt-yr-ynis. . . . . Lord Burghley took great pains to prove his descent, and from records he collected there is proof that he was son of Richard Cecil, or Sitsilt as the name was spelt. Richard was groom of the wardrobe to King Henry VIII. He was the son of David Cecil, serjeant-at-arms and steward of the King's manor of Coleweston, Northamptonshire. This David was second son of Philip Cecil, and his wife, Maud Vaughan, the granddaughter of Richard, Lord Talbot. David, like many younger sons, travelled up to London to make a position for himself. He seems to have been apprenticed to a citizen, a sieve-maker, on London Bridge, and this circumstance, common as it was at the period, was made use of to taunt his descendants with. They, however, successfully proved their gentle descent. The head of the house and his descendants continued at Alt-yr-ynis. Amongst the Marquis of Salisbury's family papers at Hatfield is a 'Genealogy of the Sitsilts of Haultereinnes in Evas, Hereford, in two branches. Sir W. Cecil, Lord Burghley, and William Sitsilt, of Haultereinnes, A.D., 1588.' The family,

however, has now disappeared, though it existed as late as the commencement of this century, as a tomb with the Cecil arms carved on it in Grosmont churchyard testifies."

On page 65 of the same article we read:—" In the Parish Registers of Skenfrith Church are entries of 1728, May 30, buried 'John Cesill,' and amongst the clerical signatures appear W. Cecil, in 1760, and Philip Hastings Cecil, vicar, who first signs the book in 1769."

Again, on page 61, " we have seen a statement that Gerald Sitsilt, or Cecil, ancestor of the ennobled families of Cecil, was buried in Abbeydore Church under a tomb bearing his arms. As his grandson, Sir John Sitsilt (son of John Sitsilt and Sibil, daughter of Robert de Ewias), was living in 1337, one of these tombs may possibly be his."

Trewyn, or Win's Home, in Monmouthshire, approached through an avenue of fir trees, where the members have been twice welcomed by General Gillespie, is treated of in *Transactions*, May 15th, 1884, pages 152 and 167, *q.v.* Oldcastle Court, about six hundred yards left of the route, is built upon the site of a former castle. St. John the Baptist's Church is close to the Court; see Sheet 48, N.E., Ordnance Survey Map. About one mile further north, at Glandwr, we again crossed the boundary to re-enter Herefordshire (Sheet 49, N.W.), and after proceeding for another short mile passed Clodock Church upon the right hand (Sheet 43, S.E). The simple primitive Lich Gate, dated 1667, has both its walls leaning. The Church possesses some features of the Norman period. Traditionally this Church is on the site of the assassination of St. Cleodicus, and his tumulus, of which there are now no vestiges, was, according to local traditions, reared on the high bank across the river. The Cornewall Arms is near the church and the altitude here is given in the map as 400 feet. About half a mile north of Clodock Church a fine tumulus is observed upon the left near Pont-hendre, and at this locality the road crosses the Olchon Brook, which here joins the Monnow river upon its right bank. Half a mile still further north upon the road leading to Michaelchurch the Escley brook empties into the Monnow upon its left bank. Proceeding onwards, taking the road bearing to the left for the distance of half a mile, the highway passes through an ancient quadrangular camp, or earthwork, upon the north-eastern angle of which the ruined ancient castle of Longtown surmounts an extensive mound. Neither history nor documentary evidence has been found in connection with this Castle. It is a building of curvilinear curtains with circular drum buttresses, similar to the Donjon or Juliet which succeeded the old Norman towers and Shell Keeps, not to be confounded with the dungeon, of which there were none save in a very few exceptional cases, the buildings so miscalled being really required and used as magazines and store houses rather than as dungeons for prisoners. One of the towers appeared to have served the purpose of a huge chimney. It is true that what is called in mediæval military architecture a Keep was commonly built as a place for final retreat and safety, within the area. In this instance the lofty mound upon which the masonry building is erected forms an excellent defensive work on a commanding situation, and there are vestiges of masonry constructions of an

inner and outer ward to the south. The Castle deserved a longer examination, but time forbade more than a flying visit by some of the most active members whilst the carriages proceeded leisurely forward up the hill.

Longtown Church has nave, chancel, and Early Decorated windows. It has no burial ground. At Longtown the road is on an elevation of 600 feet, and from this point it continues ascending, with but few breaks, for several miles, and was found a heavy drag against the horses' collars. At the distance of about half a mile from Longtown Castle (Sheet 43, N.E.), at the fork of the road near Chapel House, the road inclining to the left must be taken for Llanveyno, as the other roads conduct by the Great and Little Cwm and Parry Cwm farms, thence through Craswall to Hay. From the fork of the road, 744 feet above sea level, another mile and a half brought our party to Llanveyno Church upon the left, the terminus for our carriages on an elevation of 874 feet, whence the descent was made to the Olchon Brook by a lane one mile in length to the ford and foot-bridge at a farm which is named Glandwr, the same name as the farm one mile south of Clodock which was passed in the earlier part of our carriage journey.

Llanveyno Church, a diminutive building only 28 feet by 17 feet, has some 14th century windows in the chancel. Like Longtown it has no burial ground, and both these buildings are chapelries to the mother church of Clodock.

The road from Longtown to Llanveyno is upon a narrow ridge of land, with the narrow Olchon Valley on the left, and the wider valley upon the right, which leads to Craswall. The Black Daren, 1,750 feet high, and the Red Daren, 1,927·5 feet high, stand out in succession conspicuously under the semblance of landslips of Old Red Sandstone detached from Hatteral Hill.

On entering the narrow gorge of the Olchon Valley the sharp knife-like ridge of Crib-y-Garth, locally called Cats' Back, is conspicuous upon the right. It runs as a long spur southwards from Black Hill, 2,102 feet high, and forms with the latter the eastern boundary of the Valley.

At Glandwr farm the members were met by Mr. James Smith, of Olchon Court farm, who very kindly acted as guide as far as Pen-y-beacon, or Pen-y-begwm, the northern extremity of the Black Mountains. This guide was obtained upon the recommendation of Dr. Leslie Thain of Glan Olchon House, Clodock, whose professional engagements prevented his attendance, and who with his cultivated taste of antiquarian lore would have given us all the traditions he had gathered from the memories of the inhabitants. Dr. Thain also kindly made all the local arrangements for the conveyance of refreshments to Olchon Court, which, by the way, were thoughtfully supplied by our member, Mr. J. Carless, who has a tenant in the adjoining farm, The Firs, far aloof from sound of railway trains. There is evidently enough of interest in this locality for a special meeting instead of being scamped over in passing as was to-day imperative, and the place must be re-visited whenever practicable, under the joint guidance of Alderman the Rev. John Davies, of Tynewydd, Pandy, and Dr. Thain. Some of the inhabitants here can boast of their dwellings having been in the hands of their ancestors for many generations. In these isolated farm buildings many a quaint scrap of traditional lore is stored away in the memories of the tenants, and many times

will the same thrilling story be told by the fireside in the absence of daily newspapers. A visit to this out-of-the-way locality has been recently very pleasantly treated by "H. C. T." in the pages of *Longman's Magazine* for November, 1896, under the title "Another Arcady."

Having crossed Olchon Brook at Glandwr farm, the members, under the guidance of Mr. Smith, ascended a grass grown lane or cart track, which occasionally serves as a watercourse in times of floods, bounded by high unkempt hedges, out of which shortly a little deviation was made to the right in order to inspect Cae Thomas's Well (Saint Thomas's Well), containing water of a very cool temperature and of perfect clearness. Thence onwards over a grass meadow only one acre in extent, from which eleven loads of hay had been recorded as carried. The route thence led through a sheltered nook covered with a plantation of holly trees, whose tops had been trimmed to supply a change of food for cattle in the winter season, the leaves of the upper branches being bare of thorns or prickles. A distance of about half a mile from Cae Thomas's Well brought the party to a halt for luncheon at one o'clock at Olchon Court farm.

The unkempt high hedges must not be attributed to negligence and bad farming. They are purposely untrimmed in order to afford useful shelter in these exposed lofty situations for sheep, of which Mr. Smith has as many as four hundred.

On entering Olchon Court the surroundings prompted the visitors to quote the less prosaic language of the writer of "Another Arcady":—"Some of these interiors are so beautiful in their peacefulness, their 'tranquillity of order.' I am thinking of one such now; the old porch, the large kitchen, the carved oak chest, the inlaid chest of drawers with its engraved brass locks and handles, the puppy sheep dog who has squeezed himself into the snug chimney corner and looks out furtively at the strangers, the picturesque old figure sitting by the fire . . . . knitting yarn which is spun from the fleeces of her own sheep. . . . This is not absolutely a wilderness where no man is, but it will show that it is thinly populated when I say that we walked two miles to this farm and met no one on the way."

After luncheon the President made some remarks respecting the associations of Sir John Oldcastle and the mediæval Baptists with this locality.

Olchon Court is a farm building with substantial walls of masonry, a 14th century doorway, and square-headed and mullioned windows. One room on the ground floor, in which we lunched, has a recess like an aumbry, and one of the windows retains its original antiquity. The window in a room above, pointed out traditionally as the window through which Sir John Oldcastle escaped from his pursuer, has undergone restorations since his period. The escape of Sir John Oldcastle is as fresh to-day in the current traditions of this locality as if it had taken place within the lifetime of the oldest inhabitant. This farmhouse is also locally known as Court Walter. It is supposed to have been the home of Walter Brute, one of the earliest Lollards in Herefordshire, a man of considerable talents and learning, who was in 1391 cited to appear before Trevenant, Bishop of Hereford, for heresy. It is not positively known what became of him, though

some think that he was put to death at Bodenham. Sir John Oldcastle, afterwards Lord Cobham, was in his youth a favourite companion of Henry V. before his accession to the throne, and was, so says Coxe, "awakened to virtue by a sense of religion." In 1413 he was charged with a breach of the Statute, and with encouragement of the Lollards, particularly in the Dioceses of London, Rochester, and Hereford, by sending out "unlicensed preachers," and himself attending their meetings, and was committed to the Tower. Upon his escape from the Tower, a rising of the Lollards occurred round London, and Sir John fled into Wales, when a reward of 1,000 marks was offered for his capture dead or alive. Owing to his friendship with the Brute family, it is believed that he sought refuge in this secluded valley, where he is supposed to have remained concealed for a period of four years. Eventually, after his escape from Olchon Court, he was betrayed by some followers of the Earl of Powis, taken prisoner at Broniarth, in Montgomeryshire, and thence again conveyed to London, where, being adjudged as "traitor and heretic," he was hanged and burnt hanging on Christmas Day, 1417.

In "Herefordshire Biographies" Mr. John Hutchinson says that Sir John Oldcastle was born about the year 1360, and this author shares with Robinson in his "Castles of Herefordshire" the belief that Oldcastle in Almeley was most probably the place of his birth. There is in Herefordshire a third Oldcastle, on the western border of Deerfold Forest, between Lingen and the ruined abbey, or nunnery, of Limebrook, but neither history nor investigation encourage us to support the statement of some antiquaries that he may have been born there; that he may have visited the locality is possible enough since we know that William de Swynderby (William the Hermit) was there in 1390, and that many Lollards for a long time remained in the Forest of Deerfold, and most probably conducted their religious services in the Chapel Farm. (See the excellent paper by Dr. Bull in *Transactions* 1869, page 168, on "The Lollards in Herefordshire," and the accompanying illustration of the beautiful 14th century roof of Chapel Farm).

Mr. John Howells, in his pamphlet "The Old Baptist Church at Olchon, and Life and Martyrdom of Sir John Oldcastle," published in 1886, says, on page 41, "Olchon may, upon the whole, be looked upon as the birthplace of the first Reformers, the first Nonconformists, and the first Baptists among the Welsh; the district must be deemed a consecrated spot by many. It is certain that a church was gathered here as early as the year 1415, and probably much earlier." Vestiges of foundations near Olchon Court show the site of the old chapel, and tombstones bearing date 1387 have been dug up in the burial ground belonging to the church.

After luncheon the advance was sounded. The Olchon Brook, here nothing more than a diminutive brooklet, was again crossed, and the ascent of the hill was made. On reaching the greatest altitude of the bridle road to Hay, or cart track, if such it may be called, the Ordnance Map was consulted, and the elevation of 2,145 feet was given. Crasswall Chapel could be seen on the opposite side of the intermediate valley, and also the site of Crasswall Abbey and Priory. There are several farms about these hills situated upon very high ground. Olchon

Court stands on high ground; the Firs farm is a little higher; the farm of Blaen Olchon stands on an elevation of 1,262·7 feet; but the farms in Crasswall and on Cefn Hill are on higher elevations. The elevation of the building at Coed Major is not given in the Ordnance Map, Sheet 37, N.W., but it is situated only two hundred and fifty yards south-east of an elevation on the country road of 1,561 feet. All these buildings are in Herefordshire.

During the halt here Mr. Moore made some remarks about the altitudes of the various hills seen from this locality, culled from his Notes on Altitudes in Herefordshire, but was careful not to inflict upon the members a mass of dry statistics upon such a breezy day on which he thought they must much prefer a ramble over the heather to being lectured. A few of the party ascended to the greatest elevation in Herefordshire, 2,306 feet high, about a mile and a half south of Pen-y-begwm, or Pen-y-beacon, 2,219 feet high, at the north-western angle of the northern extremity of the range, the sharp edge of which is so conspicuous from most parts of Herefordshire, and from far beyond the Malvern Hills; the writer has seen the whole range from an elevation of 600 feet near Barnt Green railway station, at the top of the Lickey railway incline between Bromsgrove and Birmingham. Many of the party were satisfied with the walk to Pen-y-begwm, whence those who were familiar with the "rhiw," as the sheep track or mountain path is called in these parts, descended by a footpath upon its western flank in the county of Brecon, in preference to the more dangerous but shorter toboganing route down the steep declivity selected by a few. In the peaty earth on the summit of the hill the numerous trenches are visible which were successfully dug to limit the flames of the parched grass caused by the Jubilee bonfire in 1887. There were not many bogs, or "mawn pits" as the natives call them on these hills this dry weather. The remainder of the party continued along the weekly trodden market track which conducted to Hay down the hill side between the Twyn-y-beddau tumuli (which were excavated by the Woolhope Club in 1871, see *Transactions* 1871, page 1) upon the left, and the Artillery Camp upon the right, thence through the picturesque Cusop Dingle, alongside Dulas Brook, which forms here the boundary between Breconshire and Herefordshire.

Archdeacon and Miss Bevan hospitably entertained the members at their residence, Hay Castle, where is to be seen the old Edwardian gateway, the ruins of the Norman Keep attached to the present mansion, which was constructed with masonry from the ruins by one of the Boyle family, who also owned the Whitefriars in Hereford; but this and the fine old Jacobean staircase in use in the modern building have been previously chronicled in the *Transactions* of the Club.—*Transactions*, 1889, page 362.

The members, refreshed with rest and tea at Archdeacon Bevan's, walked to the station and left Hay by the evening train.

Some of the party had extended their explorations further than others. The whole walk traversed a charming variety of rural lanes, brooks, valleys, and hills, covering eight or nine miles. The task allotted to the members in the programme of the day proved to be a pleasure, and the distances appeared halved. The reason why is explained in the following extract from "The Task":—

"For I have loved the rural walk through lanes
Of grassy swarth, close cropped by nibbling sheep,
And skirted thick with intertexture firm
Of thorny boughs: have loved the rural walk
O'er hills, through valleys, and by rivers' brink."

. . . . . .

"Scenes that soothed
Or charmed me young, no longer young, I find
Still soothing, and of power to charm me still.

—*Cowper*

The following members were present:—The President (Mr. H. Ceci Moore), the Mayor (Mr. Alderman Llanwarne), Revs. W. S. Clarke, R. Harington, E. J. Holloway, A. G. Jones, A. Ley, H. B. D. Marshall, R. T. Money-Kyrle, W. E. T. Morgan, A. Pope, and H. Trevor Williamson; Lieut.-Colonel Evan Thomas, Dr. Scudamore Powell; Messrs. Ernest Ballard, J. P. Brown, J. Carless, R. Clarke, G. Davies, E. Du Buisson, G. H. Hadfield, W. Humfrys, T. Hutchinson, F. R. Kempson, C. J. Lilwall, J. W. Lloyd, H. J. Marshall, T. D. Morgan, T. C. Paris, G. H. Phillott, J. Probert, M. J. G. Scobie, J. Reginald Symonds, H. A. Wadworth, and Alfred Watkins. The following were visitors:—Revs. C. L. Money-Kyrle, and S. Onslow of Peterchurch; Messrs. B. E. Holloway, H. A. Prothero from Cheltenham, F Shuttleworth, F. Williams, and W. E. de Winton.

NOTES ON OLCHON.

By Rev. W. E. T. Morgan, Vicar of Llanigon.

In case no one has come prepared with notes of this secluded valley, I thought it as well to jot down a few particulars taken almost exclusively from the Rev. Joshua Thomas's *Welsh History of the Baptists in Wales.*

Olchon, or more properly Golchon (derived from Golchi, to wash), is a small narrow valley in the parish of Clodock, Herefordshire. The Rev. Joshua Thomas was minister here from 1746 to 1754, serving it from Hay twice a month, always preaching in the Welsh language. The tradition in those days held that the neighbourhood of Olchon was the cradle of Welsh Nonconformity. Connected with this neighbourhood are Thomas Bradwardine, who became Archbishop of Canterbury, and died 1348, Thomas Brute, a zealous disciple of Wiclif, is supposed to have lived here, or near. Foxe, in his Book of Martyrs, speaks of him. Sir John Oldcastle, Lord Cobham, the celebrated Lollard, is said to have had a residence at Oldcastle. He, too, was a faithful follower of Wiclif, and collected all his writings. He maintained a number of itinerant preachers. Tradition tells that he was either taken prisoner, or once escaped his pursuers, at a farmhouse called Olchon Court. He was ultimately excommunicated, imprisoned in the Tower, hanged, and afterwards burnt, 1417. William Tyndale is also supposed to have been a native of these parts. He was burnt in 1536. It is claimed that John Penry was born near Olchon, although it is more probable that his birthplace was Cefnbrith, in the parish of Llangammarch, Breconshire. Sir William Cecil, Earl Burleigh, whose Celtic name was Sysyllt, or Sytsyllt, which, the English finding so difficult to pronounce, changed to Cecil, was also a native of these parts. The old family seat was called Gallt-yr-ynys, or Alterennis, near Oldcastle. There can be no doubt that Nonconformity existed here very early. Mr. Thomas seems to think that the Baptists were established here in 1633, but as that is the year that they formed themselves into a sect, it is scarcely likely that the Church in Olchon can be traced so far back. There does not seem to be any proof that there were Baptists in Wales before 1649. Howell Vaughan is said to have been the first minister of Olchon, and his name appears in a letter dated 1653. There was a tradition that John Rhys Howell, who was an assistant preacher here, before he went to America, left a chest full of papers in a house at Olchon, but unfortunately they were destroyed. He died in 1692.

The earlier accounts of Olchon are derived from the "Extracts," which were records of the Church at Ilston, in Gower, Glamorganshire, which were taken to America by Mr. John Myles, who was the son of Mr. Walter Myles, of Newton, in the parish of Clodock. John Myles, according to Walker's "Sufferings of the Clergy," held the Rectory of Ilston, the rector, William Houghton, being "sequestered by the propagators for delinquency." He was ejected in 1660, and emigrated to America, settling and forming a Church at Rehoboth, in Massachusetts, in 1663. Here he was summoned before the Governor at a Court held at Plymouth for "a

breach of order, in setting up a public meeting, without the knowledge and approbation of the Court, to the disturbance of the peace of the place," and fined £5, and ordered to remove elsewhere. They were granted a large tract of land upon which they built a town called Swansea. (Backus's *History of New England.*) Mr. Myles divided his labour between Swansea and Boston, and died in the former place, 1683.

There is a rivalry between Olchon and Swansea, both claiming to be the Mother Church of the Baptists. (I think this must refer to Ilston). The Baptists and Independents were probably amalgamated originally at Olchon. In January, 1649, Mr. John Myles, with whom was Mr. Proud, according to the "letters" from Llanigon to Ilston, "preached baptism to the congregation of professing believers who met in Llanigon." He baptized no one there at that time, only gave directions to the elders, Mr. Walter Prosser and Mr. James Hughes. It seems that before Mr. Myles came to them all this Society practised infant baptism. Mr. Myles's preaching made a great impression on their minds, and in November of that year the elders sent a letter to Ilston stating what the people thought about the Baptism of Faith—adult baptism. These letters appear in the "Extracts," now in America.

From 1660 to 1688 this Church was much persecuted, yet a few remained steadfast through all. They worshipped where they could. One celebrated spot where they used to meet was called "Y Darren Ddu"—the Black Rock. They also often assembled in the house of Mr. David Watkins, Wern Wen, and in that of Mr. Thomas John Williams. Before the persecution ceased Mr. John Gilbert invited them to meet in his house, Baili Bach. In his time a pulpit was erected in an outhouse bearing the date 1703. The Rev. Joshua Thomas preached in this pulpit in 1776.

Mr. Thomas Parry was a follower of the Baptists, and one of the earliest in the parish of Llanigon. About the same time the Rev. Thomas Watkins, who lived near Olchon, was minister of Llanigon. Mr. Parry lived at the Wenallt, and the meetings were held in his house. The Rev. Thomas Watkins, who died about 1694, is said to have served Olchon for forty years. "He was the best shepherd the Church ever had."

In 1699 the Church of Troesgoed (now Maesyberllan) was founded, and it was agreed that the Churches of Olchon, Llanigon, and Maesyberllan should elect one minister, and they chose Mr. Richard Williams to be pastor. He was a successful and hard-working pastor. He died in 1724.

Three young men had begun to preach in these churches—Thomas Price, Rees Williams, and Philip Morgan, the first two from Olchon, the other from Troesgoed, when Mr. Williams died, and there seems to have been some jealousy between the churches in the selection of a successor, one party favouring the one and another the other. After a long and bitter controversy the churches separated, 1729, Llanigon and Troesgoed amalgamating.

A young man, Mr. William Williams, of Clifowyr, Pembrokeshire, was ordained in 1731, but he did not remain long. He was succeeded by Mr. Jacob Rees, of Penyfai, Glamorganshire. Soon after he arrived he baptized Mr. John

Powell, of Abergwessyn, Breconshire, who was a ery talented preacher. Mr. Rees left in 1745. There were several members belonging to Llanigon and Troesgoed in Capel-y-ffin. Finding the distance too far, they asked to be released from Troesgoed, and joined Olchon. Permission was given to twelve members in 1746. There were now three churches, Olchon, Capel-y-ffin, and Llanigon. Preaching in the two former was very irregular, but frequent in the latter. In 1746 the Rev. Joshua Thomas came to reside in Hay, and served Olchon twice a month. He left for Leominster in 1754. Olchon and Llanigon were amalgamated for nearly 120 years. In 1762 Mr. Prosser gave a piece of land to build a chapel "near a place called Capel-y-ffin." I presume this must be the Baptist Chapel of Capel-y-ffin. After 1754 Mr. J. Andrews served the chapel twice a month till 1762, when Mr. George Watkins did duty. In 1773 he was ordained. Mr. Andrews died in 1793. In 1788 Mr. James Price and Mr. James Perrot were baptized, and soon after began to preach. The first removed to Glamorganshire. The latter seems to have ministered here till 1794, when he removed to Hengoed. I know nothing of the latter history of Olchon. The last minister was Mr. Howell, who had some misunderstanding with the members, and left not many years ago. I am informed that he is still alive, living at Longtown. He was the means of building the new chapel at Olchon. The services now are very rare, a minister from Longtown coming up about once a month.

COMMENTS ON REV. W. E. T. MORGAN'S NOTES.

Mr. John Hutchinson, having seen the above notes in the local newspaper, the *Hereford Times*, writes as follows from Middle Temple Library, London, under the date of July 7th, 1897:--"Though I have not the honour of being a member of the Woolhope Club, I follow their *Transactions* with much interest; and I accompanied them in spirit in their pleasant excursion in the above old world romantic region, and perused with much pleasure the account given of it. In particular, I read with interest the paper respecting Olchon prepared by the Rev. W. E. T. Morgan, "taken chiefly," according to that gentleman, "from the Rev. Joshua Thomas's History of the Baptists in Wales."

"Relying, as the writer of that history (Mr. Thomas) seems to have done, greatly on tradition, and having probably but scant access to the best written records, it is but small reflection on his work to say that it contains some inaccuracies. The most obvious of these occurring in the paper is that "Sir William Cecil," the great Elizabethan Statesman and ancestor of our present distinguished Prime Minister, "was born in these parts" (*i.e.*, about Olchon). Sir William Cecil, it is well known, was born in Lincolnshire, "at his grandfather's house at Bourn." Had he been born at Olchon, he would have found a place, and, of course, a prominent place, in my "Herefordshire Biographies." Though it is, of course, possible that the name of Cecil is another form of Sysyllt, or Sytsyllt, or Sitsilt, and though there may have been a connection between the English Cecils and the Sysyllts of the Welsh Marches, no one has yet been able to show it; and the pedigree of Sir William Cecil cannot be satisfactorily traced

farther back than to his grandfather, David Cecil, of Bourn, aforesaid. That Sir William himself had some doubts of his Welsh, or rather Norman, origin (for the Sitsyllts, though they took a Welsh name, were Normans) is evident from his endeavouring to derive his descent from the Roman *gens Cœcilia*, as vain an attempt, of course, as the other. Then as regards Thomas Bradwardine, Archbishop of Canterbury, it is very probable that his family may have been originally connected with the neighbourhood of Olchon, if they did not take their name from Bredwardine on the Wye not far off; but it is certain that Thomas, the famous "Doctor Profundus," was born in Chichester, for he himself says so, otherwise he also would have figured in my book. As regards John Penry, "Martin Mar-Prelate," there is no doubt that he was born in Breconshire."

In reply to which, the Rev. John Davies writes from Tynewydd, Pandy, to the President under date July 17th, 1897:—"The Rev. W. E. T. Morgan took most of his facts from the 'Rev. Joshua Thomas's History of the Baptists in Wales.' I quite agree with Mr. John Hutchinson that Mr. Thomas's history is full of inaccuracies, and so is Mr. G. Howells' pamphlet, which is chiefly copied from Thomas's history. I have never seen any statement before that Sir William Cecil was born '*about Olchon.*' John Howells, I believe, is the first who made such statement. The Cecils, undoubtedly, had some connection with Allt-yr-ynys or Alterynys, as their coat of arms was to be seen there until lately in the window of the old chapel, and which is now fixed in the chancel window of Walterstone Church. John Penry had no connection whatever with Olchon. The Vicar of Llanigon calls Brute of Olchon, 'Thomas Brute,' but his name was *Walter Brute.* Charles Edwards, in the early part of the 16th Century, in his 'Unfeigned Faith, containing a brief History of the Christian Religion,' refers to '*Walter Brute of Olchon*' by name."

ETYMOLOGY OF OLCHON.

With reference to the derivation of Olchon, we have the authority of the Rev. John Davies, of Tynewydd, Pandy, a Welsh scholar, whose absence from our pa rty owing to urgent duties was much regretted. Olchon is a Welsh word, whose component parts are "golch," to wash or scour; and "on," an old British word, which we find affixed to many words connected with water, such as in "ffynnon," a well; "afon," a river; "eigion," the ocean. The "g" in Golchon is dropped for the sake of euphony. Olchon therefore means "a scouring river."

The Welsh are always happily descriptive in the selection of their place-names, which are always expressive and characteristic of their surroundings. Even in a drought a stranger can at once understand how, after a good shower, the brook here must come pouring down the steep declivities of the rocky glen with tremendous velocity, and an examination of the Ordnance map proves that in its short course of six miles it has descended sixteen hundred feet.

BOTANICAL NOTES.

By Rev. A. Ley.

The visit of the Club to the Black Mountains took place at a time of year when the mountain meadows were looking their freshest and gayest with the spring flowers, though it was too early to see the plants of the moorland and the mountain cliffs in perfection.

The Olchon dingle, and the upper part of the Cusop dingle, were full of the sweet-scented Orchis (*Gymnadenia conopsea*), the larger Butterfly Orchis (*Habenaria chlorantha*), Tway-blade (*Listera ovata*), and Lady's mantle (*Alchemilla vulgaris*); while in the hedges and stream sides in other parts of the district Globe Flower (*Trollius europœus*), Bird-cherry (*Prunus Padus*), and Water Avens (*Geum rivale*) were seen. In the Cusop dingle abundance of the two handsome Horse-tails (*Equisetum maximum* and *sylvaticum*) was growing, while all through the district the hedges and bushy banks produced abundantly the rare bramble (*Rubus britannicus*). The lane banks throughout the district were starred with the lovely blossoms of at least four varieties of Potentils of the *Tormentilla* and *procumbens* group.

On the moorlands the only plant seen in perfection was the Common Butterwort (*Pinguicula vulgaris*), which was in full bloom. The Ling and the cross-leaved Heath (*Calluna vulgaris* and *Erica Tetralix*) were noted, but were not yet flowering; and this was also the case with the beautiful heath-like plant, the Crowberry (*Empetrum nigrum*). Two of the Cotton Grasses were also seen, but not in perfection. The two Wortle-berries, the black and the red (*Vaccinium Myrtillus* and *Vitis idœa*), were both seen in flower; and the springheads produced the Moorland Crowfoot (*Ranunculus Lenormandi*), and the Creeping Forget-me-not (*Myosotis repens*).

The mountain side cliffs, which occur in many places in the district, are the homes of a series of rare Hawkweeds, which, we fear, possess no popular names, and the following scientific names will only appeal to those who have made a special study of the genus:—*Hieracium pollinarium, subulatidens, euprepes, serpentinum, prenanthoides*, were all seen, besides one or two more forms which are not yet understood. The Mountain Whitebeam (*Pyrus rupicola*) was in flower in several of these cliffs, while its beautiful relative, the Mountain Ash (*Pyrus aucuparia*), was present everywhere in great beauty. At one spot, close to the eyrie, where a pair of ravens st ll yearly breed, and where we saw this year four ravens together, the rare brier, Rosa spinosissima, grows.

Of the ferns inhabiting the district the following were all seen, most of them in abundance:—Scaly Harts-tongue, Brittle Fern, Sweet Mountain Fern, Adders-tongue, Scaly Male-fern, Oak and Beech Ferns, and the Green-stalked Maidenhair. This last is still to be found in all its old stations, except the one in Herefordshire.

Sundew, Welsh poppy, Shoreweed (*Litorella lacustris*), and Bogbean, are found in the district, but were not seen on the expedition; but three of the rarest

of the mountain plants, the Wood Crane's Bill (*Geranium sylvaticum*), the Yellow Mountain Pansy (*Viola lutea*) and the Mountain Vetch (*Vicia Orobus*) were all found. The last-named is one of the rarest of wild plants, so far as Herefordshire is concerned, having been, it is believed, only once before seen in the county, by Mr. H. N. Ridley.

NATURAL HISTORY NOTES.

By W. E. de Winton.

The wind was too strong for butterflies to be on the wing; even the ubiquitous "Little Heath," save a few odd specimens, found it too cold and rough. By beating the heather a few moths were obtained, all of well-known heather-loving species. The bird life of this bit of moorland, the highest the county can boast of, is worth mentioning, for here are found birds breeding which are rarely seen even on migration in other parts of the county. (1) Ring Ouzel (*Turdus torquatus*), this handsome, lively bird seemed quite at home. (2) Wheatear (*Saxicola aenanthe*) very plentiful, young in all stages being found. (3) Rock Pipit (*Anthus obscurus*), same remarks apply. (4) Red Grouse (*Lagopus scoticus*), one barren pair were seen. The absence of any brood was not surprising, considering the presence of great numbers of carrion crows and the gulls (No. 6 on this list). (5) Golden Plover (*Charadrius pluvialis*). This is by far the most interesting bird on the list, as it has, as far as I can learn, never before been recorded as breeding within the limits of the county. The cock bird in his splendid breeding plumage, and his manœuvres, and warning notes to his mate, were well worth seeing. The hen bird ran a considerable distance from the neighbourhood of the nest before rising, and I was much struck with the apparently much greater size of the cock bird which his rich colouring and black breast gave him. I did not search for the nest as I saw no advantage in unnecessarily disturbing the birds, but I was perfectly satisfied that a nest of eggs was there. (6) Lesser Black-backed Gull (*Larus fuscus*). There were a party of two adult and two last year's young on the ground. At this season the old birds should have been at their breeding ground and the younger birds at the sea, and I do not quite know how to account for the presence of this species, but that they would be highly detrimental to the increase of grouse and other birds is certain, for more arrant poachers are not to be found.

HEIGHTS IN HEREFORDSHIRE.

By H. Cecil Moore.

If anyone desires a good walk over the highest ground in Herefordshire, I recommend him to take the train by Great Western Railway to Pandy, in Monmouthshire, only a few hundred yards over the county boundary there formed by the river Monnow; after a walk in Monmouthshire of three miles northwards, ascending the extreme southern end of the Hatteral Hill, as this extremity of the Black Mountain is called, he would, on an elevation of 1,673 feet, (see Ordnance Survey Map, Herefordshire, Sheet 48, N.E.), re-enter Herefordshire; proceeding northwards from this place, along the Watershed of the Hill, its extreme summit, (the boundary between Herefordshire and Monmouthshire in its southern portion, and between Herefordshire and Breconshire in its northern part), he might walk for a distance of *eight miles in Herefordshire* to the northern extremity of the hill, and thence make the descent into Hay, distant about three miles. In the course of this walk the first seven miles would be a gradual ascent to the greatest elevation in Herefordshire, 2,306 feet, thence one mile descent to the verge of the northern precipice.

Pen-y-beacon, 2,219 feet high, at the north-western angle of the northern precipice, is in Breconshire.

The elevations are taken from our three bound volumes of the 181 Ordnance Survey Maps of Herefordshire, on the scale of six inches to one mile, and the ten more recently published Maps, New Series, on the scale of one inch to one mile, viz., Sheets 180, 181, 182, 197, 198, 199, 214, 215, 216, and 233.

It was originally my intention to have compiled an accompanying map giving the altitudes in a convenient portable form, but as Messrs. Bartholomew have recently issued a first series of maps specially for tourists and cyclists, coloured to indicate the heights, it is unnecessary for me to prosecute the work any further.

The heights in the following table have reference only to such as are 1,000 feet or more above the sea level, and are given in descending order.

SOME OF THE ALTITUDES IN HEREFORDSHIRE, ONE THOUSAND FEET AND MORE ABOVE THE SEA-LEVEL.

Heights in feet above sea-level.	Locality.	No. of Ordnance Map on the Scale six inches to 1 mile.	No. of Sheet on the Scale of one inch to 1 mile.	Remarks.
2306 ...	Black Mountains ...	37. S.W.	214	On the boundary line between Herefordshire & Breconshire, in the township of Craswall.
1673 ...	Hatteral Hill ...	48. N.E.	214	On the boundary line between Herefordshire & Monmouthshire, near the south-west angle of the boundary.
1593 ...	Cefn Hill	37. N.W.	214	An Ordnance Survey Station in Michaelchurch Escley.
1422 ...	Vagar Hill	31. S.E.	214	In the parish of Dorstone, near Glis farm.
1402 ...	Main Road	31. S.W.	214	On the main road leading from Cusop to Craswall.
Cen. 1397·6 / Sur. 1398·6	Twyn-y-Gaer Camp...	48 S.E.	214	The boundary line between Herefordshire & Monmouthshire intersects this Camp.
1394 ...	Hergest Ridge ...	17. N.W.	197	Two miles west of Kington. A Survey Station at a place 500 yards south-west of the Old Race-course.
Cen. 1308·7 / Sur. 1310·1	Cusop Hill	31. S.W.	197	A Survey Station.
1305·8 ...	Reeves' Hill	5. N.E.	180	In the parish of Brampton Byran. Bench mark 300 yards from the boundary line of Radnorshire.
1284 ...	Bradnor Hill ...	17. N.W.	197	Two miles north-west of Kington.
Cen. 1265·3 / Sur. 1266.6	Harley's Mountain ...	6. N.W.	180	This hill in the parish of Lingen is cultivated to its summit.
1245 ...	Between Rushock Hill & Knill Garraway	10. S.E.	180	Above and north of Offa's Dyke.
1235 ...	High Vinnals ...	3. S.W.	181	Near High Vinnals farm.
1226 ...	Herrock Hill... ...	10. S.W.	180	A Survey Station, 2½ miles north of Kington.
1222 ...	Michaelchurch Escley	37. S.E.	214	This elevation is close to the Camp in this Parish.
Cen. 1202·6 / Sur. 1203·1	Garway Hill	50. N.W.	215	A Survey Station. The adjacent hill, 3 miles south, Graig, in Monmouthshire, rises to 1389 feet.

Heights in feet above sea-level.	Locality.	No. of Ordnance Map on the Scale six inches to 1 mile.	No. of Sheet on the Scale of one inch to 1 mile.	Remarks.
				Bench Mark.
1136·4 ...	Rushock Hill... ...	10. S.E.	180	Offa's Dyke contours under the western heights; and Knill Garraway is on the north-western edge.
1126 ...	Two miles and a half south of Gladestry...	16. S.E.	197	On the boundary line separating Herefordshire from Radnorshire.
1114 ...	Herefordshire Beacon	35. S.W.	199	Camp. Worcestershire Beacon is 1395 feet high.
1108 ...	Gattley Hill Coppice	7. N.W.	181	One mile north of Croft Ambrey Camp.
1100 ...	The Warren, Wapley Hill	11. N.W.	180	The contour of 1000 feet encloses the camp. Observations taken with an aneroid from this contour prove the summit of the earthworks of the camp to be 1100 feet high.
1098 ...	Brilley	23. N.E.	180	In the parish of Brilley, on the boundary line from Radnorshire.
1097 ...	Cole's Hill	6. S.W.	180	In the parish of Kinsham. A Survey Station.
1093 ...	The Globe	5. S.E.	180	A Survey pole, two miles north of Stapleton Castle.
1092 ...	Pedwardine Wood ...	6. N.W.	180	South of Brampton Bryan Park.
1089 ...	Hell Peak	5. S.E.	180	A Survey pole one mile north of Stapleton Castle.
1063 ...	Mynydd Merddin ...	44. S.W.	214	In Longtown parish.
1049 ...	Nash Wood	10. N.E.	180	One mile south of Presteign.
1048 ...	Near Little Cacau ...	23. S.E.	214	About 400 yds. south-west of Pentwyn Camp.
1044·9 ...	Merbach Hill ...	31. N.E.	197	Bench Mark at the Quarry, about 1¼ miles north-west of Arthur's Stone.
1042 ...	Brampton Bryan ...	5. N.E.	180	An elevation on the main road in Bramp-Bryan.
1039 ..	Shobdon Hill Wood...	11. N.E.	181	On New Map, sheet 181.
1022·9 ...	Hill House in Brampton Bryan ..	5. N.E.	180	Bench Mark.
1000 ...	Mary Knowl... ..	3. S.E.	181	Elevated mound near Mary Knowl Farm.
1000 ...	Lingen Vallet Wood	6. S.W.	180	A Survey pole 1 mile north of Cole's Hill.
1000 ..	Croft Ambrey ...	7. S.W.	181	Camp.
1000 ...	Bringwood Chase ...	3. S.W.	181	The summit encloses the contour of 1000ft.

Harley's mountain, 1,266 feet high, in the parish of Lingen, is cultivated to its summit. Farm buildings are found at great elevations on the road from Michaelchurch Escley to Hay, and up the Olchon Valley and elsewhere. At Blaen Olchon Farm, in the Olchon Valley, there is a Bench Mark 1,262·7 feet. Ploughed land was seen near Coed Major, north-west of the site of Crasswall Abbey on an elevation of 1,556 feet. Such facts will astonish the inhabitants of Egdon Hill, or Hegdon as it is spelled on Sheet 20 S.E., in the parish of Pencombe, on which is a Survey Station, cen. 827·7, sur. 829·3 feet; many of the Pencombe natives were wont to believe that this hill was the highest cultivated land in Herefordshire.

As regards Roads in Herefordshire at an elevation of more than 1,000 feet. The Cefn road which bounds the parishes of Michaelchurch Escley and Crasswall extends for more than four miles over an altitude exceeding 1,000 feet. See Sheets 37 S.E., 37 N.E., 37 N.W., and 31 S.W. At a place six hundred yards south of Newhouse farm, in the parish of Michaelchurch Escley, it attains an altitude of 1,429·9 feet. The road from Glis farm over Cusop Hill to Hay extends for three miles on an elevation more than 1,000 feet; between Glis farm and Castle farm there is a Bench Mark of 1,418·2 shown on Sheet 31 S.E. At this same locality two other roads cross each other, each of which, for the length of one mile, pass over ground on an altitude of more than 1,000 feet high. Again on the road from Longtown to Hay through Crasswall, thence over Parc-y-Meirch, there is an extent of nearly three miles of road on ground higher than 1,000 feet.

The detached portion called Fwthog has been transferred by the County Council to Monmouthshire, consequently no observations of heights in that district have been included in the above remarks. In the paper on the subject of the transfer of Fwthog in *Transactions* 1890, page 40, 2,145 feet is given as the greatest elevation in Herefordshire: this error is now corrected by the publication of the more recent Ordnance Survey Maps. The greatest elevation, 2,306 feet, in Herefordshire, is on the top of the Black Mountains distant about three-quarters of a mile further south-west. The elevation, 2,145 feet, is in the country track or bridle road from Olchon to Hay.

In the next following Table, some of the principal altitudes above 500 feet and less than 1,000 feet, are given. For this purpose the county is divided into North, Central, and South. The elevations are given sometimes from the Ordnance Maps on the scale of six inches to one mile, numbered successively from the northern and western boundaries proceeding eastwards; in other places the heights are given from the New Series of Maps, with their more recently published contours, on the scale of one inch to one mile.

SOME OF THE ALTITUDES IN HEREFORDSHIRE RANGING FROM 500 FEET TO 1,000 FEET ABOVE THE SEA LEVEL.

NORTH HEREFORDSHIRE.

Height in feet above Sea level.	Locality.	No. of Ordnance Map on the scale of 6 inches to 1 mile.	No. of Ordnance Map on the scale of 1 inch to 1 mile.	Remarks.
886·5	Brampon Bryan Park	2. S.W.	180	A Survey Station.
798	Coxall Knoll	2. S.W.	180	Camp.
946	Mocktree	2. N.E.	131	On the main road two miles north of Downton on the Rock.
900	Wigmore Rolls	6. N.E.	181	The summit not given; above the contour of 900 feet.
940	Camp	6. S.E.	181	Half a mile south of Haven Farm, Deerfold Forest, Wigmore.
887	Woodhampton Wood	6. S.E.	181	In Wigmore parish, near the boundary from Aymestrey.
925	Bircher Coppice	7. S.W.	181	Its northern part and south of Dionscourt Hill.
780	Upper Sapey	9. S.W.	181	On the road leading to Tenbury.
714·8	Laysters Pole	13. N.W.	181	180 yards south-east of the guide post on the cross roads.
692	Puddlestone	13. S.W.	181	One mile north-east of the Church.
664·1	Garmsley	13. N.E.	181	Farm near the Camp.
690	Fencote	13. S.E.	181	Railway Station.
738	Wall Hills Farm, Thornbury	14. N.W.	181	200 yards north-east of the Camp.
771	Stoke Bliss	14. N.W.	181	On the bridle road 80 yards north of a Survey Station.
658	Tedstone Delamere	14. S.E.	182	On the western boundary of the parish.
669	Tedstone Wafer	14. S.E.	182	Bench Mark 200 yards south of Court Farm.
838·4	Site of Huntington Castle	17. S.W.	197	Bench Mark.
600	Site of Lyonshall Castle	17. N.E.	197	Near the Church.
775	Birley Hill	19. S.W.	198	In the parish of Canon Pyon, west end of Westhope Hill.
520	Dinmore Hill	19. S.E.	198	Above the tunnel shaft in Church coppice.
549	Ivington	19. S.E.	198	Camp.
708·9	Hampton Wafer	20. N.W.	198	Bench Mark.
818	Grendon Green	20. N.E.	198	Main road Leominster to Bromyard, one mile north-west from Bredenbury.
829	Egdon or Hegdon Hill	20. S.E.	198	In the parish of Pencombe.
755	Bredenbury	20. N.E.	198	Near the Church.
739·7	Bromyard Downs	21. N.W.	199	Bench Mark at the Flagstaff.
669·4	Brockhampton Park	21. S.E.	199	At Bromyard Lodge.

CENTRAL.

Height in feet above Sea level.	Locality.	No. of Ordnance Map on the scale of 5 inches to 1 mile.	No. of Ordnance Map on the scale of 1 inch to 1 mile.	Remarks.
963	Burton Hill	25. N.E.	198	North of Ladylift.
932·5	Ladylift	25. N.E.	198	Clump of Scotch Fir Trees.
669	Butthouse Knapp	26. N.W.	198	In the parish of Canon Pyon.
739	Nupton Hill	26. S.W.	198	In the parish of Canon Pyon.
790	Badnage Wood	26. S.W.	198	In the parish of Tillington.
747·4	Upper Dinmore.	26. N.E.	198	Bench Mark on the north-west of the building.
523	Main road, Dinmore	26. N.E.	198	On the main road from Hereford to Leominster.
652	Munderfield Row.	28. N.W.	199	Midway (2½ miles) between Bromyard and Bishop's Frome.
600	Frome's Hill	28. S.E.	199	Upper Vine Tree Farm.
679	Cradley	29. S.W.	199	In Six-acre Wood, one mile east of Cradley Church.
845	Upper Wyche	30. N.E.	199	Near the boundary line from Worcestershire, on the western slope of the Malvern Hill.
555	Snodhill Castle	31. S.E.	197	One mile and a half south of Dorstone Castle Tump.
959·8	Moccas Park	32. S.W.	197	Bench Mark near Parkgate Cottage, one mile west of Blakemere.
763	Mansell Hill	32. N.E.	198	Offa's Dyke passes over this hill.
720	Credenhill	33. N.W	198	Camp above Kenchester.
738	Backbury Hill	34. S.E.	215	Near St. Ethelbert's Camp at Adams' Rocks.
892	Seager Hill	34. S.E.	215	On Sheepcote Hill.
751·6	Frith Wood	36. S.W.	216	One mile north-east of Ledbury railway station.
787	Swinyard's Hill	36. S.W.	216	South of Herefordshire Beacon.

SOUTH.

773	Stockley Hill	38. N.W.	214	Near Wellbrook Barn, one mile east of Peterchurch.
690·4	High Oaks Coppice	38. N.E.	215	Two miles north-west of Great Brampton.
793	Newton	38. S.W.	215	One mile west of the Church of St. Margaret.
708·3	Newbarns Wood	38. S.E.	215	Three miles west of Kingstone.
601	Whitfield	38. S.E.	215	Rookery west of The Lawns.
651·4	Brampton Hill Wood	38. S.E.	215	Two miles west of Kingstone.
595	Dinedor Hill	39. N.E.	215	Camp.
905	Aconbury	39. S.E.	215	Camp.
616	Haugh Wood	40. N.E.	215	Central dome of the Upper Silurian upheaval.
596·6	Capler	40. S.E.	215	Camp.
700	Ridge Hill	41. S.W.	215	Oldbury Camp.
937	Midsummer Hill.	42. N.W.	216	Camp and Hut Circles above the site of the ancient British town.

SOUTH—(*Continued*).

Height in feet above Sea level.	Locality.	No. of Ordnance Map on the scale of 6 inches to 1 mile.	No. of Ordnance Map on the scale of 1 inch to 1 mile.	Remarks.
839 ..	Ragged Stone Hill	42. N.W.	216 ...	South of Hollybush and Midsummer Hills.
693·3 ...	Much Birch ...	45. N.E.	215 ..	Bench Mark 200 yards south of King's Thorn.
688 ...	Much Birch ...	45. N.E.	215 ...	A Survey Station on the main road.
678·3 ...	Bryngwyn Hill ...	45. N.E.	215 ...	A Survey Station.
653 ...	Little Birch ...	45. N.E.	215 ...	Near the Wesleyan Methodist Chapel.
687 ...	Bagwy Llydiart..	45. S.W.	215 ...	A mile and a half north of Garway Hill.
786 ...	Saddlebow Hill...	45. S.W.	215 ...	One mile north-east of Bagwy Llydiart.
958·1 ...	Orcop Hill ...	45. S.W.	215 ...	Between Cole's Barn and Cole's Tump.
700 ...	Orcop	45. S.E.	215 ...	One mile south of the Post Office going towards St. Weonards.
664 ...	Little Dewchurch	46. N.W.	215 ...	Between Rough Hill Wood and Athelstan's Wood.
641·1 ...	Perrystone ...	47. N.W.	215 ...	Near Perrystone Towers.
600 ...	Penyard Castle ...	51. S.E.	215 ..	Above the contour of 600 feet.
659 ...	Howle Hill ...	51. S.E.	215 ...	A diminutive Camp is near Great Howle.
666 ...	Chase Wood ...	51. S.E.	215 ...	A large Camp is on Chase Wood.
Nearly 900 ...	Northern part of May Hill...	52. S.E.	216 ...	Within 30 yards distance from the contour of 900 feet in Gloucestershire, at the western angle of Newent Wood, and 500 yards east of Yartleton Farm.
785·2 ...	Welsh Newton ..	53. N.E.	233 ...	Bench Mark, half a mile south of Welsh Newton Common.
661 ...	Great Doward ...	54. N.W.	233 ..	In Whitchurch parish, opposite Symond's Yat.
700 ...	Little Doward ...	54. S.W.	233 ...	Camp.
644 ...	Coppet Hill ...	54. N.E.	233 ...	The northern extremity near Goodrich.
500 ...	Symond's Yat ...	54. S.W.	233 ...	Above the contour of 500 feet.

SOME OF THE PRINCIPAL HEIGHTS IN THE ADJACENT COUNTIES, VISIBLE IN CLEAR WEATHER.

Carmarthenshire.—Carmarthen Van, 2,631 feet.

Breconshire.—Brecon Beacons, 2,907 feet. (New Series Map, Sheet 213.)

" —The highest point of the Black Mountains, Waun Fach, 2,660 feet; Pen-y-Gader fawr, one mile south-east, is 2,624 feet high.

Monmouthshire.—Sugar Loaf, 1,954 feet; Blorenge, 1,834 feet; Skirrid fawr, 1,596 feet; Graig Serrerthin, 1,389 feet.

Radnorshire.—Radnor Forest, 2,166 feet.

Montgomeryshire.—Corndon, about 1,650 feet.

Shropshire.—Brown Clee, 1,792 feet; Titterstone Clee, 1,749 feet; Church Stretton Hills, 1,696 feet; Wrekin, 1,342 feet.

Worcestershire.—Worcester Beacon on the Malvern Hills, 1,395 feet.

Gloucestershire.—May Hill, 968·8. (The summit of May Hill is in Gloucestershire, but the boundary line of southern Herefordshire is within 30 yards distance from the contour of 900 feet upon the northern slope of May Hill). Ruardean Hill, near the Forest of Dean boundary, is 932 feet high.

The railway station at Torpantau, near the Brecon Beacons, is 1,314 feet above the sea-level. I am given to understand that the railway station Waenavon, near Brynmawr, on the line thence to Pontypool, stands 30 feet higher than Torpantau station, but I am unable to confirm this statement. Near the railway station at Dowlais Top (near Merthyr) an inhabited cottage is seen, the elevation of which is given as 1,600 feet.

THE JUBILEE BEACON FIRES, 1897.

THE Beacon fires of the Diamond Jubilee on June 22nd, 1897, were three times more numerous than those of the Golden Jubilee of Queen Victoria's reign in 1887. Owing to a clearer atmosphere, the spectacular display was more brilliant; moreover, it was more simultaneous, which was due to a commendable spontaneous loyalty in obedience to directions issued by the Central Bonfire Committee. At 9.55 p.m. a detonating rocket was discharged as the warning signal from the Malvern Hills, in the centre of England, and at 10 o'clock the huge bonfire, 60 feet high, was lighted near its summit by means of ignited tow saturated with petroleum connected with the base by wires covered with inflammable material.

This Malvern bonfire was composed of old railway sleepers clamped together by iron ties, built round a central iron pipe 12 inches in diameter filled with concrete. The intervals between the sleepers were filled in with faggots, gorse, old hop-poles, brushwood, broken tar barrels, &c., and the structure was widened out towards the lower part to 50 feet diameter at the base. Some idea of its capacity may be formed when it is known that the material employed in its construction amounted to over 100 tons, and included 4000 sleepers, five tons of hop-poles, five tons of cordwood, 2,000 faggots, 30 tar barrels, and a quantity of liquid and solidified petroleum, the application of which was prudently reserved until the last moment.

From the report in *The Times* of July 10th, the record number of fires visible from one place was 140, from Broadway in Worcestershire. From Malvern two spectators counted 128 and 132 respectively. In *The Times* of June 24th, a correspondent from Wills' Neck, the highest point of the Quantock Hills, counted 125, made up of 100 on the Somersetshire side of the Bristol Channel, and 25 across the water in South Wales, possibly even as far as the Brecon Beacons, which ought to be visible above the intervening heights.

The following were the places in Herefordshire where bonfires were lighted in answer to the appeal of the Central Bonfire Committee :—

Birley Hill.
Brampton Bryan Park.
Bradnor Hill, near Kington.
Bredenbury.
Bromyard Downs.
Byford, on Mansell Hill.
Coddington, on Lovers' Bush.
Coles' Tump, Orcop.
Docklow.
Garway Hill.
Harley's Mountain, in the parish of Lingen.
Herefordshire Beacon.
Knill Garraway.
Ledbury, on Bradlow Knoll.
Leominster.
Perrystone Hill, near Ross.
Stoke Edith.
Thornbury Camp, near Bromyard.
Wapley Camp, Staunton-on-Arrow.
Yatton Hill.

SLIGHT EARTHQUAKE ON JULY 19TH, 1897.

ON Monday morning, July 19th, there was a slight earth tremor, observed by only the few who were awake at the early hour of from 3.30 to 4 a.m. Local newspapers have made only a few notices about it. The following replies to Dr. Davison's questions on page 231 have been sent, (the only report received), by Mr. J. F. Fitzsimons :—

1. 14, St. Owen Street, Hereford,
2. (*a*) Indoors, first floor. (*b*) Lying in bed, awake, with toothache.
3. Between 3.30 and 4 a.m.
4. (*a*) Yes. (*b*) One. (*d*) Gradually increased.
5. About ten seconds.
6. Nothing rattled, but the bed moved.
7. Yes, resembling distant thunder, or a carriage. (*b*) Before. (*d*) Yes. (*e*) After.

Dr. Davison, writing to me from Birmingham, under date July 30th, informs me that he has received corroborative accounts from Ashleworth and Barnwood, both places near Gloucester.

H. CECIL MOORE.

ENTOMOLOGY

Mr. W. E. de Winton reports the capture of a rare and local moth (*Sesia asiliformis*), in Herefordshire, on Jubilee day, June 22nd, 1897

Woolhope Naturalists' Field Club.

THIRD FIELD MEETING, THURSDAY, JULY 29TH, 1897.

DUDLEY.

ON Thursday, July 29th, the third Field Meeting was held at Dudley with the object of inspecting Dudley Castle and Priory, and the very fine collection of perfect fossils, especially of Trilobites and Encrinites, for which the Wenlock Limestone and Wenlock shales, as upheaved on the hills of Dudley Castle, and of Wren's Nest, have long been justly celebrated. The party were fortunate in having as their director Mr. William Madeley, Honorary Secretary of the Dudley and Midland Geological and Scientific Society, who met them at the main entrance gates to the Castle grounds, and conducted them without delay to the Castle on the top of the hill.

An examination was made of the principal southern entrance to the interior of the Castle. This consisted of the Triple Gateway, originally reached by a drawbridge over a moat. Two circular turrets flanked the approach, and a portcullis from a second gateway, supported by another portcullis at the third or inner gateway, added to the defensive power before reaching the inner court-yard of the Castle. The Keep is close to the entrance, on the southern extremity of Castle Hill, and probably occupies the site of a more ancient work of defence. The Keep is a massive structure fifty-two feet high, with a semi-circular tower at each angle, whose walls are nine feet thick, splaying out to a thickness of eleven feet at the base. The basement of two of the fallen towers indicate an antiquity dating possibly to the Norman period, and expose its mortar of extreme hardness. Due to recent restoration and respect for its ruins two of the towers with their connecting curtain remain, and the battlement is reached by a spira staircase, retained in a good condition of repair.

From the battlements can be seen the numerous works which surround this centre of activity, industry, and wealth, rendering this district of paramount value in an economical point of view. The products of the earth here have been for a long period disembowelled, nor are they yet exhausted, but in the present day their possession is carried on at greater depths and consequently at greater expense. Coal, iron-ore, local limestone which has rendered valuable service as a flux in the iron furnaces, fire clay for retorts, crucibles, baths, and the best Staffordshire blue bricks, glass works, sand for molten ore, enormous plants of machinery for forging leviathan anchors, and pipes from the size of gas pipes to more than one yard in diameter, hard metalling for roads from the erupted

basaltic rocks of Rowley Hill, are here mixed up with other products from the crusts of the earth in appalling confusion. The view embraces in a southerly direction the Malvern range, the Clent Hills, the Hagley Monument, the Lickey Hills, the Frankley Beeches, and the hills of Rowley and of Cawney in the foreground; in the westerly direction the Abberley Hills and the hills above Enville in the foreground backed by the Black Mountains of Herefordshire, Breconshire, and Monmouthshire, the Clee Hills of Shropshire, and in the north-west the Wrekin. A pall of smoke and steam generally shrouds the northern Black Country of Tipton, Wolverhampton, Bilston, Wednesbury, Walsall, and Cannock. Towards the east are West Bromwich, Birmingham, and Barr Beacon, and Bardon Hill, 912 feet high, in Leicestershire has sometimes been seen in the north-east. The majority of these views are exposed upon a Monday Bank-holiday when the numerous furnaces have ceased for two days to emit their volumes of smoke. A journey on a very dark night through the Black Country is recommended to any artist who aspires to eclipse Gustave Doré's illustrations of Dante's Inferno.

The condition of the ruins of the more modern buildings upon the eastern side of the courtyard is favourable for tracing throughout, without difficulty, the various rooms, such as the chapel, grand hall or banquetting room 75 feet long by 56 feet wide; the justice hall or dining-room, the kitchen with its two enormous fireplaces (either of which would be large enough to roast a bull) one with three flues, the other with two flues, the common hall, &c., the whole of which have walls nine feet thick on their exposed eastern exterior. The northern gateway was approached by a drawbridge over the moat. A well in the courtyard, more than 100 feet deep, with water generally about 10 feet from the top, supplied excellent water to the garrison. The strength of the entrenchments, made more secure by deep artificial moats, and by the hilly nature of the ground, rendered Dudley Castle before the introduction of heavy artillery an impregnable fortress.

Dr. Plott in his *History of Staffordshire*, published 1686, says, referring to a table in the great hall, said to have been 17½ yards long:—"Certainly it must be a tree of prodigious height and magnitude out of which a table, all of one plank, could be cut 25 yards 3 inches long, and wanting but two inches off a yard in breadth for the whole length, from which they were forced (it being so much too long for the hall at Dudley) to cut off 7 yards 9 inches, which is the table in the hall at Corbyn's Hall, the ancient seat of the Corbyns." This plank must have been cut from a magnificent tree. Compare it with the oak trees from the Wood Patch grove at Kyre (*Transactions*, 1893, page 128), from which a length of 45 feet by 24 inches square was obtained for dockyards at Grimsby; or with the British boat discovered at Brigg, in Lincolnshire (*ibid.* page 129), 48 feet 6 inches long, 4 feet 6 inches wide, and depth of 3 feet 1 inch at the bows, and 3 feet 4 inches at the stern.

The earliest authentic evidence of a Castle at Dudley appears in the *Domesday Survey*, which states that Earl Edwin held this lordship in the reign of Edward the Confessor, and that "William Fitz-Ansculf holds Dudley, and there is his castle." It is true that Camden, in his *Britannia*, states, but does not give

his authority, that "Doddo, or Dodo, a Mercian duke, erected a castle here about the year 700." Payton's *History of Dudley Castle*, and Shaw's *Staffordshire*, Vol. 2, also state that "the place was named after a noble Saxon, whose name is variously spelt Dud, Duds, Dudde, and Dodo, Earl of Coventry, Somerie, and Arden, who married Effrie, daughter of Edmund Ironside, by whom he had a son, Athelstan, who built the Castle of Dudley." Dr. Nash, again, in his *Worcestershire*, Vol. 1, quoting the *Habingdon MS.*, says—"Dodo, the famous Saxon, raised a strong fortification here, which remained until the conquest." The name, although the spelling is different, reminds us of the Mercian noble Odda, who built the Saxon Chapel at Deerhurst, near Tewkesbury, as we read in *Transactions 1893*, page 27 :-- "Odda dux jussit hanc aulam construi," &c. . . . but the date, 1056, for the building of Odda's Chapel does not coincide with the date given by Camden.

Mr. William Madeley read to the members assembled at the foot of the Keep a short historical sketch of Dudley Castle, which he had prepared for the annual meeting of the Dudley and Midland Geological and Scientific Society on May 12th, 1891, in which he, rejecting anything more than a passing notice of unsupported historical records, commenced with facts chronicled in *Domesday*.

Mr. Madeley has kindly presented a copy for re-publication :—

NOTES ON DUDLEY CASTLE.

By William Madeley.

In the Saxon times Dudley was a small hamlet in a clearing in the vast forest which occupied nearly the whole central part of England, and belonged to the domain of the kingdom of Mercia, which was subsequently reduced to the position of an earldom. Dismissing from our record as unsupported by any historical authority of the time, the erection of a Castle here by a Saxon chieftain named Dodo, I may state that the first mention we find of Dudley occurs in *Domesday Book*, where we read that this manor was held by William FitzAnsculf de Pinchengl, and that he had a Castle there ; also that Earl Edwin held the manor in the time of Edward the Confessor. Earl Edwin was the grandson of Leofric, the famous Earl of Mercia, who, in consequence of his taking the side of Harold with his brother Morcar in opposing the invasion of William the Conqueror, was despoiled of his possessions and kept in captivity for the rest of his life at the court of William. This William FitzAnsculf, although his name does not appear in the list of Norman barons who accompanied William, seems to have been in great favour with him, for *Domesday Book* records that he possessed forty-four other manors within eight miles of Dudley, and forty-seven in other counties. We next find Dudley in the possession of Fulk Paganel, a name which we do find recorded among the Norman companions of the Conqueror, and Planché, in his work on the Conqueror and his Companions, states that this family obtained possession of Fitz-Ansculf's estates by marriage with a daughter named Beatrice. The name Paganel is still retained in that of Newport Pagnel, in Buckinghamshire ; and the only mention I can find of FitzAnsculf (or Ausculf) is that an Ausculf was a sheriff of Buckinghamshire. Ralph Paganel succeeded his father Fulk, and, taking the part of the Empress Maud against King Stephen, garrisoned the Castle on her behalf. In 1138 Stephen marched there, devastated the neighbourhood, and then went on to Shrewsbury. It is probable that that portion of the ruins under the chapel, the masonry of which is so conspicuously rude, dates from this period. Paganel's son, Gervase, succeeded his father, and to carry out the pious intention of his father, founded the Priory of S. James at Dudley in 1161. This Priory was occupied by a small number of Clugniac monks, and was subject to the rich Priory of Wenlock. In 1175 Gervase Paganel took the side of Prince Henry against his father Henry II., and in consequence his Castle was demolished by order of the king. Again by failure in the male line the demesne of Dudley passed by marriage of the heiress to John de Somery. In 1261 Roger de Somery began to make a castle of his manor house, but was prohibited therefrom without a special license from the king. Two years afterwards as a reward for having taken the side of Henry III. against his nobles, he obtained the license to rebuild

his authority, that "Doddo, or Dodo, a Mercian duke, erected a castle here about the year 700." Payton's *History of Dudley Castle*, and Shaw's *Staffordshire*, Vol. 2, also state that "the place was named after a noble Saxon, whose name is variously spelt Dud, Duds, Dudde, and Dodo, Earl of Coventry, Somerie, and Arden, who married Effrie, daughter of Edmund Ironside, by whom he had a son, Athelstan, who built the Castle of Dudley." Dr. Nash, again, in his *Worcestershire*, Vol. 1, quoting the *Habingdon MS.*, says—"Dodo, the famous Saxon, raised a strong fortification here, which remained until the conquest." The name, although the spelling is different, reminds us of the Mercian noble Odda, who built the Saxon Chapel at Deerhurst, near Tewkesbury, as we read in *Transactions 1893*, page 27 :— "Odda dux jussit hanc aulam construi," &c. . . . but the date, 1056, for the building of Odda's Chapel does not coincide with the date given by Camden.

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his castle. In 1300 John de Somery succeeded to the estate. He was a man of great energy and importance, as well as a valiant soldier. He was, however, a troublesome and overbearing neighbour, for complaint was made to the king about him that John "did so domineer in Staffordshire that no man could enjoy the benefit of law or reason, taking upon him more authority than a king; that it was no abiding for any man thereabouts unless they did bribe him in contributing largely towards the building of his castle at Dudley, and that he had use to beset men's houses in that country, threatening to murder them except they gave what he would demand." In justice, however, to his memory we may state that he protested against these charges as being scandalous. This seems to be the time which must be fixed for the erection of the outer and inner gateways, the keep, chapel, and walls. By failure of male descent the manor of Dudley passed at his death in 1321 to his sister Margaret, wife of John de Sutton, who, however, only enjoyed peaceful possession for a very short time, for Hugh le Despencer, the rapacious and insolent favourite of Edward II., in order to obtain possession of their domains, accused John de Sutton of aiding the Earl of Lancaster in his late rebellion, and threw him into prison. From fear of execution John de Suttton assigned to Despenser his rights and estates, but on the murder of Despencer by the barons, after an interval of some few years, during which William de Birmingham had the custody of the manor on the part of the king, John de Sutton obtained restitution of his estates. But little change occurred in the Castle buildings for the next hundred years, and towards the end of the 15th century the family dropped the surname of de Sutton and assumed that of Dudley. Some little time before the year 1540 John Dudley, Lord de Lisle and Earl of Warwick, who subsequently became Duke of Northumberland and Lord Protector in the reign of Edward VI., and whose father, Edmund Dudley, together with Robert Empson, had been executed by Henry VIII. at the beginning of his reign on account of their share in the extortions of Henry VII., cast a covetous eye on the fair domains of Dudley, and planned designs for obtaining them, and acquiring the honours pertaining to the name of the family. Considerable doubt exists still as to whether his father was descended from a junior branch of the family, or only from a carpenter who migrated from Dudley, and to whom the surname of de Dudley was consequently given. The ambitious Earl of Warwick readily discovered means to gratify his desire, for he found Lord Dudley in pecuniary difficulties, and usurers in possession of mortgage deeds on the Castle estates. By getting hold of these bonds, he soon seized upon the Castle, and promptly set to work to make of it a more magnificent mansion. He built that part of the Castle which was called the "new work," and which may readily be distinguished by the superiority of the masonry, and the late style of architecture. This part contained the state apartments, with the great hall; the smaller room, with oriel window; and all the domestic apartments on that side the courtyard, together with the octagonal tower at the north end, which was used as a staircase to the upper storeys, and was by no means a watch tower, as it is sometimes stated. On the attainder and execution

of Northumberland in 1553 the Castle was confiscated to the Crown, and the son of Lord Dudley, whose father died soon afterwards, obtained restitution of his estates from Queen Mary. We hear but little of the Castle till the year 1575, when Queen Elizabeth visited it in her progress after leaving Kenilworth, and saw those magnificent pageants prepared for her reception by Robert, Earl of Leicester, son of the ambitious Duke of Northumberland. In 1585 we find Dudley Castle suggested for the incarceration of Mary Queen of Scots, who was then at Tutbury, but on examination it was considered that it was not sufficiently secure, and she was taken to Chartley. We now pass on to the troublous times of Charles I. and the Parliamentary Wars, when the heiress of the Dudley family was married to Humble Ward, the only son of William Ward, goldsmith and jeweller to Queen Henrietta Maria, who was created Lord Ward of Birmingham in 1644. In 1643 Colonel Leveson garrisoned the Castle on behalf of the King, and Charles I. wrote to Lord Ward requesting him to assist him in the defence of the Castle, and there is no doubt that the Lord of Dudley was able to render to the King important pecuniary and other assistance. The Castle was besieged by the Parliamentary troops for three weeks, when it was relieved by a detachment of the royal forces from Worcester. The damage done to the Castle was then repaired, and it remained in the possession of the Royalist party till 1646, when it capitulated, and Parliament ordered the Castle to be demolished or reduced to a condition incapable of defence. From that date for a hundred years time made great ravages in the old ruins, and but little care seems to have been exercised for their preservation, though some of the rooms were still tenantable, and the great hall was occasionally lighted up again for local assemblies by permission of the family. At last in 1750 a great fire broke out in the Castle, the lead-covered roofs fell in, the whole of the timber was consumed, and the Castle was reduced to its present ruinous condition. The ruins remain, however, as faithful records of times and modes of life which have had many changes, and incite the imagination to call up scenes of gay tournament and fierce battle, of long-enduring pre-eminence and of evanescent glory.

After thanking Mr. Madeley for his paper, and his description of the ruined Castle, the members walked in the shaded grounds until they reached a signal post on which the word in large type DANGEROUS stared them in the face. The Castle grounds embrace 73 acres 2r. 36p. of woodland, extending for one mile, riddled by numerous extensive caverns, formed by quarrying for limestone, and here and there in the depths below are a series of subterranean canals for the transport of the material to more convenient places as required. These caverns, when illuminated, as they sometimes are by the owner, the Earl of Dudley, form a most imposing and weird spectacle. The openings of several are visible, and are sufficiently awe inspiring and intimidating to prevent any but the most foolhardy from exploring them without candles and a guide; moreover, they are not now open to the public without previous inspection, due to the dangers from subsidences and falling in of roofs.

Retracing their steps towards the main entrance, the members walked to the Priory.

THE PRIORY, DUDLEY.

The Priory, the ruins of which are situated about a quarter of a mile west of the Castle Hill, was founded in 1161 by Gervase Paganel, and was supplied by monks of the Clugniac order from the Abbey of Wenlock in Shropshire. Shortly after the dissolution of monasteries in 1535 it was treated with great neglect, as is evident from the report of one Sampson Erdeswick who, writing about the end of the sixteenth century, states that it was abandoned to decay and ruin, and that different manufactures were carried on, regardless of all respect, in the midst of the remains. From Grose's *Antiquities*, Vol. 4, we learn that in 1776 "the shattered walls of some of the offices had been patched up into a dwelling and conveniences for a tanner, but were then occupied by a thread manufacturer." Again, the Rev. Mr. Warner in his *Tour in the Northern Counties*, 1801, found "Manufacturers who, in a little adjoining building, ground the glass made in the neighbouring town, and polished fireirons and other articles of steel." Drawings and records show the arches to have been pointed, and some rich ornamentation about the east window; the western doorway, although its red sandstone has suffered much from weathering, still exhibits traces of its original moulding. Drawings in an Illustrated Guide, sold by the Keeper of Dudley Castle, shows its condition in 1793, in 1812, and in 1815, with Benson's Fender and Fire Iron Works. Happily, under the auspices of the late Earl of Dudley, all the leases were bought up, the workshops and other buildings removed, and proper respect has been paid to the venerable remains now covered with ivy; they are now enclosed within the private grounds of his agent, Mr. Gilbert H. Claughton.

From the Priory the party were conducted by Mr. Madeley to the Wren's Nest, an upheaval of Upper Silurian Limestone, similar to that of the Hill of Dudley Castle, and less than one mile distant from it. Here the members entered one of the cyclopean caverns at the northern end, which was open to daylight in the openings between successive massive limestone pillars left to sustain the huge arched roof. The cavern was large enough to shelter a regiment.

The return walk was made to the town of Dudley, where Mr. Madeley had on view in the Museum a superb collection of Trilobites, Encrinites, and other fossils from the local deposits, especially valuable for their remarkably perfect condition. Before leaving Dudley a refreshing tea, at a very reasonable cost, was provided at the keeper's cottage, in the grounds of Dudley Castle.

According to the Local Guide: "The town and parish of Dudley form an isolated part of Worcestershire, and are entirely surrounded by Staffordshire. The Castle and grounds are in Staffordshire, with the exception of a small portion at the north-west corner, which is part of Worcestershire. The ancient Priory is in Worcestershire, so is also the Priory Hall, but the farm buildings belonging to it are in Staffordshire."

Here follows a list of the company:—The President, Mr. H. Cecil Moore, Sir Herbert Croft, Major J. E. R. Campbell, Revs. Charles Black, C. S. Hagreen, E. J. Holloway, Preb. W. H. Lambert, and M. Marshall; Messrs. E. J. Baker,

H. C. Beddoe, R. Clarke, E. W. Colt, Luther Davis, H. Scott Hall, Charles Hardwick, C. S. Lilwall, John Probert, and Mr. James B. Pilley, Assistant Secretary, with the following visitors—Ladies: Miss H. E. Baker, Miss B. M. Baker, Mrs. Campbell, Miss Cooper, Mrs. Colt, Mrs. E. Conder, Mrs. Davis, Miss Davis, Mrs. Hagreen, Mrs. H. Scott Hall, Miss F. Jones, Miss Madeley, Mrs. Probert, Miss Shaw, Miss E. Shaw, Miss Thomas, Miss L. Thomas, Miss H. Thompson, and Miss Wheatley. Gentlemen: Rev. Ernest Burd, Masters Campbell (2), Mr. E. Conder, Mr. Fellows, Mr. William Madeley (Hon. Sec. of the Dudley and Midland Geological and Scientific Society), and Dr. A. Wheatley.

The party having reached Dudley by the route from Woofferton through Wyre Forest, returned home through Worcester.

DUDLEY—GEOLOGY OF THE DISTRICT, AND GENERAL REMARKS.

By H. Cecil Moore.

Rising out of the measures of the South Staffordshire Coal fields at Dudley are two anticlinal outliers of the older Silurian formation, forming somewhat similar oval elevations about one mile in length from North to South, within a mile of each other, north of the town. These upheavals run obliquely across the Coal Measures of the district, and each of them contains two bands of valuable Wenlock Limestone, called respectively the grey and the blue limestone, of which the uppermost, the grey, is from 28 feet 4 inches thick, the blue or lower limestone 42 feet 3 inches, separated from each other by about 90 feet of valueless calcareous shales. These elevations are named the Dudley Castle Hill, and the Wren's Nest, the latter situated north-west of the former. They remind us forcibly, but upon a much smaller scale, of the Upper Silurian upheavals of the Woolhope district in Herefordshire. The outer band of each anticlinal is of Lower Ludlow formation, never exceeding a width of three-quarters of a mile. In the elevation of Sedgley Hill, one mile north-west of the Wren's Nest, the three formations of Lower Ludlow, Aymestrey, and Upper Ludlow are exposed. The Old Red Sandstone (the fundamental rock upon which the coal rests) is absent, its nearest exposures being on the eastern borders of the Forest of Wyre, consisting of a small strip, nearly twelve miles south-west, near Habberley, north of Kidderminster, and a larger exposure four miles further south, about four miles square, north of the Abberley Hills.

The Wenlock Limestone is considered by geologists to have been gradually and very quietly deposited in a fairly deep sea, an opinion confirmed by the accumulation within its beds of numerous species of simple corals. The Silurian fossils of the Dudley representative of this Limestone are remarkable for the perfect way in which they have weathered out, which have made them so valuable as specimens for the artist, for figuring in standard works, and for exhibition in our museums. There is no doubt that many of the local workmen have added to their income by reserving for collectors the most typical specimens, especially when the works were open to the surface fifty years ago. Although some of the best have very properly found their way into the British Museum, the Manchester, and other geological museums, nevertheless there still remain in Dudley Museum some beautifully perfect and fine specimens of Corals, Polyzoa, Brachiopoda, Encrinites, Trilobites, &c. There are large slabs swarming with Encrinites, and some of these beautiful sea-lilies have been most carefully preserved as separate specimens, making in the aggregate a most valuable collection of these crinoids. The same care has been bestowed upon the selection of separate Trilobites, and Corals, which bear close scrutiny under the pocket lens. Amongst the finest and most perfect Trilobites must be mentioned a cast of a grand Homalonotus

(delphinocephalus) six inches in length, and a curled up Calymene Blumenbachii, known amongst geologists as the "Dudley locust," and a perfect Phacops with conspicuous facetted eyes. The Museum possesses also specimens from the Coal Measures of the locality, such as ferns, calamites, sigillaria, varieties of ironstone, footprints of extinct animals from the Permian strata, and "medals of creation" innumerable.

The treasures dug out from the earth in the immediate vicinity of Dudley have rendered it a centre of commercial industry and wealth. Ironstone has been here worked for many centuries, and the Round Oak brands of the Earl of Dudley maintain their celebrity, and regulate the iron markets. From the fire-clay, which underlies the Coal Measures, are manufactured fire bricks, glass-house bricks, gas retorts, clay crucibles, and porcelain baths, and the sand of the locality has made it peculiarly fit for the erection of numerous factories for the making of glass. The local sand is also adapted for troughs for the molten iron formed into "pigs," a convenient form, maintained since the days of the Roman invasion. The whole immediately surrounding district presents to the spectator a maze of furnaces, factories, and a chaos of pit banks, embracing within a small compass a vast amount of mineral wealth. Leviathan anchors and chain cables are made at Netherton, and at Woodside are made bridges and miscellaneous articles, including our well-known pillar letter boxes, and pipes of all dimensions, varying from the gas pipe to diameters of more than one yard. The hundreds of porcelain baths perched upright near the station yard at Stourbridge Junction, presenting the appearance of vacant sentry boxes, attract the attention of passengers, and from their grotesque appearance seldom fail to excite merriment.

In fact it is the proximity of ironstone, coal to smelt it, limestone to flux it, fire-clay to line the furnaces for melting it, and sand to receive the molten metal formed into "pigs" for convenience of transport by canal or rail that has made this area of great commercial value.

With reference to the Geology of this district, the Coal Measures of this South Staffordshire Coalfield are begirt with a narrow framework of Permian formation, save where it is absent in the north angle and upper north-east parts. The Permian is encircled by a broader belt of Bunter and Keuper of the Triassic. There are detached areas of Permian to the east extending from Kenilworth through Coventry to Baddesley Ensor, and to the west, north of the Forest of Wyre, besides detached patches at Abberley Hills, Woodbury Hill, Shatterford, and one isolated outlier north of Mamble in Wyre Forest. At a subsequent period the New Red Sandstone rocks were deposited all round this area, with elevations formed south of Dudley by the Clent and Lickey Hills, by Kinver in the south-west, Barr Beacon in the north-east, and the uplands in the neighbourhood of Cannock Chase in the north. Outside is the wider arc of the Lias and Oolites of the Jurassic in the elevations eastward of Edge Hill, and, in the south, of Bredon Hill and the Cotteswolds, with the long narrow Archæan ridge of the Malvern chain intervening. At Nuneaton in the east the Cambrian rocks are exposed, and further north-east the Pre-Cambrian in Charnwood Forest. Westward are the basaltic rocks of the Clee Hills, and in the distant south-west the Old Red Sand-

stone heights of the Black Mountains separating Herefordshire from Breconshire and Monmouthshire. The Archæan formation again appears far north in the Wrekin. Nor must we fail to record the Archæan rocks of the Lickey Hills near Barnt Green, and the Cambrian quartzites of the same range exposed at Rednal and Rubery. Thus, with Dudley as a centre, we have within the range of vision the geological sequence from the Oolites down to the fundamental Archæan.

The Coal Measures in the North of England rest upon a great thickness of Millstone grit, under which again is the Carboniferous Limestone. These however are absent from the South Staffordshire Coalfields, and the thickness of the Coal Measures is reduced from 4,000 feet to an average thickness of 2,000 feet. Again, in the northern parts of the South Staffordshire Coalfield some seventeen or eighteen seams of coal are separated by sandstones of a great thickness. The valuable well known collective seam of 32 feet in thickness, known as the "Ten yard Coal Seam," or the "Thick Coal" of which an exposure is visible in the Claycroft openwork at the northern extremity of Wren's Nest, is due to the thinning and dying out of the intervening beds of sandstone, and thus to the gradual union of some fourteen coal seams into one compound seam—the thickest coal seam in the kingdom. This outcrop is continued south and west of Dudley Castle Hill and Wren's nest. The seam has been reached at Sandwell Park, one mile outside the Coldfield proper at a depth of 1,250 feet, and three miles outside the limit at Hamstead at the greater depth of 1,800 feet.*

The wrinklings of the earth's crust due to the disturbing influences of earthquakes, and igneous forces, exhibit an eruption at Rowley Regis, immediately south-east of Dudley, of an igneous rock of Dolerite, two miles in length and 200 feet in thickness. This rock is pierced by mining shafts, and workable coal has been found below it. The rock itself constitutes another valuable local natural product: under the name of Rowley Rag stone the material has been long used as metal for the roads of the Midland district, and holds a position little inferior to the well known basaltic Dhu stone from Titterstone Clee in Shropshire.

Other similar disturbing influences causing dislocations and cracks in the earth's crust have produced, besides numerous smaller faults, two large faults known respectively as the eastern and the western boundary faults.

Before leaving the subject of the local geology, reference must be made to the remarkable fact that the student of the distribution in this Midland area of the thousands of travelled glacial boulders from the Lake districts, North Wales, and Scotland, finds that those deposited to the east of Dudley and the Lickey Hills are all similar to the rocks in the Lake district, whilst the majority of those deposited west and south-west of Dudley are representatives of the rocks which form the hills around Bala Lake and the Arenig Hills of North Wales.

* Since our visit we have been recently informed of the results of a very deep boring at Himley, commenced on Mayor's Day, 1896, which have led to the decision to sink a shaft in Baggeridge Woods, near the Straits, Sedgley, with sanguine anticipations of ultimate success, based upon the fact that the shale encountered corresponds with the "broach," which is the first workable coal in the Sonth Staffordshire Coalfields. The cost of sinking the shaft, 12 feet in diameter, is calculated at about £25,000, and the execution of the work will occupy three or four years. H. C. M.

With reference to the Physiography of this district it will be noticed that this locality of Dudley is approximately the centre of England, and that the range of elevation along the line of Sedgley, Dudley, Rubery, Lickey, and Clent constitutes the watershed of central England between the basins of the Severn and Trent, or, in other words, the rivers flowing into the German Ocean on the east from those which fall into the Bristol Channel and Irish Sea on the west.

The Castle Hill and Wren's Nest are riddled with caverns, which owe their size and extension in divers directions to the work of several centuries in quarrying the limestone. The systems of canals which penetrate the hills are most convenient for its local transport to various wharves, and into a basin at a place called Dudley Port, where there is a railway station.

The boats are propelled through the tunnels by two men, called "leggers," lying across the boat, back to back, and pushing with their feet against the walls of the tunnel, the tunnel being made only a foot or thereabouts wider than the canal boats. In addition to the canals under Wren's Nest and Castle Hill, a canal tunnel was driven in 1856, at a cost of £200,000, through the Trap Rock, between Cawney Hill and Rowley, for a distance of one mile five furlongs and 140 yards. It has a waterway sufficient for three boats abreast, a towing path on each side, and is lighted with gas. Some estimate of the difficulties which have been encountered by the drainage of water, and the extra expenses thereby incurred, may be gathered from a paper on "The drainage of the South Staffordshire Coal Field in relation to mining operations," by Mr. E. B. Marten, C.E., in No. 7, Vol. II., December, 1865, page 130, of the Dudley and Midland Geological and Scientific Society, from which we gather that "the quantity of water raised by pumps or barrels from the mines of South Staffordshire is an average of about 50,000,000 gallons per day of 24 hours, composing a daily weight of 220,000 tons, or nearly ten times the weight of coal raised in the day. It represents an annual expenditure of £125,000, or about 3¾d. per ton of coal produced in the district." Compare this with the pumping capacity of 60 million gallons a day of the Severn Tunnel Works at Portskewett; or with the proposed 27 million gallons a day compensation to the river Wye, and 27 million gallons daily supply to Birmingham from the Elan Valley Waterworks near Rhayader.

The caverns under Castle Hill and Wren's Nest are numerous, and when illuminated, as they are sometimes on special occasions by the Earl of Dudley's permission, present a magnificent and an awe-inspiring aspect. The illumination is very rarely now performed, it being very expensive, and owing to the dangers due to recent subsidences, and to falling in of portions of the roof, the caverns require careful previous examination; consequently they have long been closed to the public. The openings of several of them give a sufficiently awful impression of their stupendous size. Within one of these caverns the visitor finds himself in the heart of Siluria, and it was in one of these caverns that Sir Roderick Murchison in 1849 was crowned King of Siluria.

A very good idea of the imposing spectacle of one of these subterranean caverns will be obtained if the visitor goes to the northern part of Wren's Nest, where he can enter a cavern open to daylight, which is only obstructed by the

massive solid pillars of limestone left to support the arched roof. From this cavern he can look down an opening to a canal penetrating the hill on a much lower level, which canal communicates with the canal basin at the north end of Castle Hill by a tunnel about three-quarters of a mile in length. The writer has enjoyed the experience of traversing this tunnel from the north end of Castle Hill to Wren's Nest. During the progress of the boat the tunnel was frequently lighted up by magnesium wire, exposing upon its roof numerous small stalactites, and a few fungus growths. The huge gallery under Wren's Nest was lighted up with thousands of candles, and its enormous size and divergent branches were shown by an illumination of coloured lights. This gallery runs at a depth of 90 yards from the surface level, and goes round the hill; above and below it are a second and a third gallery. The cage of the shaft is constructed to carry eight persons. The coolness of the temperature in this gallery, due to efficient ventilation, was strikingly made manifest to one's sensation. Upon emerging from the shaft, the waft of the surface atmosphere felt similar to that experienced on opening a large furnace door, or upon entering the hot-air chamber of a Turkish bath. The impression of the whole spectacle will live as one never to be effaced.

REFERENCES.—Geological Survey Ordnance Map, No. 62 S.W.; Geological Survey, Index Map, No. 8.

Woolhope Naturalists' Field Club.

FOURTH FIELD MEETING, FRIDAY, AUGUST 27TH, 1897.

WYRE FOREST, BEWDLEY, RIBBESFORD CHURCH, AND BLACKSTONE.

ON Friday, August 27th, a large party attended the fourth Field Meeting to visit the Forest of Wyre, the town of Bewdley, Ribbesford Church, and the large caves historically used as a Hermitage in the Bunter Sandstone rocks at Blackstone, opposite Ribbesford.

The members left Hereford in a special carriage in order to avoid changing at Wooferton Junction, and they de-trained at Wyre Forest Station, where they were met by Mr. Carleton Rea, of the Worcestershire Naturalists' Society, who kindly acted as their guide through the intricate winding paths of the Forest.

Wyre* Forest is well known to the Worcestershire naturalists. It is easy of access from the head-quarters, consequently we are not surprised to read in their recently published volume of *Transactions* of fifty years, 1847 to 1896 inclusive, the accounts of numerous visits of exploration, and of fungus forays in the forest. This record of their excursions is full of facts interesting not only to students of local productions of Nature, but also to the general reader. It forms a very valuable compendium of the natural history of their county, rendered infinitely more useful by the completeness of its index, which may be called a model index, by reference to which the habitat of rare plants, localities favoured by insects, occurrences of fossils, and anything pertaining to local natural history, or of local historical interest, can be readily ascertained. The print is large and clear, the book has undergone careful revision, and its price, 7s. 6d. to non-members, is cheap. The county is to be congratulated on finding placed within their reach so useful and so concise a summary of fifty years' work in the field by the members of the Worcestershire Naturalists' Field Club. The Editor, Mr. Carleton Rea, B.C.L., M.A., is especially to be thanked for his labours in sifting so successfully the huge mass of material bequeathed to the Committee.

Mr. Rea conducted the members from Wyre Forest station to the northern side of the railway by a footpath in the forest skirting Dowles' brook for the distance of about three miles, where the brook was crossed, and the ascent of the hill was made to the railway line, which was crossed in order to reach the Great Bog. Here a halt was made and a few bog plants were found. To view

*Wyre. A Welsh word signifying a spreading, an expanse.

the locality in its glory the month of June should have been chosen, when it displays a mass of the fragrant *Habenaria conopsea*, *Epipactis palustris*, the delicate pink-coloured bog pimpernel (*Anagallis tenella*), Cotton grass (*Eriophorum*), and other plants. Some specimens of Chara, the typical genus of the order Characeæ, were gathered for examination under the microscope of the streaming of protoplasm within the internodes with their enclosed enormous cells. The plant is also curious from its peculiarity of attracting calcareous incrustations from water containing lime. The Great Bog may have originally deserved its name, but it is now of small area, and its character has been altered, most probably due to drainage from the neighbouring railway line.

As regards the trees in the forest, they do not grow to a large size ; but when we consider the demands of the numerous furnaces in the east, the north, and the west, not forgetting the salt pans of Droitwich, before coal came into general use, we are not astonished at the devastation of even so vast an area as the original Wyre Forest, which is traditionally said to have extended from Church Stretton almost to Birmingham. We are informed that some fine timber remains further north in the grounds of Sir Edward Blount, at Mawley, near Cleobury Mortimer.

Leaving the Great Bog, the railway was again crossed, and the walk was continued along the Dowles' brook to its confluence with the Severn, a short distance below a fine railway bridge which spans the river. A pleasant walk along the banks of the river conducted to Bewdley. Mr. Rea gathered on the banks of the Severn a specimen of *Coronilla varia* in flower. This papilionaceous plant has become naturalised in this locality, Mr. Rea informing us that it had been known there for at least a century. The American water weed *Anacharis alsinastrum* was growing luxuriantly in the Severn. The general diffusion of this plant over our streams, ponds, and canals has been marvellously rapid since its supposed introduction into our country from America. It was first discovered in our country in 1842 by Dr. George Johnson, of Berwick-on-Tweed, in the lake of Dunse Castle, which is on a tributary of the Whitadder.* A description of the plant was published in the *Annals of Natural History* for February, 1848, by Mr. Babington. The rapidity of its growth, and the impossibility of eradicating it have made it a pest. Nothing particularly rare, or worthy of special record was found by the entomologists or the mycologists during the day. The season was too late for the former, and too early for the latter branch of naturalists. The *Transactions of the Worcestershire Naturalists' Society* testify to the Forest being an excellent hunting ground for botanists, conchologists, entomologists, and mycologists. They give a record of *Spiranthes æstivalis*, having been gathered in 1854 by George Jordan, the well-known botanist of Bewdley, a plant previously recorded only from Hampshire. *Pyrola minor*, the lesser Winter green, is also recorded.

*The above is quoted from *Transactions of the Worcestershire Naturalists' Field Club*, 1853, page 8. In *Transactions of the Woolhope Club*, No. 3 of 1861, page 8, Dr. Bull called attention to the spread of *Anacharis* in the Hereford and Gloucester canal ; also to its having been found in 1836 (*sic*) at Northampton ; and to its notice in Scotland in 1841 by Dr. Hooker.
H. C M.

The Sorb tree (*Pyrus domestica*), celebrated as the only apparently wild tree of the species in Britain, recorded as an old tree by Alderman Pitts of Worcester in the *Philosophical Transactions* for 1678, was an object frequently visited until it was destroyed by fire in 1862. In *The Botany of Worcestershire* by Edwin Lees there are two sketches of it—one in foliage, the other in its winter aspect. It was in Wyre Forest that Mr. Carleton Rea discovered the new *Agaric* pictured in *Grevillea*, Vol. 22, page 40, plate 185, under the name of *Flammula rubicunda*. See also *Transactions Worcestershire Naturalists' Club* for July, 1893, page 394.

As a Coal field Wyre Forest is not so productive as the contiguous Coal Measures of Shropshire further north, and of South Staffordshire, but its possible correlation with them affords room for geological research. Sections through some of the shafts show as many as eighteen named seams in the more northern parts, in contrast to the belt of "Ten Yard Coal" seam surrounding the greater part of the Dudley Coal fields, recorded on page 290. When treating of the Geology of Dudley the general geological characters were included extending to Wyre Forest, and the massive wedge of Permian penetrating the north of Wyre Forest Coal Measures was alluded to on page 289.

The western side of Wyre Forest Coal field is bordered by the Old Red Sandstone of South Shropshire and North Herefordshire. A belt of Spirorbis Limestone, containing the microscopic Serpula called Spirorbis carbonarius, frames its south-western border.

The Coal Measures in this district, constituted of the Wyre Forest and the Shropshire Coal fields, never exceed a width of six miles, and extend in a narrow strip as far north as three miles from Newport in Shropshire, and in a southerly direction to the Abberley Hills.

A mass of basalt is protruded at Kinlet, and a patch of Permian is exposed one mile north-east of Mamble. No coal seam of any value appears to have been worked south of Dowles Valley towards Arley Kings, but recently there has been found towards the south-west a seam of coal four feet thick at Pensax, worked from a shaft 60 yards in depth.

As in the South Staffordshire Coal Fields, so in the Severn Valley Coal fields there is an absence of any noteworthy representative of the Millstone Grit and the Mountain Limestone, the Coal Measures resting upon a base of Silurian, or Old Red Sandstone.

The Ordnance Survey Geological Maps for this locality are 55 N.E., and 61 S.E. To obtain a comprehensive view of the larger field of the Midland districts the new Index Map, Sheet 8, Geological Survey, should be studied ; also Sheet 11 for its extension southwards.

For the geography of the locality, Sheet 182, New Series, comprises the whole day's route through the Forest.

At 3 p.m. the town of Bewdley was reached.

In the middle ages Bewdley was a place of sanctuary or "city of refuge." By an Act of Henry VI. it was placed within the jurisdiction of the Marches of Wales, and within the parish of Ribbesford. By an Act of Henry VIII. it was made part of the county of Worcester, and is now a separate parish. It was

originally a Welsh port. It lost its commercial importance since the junction of the canal with the Severn at Stourport. It is now a quaint old fashioned small town with several old timbered houses of the 17th century still remaining. The present bridge was erected by Telford in 1797.

Luncheon was prepared in the large room at the George Hotel, but we do not know who is to be blamed that the productions of the locality were not upon the table, namely crayfish and champagne. Crayfish or crawfish, a decapod long-tailed crustacean (*astacus fluviatilis*), belonging to the same family as the lobster, is to be found in Dowles' brook. Coca champagne and moselle, Burgundy and Frontignac are manufactured by the Sparkling Wine Company, of Bewdley.

Dr. Gabb informed us that English wines, both sparkling and still, have been made experimentally for many years from every kind of fruit; wines in every sense of the word good and wholesome; as well as champagne from imported grapes. The Proprietor has never sent any to France, but English made wines from rhubarb, as well as new Jersey cider, have been sent to be returned with brand and label as "best champagne." The champagne here made is sold at 25s. per dozen quarts, and 14s. per dozen pints, and some purchases were made after sampling. It is satisfactory to state that money is not lavished in spurious advertisements; otherwise the trade would be increased, as it was pronounced light, dry, with a pleasant bouquet and delicate fruity flavour.

In our county we have sites of numerous vanished vineyards, one close to our city boundary still known as "The Vineyard." At the present time we read of the success of Lord Bute's vineyards at Castel Coch near Cardiff, and in a second vineyard on another part of his estate the vines grow vigorously, are thoroughly established, and ripen well in most years. In this new vineyard six hogsheads of wine were given in 1895 from one acre. The kind of vine grown is the "Gamay Noir," used in the vineyards near Paris, and in the colder parts of France. The vines are planted in rows three feet apart, and trained to stakes our feet high. At the end of the season the vines are pruned close back, leaving only two buds of last year's growth. The vineyards form a pretty object in the foreground from the ramparts of Castel Coch. From an article in the *Midland Counties Herald* for August 26th, 1897, we read that "the vintage of 1881 sold for 60 shillings a dozen, and part of it resold last year for as much as 115 shillings a dozen," and that "the yield of wine has, with various fluctuations, risen from forty gallons in 1877 to forty hogsheads in 1893 and 1896, and the cost of all previous experiments was covered by the crop of the first of these years."

After luncheon, a paper giving the results of diligent examination of the colouration of some species of shells was read by Mr. A. E. Boycott. This paper s reserved to be printed *en bloc* in "The Mollusca of Herefordshire," in course of preparation by Messrs. Boycott and Bowell.

The Rev. Richard Evans, of Eyton Hall, was elected a member of the Club.

British Mycological Society.—Dr. Crespi was chosen delegate to the Annual Fungus Foray Meeting of this Society, to be held in Sherwood Forest in September.

Publication of Parish Registers.—Mr. G. W. Marshall (Sainte Croix), of Sarnesfield, made the magnanimous offer of editing the Parish Registers of any one parish of the city, which the Vicar or Rector may desire to publish. At the present time there is only one Parish Register in the county published, namely that of Upton Bishop, by the late Rev. Dr. F. Havergal.

Archæological Survey.—The President reminded the members that Part II. of the Archæological Survey of Herefordshire was published, and to be obtained at the cheap price of 2s. 6d. from Messrs. Jakeman and Carver.

The next move was to Ribbesford Church, to which the members were conducted by the Vicar of Bewdley (Rev. H. Brierley), well-known to most of us as the former Vicar of Upper Bullinghope. On the way to the church the site of Tickenhill, or Ticknill, Palace was pointed out. Here a house marks a spot where once stood the Palace in which Prince Arthur of Wales, son of Henry VII., is said to have married, by deputy, Katherine of Aragon. Here his body rested, on its way from Ludlow Castle, where he died, to its burial place in the beautiful Tudor Chapel in Worcester Cathedral, 1502. The first object of interest at the church was a curious tympanum over the North door. The common legend has it that the story represented by the sculpture is as follows: The lady of the big house was loved by a soldier, who was too poor to aspire to her hand. She lost her ring, and her father said that whoever found the ring should have his daughter's hand in marriage. The forlorn soldier went out shooting, and aiming at a deer, he shot a fish in the Severn, which river the deer was presumably crossing. On opening the fish he found the ring lost by the lady, with the usual legendary result.

The Vicar read an extract on the subject from a book relating to the locality. The author, a Mr. Burton, said the idea that the sculpture was an emblem of the Christian faith was more likely. At Ribbesford Church they had a rude but clear emblem of the Redemption. The human soul, personified by the deer (or other animal) was fleeing from a huge monster, typical of the Evil One, when the Saviour (portrayed as an archer) intervened. In Norman times the archer was the most familiar representation of a soldier. On one of the Norman capitals supporting the doorway, a bird is represented in the act of swooping down on a fish; coming to the rescue is a larger bird, which, in turn, swoops down upon the robber. The fact of the safety of the fish is typified by its appearance above. The fish is the Christian emblem.

Sir George Cornewall said he might claim to say a word about that, because he had a tympanum at his Church of the same kind that was much clearer and better preserved. His tympanum had a Tree of Life in the centre. It was an oriental tree and had a lotus flower with various ordinary kinds of fruits. The stem of the tree was in the form of a cross, and there were men holding on to the cross and being devoured by the beast. The idea of salvation was clearly typified, and he should wholly avoid putting on the tympanum before us any idea of love-making, but would ascribe to it a meaning relating to Him who overcame sin. That at Moccas showed the power of the beast over man, and man clinging to the Cross. He should say that the date of this tympanum was late Norman

The fish was no doubt the symbol of the Church, but the figure on the tympanum looked more like a beaver.

The Rev. M. G. Watkins said there were beavers in Wales in the 12th century.

Mr. Rea said there was an island down the Severn called Bevere or Bevereye. There is also a small brook north of Worcester called Barbon, or Beaverburn, near to which is a Beaver island.

The matter here dropped, but Sir George Cornewall's definition was generally accepted. An inspection was made of the interior, which, except for one church in Cheshire, is unique in having stone pillars on the north side, and wooden pillars on the south. The latter are in excellent preservation, are unstained, and probably date from about the 15th century. Over the west door is a memorial in the shape of a magnificent stained glass window, designed by Sir E. Burne-Jones, R.A., and erected to the memory of the late Nonconformist minister of Bewdley, Mr. Macdonald. This gentleman had four daughters, all of whom are the wives of celebrated men. One is Lady Burne-Jones, another Lady Poynter, wife of another eminent R.A., a third Mrs. Alfred Baldwin, wife of the M.P. for this division of Worcestershire, and a fourth is Mrs. Kipling, the mother of Rudyard Kipling. The South-West window is also interesting, and the stained glass design represents St. Leonard and the Dragon, with various coats of arms around. There is a blocked-up Norman doorway on the south side. The church is in the Diocese of Hereford. Before leaving the churchyard, the President thanked the genial Vicar for his kind assistance and explanation.

After leaving the Church, as time was limited, a passing glance was given to Ribbesford Hall, the home of the Winnington Ingrams, and at one time the home of the Herberts of Cherbury, Lord Herbert himself living in one of the turrets, said to be haunted ever since. A short walk across the fields brought the party to the banks of the Severn again, in order to visit the large caves or "Hermitage" in the prominent Bunter or Lower soft Red Sandstone cliffs at Blackstone. The river was crossed in a fine pleasure barge, called the "Gipsy Queen," capable of seating fifty or sixty persons easily, and we soon found ourselves inside the cave. Entering by an arched doorway we found ourselves within a spacious cavern. On the left a shallow basin in the floor was pointed out by a youthful guide as "the well where he (the hermit) kept his holy water." Another smaller cave looked like a cell, a third might have been used as a library, shelves being cut into the stone sides, and a fourth as a pantry, as described in the guide books. Above the latter was a loft with small portholes overlooking the Severn, and cut through the roof was a large funnel-shaped hole that might have been a chimney, but which was said to have been used for the purposes of conveying stores to the interior of the cavern. Pillars of solid stone support the roof. We were accompanied by a gentleman representing Mr. Thomas D. Potter, the owner of the property, who had very kindly offered us the use of his fishing boat, little calculating that our party would be so large.

At Redstone Rock below Stourport lower down the river, there are caves honeycombed with a labyrinth of galleries, presenting a more important specimen of

the mediæval hermitage, which was said to be "a place of great resort for devotees of high quality" in Papal times. For Mr. Noakes' paper on "Cells and Hermitages in Worcestershire," see *Transactions of the Worcestershire Field Club*, page 383. Redstone Rock is of the Upper soft Red Sandstone formation.

Some of our party who did not visit Ribbesford Church, went by the kind invitation of Mr. Langley Kitching, to inspect at his residence, Rosenhurst, his collection of shells, birds, horns, antlers, skins of animals, cast off skins of rattlesnakes, and specimens of handiwork of natives of Madagascar and South Africa. It was pronounced a splendid private collection.

Leaving Bewdley by the 5.49 p.m. train, after parting with our good friend, Mr. Rea, Hereford was reached in time for the evening trains in other directions.

The following attended the meeting:—The President (Mr. H. Cecil Moore), Rev. Joseph Barker, H. C. Beddoe, A. E. Boycott, Major J. E. R. Campbell, Dr. T. A. Chapman, Robert Clarke, Rev. Sir George H. Cornewall, Rev. Richard Evans, Charles Fortey, Iltyd Gardner, Rev. J. E. Grasett, G. H. Hadfield, Rev. E. J. Holloway, Rev. A. W. Horton, T. Hutchinson, Richard Lewis, J. W. Lloyd, Walter Pilley, Dr. F. Scudamore Powell, John Riley, Henry Southall, Hatton G. Sugden, J. P. Sugden, Rev. Morgan G. Watkins, Alfred Watkins, Rev. R. Wood, Dr. J. H. Wood, and James B. Pilley, Assistant Secretary. Visitors: Rev. A. C. Auchmuty, Mr. Beacall, Rev. H. Brierley, Rector of Ribbesford; Masters Campbell (2), C. E. Clive, Dr. Gabb, F. Gardner, C. F. Hadfield, Langley Kitching, of Bewdley; Herr Robert Krethirtz, Franfort-on-Main; E. J. Lewis, Rev. R. M. S. Onslow, Carleton Rea, of the Worcestershire Field Club; Oswald Riley, Rev. F. H. Tatham, and Col. Yeobury.

ARCHÆOLOGICAL SURVEY OF HEREFORDSHIRE.

PART II.—MEDIÆVAL.

FEW months have elapsed since Part I. of the Archæological Survey of Herefordshire, compiled by Rev. J. O. Bevan and Mr. James Davies, was issued. The work was published under the auspices of the (London) Society of Antiquaries, which Society supplied the Woolhope Club with numbers at cost price, and is, in like manner, facilitating the publication of a similar Archæological Index and Map for every county in England and Wales. At present the only other counties completed are Kent, Hertfordshire, Cumberland, Lancashire, and Essex.

Part II. is uniform in plan with Part I., but it deals with archæological objects of the post-Norman period, and is, indeed, the first of the kind published, dealing with the limits of 1000 A.D. to 1600 A.D. It has been dedicated to the Members of the Woolhope Naturalists' Field Club, and brought out at the sole charges of Rev. J. O. Bevan and Mr. James Davies. It is on sale by Jakeman and Carver at the very low price of 2s. 6d. When bound in one volume with Part I., the pre-Conquest portion, it will form an important addition to every local library.

The following review of the work appears in the *Birmingham Gazette*:—If we remember rightly, it was Mr. Bevan who a short time ago made an eloquent plea for an archæological survey of our own county of Warwickshire, a plea which we had pleasure in supporting. As we glance over the volume before us we feel our loss more keenly, and our regret is greater that the innumerable antiquities of Shakespeare's shrine have not found record in one handy and easily-accessible volume. Dugdale is too voluminous and too rare for all save the longest purses. Messrs. Davies and Bevan have taken up the Mediæval period in the history of Herefordshire, covering from 1000 to 1600, and includes the castles, the monastic institutions, friars' houses, columbaria, bells, churchyard and parochial crosses, fonts, tympana, brasses, screens, stoups, piscinæ, stained glass, and church accessories generally. All these are noted, nor are the bridges, fords, gallows, pillories, stocks, and coins neglected. The information is arranged in that most easily-accessible form, the alphabetical, where in one column may be found the place name, in the next the objects of interest there, in the third the authorities, where recorded. The work has been well and thoroughly done, and though in abbreviated form, it will prove of considerable value to antiquarian students, especially with the excellent Map appended, on which are distinctly marked all features of interest within the county. From these may arise that "true son of Herefordshire" who will render that service to his county so lovingly given by Dugdale to Warwickshire, Plot to Staffordshire, and Nash to the fair county of Worcester.

Woolhope Naturalists' Field Club.

EVENING MEETING, THURSDAY, OCTOBER 28TH, 1897.

ON Thursday evening, October 28th, there was an evening meeting in the Woolhope Club Room to hear Dr. H. C. Sorby, LL.D., F.R.S., Vice-President of the Sheffield University College, give an address on British Marine Animals and Plants, illustrated by the real objects, prepared as lantern slides. The lantern slides were exhibited by Mr. Alfred Watkins. The principal feature in the lecture was the efficient method of mounting animals and plants as lantern slides, and the very excellent exhibition of their structure. In his lecture he illustrated the various kinds of colouring matters, which he was the first to carefully study, and the pursuit of which he has lately very successfully extended. Some of these lantern slides were exhibited before the members of the British Association, at the Annual Meeting, at Ipswich, in 1895; since that time Dr. Sorby has greatly improved the method used in making them, and many, and a large part of those shown, have not been previously exhibited to the public.

The examples of minute marine animals included nearly all the leading groups, and were surprisingly beautiful. The same may be said of the various kinds of algæ. Many useful hints were given to the microscopists present, the meeting being open to members of the Microscopical Society in Hereford. Our most experienced microscopist, Rev. J. E. Vize, especially expressed his gratitude for the introduction to Dr. Sorby, and to his skilful mounting of microscopic slides.

The President, on behalf of the Club, thanked Dr. Sorby for his kind voluntary exhibition.

ON THE PREPARATION OF MARINE ANIMALS AND PLANTS AS TRANSPARENT LANTERN SLIDES.

By H. C. Sorby, LL.D., F.R.S.

The success of such preparations depends to a great extent on the fact that when most marine animals and plants are arranged out on glass and allowed to dry, adhesion takes place first round the drying edge. The result is that there is little or no lateral contraction on further drying, though there may be great diminution in the thickness. There is thus little or no distortion in the structure in the plane of the glass, and therefore in the picture thrown ultimately on the screen. It is, of course, important to select specimens of suitable size, small individuals of large animals, and large individuals of small species being usually the best. Some are naturally too transparent, and show far better when properly stained, important structure being thus seen, otherwise almost or quite invisible. On the contrary some may be too dark, and it is thus a great advantage if the natural colour can be more or less perfectly removed.

It is almost impossible to give any general rules. Nearly every different kind of animal requires a different treatment; and sometimes what might have been thought a most unpromising process, may turn out very satisfactory. By dint of many failures, suitable processes have been found for nearly every group of animals, so far the only complete failure being in the case of Actineæ.

Examples of a considerable variety of animals mounted as transparent slides were shown, and the processes found to succeed best were explained; but to make these intelligible would involve a great deal of tedious description of detail. It may, however, be said that the mounted specimens when used as slides show very much more than can be seen when the animals are alive, since they are made sufficiently transparent to show, not only the general form, but much of the internal anatomy. This should be the constant aim, and the preparations are year by year made more and more satisfactory by the use of new processes and new re-agents.

It is now many years since Dr. Sorby prepared slides of marine algæ, mounted without balsam. He was deterred from using it, thinking that it would destroy the colouring matter. He has, however, lately used it, and finds that after keeping 1½ year there is no sign of any such action, and the colours, not only remain, but are seen to much greater perfection, on account of the plant being made more transparent. Nothing could be more satisfactory than they now are; and, since so little balsam is present, there seems reason to hope that they will retain their colour, if not kept exposed to strong light.

Though some of the slides have been mounted many years none have, so far, deteriorated, but, on the contrary, many have improved by becoming more transparent. By protecting it from the action of balsam by means of gum, even the fugitive colour of the beautiful purple Nudibranchs has not faded.

Woolhope Naturalists' Field Club.

ANNUAL MEETING, December 7th, 1897.

The annual autumnal meeting for the election of President and officers for the ensuing year was held in the Woolhope Club Room on Tuesday, December 7th. The following were present:—President, Mr. H. Cecil Moore; ex-Presidents, Sir Herbert Croft, Mr. James Davies, Rev. Preb. W. Elliot, Rev. A. Ley, and Rev. M. G. Watkins; members, Mr. H. C. Beddoe, Rev. W. S. Clarke, Mr. E. Du Buisson, Mr. Gilbert Davies, Mr. F. R. Kempson, Mr. R. Lewis, Mr. B. St. John Attwood Mathews, Mr. J. H. Parry, Mr. Edwin Stephens, Mr. J. P. Sugden, Mr. Alfred Watkins, and Assistant Secretary, Mr. James B. Pilley.

Dr. J. H. Wood, of Tarrington, was nominated President.*

Mr. H. Cecil Moore, the retiring President, and Captain Bourne, Mr. John Riley, and Mr. J. H. Parry were elected vice-presidents.

Central Committee.—Mr. Joseph Carless, Mr. Robert Clarke, Mr. T. Hutchinson, Rev. Preb. W. Lambert, and Mr. Alfred Watkins.

Editorial Committee.—Rev. Preb. W. Elliot, Rev. M. G. Watkins, and Mr. H. Cecil Moore.

Hon. Treasurer: Mr. H. C. Beddoe. Hon. Auditor: Mr. James Davies. Hon. Sec.: Mr. H. Cecil Moore. Assistant Secretary: Mr. James B. Pilley.

Phenology.—The President referred to the remarkable mild season, proved by the following list of plants in blossom during the month of November, recorded in a letter to the *Hereford Journal*, under date November 30th, by Rev. H. B. D. Marshall, writing from Norton Canon Vicarage:—"It must be many years since in the garden of a country vicarage there could be seen in blossom out of doors on All Saints' Day as many as forty varieties of summer flowers. I noticed, for instance, at that time, when usually all or most of such have been killed down by early frost, the following in bloom: Roses, hydrangea, tobacco plant, campanula (three kinds), calendula, French marigold, mignonette, phlox, phlox drummondi, nasturtium, lobelia, pompon dahlia, cactus dahlia, single dahlia, calliopsis, canariensis, geranium sanguineum, Japanese anemone, rhodanthe, petunia (in great luxuriance), carnation, white jessamine, stock, giant sunflower, miniature sunflower, malope, borage, salvia, fuchsia, cornflower, violets, alyssum, minor convolvulus, sweet pea, tritoma, sweet-William, money-wort, fever-few. So much for the beginning of November; and now, on St. Andrew's Day, at the

* Dr. Wood's professional and other engagements compelled him to politely decline the honour. Rev. H. B. D. Marshall was eventually elected President for 1898.

end of it, we have, at any rate, half of the above, notably lobelias, still in blossom, and probably this record has been beaten in other Herefordshire gardens which come into my mind.

The President made additional announcements as follow:—

Botany.—The presentation to the Club, for publication in the *Transactions*, of sketches of the Pyrus, new to Britain, named *Pyrus minima*. Thanks were accorded to the donor, Rev. Augustin Ley, the discoverer of the tree.

The discovery by the Rev. C. H. Binstead of a new Moss (*Barbula acuta*, Brid.) at Nash Scar near Presteign, but within the county of Herefordshire. This Moss has only once before been discovered in the kingdom, namely near Bristol. Mr. Binstead particularly directs attention to the occurrence of this and two other Mosses (*Tortula canescens*) on Stanner Rock, and *Tortula cuneifolia* in Eardisley within a few miles area.

Geology.—The two curiously shaped stones, found with the *Lituites giganteus* in the gravels when digging the foundations of Mr. Merrick's house in Venn's Lane, referred to on page 4, line 12, of the President's Address, have been submitted to Professor M'cKenny Hughes of Cambridge, who has pronounced them to be simply fragments of possibly one and the same long almond-shaped concretion. Two or three other stones picked up in local gravel beds are similar concretions, after the manner of septarian nodules without the septaria.

It is considered probable that Professor Hughes may purchase the geological collection of the late Mr. Piper for the Cambridge Museum.*

The following proposition by Mr. Alfred Watkins, seconded by Mr. James Davies, was brought forward: "That it is desirable that each year's *Transactions* be printed and issued to members at, or immediately after, the termination of the year, and that it be an instruction to the Central Committee to discuss means of carrying this out."

The meeting accepted the proposition, and referred it to the Central Committee and Editorial Committee, to report to the next Spring Annual Meeting in 1898.

* Mr. Piper's geological collection was purchased by Mr. Woodward for the British Museum, Natural History Department, Kensington.

MOSSES.—SOME INTERESTING MOSSES FROM THE NEIGHBOURHOOD OF KINGTON.

By Rev. C. H. Binstead.

The following rare species were found in the years 1897-1898 at the localities indicated:—

1. *Tortula cuneifolia* (Dicks), Roth. Eardisley, on sunny hedge banks, in two distinct localities, in one of them in plenty.

2. *Tortula canescens*, Mont. Stanner Rock, Radnorshire.

3. *Barbula acuta*, Brid. Plentiful at Nash Scar, (near Presteign,) in Herefordshire.

4. *Bartramia stricta*, Brid. Stanner Rock, Radnorshire, in small quantity and sterile, but specimen good and typical.

It will be observed that two out of the four species were found in *Radnorshire*, at Stanner Rock, which is, however, so near the Herefordshire county boundary that I have not hesitated to mention them in this contribution to Herefordshire Botany The fact that they are rare and local species should make their occurrence near our county one of interest to local botanists, whilst that of their occurrence within a comparatively small area *in this part of Britain* is remarkable. Had any one, or even two, of them been found in these parts the discovery would have been interesting, but the occurrence of the four suggests a rather difficult problem, viz., how to account for their presence in the district referred to, for they all belong to a Southern Flora.

Roughly speaking, the Moss-Flora of the British Islands as a whole has its headquarters in Scandinavia; but, as might be expected, several species belonging to what may be called the Mediterranean Moss-Flora are found in the southern parts of Britain; and amongst them are these four referred to as having been found recently in the Kington neighbourhood. *Tortula cuneifolia* is found in the south-western corner of Ireland, in Devonshire and Cornwall, and also as far north as Warwickshire. *Tortula canescens* has been found in Cornwall (by Rev. A. Ley, of Sellack) and in Sussex, and is also recorded from *Radnorshire* —the locality being, doubtless, Stanner Rock, where I myself found it in 1897. *Barbula acuta*, until it was discovered at Nash Scar, near Presteign, had been found in Britain only at Clifton, Bristol, in 1843, since when I have heard of no other recorded find. *Bartramia stricta* is one of the very rarest of British mosses, and I think I may safely say had been found in Britain only at one locality in Sussex, in 1864, until I happened to come across it at Stanner Rock. The specimen was sterile, but in other respects seems quite as good as specimens from Italy.

Now, the question is, how do these four species hitherto found in the *South of England*, but rarely and at wide distances apart, come to be not merely growing, but, apparently, *flourishing*, in one small area with Kington for its

centre? I confess I have no solution of the problem to offer. The fact that the Rock at Stanner is volcanic may suggest itself as a possible solution, and indeed may have something to do with the occurrence there of rare plants—mosses especially delighting in a rock of this kind. There are also abundant sunshine and shelter at Stanner Rock, and it is in such spots that the rare species are found there.

But these favourable conditions are found in places further South, where, however, there are no traces of these mosses. Besides, volcanic rock has nothing to do with the species recorded from Eardisley and Presteign. At both these places the rare mosses are found in such situations as they are known to inhabit elsewhere, viz., clay banks and stony calcareous ground. The problem, though a difficult one, does not stand alone, for Killarney furnishes us with one which seems even more remarkable. There occurs at Killarney a Hepatic, or "Scale Moss," closely related to species found in the Amazon region of S. America, and to no other known species; and one of the true mosses found there, *Daltonia splachnoides*, belongs to a genus the other species of which are found only in tropical countries, S. America in particular.

Not being a geologist, I dare venture on no solution of either problem.

In the meantime the fact remains that a few very interesting additions have been made to the Moss-Flora of Herefordshire, which, thanks to the acute investigations of Rev. A. Ley, of Sellack, and others, has long been known to be a very rich one. The study of mosses, at least in this county, is one that can be undertaken, practically, only in winter and early spring, when country life is found by many to be so dull. If these remarks should meet the eyes of readers fond of the study of nature, let me suggest that during the coming winter months they should observe, if not study, the mosses. There are probably few country parishes in Herefordshire in which at least 100 distinct species of mosses might not be found. Within a circle, having a radius of four miles from Eardisley Church, I found about 180 species. I mention this merely as an example of what may be done by any one having a liking for these things. The amount of pleasure to be derived from such a pursuit must be discovered by each one for himself. If the experiment is made by a true lover of nature, I can guarantee the pleasure—not to mention profit—that will attend it.

MOLLUSCA OF HEREFORDSHIRE.

A REFERENCE to pages 201 and 220 will show that Mr. Arthur E. Boycott gave a contribution to the Mollusca of Herefordshire in a paper read at the Field Meeting at Droitwich on August 28th, 1896, and a further contribution on the same subject at the Field Meeting at Bewdley on August 27th, 1897 (see page 296). These papers were reserved in the hopes of publication and insertion at the end of this volume, at the express desire of Mr. Boycott and Mr. Ernest W. W. Bowell, who have conjointly prepared a long paper, covering 260 pages of closely written manuscript, and treating the subject *in extenso*.

It is with great regret that the Editorial Committee feel themselves compelled to defer the publication of this valuable contribution, the result of many years study, and they only came to this decision upon the resolution of the Central Committee that the work should be placed in the hands of the printers at once, and form the commencement of the succeeding volume of *Transactions* of the year 1898, with every prospect of its being in the hands of the authors, and issued to the members, early in the year 1899.

The cause of the postponement is due to the facts that, first; the material already printed has assumed proportions sufficiently large to form a volume conveniently portable, and the addition of 260 closely written pages of manuscript would have made the volume inconveniently ponderous; and secondly; the issue of the present volume of *Transactions* would be tediously deferred for about two months.

RAINFALL.—THE BRECON BEACONS.

Mr. J. A. B. Williams, engineer for the construction of the Reservoirs in the Taff-Vawr Valley, has reported to the Cardiff Waterworks Committee that the Rainfall for December, 1897, was the heaviest on record. At the Beacons Reservoir the total for the month was 15·52 inches, of which 3·36 inches fell in one day. This produced a discharge over the overflow weir of 11 inches in depth, equivalent to 260,000,000 gallons per day. During the last month the men have been employed in taking down and removing the huts, and in clearing and re-forming the surface where they stood, and in generally clearing up the works.

OBITUARY.

Our obituary for 1897 includes the loss of an old and esteemed member, the late Mr. George H. Piper, F.G.S., who died on Thursday, August 26th, at his residence, Court House, Ledbury.

Mr. Piper had been a member of the Woolhope Naturalists' Field Club for 24 years, having been elected in 1873. Twice he held the office of President, in 1883 and in 1886. His geniality, humour, and earnestness in imparting information gained attentive hearers, and secured many friendships. He took a great interest in the cultivation of fruit, and his knowledge of local vintage fruits was of assistance to Dr. Bull in his compilation of *The Herefordshire Pomona*. He accompanied Dr. Hogg and Dr. Bull to the great Congress of the Pomological Society of France at Rouen in 1884 (see *Transactions* 1884, page 227), when the representatives secured two gold medals, three silver medals, one bronze medal for their fruit, and a diploma of honour from two Societies for *The Herefordshire Pomona*, *ibid.*, page 229.

For many years Mr. Piper devoted his attention to the study of Geology, and contributed several papers not only on geology, but on local, historical, and archæological subjects. His papers were concise and carefully finished, and exhibited ability and literary taste.

His collection of local fossils contained some excellent and valuable specimens, and have been found worthy of a position in the Natural History Department of the British Museum at Kensington. A beautiful model of the *Cephalaspis* and *Auchenaspis* fishes has been presented to the Hereford Museum by his sister and executor, Miss Piper.

On May 24th, 1883, Mr. Piper, President of the Woolhope Club, read to the members a paper which is recorded in the *Transactions*, 1883, page 17. In his retiring address on April 26th, 1884 (*ibid.* page 136), further reference was made to the same subject, and on page 138 the thicknesses of the various beds, 29 altogether, are given, accompanied by a photograph taken from the south, facing the beds, the details of the separate beds being reserved for a future occasion.

For many years Mr. Piper had conceived the project, unfortunately for geologists never matured, of writing a work on the Geology and Physiography of the Ledbury district, in which the details of the various Passage Beds would have been minutely described for the benefit of future explorers. This exposure had been advantageously examined by him during the progress of the enlargement of the railway station yard during the construction of the branch line from Ledbury to Gloucester.

This is an appropriate place for publishing *in extenso* the paper read to the members in May, 1883, giving a more complete description of each respective bed, and for introducing a photograph of them from a different prospect, taken from the east, looking westwards along the exposed edges of the beds which face

the south. The straight line low down in the left corner represents the summit of the parapet wall over the western entrance of the tunnel, as it appeared in 1885.

The same paper has been read frequently by Mr. Piper to various kindred Societies, *e.g.* :—On August 30th, 1883, to the St. John's Working Men's Club ; on July 21st, 1884, to the Cotteswold Field Club ; on July 7th, 1887, to the Midland Union of Natural History Societies ; on September 17th, 1891, to the Dudley and Midland Geological Society ; and on April 6th, 1896, to the Liverpool Geological Society.

THE PASSAGE BEDS AT LEDBURY.

By George H. Piper, F.G.S.

Read at a Meeting of the Woolhope Field Club, at Ledbury, on Thursday, 24th May, 1883.

The great Geological Formation known as the "Old Red Sandstone," and the vast range of fossiliferous strata named by Murchison "The Silurian System," which lies beneath the Old Red, and above the Cambrian Schists, meet conformably on the western flank of the hills which lie on the eastern side of the town of Ledbury. The area of the ancient borough, which is a limited space, and not co-extensive with the town, is entirely of Old Red Sandstone, and the very lowest beds of that important series. The Frith Wood, close by, is Upper Ludlow. Dog Hill, or Robert's Wood, with the large quarry in the Knap Lane, are of Aymestry Limestone, and the Conigre Wood, with the Commissioners' quarries, and the deep rocks near the Pear Tree Walk are of Wenlock Limestone. The sections in Cut-throat Lane are Lower Ludlow. These places are all close to the railway station at Ledbury.

The recent cutting at the eastern end of the great excavation, near the railway station at Ledbury, has laid bare the lowest of the passage beds between the two great systems, and has sectioned and exposed to view all the Upper Silurian Strata down to the Lower Ludlow beds, so that in a few minutes' walk you may in broad daylight examine the true base of the Old Red Sandstone and all the different strata which lie in their exact positions between it and the blue muddy formation known as the Lower Ludlow, which attains here a thickness of several hundred feet, and lies immediately upon the solid beds of Wenlock Limestone.

It may be safely asserted that there is no other spot in the whole world where the exact union of these two great systems may be so readily observed and so thoroughly studied as here, and, in order that a record of the true sequence and dimensions and lithological character of the various bands composing the Passage Beds may be preserved, I have made a careful examination and admeasurements of the whole. This has never before been done. To do this now merely required care and attention, but, in the course of a very few years, weathering, and the growth of weeds, would render it altogether impracticable. Another object was, to identify with precision the few beds which contain the exceedingly rare and interesting fossils found here—some of which are new to science—for I need scarcely say fossils are not scattered everywhere; each has its own peculiar habitat, and some of the larger and more conspicuous of the beds are without fossils. It may he said that, of the true Passage Beds, which here attain a thickness of about 396 feet, some 350 feet are practically without perceptible organic remains; these are principally found in five narrow bands having an aggregate admeasurement of about 20 feet only.

My admeasurements have been taken on the north side of the section, and

in order to have a starting point at once conspicuous and incapabl of removal, I commenced at the narrow bed of Grey Sandstone opposite the end of the Goods shed* in the station yard, and thence proceeded in an eastward direction.

OLD RED SANDSTONE.

Feet.

1. Grey Sandstone, sometimes nearly cream coloured; exceedingly hard, compact, and gritty; very good building material, but difficult to work. It has no fossils. 15
2. Red marls and clays, with a few thin laminated bands of Red and Yellowish-grey Sandstone, much of it highly micaceous and fragile, but other parts compact. Some of the Upper Beds contain a profusion of *Foralites*, or tube-like markings, the burrows of annelids. These, with a few very imperfect remains of *Cephalaspidean* fishes, are the only results of very many searches, so that practically these extensive beds will very scantily reward the labours of the Palæontologist. They attain a thickness of 332

(*Pteraspis ?*)

TRUE PASSAGE BEDS.

3. Ledbury Grits, or *Auchenaspis* Beds. This formation is divided into two bands, which lie at the top of the true Passage Beds, and are separated from each other by a thin band of blue mud. The Grits are of a light bluish-grey colour, and consist chiefly of minute fragments of quartz agglutinated by lime. They are very compact and exceedingly hard, not entirely free from appearances of lamination, and are comparatively indestructible. The top band is perhaps a trifle harder than the lower one, and does not yield many perfect fossils, but contains very many broken up fragments of organisms 2
4. *Blue Mud*, lying between the Ledbury Grits; without fossils 1
5. *Ledbury Grits, Lower Bed.* This is the true *Auchenaspis* Bed. Of the same character as the top band, but not quite so hard. Here are found in great numbers the head and neck plates of *Auchenaspis Egertonii* and *Auchenaspis Salteri*, which were first discovered by Henry Brookes, D.C.L., when the railway was constructed in 1858, 1859, and 1860. From the rough gritty nature of the stone the impressions are generally obscure, and the body of the fish is, as yet, unknown in the Grits. This bed has also produced rims of *Cephalaspidean* head shields, probably *Hemicyclaspis Murchisoni*, and *Cephalaspis Lightbodii*, *Pterygotus*, a large *Lingula* and *Onchus*, and probably contains many other species (*Plectrodus* and *Scaphaspis*). Much of the rock is filled with black fragments of broken up indistinguishable fish and crustacea. 3

When the railway was first made, this stone was put aside for copings for bridges and other purposes, but was so difficult and costly to work that, as far as is known, one piece only of it was ever used, and the rest went for ballast 3

* Since that period the Goods-shed has been removed to a position further east. H. C. M.

		Feet.
6.	Red and Purple Shales and laminated Rocks. Very large heads of *Cephalaspis* have been obtained here, probably *Murchisoni*, and also heads of one or more new species of Fish	64
7.	Blue muddy soft frangible stone of the Lower Ludlow character. It contains a few *Lingulas*, and I found here a small *Trilobite* above the uppermost part of the Upper Silurian formation	3
8.	Red Marls and thin band of Old Red Sandstone	7
9.	Grey Sandstone embedded in blue mud. Has yielded nothing but one *Lingula*. This is just opposite the western entrance to the tunnel, but it is understood many feet of the tunnel will be removed at an early period, and the entrance will then be so much further eastward than it now stands. Consequently the entrance to the tunnel is not a reliable landmark*	4
10.	Red Marls, with strong bands of Old Red Sandstone. Almost devoid of fossils of any kind	52
11.	Silurian band of Soft Blue Stone, with a few *Lingulas*	1
12.	Red Marls and Shales, without fossils	10
13.	Brownish-grey band of soft Silurian Rock with large heads of *Cephalaspis*, new species, *Auchenaspis* with part of the body scales, never before seen, *Lingula*, *Onchus*, &c.	1
14.	Old Red Sandstone. Very hard tabular band. Valuable building stone. Almost without fossils	4
15.	Red Shales and Marls without fossils	5
16.	*Cephalaspis* Bed. Fine grained Old Red Sandstone of compact structure, very full of *Cephalaspis*, consisting chiefly of the new species peculiar to Ledbury, the head shield ending abruptly without cornua. Here also may be seen the body and tail of *Auchenaspis Egertonii*, never found until the year 1882. Here also are several species of *Lingula* ...	3
17.	Blue Silurian Shales. *Pterygotus*.	1
18.	Red Shales and Marls, with a few narrow bands of Old Red Sandstone. The base of this formation is a band of very dark red shaly clay, having laminations of varying thicknesses with wavy surfaces, whereon are accumulated many semi-spherical concretions varying from a quarter of an inch to an inch in diameter. These may be worm casts, but I have not completely satisfied myself on that head. Except these, there are no fossils	80
19.	The *Lingulu* Bed of Greenish-grey Muddy Shales, about four feet thick at the base, *i.e.* the level of the present work, diminishing gradually to a point, the upper end being retroverted westward for a distance of several feet, the retroverted portion lying horizontally on the red marly clay wherein it is enveloped to its termination. The uppermost parts of these shales are so soft and muddy in structure as to be easily soluble in water; the lower portion is harder. Both	

* The removal of the western entrance of the tunnel to a position many yards further east is now in process of execution. (H. C. M., November, 1898).

Top of parapet wall of tunnel, 1885.

THE PASSAGE-BEDS, LEDBURY, HEREFORDSHIRE, BETWEEN THE OLD RED SANDSTONE AND THE UPPER SILURIAN.
CAMERA POINTING WEST, SHOWING THE EXPOSED EDGES OF THE BEDS FACING SOUTH.
From a photograph by Alfred Watkins, taken 1884-1885.

Feet.

are almost or quite homogeneous. They lie in a nearly vertical position, with a dip slightly westward immediately under, but entirely unconformable with, the clay shales just described. For many superficial square yards large *Lingulas* abounded in masses, and portions of *Pterygotus* were also found. These probably would have been tilestones if they had become sufficiently hard, and are the equivalents of the so-called Tilestones of Murchison 4

20. Red Marls lying between thin bands of Old Red Sandstone. Without fossils 93

21. Grey Silurian Shales of the Downton Sandstone character. Without fossils 1

22. Old Red Shales and Marls. Without fossils 15

23. Laminated Silurian Shales, with a narrow band 12 inches wide of Downton Sandstone. These bands are vertical, the upper portion being very much retroverted. Without fossils 9

24. Old Red Sandstone Shales and Marls, overlaid the whole distance by a downthrow of broken up fragments of Downton Sandstone, intermingled with scraps of Old Red. Without fossils... 33

This is the true base of the Passage Beds.

UPPER SILURIAN.

25. Downton Sandstone. All that is in sight is retroverted westward, and in that position lies upon the Old Red Sandstone. Small *Chonetes* may be found here. The entire absence of the Bone Bed from its place here is worthy of notice 58

26. Upper Ludlow Shales. At a distance of 40 feet below the Downton Sandstone there is a band of hard stone eight inches wide, nearly vertical, very much stained with ochre, and resembling Downton Sandstone, but it does not belong to that formation. The whole of the last 40 feet is nearly vertical at the base, and all of it is retroverted. About 90

27. Aymestry Limestone. At a distance of 113 feet from the top of the Aymestry Limestone, or 27 feet due east of the corner of the Frith Wood may be found a very interesting occurrence of the bed containing *Pentamerus Knightii*. These beds at Aymestry, whence their name is taken, are very many feet in thickness; at Ledbury the *Pentamerus* bed is only one inch thick. The fossils which at Aymestry are nearly as large as a man's fist, have dwindled here to little more than the dimensions of a thumb nail. When the Ledbury railway was first made *Pentamerus Knightii* was found in stone which came out of the tunnel, but the exact position of the bed was not known, and has never been discovered since until now 236

28. Transition Beds. It is impossible to draw a line of demarcation between the base of the Aymestry Limestone and the top of the Lower Ludlow. I have therefore called these Transition Beds 12

29. Lower Ludlow.

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TO THE

TRANSACTIONS OF THE WOOLHOPE CLUB

FOR THE YEARS 1893 AND 1894.

COMPILED BY

H. CECIL MOORE.

PUBLISHED IN 1898, AND APPENDED TO THE VOL. 1895, 1896, 1897.

Field Meetings

AND DATES OF ANNUAL MEETINGS, 1893-1894.

1893.

April 4th.—Annual Spring Meeting.
May 25th.—Ludlow for Heath Chapel, Clee St. Margaret, and the Brown Clee Hills.
June 27th.—Tewkesbury and Deerhurst.
July 27th.—Water break-its-Neck (Ladies' day).
Aug. 22nd.—Kyre Park.
Nov. 23rd.—Annual Autumnal Meeting.

1894.

April 12th.—Annual Spring Meeting.
May 24th.—Ashperton for Mainstone Court, Munsley, Bosbury, Castle Frome, and Canon Frome.
June 26th.—Cardiff, Llandaff, and Penarth.
July 26th.—Church Stretton (Ladies' day).
Aug. 28th.—Usk and Caerleon.
Oct. 25th.—Annual Autumnal Meeting.

List of Meetings.

1893-1894.

(*Arranged Alphabetically*).

Illustrations,

1893-1894.

Contributors of Papers and Communications, 1893-1994.

General Index,

1893-1894.

INDEX, 1893-1894 (*Continued*).

INDEX, 1893-1894 (*Continued*).

INDEX, 1893-1894 (*Continued*).

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OBITUARY.

1893.

Aug. 15th.—Meadows, T.

Sept. 16th.—Cobbold, Rev. Preb. H.

Oct. 10th.—Apperley, H. G.

1894.

April 4th.—Martin, C. G.

Oct. 19th.—Cooke, W. H. His Honour Judge, Q.C.

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TO THE

TRANSACTIONS OF THE WOOLHOPE CLUB

FOR THE YEARS 1895, 1896, & 1897.

COMPILED BY

H. CECIL MOORE.

1898.

Field Meetings

AND DATES OF ANNUAL MEETINGS, 1895, 1896, 1897.

1895.

April 5th.—Annual Spring Meeting.
May 28th.—Shrewsbury for Atcham Church and Wroxeter.
June 28th.—Wapley Camp, The Rodd, and Presteign.
July 23rd.—Dean Forest, for Staunton and the Buckstone (Ladies' Day).
Aug. 30th.—Severn Tunnel Pumping Works at Portskewett by Caerwent and Caldicot.
Nov. 14th.—Annual Autumnal Meeting.

1896.

April 21st.—Annual Spring Meeting.
May 19th.—Aymestrey for Croft Ambrey Camp and Mortimer's Cross.
June 23rd.—Rhayader for the Birmingham Water Supply Works in the Elan Valley.
July 30th.—Downton—the gorge of the Teme—(Ladies' Day).
Aug. 28th.—Droitwich.
Nov. 19th.—Annual Autumnal Meeting.

1897.

April 23rd.—Annual Spring Meeting.
May 27th.—Wormesley, and the Butt-House, King's Pyon.
June 17th.—Olchon Valley, and the Black Mountains.
July 29th.—Dudley (Ladies' Day).
Aug. 27th.—Wyre Forest.
Oct. 28th.—Lantern Slides—Exhibition of Marine Animals and Plants prepare by Dr. Sorby.
Dec. 7th.—Annual Autumnal Meeting.

List of Meetings.

1895, 1896, 1897.

(*Arranged Alphabetically*).

Illustrations.

1895, 1896, 1897.

Contributors of Papers and Communications,

1895, 1896, 1897.

General Index.

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INDEX, 1895, 1896, 1897 *(Continued).*

Woolhope Naturalists' Field Club.

ADDRESS OF THE PRESIDENT,

H. Cecil Moore, at the Annual Meeting, 23rd April, 1897.

Gentlemen,—

In the circular convening this meeting it is stated that the President will draw the attention of members to a proposal for the better preservation of Records. I must remind you that six times a year your attention is called to Rule X., requesting any member finding rare or interesting specimens, or observing any remarkable phenomenon relating to any branch of Natural History, to immediately forward a statement of the same to the Honorary Secretary, or to any member of the Central Committee.

Is it owing to modesty that this frequent appeal has not been so successful as its importance demands? The thanks, however, of the Committee are due to a few careful observers for the Records which they have sent. There is frequently occurring some isolated fact, the record of which, by itself, may apparently be of no special interest, but the collection of a series may prove very useful in the future to the student of some special line of research. Again, there are other facts so prominent to every individual that no one thinks it his duty to send any record whatever to the Committee. I am referring to such an alarming feature upon our globe as the earthquake of December 17th, 1896. A true observer would not be satisfied with the fact alone, but would notice accompanying details, such as its duration, from what quarter it came, and what direction it pursued in its course, and other peculiarities. That there should be no difficulty in determining what observations were most essential, the form of questions selected by Mr C. Davison, Sc.D., F.G.S., was published in the Transactions of the Club for 1892, page 356. In vain I waited several weeks for reports from our members, until I was compelled to write and solicit them, and I have to thank those with whom I communicated for their courteous replies. I am now only in want of records of any damaged buildings between the lines drawn south and west of Hereford. Dr. Davison expresses his surprise at the power of observation and of careful description which many apparently non-scientific persons possess, rather than at the failure to describe at all. With reference to this earthquake, Dr. Davison wrote to me:—"I think this earthquake will turn out to be the most

interesting I have yet had an opportunity of observing. I have received 900 reports, all good, with very few exceptions, and I hope to get 2,000. I have been very unsuccessful in getting reports from Herefordshire, and there is no place so important. To get too many reports would be impossible."

The results of the investigation of the earthquake of December 17th, 1896, seem to confirm the fact that the maximum intensity was west and south-west of the Upper Silurian upheaval at Woolhope. Before leaving the subject I ought to inform you that Dr. C. Davison is joint secretary with Professor Milne, of the Committee appointed by the British Association for Seismological observations, and his many contributions of papers on earthquakes entitle him to assistance in his investigations. That such are not without interest as well as utility may be learnt from the letter of Professor Milne, in *The Times* of Thursday, April 15th, in which he informs us that last year (1896) earthquakes which created enormous destruction in Japan were faithfully recorded in the Isle of Wight 16 minutes after their occurrence, that being the time taken by an earth-wave to travel from that country to Europe.

In one instance these methods were the means of showing that there had been an error of two days in the transmission of the earthquake.

In another instance they enabled us to anticipate the news of an earthquake a month before the account of the same was received in England by the ordinary mail.

Perhaps the most extraordinary confirmation of the value of the Seismograph is evidenced by the fact that the quietude of the instruments in the Isle of Wight showed that the accounts of an earthquake causing much destruction at Kobe, where many Englishmen have friends and property, had at least been greatly exaggerated. Later it was learned that the cablegram giving the information was without foundation.

Soundings taken in the sea along the lines of rupture have shown that there have been considerable increases in depth after an earthquake. In one instance it exeeeded 400 fathoms.

The necessity for the preservation of Records of Facts we may take as an axiom. But the present system of publishing them in our Transactions is not satisfactory, scattered promiscuously through their pages, so that, in the absence of a good Index to the volume, the inquirer has to spend too much valuable time in detecting their whereabouts. The project I now propose is the establishment of a special Referee for each subject of investigation, whose duty shall be to analyse the various records, and who shall be responsible for their yearly publication in a systematic tabulated form easy of reference. Such a system has been most successfully carried out during the last few years by the Caradoc and Severn Valley Naturalists' Club in the publication I now hold in my hands, and circulate for your inspection. By this system your Records of Facts will be seen at a glance, and will prove most valuable and useful to the student. If this project meets with your approbation, as the year is already well advanced, I shall rejoice if you elect your Referees to-day, so that their names may be reported in our next circular,

THE MUSEUM.

As the collection of records of facts in this large world around us must lead to more general diffusion of knowledge, and furnish us with an important factor in scientific culture, so the teachings of truth will be communicated through lessons from objects themselves collected, and fortunately we are possessed of a repository for these objects, in which their infinite variety is reduced to order. Our Museum is an expansion of modern growth, which has attained its majority. This Free Library building, which contains under its roof the Museum, was erected in 1872-74 at a cost of £8,000, of which our present Member of Parliament, Mr James Rankin, contributed upwards of £6,000, on the condition that accommodation was provided in the institution for a Museum of Natural History, and also for the meetings of the Woolhope Naturalists' Field Club whenever required. Let it be understood that the Woolhope Club Room is at the service of the Committee of the Free Library and Museum when not required by the Woolhope Club. This Committee is elected annually, and their anxiety for many years has been to obtain an orderly and methodical arrangement of its treasures, so that the student of research may be able to examine as well as to see the objects displayed, whilst the story they have to tell may be read as easily as possible. Even the ordinary visitor may have his intelligence awakened and his range of thought widened by having myriad forms of nature, such as the birds which have visited our British Islands, the numerous butterflies and moths, land and fresh-water shells, and the gradations of life in our classified collections of fossils, records of the rocks, "Medals of Creation" as they have been aptly called, exhibited before his eyes in a few hours. For the proper execution of this work this Committee has appointed specialists of our Natural History Club as supervisors, with the rank of honorary curator of each special branch, and we may congratulate ourselves that our progress has been encouraging, that our Museum is no longer a collection of aimless curiosities, and very different from the very mixed display of a few years ago, when the authorities were glad to receive contributions of whatever came to hand from any region of the world, even on loan.

Botany Records.—If there is one subject better worked than another in our Club it is the subject of Botany. The Flora of Herefordshire, by Messrs Purchas and Ley, is a work of which any county may be proud. The recent "Additions to the Flora," including a large addition of Mosses, shows that there is evermore work to be done. It is to be regretted that no one can be found displaying enthusiasm for Fungi. Our Club led the way for many years in this branch of study, but at present seems contented to rest upon its laurels. In truth I feel a difficulty in guessing whom you would make your Referee for Funguses. One link still connects us with this study, namely, our membership of the recently instituted Mycological Society, the only apparent means at present of saving us from extinction.

We have an excellent collection of the Flora of our county in the Herbarium in drawers beneath the geological specimens. Mosses are also here, and can be seen, upon the usual conditions, by the student. When we get

richer we shall hope to possess a separate upright case for the Flora, in a cupboard with sliding shelves.

GEOLOGY RECORDS.—Our Museum contains a good collection of local fossils, but curiously enough the fossils of the Woolhope limestone itself are but feebly represented. A good hunting in the quarries of Littlehope and Scutterdine, less than a mile distant from the Moon Inn at Mordiford, might possibly be rewarded with an addition which would be appreciated.

GRAVEL AND DRIFT EXPOSURES.—Much may yet be learnt by careful observation of drift exposures and of gravel beds. For example: In digging the foundations for Mr Merrick's house in Venn-lane, within two hundred yards of the County College, a fine specimen of *Lituites giganteus* of the Lower Ludlow formation was found. There were also found two curiously-shaped stones whose similarity, betokening artificial work, still baffles our experts.

We have, underlying our immediate neighbourhood, numerous deep gravel drifts. These should be frequently visited whenever exposed in excavations made for foundations.

In our table cases representing local geology, thanks to the Rev. J. D. La Touche and the Rev. William Elliot, we are able to exhibit the continuous series of life upon our globe in the age of the Silurian system, and in these cases we see some instances of great mechanical and chemical changes produced by the powerful agents of pressure, fire, and water. The local development of this gradation of life will be seen, from the Geological Map in the Committee Room, to be confined to an area of about seven miles by four miles near Woolhope, and to but few other portions of our county, as near the Ledbury railway tunnel cutting, at Aymestrey, and the north-western parts near Kington, the remainder of our county representing Old Red Sandstone, in which a few fragments of fishes have been found.

In the table cases devoted to this branch we very much want an extension, so that the life of Molluscs of the present day may be represented by our land and freshwater shells. This would be less incongruous than the present system of our Palœontological specimens running into the butterflies, moths, and other ephemera of to-day.

BUTTERFLIES AND MOTHS.—Thanks to Dr. T. A. Chapman, recently Superintendent of our County Asylum, we have a most enviable collection. As these are liable to suffer injury and great depreciation from loss in colour by exposure to light, the seclusion of the specimens in drawers is necessary for their careful preservation. The student can examine them conditionally, as they are of high value, and a negligent visitor may inadvertently leave a drawer unlocked, and at the mercy of the many visitors of untested morality, as has taken place, and may occur again. The presentation of this collection, mainly by Dr. T. A. Chapman, is one of the most generous donations we have received for our Museum. This subject of entomology might be considerably increased in value and interest by the addition of life-like groups of the *larva* and *pupa* stages of the butterflies and moths.

FISH.—Local fish are but poorly represented, although we boast of a

Royal Sturgeon, 8 feet 6 inches long, weighing 182lbs., which was caught by James Postans in the Wye, at the New Weir, six miles above Hereford, on May 31st, 1846, before railways interfered with the navigation of the river.

MOLLUSCS.—A very valuable collection of these invertebrates, limited to the shells of land and fresh water of the British Isles, now occupies a cramped position, which, under the supervision of Messrs. A. E. Boycott and Ernest Bowell, requires a more extended area for their display, especially as these gentlemen are desirous of placing in classified order the varieties found in Herefordshire, and have contributed to the Woolhope Club their first paper on the subject of "Land and Freshwater Snails of Herefordshire."

BIRDS.—Nobody can visit our magnificent collection of British birds without acknowledging that great artistic taste, and knowledge of their living habits and characteristics, has been displayed in their mounting; but there remains yet much to be done, such as an arrangement in artistic groups on ground, rocks, with water surroundings, or such objects in Nature with which the life of the bird in its natural habits was associated, in lieu of the artificial pedestals of the wood-turner, so unedifying to the eye of the naturalist.

BIRDS' EGGS.—By a judicious purchase the Museum has obtained a collection of eggs, and through the influence of Mr. W. E. de Winton, son of one of our members, we are placed under the patronage of the British Museum, from which we have already received a supply of eggs from their duplicates, which has filled up many a gap in our collection.

ARCHÆOLOGY AND ANTHROPOLOGY.

But since a museum has for its objects the preservation of materials constituting the history of the earth and its inhabitants, we have not forgotten man himself, for we have a nucleus of objects of historical interest, illustrating the occupation of our country by our ancestors, and by our invaders the Romans. We have their manners and customs illustrated by implements and querns, their arts and domesticated habits by tesselated pavements, fragments of pottery, articles used in their hair and apparel, by pins and buckles, and a fairly representative collection of the coinage of the later Roman Emperors.

We have also a few implements of prehistoric man, such as axes of the Early Stone Age. We have been recently astonished by further evidence of the wanderings of prehistoric man, by the discovery of the distribution of flint flakes over a small area of the county north of Ledbury. They will probably be found in many other localities by an observer possessing a good eye for such objects.

From the above few observations you will see that the Museum possesses some valuable objects. The value of a Museum is tested by such an orderly arrangement of its contents, as not only to render it attractive and instructive to the general public, but to afford scientific students the means of studying their favourite branches of science.

For the proper carrying out of this object more Table Cases are required,

and a uniform system of labelling with correct classifications. The cost of each Table Case would be about £20, and might be obtained amongst us by a few subscriptions, so soon as we have recovered from the exhausting demands of the Diamond Jubilee year. We require three more Table Cases.

I have dwelt so long upon our Museum in the hope of stimulating some of our members to do more work in their own neighbourhood, in the endeavour to fill up the broken and missing parts of the series in the various branches of local Natural History.

You all know that our Club is far-reaching in its aims, spreading out its arms, like an octopus, to grasp anything that comes within its reach, and I ask your co-operation to enable us to utilise to greater advantage its miscellaneous character.

We shall add considerably to the diffusion of scientific knowledge if we render our Museum more worthy of its name and objects, and by the further development of the resources of Local Natural History in all its aspects, we shall make our Museum what it ought to be, the recognised headquarters of all the scientific activity of the district.

It behoves me to inform you that the income for conducting both the Free Library and the Museum combined is limited, being derived solely from the penny rate, and is barely sufficient to cover the every-day working expenses of the Reading Room, Library, and Reference Library, irrespective of the requirements of the Museum. The usefulness of the Museum is thus necessarily limited. Its success demands increased means for its support by assistance from other sources.

The Honorary Curators of the Museum are :—

Botany—Rev. Augustin Ley.
Conchology—Mr. E. W. Bowell and Mr. A. E. Boycott.
Entomology—Mr. E. W. Bowell, Mr. A. E. Boycott, Dr. T. A. Chapman, and Mr. T. Hutchinson.
Geology—Rev. Preb. Wm. Elliot, Rev. J. D. La Touche, and Mr. G. H. Piper, F.G.S.
Ornithology—Mr. W. E. de Winton and Mr. James B. Pilley.
Local Antiquities—Mr. H. Cecil Moore.

"Well-ordered stones make architecture, well-ordered ideas make logic, well-ordered facts make science."—*Prof. Blackie.*

In the year 1891 the Rev. J. O. Bevan laid before our members certain useful subjects of scientific observation, occupying pages 211 to 220 of our Transactions. Of the many subjects therein presented to our notice, the devotion of the Club seems to have been chiefly bestowed upon one, namely, the Archæological Survey of the county. Our warmest thanks are due to Mr. Bevan and Mr. James Davies for their many years devotion to this useful as well as interesting work, not forgetting Mr. F. Haverfield, who has revised the whole and summarised the mounds and earthworks, and the ancient roads in

two appendices. Mr. Haverfield has exhibited himself a wise student and tutor. A deliberate consideration of his calm judgment, based as it is upon an accurate and extensive knowledge of Romano-British history, so far as it has been revealed to us by numerous authorities, has made us more prudent; our consciences have pricked us that we have been enthusiastic and too rash in accepting the explanations and interpretations of later writers, which have suffered the penalty of getting exaggerated into traditions of earlier inhabitants, and we have been led into the wisdom of retaining an open mind upon many so-called traditions of the ancient history of Herefordshire, until further revelations produced by discoveries, especially by excavations, afford us a more safe and sure justification for our opinions. I have been asked—Can you not signalise your presidential year by carrying out some excavations? To this I reply—If proprietors of land will only give us an invitation, we will, after consultation with a committee of aid of experts from the Society of Antiquaries, place them in a position to carry out their desires in the most favourable manner.

We have the Archæological Survey of Herefordshire in our hands. It is the duty of every member to inspect the localities most familiar to himself, and to report without delay to Mr. James Davies, at 132, Widemarsh-street, Hereford, any omissions and any errors, so that the corrections may be made known by publication in our Transactions. At the same time we call upon any member who has any material of the Mediæval age to report from his district to communicate it in the authorised manner upon the blank form of Return, which he can obtain upon application to Mr. James Davies. By so doing he will expedite the publication of the Mediæval Survey of our county.

Now comes the question—How can we utilise to our best advantage the suggestions of the Rev. J. O. Bevan? A re-perusal of his pigeon-boxed paper, rescued as it were from the dead-letter office, combined with an intelligent grasp of the system of work so admirably elaborated by the committees of the British Association for the Advancement of Science, will assuredly animate some of our two hundred and twenty members to work in one or other of the many fields of science open for their investigation. For the benefit of members who have recently joined our ranks a few observations will now be made explanatory of the work yearly undergoing careful research in the various sections.

CORRESPONDING SOCIETIES.

Yearly we send to the Secretary of Corresponding Societies of the British Association a report of the papers published by our Club, and it is an honour to us that, ever since our association with that body, we have been yearly retained on the list of Societies in Union. This affiliation is a specific acknowledgment by the British Association of the position of our Woolhope Naturalists' Field Club. The papers written by our members are classified, and a list is printed in the annual report of the Association, giving in its proper section reference to the author, the title of his paper, and the page on

which it will be found in the volume of Transactions of the Club. The work of our Club is thus brought before the notice of the workers of science throughout the world, seeing that there are few National and Scientific Libraries in which the reports of the British Association are not to be found. To meet the demands of those who are desirous of consulting the papers themselves, two copies of our publications are preserved for reference in the Offices of the British Association in Burlington House, Piccadilly, one copy is always sent to the British Museum Natural History Department, Kensington, in addition to the five copies always sent by the Copyright Act to the following: The British Museum; the Bodleian Library, Oxford; the University Library, Cambridge; the Advocates' Library, Edinburgh; and the Library of Trinity College, Dublin.

In order to derive the full advantages of this our connection we send annually a representative to the Conference of Delegates, where matters relating to the Corresponding Societies are discussed, and questions bearing on the promotion of more systematic observations and plans of operation, and of greater uniformity in the mode of publishing results are considered. The subjects for investigation, their nature and object, and the method of conducting them are announced.

Our delegate, on his return home, forwards his report, upon which it is desirable that committees of our members be formed to arrange and carry out such investigations as can be locally applied. If further information be wanted, communication can be made direct with the Committees of the Association, a list of which, with the names of the Secretaries, is appended to the official report of the Conference. I would urge upon our Club collectively, and our members individually, the importance of taking part in the work of as many of the subjects as may be found practicable in our district.

By the establishment of committees a great stimulus to local work will be given, to the benefit of the Association and especially of ourselves, and the number of communications will be materially increased. Thus our officials will be relieved from some of their anxiety in the deficient supply of papers for our meetings and our annual volume of Transactions. The ponderous annual report of the British Association is on our shelves, and if we refer to the sixty subjects for investigation proposed at the Liverpool meeting last September, 1896, we shall be able to find some in which our local knowledge and enterprise can render assistance. Some of the Committees receive grants from the funds of the Association:—

1. The Application of Photography to the Elucidation of Meteorological Phenomena, with Mr. G. J. Symons as its Chairman, received a grant of £10. Secretary, Mr. A. W. Clayden.

2. Seismological Observations. Chairman, Mr. G. J. Symons. This subject was considered of such importance, owing to the recent discoveries, as already previously mentioned, of the value of the Seismograph, as to receive a grant of £100. Secretaries, Dr. C. Davison and Prof. J. Milne.

3. The Committee to investigate the Erratic Blocks of the British Isles

and to take measures for their preservation, with Professor E. Hull as Chairman, received a grant of £10. Secretary, Mr. P. F. Kendall.

4. The collection, preservation, and systematic registration of Photographs of Geological interest, with Professor J. Geikie as Chairman, received a grant of £15. Secretary, Mr. W. W. Watts.

5. The Committee to organise an Ethnographical Survey of the United Kingdom, with Mr. E. W. Brabrook as Chairman, received a grant of £40. Secretary, Mr. E. Sidney Hartland.

METEOROLOGY.

As regards the rainfall for Herefordshire, there are numerous observers. See the reports every week in the *Hereford Times*, summarised every month, and totalled annually. I hear from headquarters of the Royal Meteorological Society, at 22, Great George-street, Westminster, S.W., that more observers are required from the neighbouring counties of Brecknock, Radnor, and Carmarthen. I shall, however, feel very grateful to any member who will compile all the annual arrears from various stations in Herefordshire for publication *en bloc* in our Transactions during this current year. We receive most valuable information frequently on climatological phenomena from the pen of Mr. H. Southall, F.R., Meteorological Society; but the series of annual rainfall statistics has for a long time been discontinued ever since the year 1874. The utility of correct and long continued series of rainfall observations is practically demonstrated by the records of Mr. Lloyd, at Nantgwyllt, near the confluence of the rivers Elan and Claerwen, from which the Birmingham Corporation has been enabled to estimate the supply of water they can impound in the reservoirs in course of construction in the Elan Valley.

I here exhibit to you the form adopted by the Royal Meteorological Society for Climatological and Meteorological observation. The form is too voluminous and elaborate perhaps for re-publication on this occasion, but any member disposed to work in this department can obtain a printed form from the Secretary at the address above given. The Returns of Phenological observations are not so lengthy. Perhaps their publication below will induce some member to make application to the Secretary, Mr. Edward Mawley, Rosebank, Berkhamsted, Herts; being careful to reserve a duplicate copy for our own Club's Referee for publication annually in our own Transactions.

ROYAL METEOROLOGICAL SOCIETY.

Phenological Observations taken at .....

During....., 189.....

Date of Flowering.	PLANTS.
.....	1. Hazel* *(Corylus Avellana).*
.....	2. Coltsfoot *(Tussilago Farfara).*
.....	3. Wood Anemone *(Anemone nemorosa).*
.....	4. Blackthorn *(Prunus spinosa).*
.....	5. Garlic Hedge Mustard *(Sisymbrium Alliaria).*
.....	6. Horse Chestnut *(Æsculus Hippocastanum).*

..... 7. Hawthorn *(Cratægus Oxyacantha)*.
..... 8. White Ox Eye *(Chrysanthemum Leucanthemum)*.
..... 9. Dog Rose *(Rosa canina)*.
..... 10. Black Knapweed *(Centaurea nigra)*.
..... 11. Harebell *(Campanula rotundifolia)*.
..... 12. Greater Bindweed *(Convolvulus Sepium)*.
..... 13. Ivy *(Hedera Helix)*.

INSTRUCTIONS TO OBSERVERS.

1. Observe the same individual trees and shrubs each year, and as regards plants, those growing in precisely the same spots. This is of the greatest importance. In the case of trees and shrubs they must be of mature growth. The particular plants, &c, selected for observation should be situated neither in very sheltered, nor, on the other hand, in very exposed positions, and should neither be abnormally early or late in their flowering for the district. When from any cause any of the selected plants, trees, or shrubs cease to be available, other specimens of the same variety similarly situated should be observed instead of them.

2. Watch carefully for the appearance of the first flowers. A plant, &c, is to be considered "in flower" when the stamens of the first blossom on it first become visible. As soon as the date of one plant has been secured, watch for the appearance of the next on the list. If, unfortunately, the first flowering be missed by a day or two, the observer is requested to give the estimated date of first flowering, and to place an asterisk against the entry. Should the plant be estimated to have been in flower more than four days, no entry at all should be made, as the observation would be of no value whatever for the purpose of this investigation.

*3. In the case of the Hazel the fertile flowers are to be observed. They are little bright red flowers, which, as a rule, open directly after the barren flowers or catkins.

Note.—Each Form should be signed by the Observer.

BIRDS.

Date.
..... 1. Song Thrush *(Turdus musicus)*, first heard.
..... 2. Swallow *(Hirundo rustica)*, first seen.
..... 3. Cuckoo *(Cuculus canorus)*, first heard.
..... 4. Nightingale *(Daulias luscinia)*, first heard.
..... 5. Flycatcher *(Muscicapa grisola)*, first seen.
..... 6. Swallow *(Hirundo rustica)*, last seen.

INSTRUCTIONS TO OBSERVERS.

1. The note of the Song Thrush must not be mistaken for that of the Missel Thrush, which is generally heard earlier. The notes of the Missel Thrush are less musical and connected, its strain is altogether much shorter,

and being repeated many times in succession, it wants the variety of that of the Song Thrush.

2. The Swallow may be distinguished from the House Martin and Sand Martin by its back being of a uniform glossy steel blue, almost black, by its long forked tail and by the dingy white colour of its lower parts. The House Martin has the rump and lower parts pure white, while the Sand Martin is of a mouse-colour above. The Swift differs from the Swallow in its more rapid flight, the peculiar narrowness of its outspread wings, and its general sooty colour.

3. Observers should be on their guard against imitations of the well-known note of the Cuckoo.

4. The observer should be certain that it is the Nightingale that is heard, as the Song Thrush also often sings late in the evening.

The Flycatcher is a little grayish-brown bird, fond of sitting on a post, rail, or perch, whence it can readily dart off and seize a fly, and commonly returns to its former station.

INSECTS.

Date.
..... 1. Honey Bee *(Apis mellifica)*, first seen.
..... 2. Wasp *(Vespa vulgaris)*, first seen.
..... 3. Small White Butterfly *(Pieris rapæ)*, first seen.
..... 4. Orange-tip Butterfly *(Anthocaris cardamines)*, first seen).
..... 5. Meadow-brown Butterfly *(Epinephile Janira)*, first seen.

INSTRUCTIONS TO OBSERVERS.

1. The date when the Hive Bee first visits flowers.

3. This must not be mistaken for the large White Butterfly, which generally makes its appearance a little later than the Small White one.

GENERAL INSTRUCTIONS.

1. Place the dates against the names of the Plants, Birds, and Insects in the lists, and send the form to Mr E. Mawley, Beckhampsted, Herts, quarterly, viz., on March 1st, June 1st, September 1st, and December 1st.

2. Notes made at the time on any exceptional weather, and its influence on farm and garden crops, trees, birds, insects, &c, will add greatly to the value of the returns. For example, the effect on vegetation of severe frost, of heavy rain, snow, or hail, of a prolonged drought, etc.

3. Someone should be instructed to make the observations during the absence of the observer.

(Signed).....Observer.

Notes and Remarks should be given on the front of the Form.

METEOROLOGICAL PHOTOGRAPHY.

At the Leeds Meeting of the British Association in 1890 a committee was formed to collect and register photographs of meteorological phenomena. The instructions are simple, and can be obtained on application to the

Secretary, Mr Arthur W. Clayden, "Warleigh," Palace Road, Tulse Hill Park. London, S.W.

The Return is simple and short, as you see it here condensed on a single page. It is printed below :—

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

Committee on Meteorological Photography.

Name of Observer .....

Address .....

Place of Observation (1).....

Description of Lens (2)..... Focal length.....

Make of Plate employed (3).....

Please state also whether the Picture was taken by direct exposure, through yellow glass, by reflection from black glass, or by any other special device.

Any other information.

No. of Print .....

Date .....

Time of Day .....

Direction (4) .....

Stop (5) .....

Exposure (6) .....

Developer (7).....

(1). If more than one place is used, take a separate Form for each.

(2). Name of maker and his description, such as "rapid rectilinear."

(3). Maker's description, unless a special emulsion is used, in which case the Committee would be glad of the full formula.

(4). Insert point of compass towards which the camera was pointed. State whether true or magnetic.

(5). *f*-8, *f*-11, *f*-16, or whatever the ratio may be.

(6). Great exactness is not required.

(7). Insert P. for Pyro, P.S. for Pyro and Sulphite, E. for Eikonogen, F.O. for Ferrous Oxalate, Q. for Hydro-quinone. The Committee will be obliged for the full formula.

N.B.—It is highly desirable that all prints should show some fixed object, such as a tree or chimney. In the absence of any such point of reference, the print should be marked to show the north and the zenith.

THE DAILY WATER-LEVEL OF THE WYE.

The height of the River Wye at the Wye Bridge, Hereford, is taken daily at 10 a.m., under the supervision of the City Surveyor, and the Record is given weekly in the *Hereford Times*. When Mr. J. B. Evans kept the Saracen's Head Inn on the south-east corner of Wye Bridge, the highest daily rise of the river was ascertained by a self-registering instrument, of which the index was set daily. This was a far more correct method of determining the average volume of water passing through the Wye Bridge than the present method

of taking the elevation of the river-level at ten o'clock every morning only. Reference to the Register kept for the Woolhope Club during the four years 1887 to 1890 inclusive, shows occasionally a difference of level over a period of twenty-four hours amounting to so much as 11½ feet. I have been surprised that the Corporation have not adopted a self-registering maximum and minimum instrument, and have been informed that the purchase of one and the fixing thereof would be an expensive item. Mr Parker, the City Surveyor, informs me that the expense, including fixing, of a Self-indicating Register of the volume of water, such as is made by Bailey, of Salford, or Jennings, of Southwark, would amount to £20. Mr Evans was an ingenious man; he made his instrument, and I frequently verified its accuracy before calling upon the Club to give him a guinea a year for keeping the Records. The instrument was exceedingly simple, and its mechanism may be thus explained:—A soda-water bottle, plugged with a cork, floated in a narrow well made out of large drain pipes, within which it was secure from wave oscillations, whilst it communicated directly with the river. The bottle was suspended by fine whipcord which passed vertically upwards over a pulley, whence its course was horizontal under the ceiling of the cellar. A frame supporting a wooden barrel twelve inches in diameter was fixed to one of the rafters of the ceiling, and to the barrel was attached a spindle with a diameter of one inch. The cord from the floating bottle passed round the wooden barrel, which was so sensitively balanced as to revolve freely with the up and down movements of the bottle. A fine whipcord attached to the spindle of the barrel, revolving simultaneously with it, passed vertically through the ceiling and floor of the smoking-room above it to a gauge about 2ft. or 3ft. in length, somewhat similar in size and appearance to a FitzRoy mercurial barometer, protected by a glass frame under lock and key. At the summit of the gauge the whipcord passed over a pulley, to which was suspended a small metal weight, adjusted, with due allowance for friction, to counter-balance the floating soda-water bottle. As the river rose so the counterbalance propelled a sliding index which registered the maximum rise. Another index resting upon the flanged base of the counterbalance might have been added to register the minimum fall of the river; this, however, was not attached to the instrument, and the index was set by the hand. Every inch of the graduated scale upon the gauge represented one foot rise or fall of the soda-water bottle float. Thus the rise and fall of the river could be easily read, and calculated to the nicety of two or three inches, by any visitor to the smoking-room, upon one of the walls of which the gauge was fixed. I frequently called at unexpected times, and the results of my visits assured my confidence in Mr Evans, who took an interest in this work I always found he had daily recorded the maximum in the Diary.

It may here be mentioned that during an impetuous flood the obstruction of the bridge dams up the river above the bridge. It was found that the fall of the river thus caused below the bridge seldom occurred until the rise was as great as 8 feet; seldom was there any appreciable variation when the rise was under 7 feet. When it exceeded 8 feet in rise, influenced of course to

a greater extent by the velocity of the current, a variation as far as twelve inches has been found in the difierence of level above aad below the bridge.

I here exhibit to you a drawing of Mr Evans's ingeniously contrived gauge. When Mr Evans left extensive alterations were made to the premises, and the fine broad promenade to the Wye meadows now covers the site of his gauge.

The adoption by the Corporation of a self-registering maximum and minimum gauge would assure a more accurate computation of the value of water daily passing through Wye bridge than the present system of recording the height of the water at ten o'clock every morning, since the gauge would enable us to ascertain the average height during the whole twenty-four hours.

This daily computation ought to be determined as accurately as possible so as to put us in a position to make the comparison in the future, when in the place of periodic natural floods the daily compensation supply of 27,000,000 gallons of water will be substituted through the lowerpoint dam in the Elan Valley called Caban Coch.

The highest floods recorded at Wye Bridge, Hereford, are those of 6th February, 1852 (18ft. 4in.), and the as yet unparalleled flood, 20ft., of 11th February, 1795.

On page 151 of the Transactions for 1869 is a useful table, prepared by Mr. C. E. Curley. As very few of our recently joined members possess copies of our earliest volumes, this table is now re-published.

TABLE

Of the number of cubic feet of water passing down the river per minute at Wye Bridge, Hereford, from summer lowest water level up to ten feet in height.

Height of river in feet.	Volume of water in cubic feet per minute.
1	177·000
2	233·420
3	296·880
4	353·250
5	413·140
6	476·550
7	553·185
8	635·100
9	696·193
10	776·000

SEISMOLOGICAL OBSERVATIONS.

I have already referred to earthquakes in an early part of these my remarks. As regards the earthquakes which have been seriously felt in Herefordshire, a report of that of October 6th, 1863, with an accompanying map showing the area affected, is to be found in Transactions, Part 5, page 115. The volnme for 1892 contains on page 354 observations of the earthquake of August 18th, 1892, with Dr. Charles

Davison's formula of observations to be made during the occurrence of an earthquake. A brief record of the earthquake of November 2nd, 1893, which was felt by only a few in Hereford, is to be found on page 146 of the Transactions for that year. With reference to the earthquake of December 17th, 1896, it is thought that there may possibly be some connection between it and those of 1863 and 1868, but to prove its existence a careful examination of both is required. Should such be determined upon, Dr. Davison remarks, in a page on 179 of "Nature" of December 24th, 1896, "Important evidence will in all probability be furnishhd as to the later stages in the growth of the originating fault." I have not calculated the area affected by this earthquake, but its boundaries can be seen in a map in Symons's Meteorological Magazine for January, 1897, and compared with the approximate boundaries of the earthquake shocks of the years 1248, 1574, 1705, 1863, and 1868. The shock of 1884 in Essex disturbed an area computed by Messrs Meldola and White at about 50,000 square miles, which was since exceeded by the Pembrokeshire earthquakes of 1892 and 1893. The connection of the Exmoor earthquake of January 23rd, 1894, with the Morte Slates of Devonshire is shown by Dr. Davison on page 553 of the Geological Magazine for December, 1896. For the "History of the earthquake of October 6th, 1863" see British Meteorological Proceedings II., 1865, pp. 55 to 59. See also Symons's Meteorological Magazine III., 1868, pp. 153 to 154.

Should another earthquake occur, reference should be made to Transactions, vol. 1892, page 354, for Dr. Davison's formula of observations required before, during, and immediately following the occurrence. It is unnecessary to reprint them here, but the following general remarks upon that formula, contributed by him, will be found useful :—

HINTS FOR OBSERVING AN EARTHQUAKE.

I.—GENERAL REMARKS.

1.—All notes should be made as soon as possible after the shock is over.

2.—Nothing about which the observer feels the least doubt should be entered without some word or note to indicate its uncertain or approximate character.

3.—In writing his description, the observer may find it useful to place himself in the same position as that in which he felt the shock.

4.—A negative answer to a question is often as useful as an affirmative one or a full description.

5.—Especially is this the case when the shock is not felt or the sound not heard. Such information, especially if it is the experience of several or many persons, may be of great service in determining the boundaries of the disturbed area and the sound area.

6.—If all or many of the questions cannot be answered, most useful information may still be given by answers to those numbered 1, 3, 6, and 7 *(a)*, especially at places where the shock was not strongly felt. Next in importance to these are numbers 4 *(a)*, *(c)*, *(d)*, and 7 *(b)*, *(c)*, *(d)*, *(g)*.

7.—If more than one shock is felt, the descriptions of the different shocks should be kept separate. It is just as important to describe such shocks fully and accurately as those which are stronger and more striking.

8.—Skill in observing earthquakes may be gained by the close observation and description of other transitory phenomena, *e.g.*, a railway train passing near at hand, a peal of thunder, the firing of heavy guns or blastings.

Any member who has not upon his shelves the volume for 1892 above referred to should communicate with Dr Davison, 373, Gillott-road, Birmingham, who will be grateful for simple short answers to even a few of the questions (see paragraph 6 above), or will supply more elaborate queries with lucid explanatory notes to any more studious investigator.

My previous remarks in the earlier portion of my address testify to the utility of endeavouring to add to our knowledge of earthquakes, and demonstrate the advantages of the formation of a series of depôts of sensitive Seismometers in suitable localities.

GEOLOGICAL PHOTOGRAPHY.

In the year 1888, at the meeting of the British Association at Bath, the utility of a collection of photographs of geological phenomena and features was demonstrated in a paper read by Mr. O. W. Jeffs. In 1889, at their meeting at Newcastle, a committee was formed, with Professor James Geikie as its chairman, to arrange for the collection, preservation, and systematic registration of photographs of geological interest in the United Kingdom, with the object of eventually forming a national collection of photographic views, illustrating the geology of our country, to be deposited in a central position, where it may be available for purposes of study and comparison. All Corresponding Societies were invited to aid in furthering this work, which, during its seven years of working, has proved so successful that nearly 1,500 prints have now found a permanent home, accessible to the public for reference in the Museum of Practical Geology, 28, Jermyn-street, London, S.W., under the supervision of Mr. W. W. Watts, secretary of the Committee. In the report issued to the British Association last September, in Liverpool, I regret to find that Herefordshire is one of the few counties which has failed to send a single contribution, due probably to the want of organization of a small committee of our Club.

That the aims and scope of the parent committee and the simplicity of their requirements may be readily understood, I exhibit to you a few specimens of the photographs already contributed, three of which you will find reproduced on plates 2, 3, and 4, of the Geological Magazine for January, February, and March, 1897, Dec. 4, Vol. 4, from which you will see that the most typical views, taken under skilled geological direction, are chosen in preference to general artistic views, and I reproduce the following extract from the report of the Geological Photographs Committee, issued in 1896.

"It is desired to obtain photographs, illustrative of characteristic rock exposures, especially those of a typical character or temporary nature; important boulders; localities affected by denudation, or where marked

physiographical changes are or have been in operation; landslips; raised beaches; old sea cliffs and other conspicuous instances of marine erosion; characteristic river-valleys or escarpments, and the like; types of rock structure, jointing, folding, and faulting; glacial phenomena, such as *roches moutonnees*, moraines, drums, and eskers; or any natural views of geological interest. Photograghs of microscopical sections and typical hand-specimens of rocks and fossils are also admissible. It is important that copies of photographs which have been processed for illustrating articles and papers in Journals should be deposited in the collection; they should be accompanied by an exact reference to the publication, and, if possible, a copy of the plate."

The attention of our members has been previously called to the subject in the pages of our Transactions of 1892 (page 359). Hoping it may not again fall as a dead letter, application for their co-operation is renewed, and the republication of geological exposures in our own county, as recommended by Mr George H. Piper, F.G.S., will be opportune, indicating where the most typical examples of rock phenomena, and features of landscape affected by geological agency, are to be found in and near our own county. 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 Peartree Walk at Ledbury, of Wenlock limestone; 7. Worcester-road, Ledbury, the exposure of Wenlock limestone; 8. Eastnor, the drift at Clincher'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, etc.; 11. Holly Bush Pass, Diorite, Hornblende, etc.; 12. Holly Bush, Eastnor, Cambrian Sandstone; 13. Winds Point, Diorite, Hornblende, Gneiss, etc.; 14. The same exposure at North Malvern. To the above may be added: 15. The general scenery of the Woolhope anticlinal: its ridges and cross valleys; 16. Anything similar seen in the May Hill anticline; 17. Characteristic scenery and exposures in the Old Red Sandstone anywhere; 18. Rocks of the Kington and Radnor region, e.g., the Stanner Rock on the boundary; 19. Intrusive igneous rock near Brook Hill, south west of Abberley.

In addition to the copy sent to the parent and central society, one copy should be reproduced in our Transactions, and a third copy retained in a book specially provided for local geological features, and kept on our library shelves.

The report of the Geological Photographs Committee referred to, copies of which are in my hands, contains suggestions regarding the apparatus recommended, and for the collection of geological photographs. When measurements are unattainable it is always advisable to include a "scale-object" in the photograph as more suitable than the introduction of a geological hammer. As regards size of photograph, 8½ by 6½ inches ("whole

plate ") is recommended, but this is optional. In the cases of small negatives, when sharp, an enlargement to whole plate size is desirable.

In order to obtain uniformity in the collection, occasional rearrangement of which is necessary, the cataloguing and arranging has been facilitated by the adoption of self-binding mounts of standard size. It is essential, therefore, that photographs should be sent *unmounted*. They will be mounted by the Committee on cards of uniform size, with perforated edges for binding, to hold one whole-plate, two ½-plate, or four ¼-plate views. Donors of photographs, who prefer to mount their own prints, will be supplied with the required number of standard mounts on application to the Secretary. Every security will be taken to prevent any infringement of the copyright, which will remain vested in the donor.

In order to preserve its scientific value, each photograph should be accompanied by as many details in a uniform manner as can be conveniently given, for which purpose a blank form will be supplied on application. Form A, represented in a reduced size, is adopted, copies of which will be supplied on application to the Secretary.

The extension of this collection has been due in great measure to the work of local societies and Field Clubs like our own. Yorkshire especially has contributed largely, whilst Warwickshire appears determined to complete a photographic survey of its whole county, including subjects of ethnographical and archæological, as well as of geological, interest.

Of what a storehouse of fact will the rising geological student shortly be possessed, enabling him readily to compare the progress of physiographic changes with the former conditions, when the whole of the United Kingdom has become fairly represented. And how much has been lost to us, and can no longer be delineated owing to the temporary duration of some exposures of geological features, due to their getting covered, naturally by vegetation, or artificially by plantations or by buildings; to the breaking up of boulders for road metal or their disappearance in other ways; to the covering of landslips with soil, made more remunerative by the agriculturist or forester.

Let then the members of our Woolhope Club not fail to photograph any new sections so soon as they are exposed, and new phenomena so soon as they are recorded. Here is a field of work before us, not requiring too much technical knowledge, and in which many members may help individually. To the subject of geology, for the study of which our Club was instituted in 1851, we have of recent years failed to pay much attention. Let us then be up and doing, re-awaken an interest in Herefordshire, and, having renewed our acquaintance with the work done by our distinguished predecessors, collectively contribute to it a handsome memorial of permanent value.

COMMITTEE ON ERRATIC BLOCKS.

This Committee, with Professor E. Hall as Chairman, and Mr. Percy F. Kendall, of Yorkshire College, Leeds, as Secretary, has for its object the "recording the position, height above the sea, lithological characters, size and origin of the Erratic Blocks of England, Wales, and Ireland, reporting other

matters of interest connected with the same, and taking measures for their preservation."

On this subject Herefordshire continues unrepresented. There is reason to believe that there may yet remain in the county some hitherto unnoticed boulders to be added to the scanty record of these at Lugwardine, referred to on page 83, the 1880 edition of "Old Stones," by the late W. S. Symonds; "Boulders a ton weight of Caradoc conglomerate from the north were found here, and with them masses from the Clee Hill basalt," to which he also refers on page 166 of the 1872 edition of his "Records of the Rocks," when he says "the drift is not merely a high level Lugg drift, but appears to have been deposited by a broad stream which flowed from the Church Stretton district partly, and only partly, in the direction of the existing Lugg." The same "deposit has been quarried largely at Hagley and Wilcroft, in the parish of Lugwardine, and has rendered to searchers the teeth of the fossil horse (equus fossilis) and a worn molar of rhinoceros tichorinus." On June 16th, 1893, Mr. George H. Piper wrote to me, "I have seen erratic blocks in the drift at Clincher's Mill, Eastnor, as well as at Wilcroft, Lugwardine, where I have frequently worked; and in other places in Herefordshire, but at present I cannot call to mind where." These missing links must be discovered by our Club. The amount of work done in this branch in the Midland counties of Warwickshire and Worcestershire is truly marvellous. The researches of geologists have discovered isolated erratic blocks or boulders, *i.e.*, masses of rock evidently transported by natural agency from some locality more or less remote, and deposited literally by thousands (as shown in the map accompanying Mr. F. W. Martin's paper, read before the Birmingham Philosophical Society on February 5th, 1890, and published in Vol. vii., part 1, of their proceedings) over the Midland districts, bounded by Stafford on the north, over Cannock Chase, by Wolverhampton, Dudley, Northfield, The Lickey Hills, down to Bromsgrove and Droitwich on the south, thence upwards by Bridgenorth, Much Wenlock, and west of The Wrekin in the north-west. Over this area are scattered boulders from the English Lake district, from the Arenig and other mountains of North Wales, and from Mount Criffel and South Scotland, including a Criffel granite transported as far south as Worcester. Again, in our adjoining county of Shropshire, granite and other boulders, observed by members of the Caradoc Field Club, have been identified by Professor Lapworth as transportations from Scotland.

Blank forms will be supplied on application, upon which answers are required to the following questions, under headings A. and B. as below:—

(A) ISOLATED BOULDERS.—QUERIES.

1. What is the name of the parish, estate and farm on which boulder is situated, adding nearest town and county, and any particular enabling its position to be marked on the Ordnance map?

2. What are dimensions of boulder, in length, breadth, and height above ground?

3. Is the boulder rounded, subangular, or angular?

4. If the boulder is long shaped, and has not been moved by man, what is direction by compass of its longest axis?

5. If there are any natural ruts, groovings, or striations on boulder, state—*(a)* Their length, depth, and number; *(b)* the part of boulder striated, viz., whether top or sides; *(c)* whether the striations are in the direction of the longer axis, or at what angle to it?

6. What is the nature of the rock composing the boulder? If it is a species of rock differing from any rocks adjoining it, state locally where, from personal observation, you know that a rock of the same nature as the boulder occurs, the distance of that locality, and its bearing by compass from the boulder.

7. If the boulder is known by any popular name, or has any legend connected with it, mention it.

8. What is the height of the boulder above the sea?

9. Is the boulder indicated on any map, or does it make any boundary of a county, parish, or estate?

10. If there is any photograph or sketch of the boulder. please to say how the Committee can obtain it?

11. Is the boulder connected with any long ridges of gravel or sand, or is it isolated?

12. Upon what does the boulder rest?

(B) GROUP OF BOULDERS.

Though there may be no one boulder in your district so remarkable as to deserve description, there may be groups of boulders.

1. What is the name of the parish, estate, and farm on which they are situated, adding the nearest town, and county, and any particular enabling their position to be marked on the Ordnance map?

2. What are the dimensions of the smallest and largest boulders of the group?

3. Are the boulders rounded, subangular, or angular?

4. If any large boulder of the group (which has not been moved by man) is long shaped, what is the direction by compass of its longest axis?

5. If there are any natural ruts, groovings, or striations on any boulder, state— *a)* Their lengths, depth, and number. *(b)* The parts of the boulder striated, viz., whether top or sides. *(c)* Whether the striations are in the direction of the longer axis, or at what angle to it?

6. State *(a)* localities where rocks undoubtedly of the same nature as the boulders occur. [Be careful to ascertain that none of the boulders have been brought from a distance by human agency.] *(b)* The distances of those localities and their bearings by compass from the boulders?

7. What is the nature of the rocks composing the boulders; and in what proportions do the boulders of the various rocks represented in the group occur?

8. What is the height of the group above the sea?

9. Over what area does the group extend, and what number of boulders are there in the group, or per acre?

NOTE.

With respect both to the isolated boulders and the groups of boulders described, state whether they are exposed on the surface or surrounded by any deposit. Describe the nature of any deposit containing boulders; and state whether the embedded boulders are of the same character as those (if any) upon the surface.

TYPE SPECIMENS OF BRITISH FOSSILS.

There is also a Committee for the registration of the above, of which the blank forms have six columns with headings as follow:—1. Name under which originally described. 2. Where originally described and figured. 3. Locality. 4. Exact stratigraphical horizon. 5. In what collection deposited. 6. Nature (whether entire, or if not, what portion).

THE SOCIETY OF ANTIQUARIES, LONDON.

Our Club is one of the 36 Societies in union with this Association. The late Rev. Dr. Havergal in 1888, and subsequently Mr. Thomas Blashill has annually represented our Club at the annual Congress of Archæological Societies. It is to this affiliation that we owe the publication of the Archæological Survey of Herefordshire, the expenses of setting it in type being mainly discharged by the Society of Antiquaries.

The following subjects are under their consideration:—A. The Transcription of Parish Registers. B. The Photographic Survey of England and Wales. C. The Ethnographic Survey of the United Kingdom. D. The Archæological Surveys of Counties. E. The Compiling of County Bibliographies. F. The Index of Archæological Papers Published. G. The Preservation and Care of Historical Monuments, and numerous other analogous subjects.

(A) PARISH REGISTERS.

Since the publication of the first report of Parish Registers, which occupies a position at the end of volume of our Transactions for the year 1892, giving suggestions as to the method of transcription, the revision and collation of copies and their publication, a large number of Registers have been transcribed, probably partly in consequence of that report. A supplemental list has recently been published, and will be appended to our next volume when issued. Nearly every county in the kingdom is represented. Herefordshire supplies only one transcription, namely, that of Upton Bishop, by the late Rev. Dr. F. T. Havergal.

(B) PHOTOGRAPHIC SURVEY OF ENGLAND AND WALES.

This signifies the establishment of a general photographic record of all works of antiquity in the district, organised on the basis so very successfully initiated. The photographs should be as large as possible, whole plate being preferred, but in no case less than ½-plate. In the case of tombs, effigies, and architectural objects, a more valuable record will be acquired by the exhibition

of architectural details, even at the deliberate sacrifice of picturesque effect, and, for the true definition of the scale, a graduated rod must always be introduced, such as the graduated scale, marked clearly with English and French measures, which has been always included in a series of Roman masonry now in preparation for the Society of Antiquaries. Printed copies of this scale can be obtained (price 6d, post free, or 5s per dozen) from the Assistant Secretary of the Society of Antiquaries, Burlington House, London, W. The regulations suggested by the Committee in their report for 1895, being of permanent value, will be appended to our next volume of Transactions.

(c) ETHNOGRAPHIC SURVEY OF THE UNITED KINGDOM.

The Committee upon this subject is a powerful body, with representatives from the Anthropological Institute, the Folk-lore Society, the Royal Statistical Society, the Dialect Society, the Society of Antiquaries, London, with committees for Wales, Scotland, and Ireland.

With reference to the Forms of Schedule, the eighteen pages octavo I hold in my hands are far too lengthy for publication here, but on application by any member of our Club I will supply him with a copy of Form for such subject as his tastes and environs of his place of residence entice, and enable, him to pursue. The subject is extensive and of much public interest, and can only be satisfactorily worked by the aid of willing and intelligent observers within whose compass it comes. It is not very probable that one person will undertake every branch of the inquiry, but it is reasonably hoped that some person will be found to take interest in one branch, and others in another branch. The best field for most of the inquiries is an out-of-the-way village, whose population has remained practically unchanged for many generations, remote from railway facilities of emigration, such as may possibly be found in that part of Herefordshire forming the boundary line on the top of the Black Mountains, and probably elsewhere.

The Committee propose to record—(1) Physicial types of the inhabitants; (2) Current traditions and beliefs; (3) Peculiarities of dialect; (4) Monuments and other remains of ancient culture; and (5) Historical evidence as to continuity of race.

The schedule prepared by the Committee, occupying eighteen pages octavo, supplies forms for each of the five heads of inquiry, with questions and suggestions applicable to each section, and the digestion of each collection is undertaken by one or other member of the Committee. Some useful notes explanatory of the schedules are appended by Mr. E. Sidney Hartland, F.S.A., Secretary of the Committee, which can in this address be only epitomised. A collection of authentic information relative to the racial elements of our population opens a large field of high interest for the historian and archæologist, and would enable him to collect or confirm many of the guesses of earlier historians based upon meagre or delusive data. The difficulties attending this inquiry are getting more and more difficult as civilisation draws the agriculturist into larger centres of towns; nevertheless

there still remain hamlets and retired places which have not been much affected by the exodus of their population.

Mr. Hartland desires to throw more light upon historic and prehistoric monuments and other material remains by the collection of surviving depositions of tradition, namely, "tales, sayings, customs, medical prescriptions, songs, games, riddles, superstitions, and all those scraps of traditional lore stored in rustic memories." In fact he does not despair of "recovering at least the outlines of the beliefs of our remote predecessors."

Tradition is fast dwindling away before the influences of modern civilisation. Elementary education, railways, and newspapers have changed the talk by the fireside, and it behoves the collector to make no delay before the old traditions have faded out of the memory of the better educated younger generation.

The dialect is perishing as rapidly as the folklore.

Doctors are often in the way of learning scraps of folklore, especially medical folklore. But the best collectors of folklore are generally found to be ladies, teachers, and clergymen.

Villages suitable are such as contain not less than a hundred adults, the large majority of whose forefathers have lived there as far back as can be traced, and of whom the desired physical measurements with photographs might be obtained.

Amateur photographers may take photographs of the peasantry in their every day garb. Country doctors may be interested in the measurements. The traveller's anthropometer may be obtained from the manufacturers, Aston and Mander, 25, Old Compton-street, London, W.C., for £3 3s. complete. The observer should procure "Notes and Queries on Anthropology," second edition, from the Anthropological Institute, 3, Hanover-square, London, W., for 3s. 6d. Valuable hints can be obtained from the "Handbook of Folklore," price 2s. 6d. The Folklore Society have printed a pamphlet, "County Folklore. Printed extracts, No. 1, Gloucestershire" (London: D. Nutt, 1892, 1s.), being a collection of Gloucester folklore from Atkyns, Rudder, and the first four volumes of "Gloucestershire Notes and Queries," compiled by Mr. Hartland.

The method of collection and transcription is given in detail in the schedule, to which your attention is particularly directed when it is published in the next volume of our Transactions.

(D) THE ARCHÆOLOGICAL SURVEYS OF COUNTIES.

You are now, thanks to the Rev. J. O. Bevan and Mr. James Davies, fully acquainted with the purposes of this subject, as the Archæological Survey of Herefordshire is now in your possession. According to the last report the surveys of the following counties have been completed:—Kent, Hertfordshire, Lancashire, Cumberland and Westmoreland, and Herefordshire, and maps of Essex and Surrey are in preparation. We have ordered a copy of each county for our library.

The map and text, with the index, form a very useful work of reference

in a compressed form, which will stimulate our members to further archæological research.

(E) THE COMPILATION OF COUNTY BIBLIOGRAPHIES.

The Bibliographical Society has issued a paper by Mr. F. A. Hyett, on March 10th, 1895, with suggestions and recommendations by the Society in January, 1896. Out of the nine classes recommended on page 12 of the above pamphlet, our local literature may be divided into five of them, namely:—

1. Printed works—the contents of which exclusively relate to the county or any part of it.

2. Printed works which contain a substantive and important reference to the county or any part of it.

3. Biographies of inhabitants of the county.

4. Prints.

5. Maps.

We shall not find it difficult to name one or more members of our Club to whom this work would be a comparatively easy labour of love.

(F) ARCHÆOLOGICAL PAPERS.

An Index of Archæological Papers published in 1891, 1892, 1893, and 1894 has been in your hands bound in the two last volumes of our Transactions. The Index for 1895 is ready to appear with our next Volume.

Mr. G. L. Gomme has made the handsome offer to the Congress of his MS. of an Index of Archæological Papers, printed from the commencement of the publications of the Royal Society in 1670 to 1885. The Index will occupy 1,000 pages 8vo. It is estimated that, if 500 were subscribed for, it can be supplied at 15s. per copy. We have ordered a copy for our own Library.

A circular upon this subject has already been forwarded to every member of our Club. It is hoped that sufficient subscriptions will be forthcoming to enable this volume, so valuable in the cause of Archæological research, to be issued early.

In the foregoing remarks I have limited myself to recommending, for investigation, only a few out of the sixty subjects proposed, and all these may be reasonably considered within our range. I am grateful for the opportunity, which this my address to you as your President has given me, of simplifying your pursuit of these recommendations by the publication in greater detail of the simple forms of inquiry upon each subject, as adopted by our parent and central society—the British Association for the Advancement of Science.

The principal object of my address has been to point out what work now lies before us, and the most simple way of adding your individual assistance. As we have witnessed our Club increasing yearly in its constituency, so we look forward to its usefulness and activity increasing proportionately—not in arithmetic, but with the motto of our Club, "Hope on, Hope ever," before us—in geometric progression.

Another object I have had in view in this my address has been to get our observations tabulated and systematized, so that they may be rendered of more permanent value by being compared and correlated with others. This object will not be attained by the election of Committees and Referees, unless

our members exhibit greater affection and loyalty by individually giving their assistance as they can in one way or other, be it ever so humble.

At this meeting you have seen that the proposal to limit the strength of our Club to 200 members has not been accepted. What was the inducement that brought about that proposal beyond the fear that visitors to our Field meetings, attracted by their pleasant social view only, might be admitted into membership, thus rendering more difficult the task of making arrangements for their conveyance and sustenance as members of a picnic party? We hail to our ranks all such as promise to be active observers, and we hereby resolve to stimulate the freshmen to examine the secrets of mother Nature, so that they may eventually become good practical naturalists, whereas otherwise the opportunity of cultivating their powers of observation in the field would never have been open to them.

I will conclude my address by quoting the following definition of a good practical naturalist as given by the great Bishop Wilberfore, late Bishop of Oxford and of Winchester: "A good practical naturalist must be a good observer; and how many qualities are required to make a good observer? Attention, patience, quickness to seize separate facts, discrimination to keep them unconfused, readiness to combine them, and rapidity and yet slowness of induction; above all, perfect fidelity, which can be seduced neither by the enticements of a favourite theory nor by the temptations to see a little more than actually happens in some passing drama."

Woolhope Naturalists' Field Club.

NOTES ON SOME OF THE ROMAN COINS FOUND IN HEREFORDSHIRE.

By H. C. Moore.

The fact of some valuable presentations of Roman coins found in Herefordshire having been recently made through our Woolhope Club to the Hereford Museum, induces me to write a few introductory remarks to the tabulated list of these coins.

In the *Transactions of the Woolhope Club* there are not many notices of Roman coins found in the county. On page 45 of the *Transactions* of 1883 we have a description of a 1st brass coin of Lucilla, daughter of Marcus Aurelius and Faustina, A.D. 147 to 183. Again on page 342 of 1885 we find a notice of a few found in 1881 at Blackwardine when making the cutting of the Leominster and Bromyard Railway—namely, a 2nd brass of Agrippina, and denarii of Tetricus, Constanine, Urbs Roma, Crispus, Constans, and Honorius.

In the Hereford Museum there is a tray containing a miscellaneous collection gathered from sources unknown.* The recent presentations are constituted of:

1.—84 coins from the hoard discovered in April, 1895, on the property of Mr. Harry McCalmont, M.P., at Bishopswood, a little south of Ross, being a representative collection of the various Emperors and mints out of the hoards of nearly 18,000 coins found buried in three jars.

2.—71 coins out of a collection of about one hundred and fifty found during a series of years on the site of Magna Castra (Kenchester) by the Hardwick family, presented by Mr. Charles Hardwick, of the Old Weir, Kenchester, and

3.—43 coins or more out of a collection of about one hundred and fifty found under similar circumstances on the same site of Magna Castra, presented by Mr. Richard M. Whiting, of The Lower House, Credenhill.

With reference to the collection from Bishopswood, as we are promised a detailed description from the pen of a numismatist, Mrs. Bagnall-Oakeley, of Newland, it will not be necessary at present to do more than congratulate ourselves that, after numerous coins had been picked up by school children and others, so many as 17,446 of these coins fell into her hands for examination, and at the same time gratefully thank her, not only for tabulating the series, but also for her intermediatory influence in their presentation.

*It is *believed* that they came principally from Kenchester.

Turning to the two collections from Kenchester, we owe many thanks to Rev. A. W. Hands, recently of Hereford, now residing at Cheltenham, for devoting so many hours in my house at various periods during the last three months in examining and tabulating these coins. In "Spinks & Son's Monthly Numismatic Circular" there is a series of articles monthly from his pen, entitled "Chats on Roman Coins for Young Collectors." The series, commenced in February, 1895, is expected to be continued until the middle of the year 1897. The articles, written in a pleasantly readable style, afford conclusive evidence that the writer has deeply studied the details of Roman coinage, and has extensive knowledge of Roman history. In gratitude I acknowledge my great indebtedness to him for enabling me to draw out in detail a thoroughly corrected list of coins, which confirm more than anything else the long period of occupation of Kenchester by the Roman invaders, and teach in a fascinating manner some little of Roman history.

The combined collection introduces us to the coinage of the Roman Emperors from the time of Domitian A.D. 81 to Gratianus A.D. 383. Magnus Maximus, a Christian before his accession, was proclaimed Emperor in A.D. 383. In the same year he left Britain for Gaul, and from that year is dated the fall of Imperial influence in this Island. There is a legend that Magnus Maximus married Helena, daughter of Eudda, a noble in Caernarvon, in Wales, so it is very probable that he may have visited Kenchester. Our collection contains a few coins of Romano British unknown rulers after that date.

The coins are principally brass denarii. We have only eight Silver coins, and those of the earlier Emperors, and of First and Second Brass only ten; one Billon (a term applied by the French numismatists to coins of silver mixed with much alloy, often with copper), of Gallienus, and ten brass Follis coins. The changes in the names and the value of the Imperial coinage are complicated, and would require a very long chapter of explanation through their different phases. One change took place about the time of Gallienus, A.D., 253 to 268. Before this time there were 1st, 2nd, and 3rd brass coins. There never was an exergue denoting the date of mint on a true 3rd brass, the exergue is found on the brass denarius only. It has become popular for the sake of convenience to call these small coins 3rd brass: in our tabulated list the term brass denarius has been adopted. In the time of Diocletian (Emp., A.D. 284, abdicated 305, died 313), the brass Follis, about the size of our shilling, was introduced.

The various mints represented are London in our own country, and the cities of Treves, Lugdunum (Lyons), Siscia near Bosnia, Constantinople, and Constantina (Arles).

The study of Roman coins fascinates by representing to us the religions, customs, arts, literature, musical instruments, and general history of the ancients. We are reminded of the Tribute money shown to Our Lord, and the question, "whose is this image and superscription?"—of the two pence offered to the innkeeper by the good Samaritan—the denarius, worth about 7½d., being translated in our Bibles as "one penny." On the earlier coins we see figures of the heathen deities; pagan emblems such as sacrificial altars with basin and vessel for

pouring libations upon them; emblematic figures and words betokening Victory, Peace, and Tranquility, Happiness, Security, Concord, Faith, and the like; the Palm and the Olive branch, Cornucopia, Hasta pura, &c. In time of the plague which devastated Europe from A.D. 250 to 265 we find the Centaur or the propitiatory figure of Æsculapius, or of Salus, feeding a snake; so also in the time of the plague forty-eight years afterwards of which Maximinus Daza sickened in A.D. 313. Animals introduced from Africa for exhibition in the amphitheatres; Chariots for races in the games, &c.

Here we may note that the figure of the horse was the favourite representation on the very earliest coins B.C. of the Britons. One gold coin, about the size of a shilling, with oh! such a horse! was found some years ago at Kenchester. This coinage is supposed to have been derived through Gaul from the chariot drawn by horses on the coins of the Macedonians.

As we proceed to the commencement of the fourth Century we are prompted to a joyous feeling of sympathy with the Early Fathers of our Faith when, after the embracing of Christianity by Constantine the Great about A.D. 312, we find the emblem of the Holy Cross on the Labārum, the standard borne before the Emperors, and the sign ☧ Chi Rho as it is called, being the first two letters of the word Χριστος, introduced upon the coinage, and the consecratio coin of the Emperor which enabled Eusebius to make the comparison of the ascent of Elijah to Heaven.

ROMAN COINS, FOUND AT BISHOPSWOOD, NEAR ROSS.

Presented by HARRY L. B. MCCALMONT, Esq., M.P.

ROMAN COINS discovered in April, 1895, at Bishopswood, near Ross, on the property of Mr. Harry L. B. McCalmont, M.P., and by him presented through the Woolhope Naturalists' Field Club, to the Museum, Hereford. The coins were found in three earthenware jars amongst a heap of stones about nine inches below the surface level, about 50 yards on the north side of Bishopswood Church, whilst the workmen were engaged in making a path to the Church, about a quarter of a mile above the main road from Ross viâ Kerne Bridge, and about one mile east of Kerne Bridge Railway Station. There were about 18,000 in number and their weight was about 1¼ cwt. The jars were of an elegant and similar pattern, thirteen inches high, and five inches across the mouth and the base. All three jars were broken; they were enclosed by a low rough wall.

Presented by Mr. McCalmont on the condition that they should be kept distinct as representative of one of the largest "finds" of late Roman coins ever recorded from this part of England. Out of this hoard Mrs. Bagnall-Oakeley has classified 84 coins as a collection representative of the varieties in the "find."

The find is interesting because, with the exception of the coins found at Lydney Villa, no Roman coin has hitherto been found in the Forest of Dean, in its ancient boundary between the rivers Wye and Severn, and northwards to Ross and Newent, later than Allectus (obiit A.D. 296). The sequence of the Roman Emperors is now carried onwards through the Constantine family up to Constantius II., A.D. 323 to 361. Amongst the varieties are coins bearing the earliest Christian symbols of the cross on a standard, and the symbol ☧ or the first two letters (in the Greek alphabet) of the word "Christos," (Χριστος).

Chronological arrangement of the coins. All are brass denarii.

1, 2. HELENA, 1st wife of F. Val. Constantius, 292—306. Trèves, 1st and 2nd mint. No varieties. All poor coins.

3, 4. THEODORA, 2nd wife of do. (married A.D. 292). Trèves, 1st and 2nd mint. No varieties. All poor coins.

5. LICINIUS I. 307 to 323. Only one reverse of this Emperor in the find.

6. LICINIUS II. 317 to 326. Only one reverse of this Emperor, and only seven coins in the hoard.

7. CONSTANTINE THE GREAT. Cæsar, A.D. 306; Christian, A.D. 311; Constantinople, A.D. 330; Obiit, A.D. 337. Prætorian Gate.

8. Do. SOLI INVICTO.

9. Do. SARMATIA DEVICTA.

10. Do. Two soldiers, with oak-leaf between the standards.

11, 12. Do. Star above standards.

13, 14. Do. ☧ on Labārum, with a cross below.

15 to 27. Do. Thirteen coins of different mints and varieties.

28. CONSTANTINE THE GREAT. DIVO CONSTANTINO. Veiled head. Quadriga. Four-horse chariot.

29. CONSTANTINOPOLIS. 330, with ☧

30 to 36. Do. Seven coins of different mints.

37. URBS ROMA. This coin with the Christian symbol ☧ is rare.

38 to 43. Do. Six coins of different mints (330 to 334)?

44. DELMATIUS. 335 to 337. Nephew of Constantine I. (a rare coin).

45 to 52. CONSTANTINE II. 317 to 340. Eight coins of different mints.

53. Do. Obv. IVN. N.C. Diademed cuirassed bust when he was only Cæsar. Rev. GLORIA EXERC. Exergue P. CONS.

54 to 58. CONSTANS. 333 to 350. Five coins of different mint and varieties.

59. Do. do. ☧

60. Do.
- Obv. FL. IVL. CONSTANS AVG. Diademed draped head of Constans to right.
- Rev. GLORIA EXERCITVS. Two soldiers with Labārum bearing cross with wreath underneath. Exergue TR.S. (Trevirensis signata).

61 to 73. CONSTANTIUS II. 323 to 361. Thirteen coins of different mints.

74. Do.
- Obv. FL. IVL. CONSTANTIVS NOB. C. Diademed draped head of Constantius II. when he was only Cæsar.
- Rev. GLORIA EXERC. Palm branch between standards. S. CONS (T).
- Perhaps Signata (Pecunia) Constantina (Arles), a town in Gaul,—not Constantinople.

75. Do.
- Obv. FL. IVL. CONSTANTIVS AVG. Diademed cuirassed bust of Constantius II. to right.
- Rev. GLORIA EXERC. TR.P—(Trevirensis Pecunia).

76 to 78. Do. Three coins—wreath, palm branch, star.

79, 80. Do. Two coins—star above standard.

81, 82. Do. Two coins ☧ and + on Labārum.

83. Do. ☧

84. CONSTANTINOPLE. A.D. 330. Helmeted cuirassed bust to right, carrying a sceptre, surmounted by a small cross. Rev. Figure of Victory with hasta pura in right hand, the left hand on a shield.

POSTCRIPT.—The last coin, No. 84, has been received from Mrs. Bagnall Oakeley since the above list was printed, hence its position at the bottom of the list. Mrs. Bagnall Oakeley writes:—"There were in the find four coins of Crispus (ob. 326), and three coins of Helena, the wife of Julian the Apostate (A.D. 355 to 363)."

COINS FOUND AT KENCHESTER,

Principally on the site of the Roman Camp, Magna Castra, presented to the Museum, Hereford (through the Woolhope Naturalists' Field Club), by Mr. CHARLES HARDWICK, the Old Weir, Kenchester.

SILVER COINS *AR*.

1. *AR*. (Silver). A.D. 81 to 96. Denarius of DOMITIAN. Obv. [DOMI]TIAN C[AES] Head of Emperor laureated to right. Rev. Equestrian figure.
2. *AR* (denarius). A.D. 96 to 98. Obv. IMP. NERVA CAES AVG. P.M. TR.P. COS. II. P.P. Laureated head of Emperor to right. Rev. FORTVNA. Fortune standing to left with gubernaculum and cornucopia.
3. *AR* (denarius). A.D. 98 to 117. Obv. IMP. CAES NERVA TRAIAN AVG. GERM. Laureated head of Emperor to right. Rev. P.M. TR.P. COS. IIII. P.P. Victory with wreath in right hand, and Trophy ? in left.
4. *AR* (denarius). A.D. 98 to 117. Obv. IMP. CAES NERVA TRAIAN AVG. GERM. Laureated head to right. Rev. PONT MAX. TR. POT. COS II. Peace (Pax) with olive branch and cornucopia.

BRASS COINS. I. Æ OR FIRST BRASS.

1. I. Æ. (1st brass sestertius). A.D. 98 to 117. Obv. [IMP. NERVA] TRAIANO AVG. GER DAC P.M. [illegible TR.P.] Laureated head of Emperor Trajan to right. Rev. Probably a figure of Pax standing to left holding in right hand an olive branch, in left a cornucopia. In field S.C.
2. I. Æ (1st brass sestertius). A.D. 13 to 161. Obv. ANTONINVS AVG. PIVS. P.P. TR.P. Laureated head of Emperor to right. Rev. Legend illegible [.....] AVG.[ ]C. In field S.C. Figure apparently of Pax standing to left with olive branch in right hand, and cornucopia in left.
3. I. Æ (1st brass sestertius). A.D. 138 to 161. Obv. ANTONINVS AVGVSTVS, the rest illegible. Laureated head of Emperor to right. Rev. Seated robed figure of Roma holding Victoriola in right hand, and hasta in left shield. In field S.C. Of the legend only the letter M remains.
4. I. Æ. Anna Faustina obit A.D. 175. Obv. Head of FAVSTINA II. to right. Legend illegible. Rev. Figure of Pax? standing to right, robed, holding hasta in right hand, and branch ? in left hand.

5. I. Æ. A.D. 138 to 161. Consecration coin of the apotheosis of the Emperor. Obv. DIVVS MARC ANTONINVS PIVS. Bare head of Emperor to right. Rev. The Eagle with image of the soul of the Emperor ascending to Heaven. CONSECRAT. In field S.C.

THIRD BRASS, FOLLIS, AND BRASS DENARII, &c.

1. III. Æ (Third brass). A.D. 222 to 235. Obv. [IMP.] SEV ALEXAND AVG. Laureated head to right. Rev. FORTVNA AVG. Standing to left with rudder and globe at feet.
2. (Brass denarius). Query ? III. Æ. A.D. 253 to 260. Obv. LIC. VALERIANVS. P.F. AVG. Radiated draped bust to right. Rev. ORIENS . ...Figure of Sol advancing with whip. No exergue.
3. (Brass denarius). A.D. 253 to 268. Obv. Radiated bust of GALLIENVS to right. Legend illegible. Rev. A Centaur to left holding Lyre? in left, and Orb? in right hand. Exergue illegible.
4. Ditto. Obv. Radiated bust of GALLIENVS AVG to right. Rev. Panther advancing to left. Legend LIBER CONS AVG. Exergue illegible.
5. Ditto. Obv. GALLIENVS AVG. Radiated head to right. Rev. SECVRITAS AVG. Figure of Security leaning on column. Exergue, none.
6. Brass coin shewing signs of having been washed over with silver. Obv. SALONINA AVG. Head of the wife of Gallienus as Luna, with crescent moon under the head. Rev. Figure standing to left holding simpulum ? in right, and cornucopia in left hand. Legend illegible. Exergue wanting.
7. (Brass denarius). Query III. Æ ? Obv. VICTORINVS P.F. AVG. Radiated draped bust to right. Rev. Obliterated, but from the letter X most probably [PA]X.
8. (Brass denarius). A.D. 265 to 267. Obv. IMP. VICTORINVS AVG. Radiated bust to right. Rev. Radiated figure (apparently Sol) advancing to left with whip in left hand, right hand raised. Exergue not visible. Legend perhaps ORIENT.
9. (Brass denarius). Query III. Æ ? Obv. Illegible. Head like that of Victorinus. Rev. SPES AVG. Hope advancing to left with blossoms or buds in right hand. No exergue.
10. (Brass denarius). A.D. 265 to 267. Obv. IMP. C. VICTORINVS. Radiated draped bust to right. Rev. PAX AVG. Figure of Peace standing to left with olive branch in her right hand, and holding in left hand a hasta pura. No exergue.
11. (Brass denarius). A.D. 268 to 276. Obv. CLAVDIVS P.F. AVG. Radiated bust of Claudius Gothicus to right. Rev. PAX AVG. Peace advancing to left. No exergue.

12. (Brass denarius). Obv. DIVO CLAVDIO. (Claudius Gothicus).
(A rare coin). Rev. An altar—consecratio. No exergue.

13. (Brass denarius). Obv. Legend obliterated. Radiated head probably of Claudius Gothicus.
Rev. An eagle CONSECRATIO. Exergue, if any, obliterated.

14. (Brass denarius). A.D. 267 to 273. Obv. PESV. TETRICVS [II.] CAES. Draped radiated bust of young Cæsar.
Rev. Obscure, probably Pax.

15. (Follis). A.D. 286 to 310. Obv. IMP. G. MAXIMIANVS P.F. AVG. Laureated bust with cuirass.
Rev. GENIO POPVLI ROMANI. The genius standing to left with wreath in right hand and cornucopia in left.

16. (Brass denarius). A.D. 287 to 293. Obv. IMP. CARAVSIVS P.F. AVG. Radiated draped bust to right.
Rev. Figure of Pax standing to left with olive branch in right hand and hasta pura in left. In field S.P. ? Signata Pecunia. In exergue MLXXI. *See footnote below.

17. (Æ denarius) ? A.D. 287 to 293. Obv. IMP. CARAVSIVS P.F. AVG. Radiated draped bust to right.
Rev. SALVS. Figure of Salus standing to left with hasta pura in left hand. The right hand imperfect. In field S.P. ? Signata Pecunia. In exergue MLXXI.* See footnote below.

18. (Brass denarius). A.D. 287 to 293. Obv. CARAVSIVS AVG. Radiated draped bust to right.
Rev. FORTVNA REDVX. Figure of Fortuna standing to left holding rudder on a globe, with cornucopia in left hand. In field S. No exergue.

19. (Brass denarius). A.D. 287 to 293. Obv. Probably [CARAV] SIVS AVG. Radiated draped bust to right.
Rev. SECVRITAS AVG. Figure of Security leaning on a column with hand raised to head—a position of ease. Exergue illegible.

20. (Brass denarius). A.D. 287 to 293. Obv. IMP. CARAVSIVS AVG. Radiated draped bust to right.
Rev. SALVS. Salus standing to left feeding snake with right hand, a hasta pura in left. Exergue M.L. (Moneta Londinensis).

21. (Brass denarius). A.D. 287 to 293. Obv. IMP. CARAVSIVS AVG. Radiated bust to right.
Rev. Salus standing to left feeding snake. No exergue.

22. & 23. (Follis coins). Unusually good condition and type. A.D. 287 to 293. Obv. IMP. CARAVSIVS P.F. AVG. Radiated draped bust to right.
Rev. PAX. Figure of Peace standing to left with olive branch in left hand and hasta pura in right. In one of these coins the hasta pura is upright; in the other coin it is held obliquely. In field B.L. 2nd mint of London. In exergue MLXXI. * See footnote below.

*MLXXI=Moneta Londinensis. XXI. of these to a silver coin called "argenteus."

24. (Brass denarius). A.D. 287 to 293. Obv. IMP. CARAVSIVS P.F. AVG. Radiated draped bust to right.
Rev. PAX. Figure of Pax standing to left with olive branch in right hand, and hasta pura in left. In field F.O. (sixth Officina). In exergue M.L., rather illegible.

25. Ditto. Obv. (Same as 24).
Rev. Very obscure.

26. (Brass denarius). Obit. A.D. 296. Obv. IMP. ALLECTVS P.F. AVG. Radiated draped bust to right.
Rev. P [A X]. Figure of Pax standing to left holding olive branch in right and hasta pura in left. In field S.P. (Signata Pecunia). In exergue M.L.

27. (Brass denarius). Obit. A.D. 296. Obv. C. ALLECTVS AVG. Radiated bust to right.
Rev. [LIBER]TAS AVG. Figure of Liberty? because holding cap of liberty. In field E. No exergue.

28. Æ. (A Follis coin). Father of Constantine the Great. A.D. 292 to 306. Obv. FL. VAL. CONSTANTIVS NOB. C. Bust of Constantius cuirassed.
Rev. GENIO POPVLI ROMANI. The genius standing to left, holding a wreath in the right hand, and a cornucopia in the left.

29. (Brass denarius). A.D. 307 to 323. Obv. IMP. LICINIVS P.F. AVG. Laureated and draped bust of Licinius I. to right.
Rev. GENIO POP ROM. The genius standing to left, holding wreath in right hand, and cornucopia in left. In field T.B. (Treves 2nd mint). In exergue B. TR. (2nd mint, Treves).

30. (A Follis in very good condition). A.D. 306 to 337. Obv. IMP. CONSTANTINVS P.F. AVG. Laureated bust to right with cuirass.
Rev. SOLI INVICTO COMITI. Radiated figure of the Sun standing to left holding orb in left, right hand raised. In field T.F. (Treves 6th mint). In exergue P. TR. (Pecunia Trevirensis).

31. Ditto. Obv. CONSTANTINVS P.F. AVG. The bust appears more youthful, and more draped than that on coin 30, and the letters IMP. are not on this coin as on No. 30.
Rev. Similar to No. 30 coin of the same Emperor.

32. (A Follis). Constantine the Great. Cæsar, A.D. 306. Christian, 311. Constantinople, 330. Obit. 337. Obv. CONSTATINVS P.F. AVG. Laureated bust to right with cuirass.
Rev. MARTI CONSERVATORI. Figure of Mars helmeted standing to right with reversed spear in right hand, his left hand leaning on either a curiously shaped shield, or the prow of a vessel. In field T.F. (Treves 6th mint). In exergue P.TR. (Pecunia Trevirensis).
Note.—A rare coin—from MARTI CONSERVATORI we deduce that this must have been coined in the first years of his reign before he became a Christian.

33. (Brass denarius). A.D. 306 to 337. Obv. IMP. CONSTATINVS P.F. AVG. Laureated draped bust to right.
Rev. SOL[I INVIC]TO COMITI. Figure of Sol standing to left with orb in left hand. In the field a star to the left. In exergue P.LVG. (Pecunia Lugdunensis).

34. (Brass denarius). A.D. 306 to 337. Obv. IMP. CONSTATINVS P.F.? AVG. Laureated draped bust to right.
Rev. SOLI INVICTO COMITI. Figure of Sol standing to left with orb in left hand. In field S.P. (Signata Pecunia). In exergue P.LN.

35. (Brass denarius). A.D. 306 to 337. Obv. CONSTANTINVS MAX AVG. Diademed draped bust to right.
Rev. GLORIAE EXERCITVS. Two soldiers armed with sword and spear—two standards between them. Exergue TR.B.

36. (Brass denarius). A.D. 306 to 337. Obv. Helmeted bust of Constantine I. to left.
Rev. The wolf to the left with twins. Two stars above. In exergue P.LG. (Pecunia Lugdunensis), *ie.*, Lyons.

37. (Brass denarius). A.D. 306 to 337. Obv. CONSTANTINVS AVG. Diademed cuirassed bust to right with spear.
Rev. Cippus bearing VOTIS XX—with shield above obliterated. Three stars above shield. BEATA TRANQVILLITAS. Exergue P. LON. (Pecunia Londinensis).

38. (Brass denarius). A.D. 306 to 337. Obv. Legend obliterated. Helmeted head to right, of Constantine I.
Rev. GLORIA.....obliterated. Two figures of Victory on either side of shield with VOT. XX. In exergue, P.L.N.

39. (Brass denarius). A.D. ? Obv. CONSTATINVS AVG. Laureated head to right.
Rev. DN. CONSTANTINVS?[II]. X. AVG. Wreath with VOT. $\frac{\times}{\times}$ inside. In exergue SIS. (Siscia).

40. (Brass denarius). Obit. A.D. 326. Obv. DN. CRISPVS NOB. CAES. Laureated bust with cuirass and shield to right.
Rev. Cippus VOTIS XX. with BEATA TRANQVILLITAS in the legend around. Exergue P.TR.

41. (Brass denarius). Obit. A.D. 326. Obv. I. FL. CRISPVS NOB. CAES. Diademed cuirassed bust to left with spear.
Rev. Cippus inscribed VOTIS XX., surmounted by circular shield bearing cross and four bosses. Three stars above. Legend BEATA TRANQVILLITAS. No letters visible in field or in exergue.

42. (Brass denarius). Obit. A.D. 326. Obv. CRISPVS NOB. CAES.
Rev. BEATA TRANQVILLITAS. VOT. XX.

43. (Brass denarius). A.D. 317 to 340. Obv. FL. IVL. CONS[TANTINVS].
Rev. Labārum $\overset{D}{\ast}$ GLORIAE EXERCITVS. In exergue S. CONST.

44. (Brass denarius). A.D. 317 to 340. Obv. CONSTANTINVS IVN. N. CAES letters very illegible. Laureated draped bust to right.
Rev. Seated figure by shield writing on or pointing to shield bearing $\overset{\times}{\text{II}}$. Legend.....ETERNAE. In exergue A? $\frac{\text{CPO}}{\text{C.T.}}$

45. (Brass denarius). A.D. 317 to 340. Obv. FL. IVL. CONSTANTINVS NOB. C. Diademed draped bust to right of the young Cæsar.
Rev. GLORIA EXERCITVS. Two soldiers armed with sword and spear—two standards between them. Exergue S. CONST.

46. (Brass denarius). Constantine II. A.D. 317 to 340. Obv. CONSTANTINVS AVGG. AVG. Diademed head to right.
Rev. GLORIAE NOVI SAECVLI. Soldier standing to right holding Labarum with $\overset{D}{\ast}$ in right hand, and shield on the ground in left hand. Exergue? T. [CON.]

47. (Brass denarius). Probably Constantine II. A.D. 317 to 340. Obv. CONSTANTINVS P.F. AVG. Diademed draped bust to right.
Rev. REIPVBLICAE REPARATIO. Foot soldier slaying fallen horseman. Exergue S.P.L. (Signata Pecunia Londinensis).

48. (Brass denarius). A.D. 333 to 350. Obv. CONSTANS P.F. AVG. Diademed head to right.
Rev. GLORIAE EXERCITVS. Two soldiers with a standard between them. M. on standard. Exergue TR.P. (Treves Pecunia).

49. (Brass denarius). A.D. 333 to 350. Obv. CONSTANS P.F. AVG. Diademed draped bust to right.
Rev. FEL. TEMP. REPARATIO. Foot soldier slaying fallen horse soldier. Exergue SS. LG. (Signata Lugdunensis).

50. (Brass denarius). A.D. 333 to 350. Obv. CONSTANS P.F. AVG. Diademed head to right.
Rev. VICTORIAE DD. NN. AVGG. (Dominorum nostrorum Augustorum). Two figures of Victory with wreath in hand facing). Exergue P.LG.

51. (Brass denarius). Constantius II. A.D. 323 to 361. Obv. FL. IVL. CONSTANTIVS NOB. C. Diademed cuirassed bust to right.
Rev. GLORIA EXERCITVS. Two soldiers holding each a spear and a sword. Between them are two standards. Nothing in exergue.

52. (Brass denarius). A.D. 350 to 353). Obv. MAGNENTIVS.
Rev. Two figures of Victory with a shield bearing VOT. V. MVLT. X.

53. (Brass denarius). A.D. 364 to 375). Obv. VALENTINIANVS P.F. AVG.
Rev. GLORIA [EXERCITVS] OF. III. (Officina 3rd mint). In exergue CONS.

54. (Brass denarius). A.D. 364 to 378). Obv. DN. VALENS P.F. AVG.
Rev. In field V A SECVRITAS REIPVLICAE. In exergue CON.

55. (Brass denarius). A.D. 367 to 383. Obv. DN. GRATIANVS AVGG. AVG. Diademed draped bust to right.
Rev. GLORIA NOVI SAECVLI. Soldier holding Labārum with ☧ in right hand, and a shield resting on the ground with his left hand. In field OF. III. In exergue CON.

COINS IN TRAY No. 2 (MORE OR LESS ILLEGIBLE).

56. Billon of GALLIENVS (A.D. 253 to 268), or of his son SALONINVS (obit. A.D. 259). This coin is indistinct and illegible

57. (Brass denarius). A.D. 253 to 268. Obv. GALLIENVS AVG. Rev. A goat. DIANAE CONS. AVG.

58. (Brass denarius). A.D. 268 to 270. Obv. CLAVDIVS GOTHICVS. Rev. HILARITAS.

59. (Brass denarius). A.D. 267 to 273. Obv. TETRICVS. Rev. SALVS. Figure feeding snake.

60. (Brass denarius). A.D. 267 to 273. Obv. TETRICVS. Rev. LAETITIA.

61. (Brass denarius). A.D. 267 to 273. Obv. TETRICVS PF. AVG. Rev. [PAX] AVG.

62. (Brass denarius). A.D. 287 to 293. Obv. CARAVSIVS. Rev. CONCORDIA.

63. (Brass denarius). A.D. 287 to 293. Obv. CARAVSIVS P.F. AVG. Rev. PAX AVG. Exergue M.L.

64. (Brass denarius). Obv. FL. MAX THEODORAE AVG. Rev. PIETAS PVBLICA. The second wife of Constantius, (married A.D. 292 after the divorce of Helena).

65. (Brass denarius). A.D. 333 to 350. Obv. CONSTANS P.F. AVG. Diademed bust to left holding orb. Rev. FEL. TEMP REPARATIO. A soldier helping man out of Gallic house, with a tree branching over the house.

66. (Brass denarius). A.D. 333 to 350 Obv. CONSTANS P.F. AVG. Rev. VICTORIAE DD: NN. AVGG. A palm between figures. Exergue TR.S.

67. (Brass denarius). A.D. 323 to 367. Obv. CONSTANTIVS (II.?) Rev. VICTORIAE DD. NN. AVGG. Victory holding shield with VOT. MVLT. X.

68. (Brass denarius). A.D. 323 to 367. Obv. DN. CONSTANTIVS AVG. Rev. GLORIA EXERCITVS. Exergue TR.P.

69. (Brass denarius). A.D. 323 to 367. Obv. CONSTANTIVS NOB. C. Rev. GLORIA EXERCITVS. Exergue S.LG.

70. (Brass denarius). A.D. 323 to 367. Obv. CONSTANTIVS NOB. C. Rev. FEL. TEMP REPARATIO.

71. (Brass denarius). A.D. 364 to 378. Obv. DN. VALENS. Rev. SECURITAS REIPVBLICAE.

ROMAN COINS, FOUND AT KENCHESTER (THE SITE OF MAGNA CASTRA).

Presented by Mr. Richard M. WHITING, Lower House, Credenhill).

SILVER COINS. *AR*.

1. *AR* (Silver denarius). A.D. 98 to 117. Obv. IMP TRAIAN [CAES] GER. DAC. P.M. TR.P.C. Laureated nude bust to right.
Rev. Figure of Equity seated to left holding scales in right and cornucopia in left cos. V.P.P. [S.P.Q.R.] OPTIMO PRINCI.

2. *AR* (Silver denarius). A.D. 138 to 161. Obv. ANTONINVS PIVS AVG. Caracalla.
Rev. VIRTVS AVG. Figure of Valour standing to left holding small figure of Victory and a spear.

3 *AR* (Silver denarius). A.D. 138 to 161. Obv. IMP ANTONINVS AVGVSTVS. (Caracalla?) Laureated head and draped bust of youthful Emperor to right.
Rev. The God nude standing pouring from a patera on to a lighted altar holding in left-hand.....?

4. *AR* (Silver denarius). A.D. 138 to 161. Obv. IMP ANTONINVS AVG. Laureated draped bust of Emperor to right.
Rev. TEM.....M FELICITAS. Standing figure of Felicitas holding orb in right hand, cornucopia in left. Query Caracalla?

BRASS COINS.

FIRST AND SECOND BRASS. I. Æ, II. Æ.

1. I. Æ. DOMITIAN. A.D. 81 to 96. Laureated head to right. Legend, illegible. Rev. A blank.

2. I. Æ. Head of TRAJAN. A.D. 98 to 117. Laureated to right. Legend, illegible. Rev. Figure of Pax.? S.C. in field.

3. II. Æ. Dupondius (Marcus Ulpius) NERVAE TRAIAN. A.D. 98 to 117. Radiated head of Emperor to right. Legend, illegible.
Rev. DACIA AVGVST as legend. In exergue PROVINCIA S.C. in exergue. Figure of the Province seated to left holding globe and spear. In front a child.

4. II. Æ of Hadrian. A.D. 117 to 138. Obv. IMP. CAES HADRIAN. Laureated head to right. Rev. Standing figure with cornucopia in left and wreath or simpulum in right-hand. Legend, illegible.

5. I. Æ. Sestertius. A.D. 161 to 180. Obv. MARCVS AVRELIVS. The legend is illegible except P.M.TR.P. Laureated head to right.
Rev. An altar with S.C. Legend, illegible.

BRASS DENARII.

Follis, and Third Brass Coins.

1. (Brass denarius). A.D. 253 to 268. Obv. GALLIENVS AVG. Radiated head. Rev. Figure of Faithfulness or Trustworthiness of the Army, FIDES MILIT. The figure standing to left holding standard and spear. In field N.

2. (Brass denarius). A.D. 270. Obv. Radiated draped bust of MARCVS AVRELIVS CLAVDIVS QVINTILLVS, brother of Claudius Gothicus. Rev. Fortuna standing to left with cornucopia.

3. (Brass denarius). A.D. 267 to 273. Obv. [IMP.] TETRICVS. Radiated head to right. Rev. Illegible. Female draped standing figure leaning on shield? Exergue obliterated.

4. (Brass denarius). A.D. 267 to 273. Obv. IMP. C. TETRICVS AVG. Radiated draped bust to right. Rev. PAX AVG. Peace standing to left holding olive branch and spear. No exergue.

5. (Brass denarius). A.D. 286 to 310. Obv. IMP. MAXIMIANVS. AVG. (Herculeus). Radiated draped bust to right. Rev. Figure of Peace standing holding olive branch in right and cornucopia in left. A letter in field illegible. No exergue.

6. (Follis brass). A.D. 286 to 310. Obv. IMP. MAXIMIANVS. P.F. AVG. Laureated draped bust of Emperor to right. (Herculeus). Rev. GENIO POPVLI ROMANI. The genius of the Roman people standing to left, holding wreath and cornucopia. A A in field. Exergue illegible.

7. (Brass denarius). A.D. 287 to 293. Obv. IMP. CARAVSIVS [AVG.] Radiated draped bust to right (a thicker coin than usual). Rev. Figure of Peace standing to left.

8. (Brass denarius). A.D. 287 to 293. Obv. IMP. CARAVSIVS AVG. Radiated draped bust to right. Rev. SALVS AVG. Health—a girl feeding a serpent, the emblem of renewed life—or of Æsculapius father of Salus.

9. (Follis). A.D. 287 to 293. Obv. IMP. CARAVSIVS P.F. AVG. Radiated cuirassed bust to right. Rev. Nude figure standing with spear—probably Valour—V[IRTV]S AVG. No exergue. Legend, much defaced.

10. (Follis brass). A.D. 287 to 293. Obv. IMP. CARAVSIVS AVG. Laureated draped bust to right. Rev. PAX AVG. Figure of Peace standing to left holding olive branch in right hand, and hasta pura in left. o in field. No exergue legible.

11. (Follis). A.D. 287 to 293. Obv. IMP. CARAVSIVS P.F. AVG. Radiated draped bust to right. Rev. PROVID. AVG. Figure of Providentia standing to right holding orb and hasta pura. In field S. (Signata). In exergue C.

12. (Brass denarius). Obit. A.D. 296. Obs. IMP. C. ALLECTVS P.F. AVG. Radiated draped bust of Emperor to right. Rev. A galley. VIRTVS AVG. Exergue L. (Londinensis).

13. (Brass denarius). Obit. A.D. 296. Obv. Probably coin of Allectus. "AL." Radiated head to right. Rev. A horse galloping to right.

14. (Small brass). Obit. A.D. 328. Obv. HELENNA AVG. Head and draped bust of Empress. Rev. PAX AVG. Peace standing to left with olive branch and hasta pura. No exergue.

15. (Small brass). Obit. A.D. 328. Obv. FL. IVL. (nearly illegible) HELENNA AVG. Head and draped bust of Empress Helena. Rev. PAX REIPVBLICAE. Figure of Peace standing to left with olive branch and hasta pura. Exergue TR.P. (Pecunia Trevirensis).

16. (Follis brass). Cæsar A.D. 305. Obit. A.D. 313. (Galerius Valerius). Obv. IMP. MAXIMINVS AVG. Laureated cuirassed bust of Emperor to right. Rev. GENIO. POP. ROM. In field T.F. (*i.e.* 6th mint of Treves). The genius standing to left with wreath and cornucopia. In exergue P.TR. (Pecunia Trevirensis).

17. (Brass Follis). A.D. 306 to 337. Obv. IMP. CONSTANTINVS AVG. Wreathed bust to right. Rev. SOLI INVICTO COMITI. Radiated figure of the Sun holding up his hand and bearing orb. In field T.F. = Treves 6th mint. In exergue P.TR. (Pecunia Trevirensis).

18. A.D. 330. Obv. Constantinopolis. Rev. Figure.....In exergue TR.P.

19. A.D. 330. Constantinopolis. Obv. ROMANAM.....Rev. Figure?...

20. A.D. 330. Constantinopolis. Bust to left. Rev. Figure?.....

21. A.D. 330. Constantinopolis. Common coin of Constantine I.

22. (Brass denarius). A.D. 330. Obv. CONSTANTINOPOLIS. Helmeted head of Constantine I. Rev. Victory to left with shield.

23. (Brass denarius). A.D. 330. VRBS ROMA. Helmeted head of Constantine I. Rev. Wolf and twins, two stars. In exergue TR.S. (Treves signata or secunda.)

24. (Brass denarius). A.D. 330. Obv. VRBS ROMA. Helmeted head of Constantine I. Rev. Wolf and twins, two stars. Exergue P.LG. (Pecunia Lugdunensis. Lyons).

25. A.D. 330. VRBS ROMA. Obv. Helmeted head to left. Rev. Wolf and twins.

26. (Brass denarius). A.D. 300, obit. 326. Obv. CRISPVS NOB. CAES. Diademed cuirassed bust to right. Rev. Wreath containing VOT. V. DOMINORVM NOSTRORVM CAESS as a legend. S.T. in exergue. (Signata Trevirensis).

27. Four coins of CONSTANTINUS JUNIOR (*i.e.* Constantinus II.) A.D. 317 to 340. All bearing the same reverse, viz., two soldiers and standard.

28. A.D. 317 to 340. CONSTANTINE II. ? very rude work.
29. (Brass denarius). Obv. CONSTANS P.F. AVG. Diademed draped bust to right.
A.D. 333 to 350. Rev. GLORIA ROMANORVM. Two figures of Victory holding wreaths. Exergue TR. (Trèves).
30. A.D. 333 to 350. Obv. CONSTANS P.F. AVG. Diademed draped bust to right.
Rev. Legend, VICTORIA? Two figures of Victory facing and holding up wreaths. M in the midst.
31. (Small brass). Obv. CONSTANS P.F. AVG. Diademed draped bust to right.
A.D. 333 to 350. Rev. Two soldiers with Labärum bearing M. Legend. GLORIA EXERCITVS. Exergue TR.P. (Trevirensis Pecunia).
32. ..... Perhaps Magnentius. Legend gone?
A.D. 350 to 353. Rev. Victory bearing shield with VOT. V. MVLT.
33. (Follis). Obv. DN. MAGNENTIVS P.F. AVG. Bare head of Emperor to right.
A.D. 350 to 353. Rev. GLORIA ROMANORVM. A horse soldier triumphing over fallen foot soldier. Exergue TR.P. (Trevirensis Pecunia or Prima).
34. (Brass denarius). Obv. DN. CONSTANTIVS P.F. AVG. Diademed draped bust to left. (Constantius II).
A.D. 323 to 361. Rev. Gallic hut door with vine over, or a tree. A soldier raising man coming out of his house. Exergue TR.P. (Trevirensis Prima).
35. (Brass denarius). Obv. FL. IVL. CONSTANTIVS NOB. C. Diademed head
A.D. 323 to 361. and draped bust to right.
Rev. REPARATIO REIPVBLICAE. Figure of Victory holding wreath to left.
36. (Brass denarius). Obv. VALENTINVS AVG. Diademed bust draped to right.
A.D. 364 to 375. Rev. SECVRITAS REI PVBLICAE. Figure of Security advancing to left. Exergue indistinct.
37. (Brass denarius). Obv. DN. VALENS. P.F. AVG. Diademed bust to right.
A.D. 364 to 378. Rev. SECVRITAS REIPVBLICAE. Figure of Securitas with wreath to left. Exergue CON.
38. (Brass denarius). Obv. VALENS. P.F. AVG. [D.N.] Diademed draped bust
A.D. 364 to 378. to right.
Rev. SECVRITAS REIPVBLICAE. Victory to left holding wreath and palm branch.
39. Follis of late Empire. Illegible and valueless.
40. Collection of Minimi coins, the smallest coin made. About one hundred or so to one denarius.
41. Four Romano-British small coins.
42. Coins of the Romano-British period coined after Magnus Maximus had left Britain. He left in A.D. 383.
43. Romano-British unknown ruler. No name on coin.

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NOTES ON A GREAT HOARD OF ROMAN COINS FOUND AT BISHOP'S WOOD IN 1895.

BY MARY ELLEN BAGNALL-OAKELEY,
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IN the Spring of 1895 a large hoard of late Roman coins was discovered on the estate of Mr. McCalmont, at Bishop's Wood, near Ross-on-Wye, about 400 yards on the Herefordshire side of the boundary between that county and Gloucestershire. The coins were found by some workmen who were getting surface stones to mend a road, when an accidental blow from a pick struck a large earthenware jar in which they had been placed, and scattered the coins in all directions (see plate.) Two other jars lay in fragments near it, with the coins they had originally contained mixed with soil and *débris*. All had been enclosed by rough walling built against the hillside, but if ever they had been covered by a stone it had disappeared. The coins are all 3rd and 4th Brass of the Constantine family (except three single coins), and a description of 17,550 is appended. A good many more were found by school-children and others after the workmen had left, and early next morning, but no description can be given, as they are dispersed.

There have been at different times a considerable number of "finds" of Roman coins in various parts of the Forest of Dean,[1] which may be accounted for in several ways. (1.) The large villa at Lydney Park seems to have been occupied for a long period,[2] and gold, silver, and brass coins have been found there in large quantities—the money, in fact, which was required for the expenses of this magnificent establishment. These coins range from Augustus, who died A.D. 14,

[1] Although Bishop's Wood is at the present time outside the boundary of the Forest, it was included within the area of the Forest of Dean in the time of Edward I.

[2] See Prebendary Scarth's remarks at Lydney Park Meeting, *Transactions of the B. and G. A. S.*, vol. i.

to the departure of the legions from Britain, in the early part of the 5th century. (2.) The iron mines of the Forest were worked by the Romans for a considerable time, and probably most of the hoards hitherto recorded in this district were intended for the pay of the miners, as they were all discovered either actually *in* the iron-workings, or closely adjacent to them. These coins are mostly small brass (though a hoard of silver denarii has been found), and they do not extend over a later period than the reigns of Carausius and Allectus. Probably, in the disturbed period which succeeded the rebellion of the usurpers, the Forest was not in a sufficiently peaceful state to continue working the mines. During the period of unrest which followed, many of the camps in Herefordshire and Gloucestershire were occupied by Roman troops, and coins of Constantius and his immediate successors have been found in them.

Probably the Bishop's Wood "find" was a military hoard, and in much the same condition as it arrived from the Continent, for it contains coins from the mints of Arles (Constantina), Trèves, Lyons, Aquileia, Rome, Constantinople, Siscia, Antioch, Carthage, Nicomedeia, Heracleia, and Thessalonica, but none from any mint in Britain.

The spot where the hoard was deposited is near the village school, on steeply sloping ground, which rises from 150 ft. to 200 ft. above the level of the river Wye. The ground seems to have been escarped on the east, where an ancient road passes it in a deep hollow, and leads from the river towards Walford and the Great Howle Camp, which is two miles north-east of Bishop's Wood. A short distance up the stream is an old ford, where the ancient road from Drybrook comes out. Since the discovery of the coins, Mr. McCalmont's workmen, who were employed in clearing the "Lodge Grove" Wood, came upon part of the fosse and vallum of a camp, which, from its rectangular form, was probably Roman, and a quantity of coarse Roman pottery was found within it. The surrounding bank was roughly built with small stones and covered with earth, but unfortunately it was at once

levelled, through ignorance of its origin, but the configuration of the ground still shows where it was placed. About five miles to the north-east of Bishop's Wood is the site of Ariconium, which was the great station of the Roman iron manufactures of the district. The 13th Iter of Antoninus gives Ariconium as the next station beyond Glevum (Gloucester), and from it the road proceeded to Blestium (Monmouth), across the beautiful country on the banks of the Wye, among hills which are in many places covered with ancient cinders. From Blestium the road continued to Burrium (Usk), and after a short stage the traveller arrived at the grand city of Isca (Caerleon), the headquarters of the second Legion. Along so important a highway it is but natural there should have been many camps for defence, and soon after leaving Ariconium the ancient road passed between the strongholds of Penyard and Chase Wood. After crossing the Wye at Goodrich, the road passes near the two camps of Great Doward and Little Doward, both of which command the Wye. The latter camp, though evidently older than Roman times, must have been occupied by them for some considerable time, for a rectangular addition has been made on the one end, and Roman coins and swords were discovered there some years ago, when the late Mr. Blakemore was making a drive to the summit of the hill.

The most interesting subject connected with the Bishop's Wood "find" is a series of coins bearing Christian symbols and devices. They were struck at that period of Roman history when the pagan deities hitherto figured upon the reverses of the current money were being replaced by historical subjects and Christian devices and symbols. This change probably began about A.D. 312, when Constantine the Great avowed himself a Christian; but pagan reverses are found later from some mints than from others. Whether the account given by Eusebius of the Cross which appeared in Heaven be the real cause of the Emperor's conversion or not, it must have been a mighty influence which induced the ruler of the Roman people to place the sign of the despised

Jesus of Nazareth upon the banner of pagan Rome, and upon the money which was to circulate through the known world. The description given by Eusebius of the Labarum itself, with the sacred sign upon it, accords in every particular with the banner represented upon some of these coins, and several varieties of the Chi-Rho and different forms of the Cross itself occur upon many of them.

It is remarkable that in this large hoard there are only four coins of Crispus. This probably arises from the fact that Crispus was put to death A.D. 326, whereas this hoard cannot have been deposited till well after A.D. 337, when Constans and Constantius received the title of Emperor; for many coins of both which occurred in the hoard bear the title of Augustus.

In a hoard of 2,000 to 3,000 small brass coins found at Haresfield Beacon on August 19, 1837, only 12 coins of Crispus were present; those of Helena, Theodora, Constantinus I. and II., Constantinopolis, Urbs Roma, Fausta Delmatius, Constans, and Constantius II. constituted the remainder. This deposit must have been buried at much the same time as that of Bishop's Wood.

LIST OF COINS AND TYPES.

CLAUDIUS GOTHICUS.

Died A.D. 270.

Claudius Gothicus was made by Valerianus Governor of Illyricum and the Lower Danube in A.D. 259.

Types.	No. of Coins.
1. *Ob.* DIVO CLAVDIO OPTIMO IMP. Laureated head to right.	
R. REQVIES OPTIMOR(*um*) MERIT(*um*). Emperor veiled, seated, right hand raised	1
In exergue: ?RS.	
Total	1

A posthumous coin, probably struck under Constantine the Great.

Types.	No. of Coins.

DIOCLETIAN.

Emperor A.D. 284. Abdicated A.D. 305. Died A.D. 313.

1. *Ob.* IMP.C.C VAL DIOCLETIANVS. PP.AVG. Radiated head to right.	
R. CONCORDIA MILITVM. Jupiter presenting a Victory, which holds a palm branch, to the Emperor	1
In ex.: ANT. In field: ☆ Γ	
Total	1

MAXIMIANUS HERCULES.

Emperor A.D. 286. Died 310.

1. *Ob.* IMP. C. MA MAXIMIANVS AVG. Head with radiated crown to right.	
R. CONCORDIA MI(litum). Soldier with spear presenting a Victory to Emperor	1
In ex.: ALϵ (Alexandria, 5th Mint).	
Total	1

HELENA,

Mother of Constantine the Great. Died A.D. 328.

1. *Ob.* FL IVL HELENAE AVG. Head of Helena to right.	
R. PAX PVBLICA. Peace standing with palm branch and long sceptre	312
All struck at Tréves.	
See list of Christian reverses.	
2. *Ob.* FL HELENA AVGVSTA.	
R. SECVRITAS REIPVBLICAE. Security holding palm branch in right hand	3
Total	315

Types. No. of Coins.

THEODORA,

Second wife of Constantius I. Died A.D. 328.

1. *Ob.* FL MAX THEODORAE AVG.
   R. PIETAS ROMANA. Piety standing, holding an infant in her arms 271

Total 271

All struck at Treves.

See list of Christian reverses.

LICINIUS I.

Emperor A.D. 307–323.

Licinius married Constantina, sister of Constantine the Great, who associated him in the Empire A.D. 307

Ob. IMP C VAL LICIN LICINIVS PF AVG. Radiated head to right.

R. IOVI CONSERVATORI. Jupiter standing, sceptre in left, a Victory in right, and at his feet an eagle presenting wreath, a captive on ground at left. $\frac{X}{III}$ in field to left.

In ex.: { SMN Δ / SMN A / SMN Γ / SMAL P } 20

2. *Ob.* IMP LICINIVS PM AVG.
   R. GENIO POP.ROM. Genius with modius on head, patera in right hand, cornucopia in left 1

In field: F. In ex.: { BPR / SMALP }

Total 21

LICINIUS II.

Cæsar A.D. 315–326.

Son of the elder Licinius by Constantina, sister of Constantine the Great. Declared Cæsar A.D. 317. Put to death after his father's death by Constantine A.D. 326.

Types. No. of Coins.

1. *Ob.* DN.VAL LICIN.LICINIVS NOB.C. Helmet on head, spear over right shoulder.
   R. IOVI CONSERVATORI. Emperor standing. Spear in left; Victory in right; at feet eagle presenting wreath 7

In ex.: SMNA

Total 7

CONSTANTINE I. THE GREAT.

Emperor A.D. 306–337.

1. *Ob.* CONSTANTINVS MAX.AVG. Head with diadem.
   R. GIORIA EXERCITVS. Two soldiers with spears and shields.
   This type was not used till after the death of Crispus 2396

The following coins are all varieties of Type 1:

a. Chi-Rho on Labarum 34
b. Cross between standards... 4
c. Cross on Labarum 3
These are fully described among the Christian reverses, page .
d. Star of eight rays, do. 61
e. Oak leaf between standards 29
Always Constantina mint.
f. F between soldiers in field 2
g. Chi Rho in field 1
h. Spear heads end in crosses 2
These are counted in the number of Type 1.

2. *Ob.* CONSTANTINVS AVG. Emperor in helmet and cuirass.
   R. BEATA TRANQVILITAS. Altar with VOTXX and globe, three stars above 2

PTR
STR

Types.	No. of Coins.
3. *Ob.* Same.	
R. PROVIDENTIÆ AVGG. Prætorian gate, star over ... ... TR⌣ / PTR⌣ / STRE / STR } Struck at Trèves, 1st & 2nd Mints.	5
4. *Ob.* CONSTANTINVS AVG. Head to right, laurel wreath and paludamentum.	
R. SARMATIA DEVICTA. Victory with palm branch standing over captives ... ... In ex.: { 2 STR / 2 STR⌣ / 2 PTR }	6
Large good coins.	
Constantine conquered the Sarmatians A.D. 322.	
5. *Ob.* IMP.CONSTANTINVS P.F AVG. Head with diadem, or wreath.	
R. SOLI INVICTO COMITI. The sun walking to left ... ... In field: { FT / RS / AS } In ex.: { PTR / PLC }	6
6. *Ob.* IMP. CONSTANTINVS MAX AVG. Head to right, helmet and wreath, cuirass.	
R. VICTORIAE ? .... Two Victories, placing buckler on altar	1
7. *Ob.* CONSTANTINVS AVG. Head in helmet to right.	
R. Illegible. Two winged Victories holding shield, with VOT / X?	2
8. *Ob.* Same.	
R. VIRTVS AVGVSTI. Constantine with spear and shield, wreath round head. Large size.	1

Types.	No. of Coins.
9. *Ob.* CONSTANTINVS AVG. Laureate head to right. Large size.	
R. CONSTANTINI AVG. Round the inscription, VOTIS XX.... ... ... In ex.: PLS.	1
10. *Ob.* Same as 2.	
R. VIRTVS. EXERCIT. Two captives on ground under banner, on which is VOT / XX	2
A coin exactly similar to 9, but with head looking left. Both these are very rude work	1
11. *Ob.* Head of Constantine without legend.	
R. CONSTANTINVS AVG. across the field; wreath above ... ... In ex.: STR.	5
CONSECRATION COINS.	
Veiled head to right.	
12. DIV.CONSTANTINVS PT. AVG... ... ... Described among Christian reverses.	20
13. DIVO CONSTANTINO ... ... Described among Christian reverses.	7
Total	2455

CONSTANTINOPOLIS.

This Type was introduced at the Dedication of Constantinople, A.D. 330.

1. *Ob.* CONSTANTINOPOLIS. Helmeted head of City personified, with sceptre on her shoulder.	
R. A Victory standing, with prow of vessel at her feet, holding sceptre in right, leaning on shield	3512
1 coin has the above obverse, and the Wolf and twins reverse.	

Types. No. of Coins.

There are the following varieties:

a. ◡ in field to left.
b. Wreath in field.
c. Palm branch in field.
d. Triple palm branches in field.
e. Oak leaf in field.
f. F do. do.
g. ☧ in field.
i. Sceptre on obverse ends in a cross.
j. Shield on obverse has a cross on it.

} All described among the Christian reverses.

Total 3512

URBS ROMA.

1. *Ob.* VRBS . ROMA. Helmeted head of Roma to left. (There is a slight difference in helmet.)

R. Wolf and twins. No legends 4214

There are several varieties of this Type. Some have SMH℮ or SMTS℮ in the exergue.

a. Two stars above wolf.
b. ☧ between two stars. (Described among Christian coins.)
c. Wreath between two stars.
d. Palm branch do.
e. Triple palm branch do.
f. Three stars above wolf.
g. Two stars with ⁝ between. SMN℮
h. ◡ between stars. P CONST

One coin has the above obverse and the usual reverse of Constantinopolis, Victory marching, &c.

Total 4214

Types. No. of Coins.

CRISPUS.

Son of Constantine the Great. Cæsar A.D. 317–326.

1. *Ob.* CRISPVS NOB CAES.
R. BEATA TRANQVILITAS.
Altar with VOTIS XX 1
In field: CP In ex.: PLC

2. *Ob.* Same.
R. CAESARVM NOSTRORVM. Wreath with VOT X ... ...
In ex.: TRP

3. *Ob.* IVL CRISPVS NOB. C.
R. Same as No. 2 1

4. *Ob.* DN.FL.IVL.CRISPVS NOB CAES.
R. IOVI CONSERVATORI CAESS. Jupiter standing, Victory on right hand, spear in left, captive on ground, eagle offering wreath. ... 1
In field: ☧ / NT In ex.: SMK. (Signata Moneta Karthagenæ).

Total 4

DELMATIUS, OR DALMATIUS.

Nephew of Constantine the Great (Cæsar A.D. 335.) Died A.D. 337.

1. *Ob.* FL DELMATIVS NOB. C. Head to right, hair bound with fillet.
R. GLORIA EXERCITVS. Two soldiers with standard between them 0
In ex.: B:SIS.

2. *Ob.* Same as 1. Head to right, laureated.
R. GLORIA EXERCITVS. Two soldiers holding spears, leaning on shields. Two standards ... 2
TRS. SLC.

3. *Ob.* Same as 1.
R. Same, but oak leaf between standards 1
In ex.: P. CONST.

Types.	No. of Coins.
4. *Ob.* Same.	
R. Same, but palm branch between standards ... In ex.: TRS✳	19
5. *Ob.* Same as 1.	
R. The Labarum, with ✳ P. CONST	5
6. *Ob.* Same as 1.	
R. The Labarum, with ☧ S. CONST	1
Total	30

These two latter are fully described among Christian reverses.

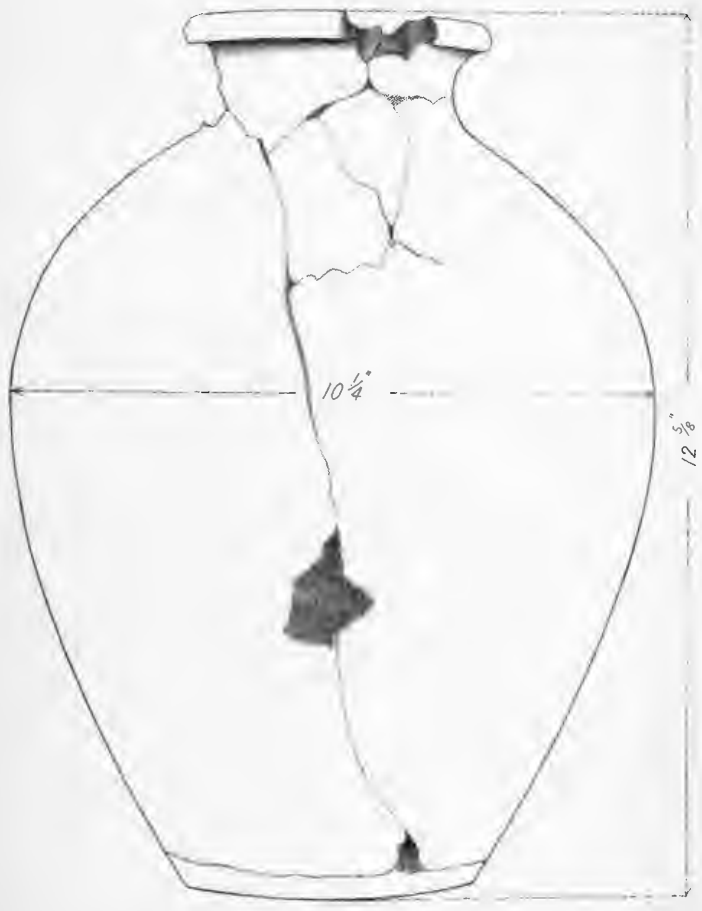
CONSTANTINE II.

Cæsar A.D. 317. Augustus A.D. 337–340.

1. *Ob.* CONSTANTINVS IVN. NOB C. Head to right, laureated, wearing paludamentum.
   R. GLORIA EXERCITVS. Two soldiers with spears, leaning on shields with standard ... 3672

   The following are varieties of this type:
   a. Chi-Rho and cross on Labarum, which is between soldiers.
   b. Star of eight rays between and above standards.
   All described among Christian reverses.
   c. Oak leaf? between standards.
   d. Palm branch between standards. Always P CONS / S CONS
   e. Wreath ,,
2. *Ob.* Youthful head of Constantine to left, without legend.
   R. CONSTANTINVS CAESAR across the field 1
3. *Ob.* CONSTANTINVS IVN AVG.
   R. BEATA TRANQVILLITAS X. Altar with VOTIS XX 1

   In ex.: PLC

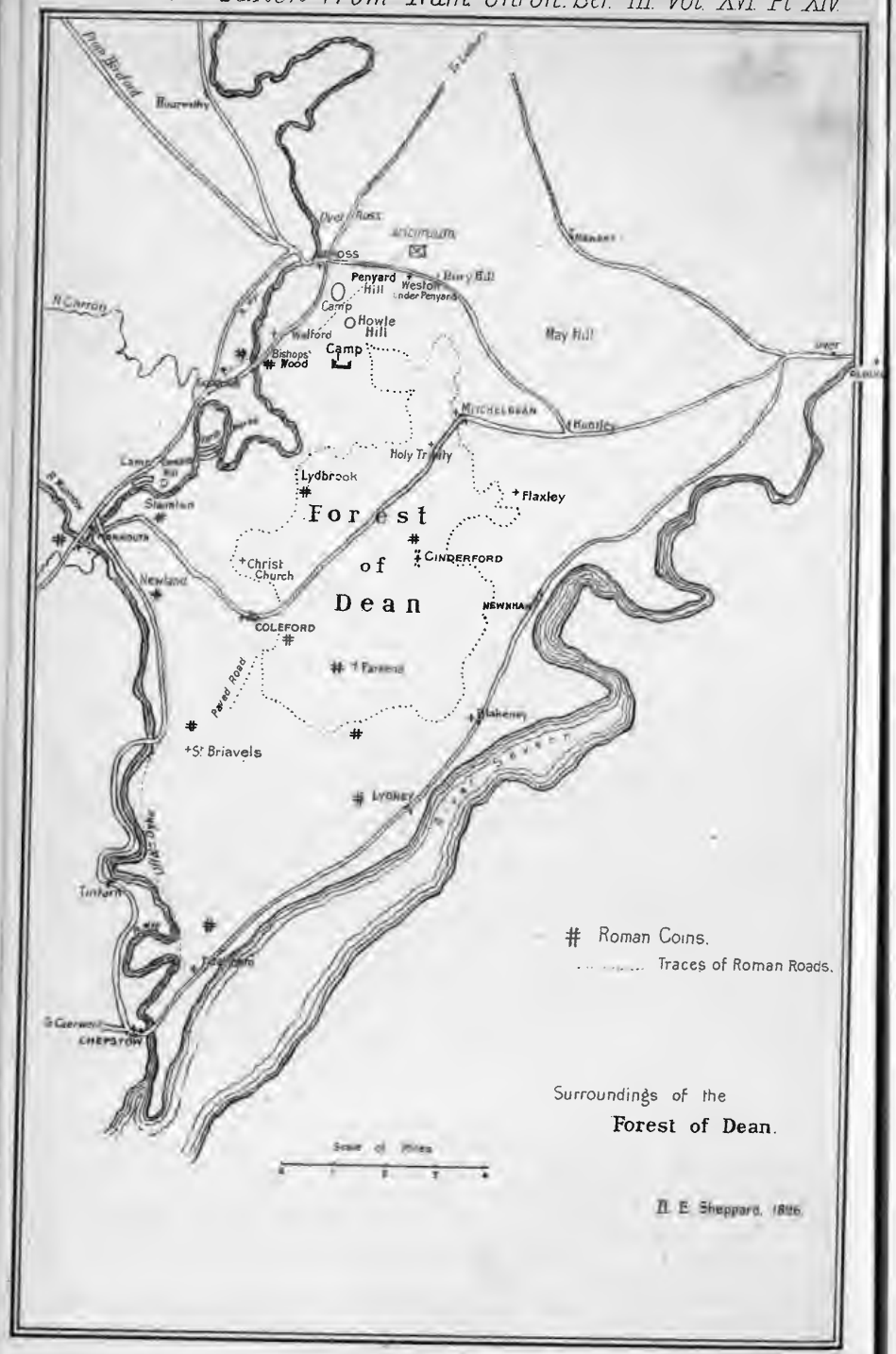


H. C. Moffatt.

JAR WHICH CONTAINED ROMAN COINS FOUND ON THE BISHOPS WOOD ESTATE NEAR ROSS AND RUARDEAN.

LAVARS & CO., BRISTOL.

Plate II. Taken from Num. Chron. Ser. III. Vol. XVI. Pl. XIV



Types.	No. of Coins.
4. *Ob.* CONSTANTINVS IVN NOB C. *R.* CAESAR NOSTRORVM DOMI? Within a garland is VOT V	1
5. Same, but VOT X	1
6. *Ob.* Same. *R.* PROVIDENTIA CAESS. Prætorian gate, with star above ... ... In ex.: STP	1
7. *Ob.* Same. *R.* VIRTVS AVG. Prætorian gate ... ... In ex.: ARLS	3
8. *Ob.* FL IVL CONSTANTINVS AVG. *R.* SECVRITAS AVG. Security, with spear in right hand, leaning on column ... ... In ex.: P † S Described among Christian reverses.	1
9. *Ob.* Large head of different type. *R.* Same	1
10. *Ob.* CONSTANTINVS AVG. Head to left, laureated. *R.* Victory marching with spear, leaning on shield (the common reverse of Constantinopolis) ...	1
Total	3683

CONSTANS.

Cæsar A.D. 333, Augustus A.D. 337. Died A.D. 350.

1. *Ob.* FL. IVL. CONSTANS AVG. or CONSTANS AVG	Head to right, laureated.
R. GLORIA EXERCITVS. Two soldiers with spears and shields	439

Varieties of Type 1.

a.	⌣ on Labarum.	
b.	oak leaf between standards.	
c.	Sacred monogram on Labarum.	Described among Christian reverses.
d.	Cross on Labarum.	
e.	✳ between standards.	

Types. No. of Coins.

2. *Ob.* Same as 1.
R. VIRTVS AVGG NN. Emperor wearing, helmet ? spear in left hand, sword in right.
TRP 2
TRS 2

3. *Ob.* CONSTANS AVG.
R. VICTORIEAE DD.N·N. Two winged Victories with wreaths in their hands, an ivy leaf in field.
TRP 3
TRS 1

4. *Ob.* CONSTANS. PF. AVG. Head to right, *diadem.*
R. Same as 1 2

5. *Ob.* FL IVL CONZTANS. Very rude coin.
R. GLORIA, &c. 1
TRS

Total 450

CONSTANTIUS II.

Cæsar A.D. 323. Augustus 337–361.

1. *Ob.* FL.IVL.CONSTANTIVS NOB CAES. or C. Head to right.
R. Two soldiers with spears and shields; one or two standards GLORIA EXERCITVS. ... 2193

Varieties of Type 1:

a. Oak leaf between standards.
4 coins. All P or S or CONST. Prima or Secunda Constantina (Arles).
b. Star between standards.
c. Wreath do.
d. Palm branch do.
e. F in field.

Types. No. of Coins.

f. ☧ on Labarum. 5 coins.
g. ✣ on Labarum. 9 coins.
h. † on ground. 2 coins.
} Described among Christian reverses.
In ex.: AQS

2. *Ob.* FL IVL CONSTANTIVS NOB C. Face to left.
R. PROVIDENTIA CAESS. Prætorian gate, star over... 1
In ex.: STPE?

3. *Ob.* Same as 2.
R. Emperor in paludamentum 1

4. *Ob.* FL IVL CONSTANTIVS AVG. Laureated head to right.
R. VIRTVS AVGG.NN. Military figure with reversed spear and shield 3
TRP

5. *Ob.* Same as 4.
R. Emperor with spear in left, Victory on right hand, two captives on ground 1

6. *Ob.* Same as 4.
R. SECVRITAS RE . . . . Security standing ... 1

7. *Ob.* Same.
R. Victory marching with spear and shield (the ordinary Constantinopolis reverse) 1

Total 2201

There are many examples of careless workmanship upon these coins. On some of them two stamps of the same device and legend are found, one intersecting the other. On some the obverse is perfect, but slightly convex, while the reverse is concave, with an incuse re-presentation of the same subject—the result of putting a piece of metal to be struck, on the top of a coin already stamped, but not taken out.

A few coins have names blundered in spelling, and several of the letters in the exergue are reversed; but most of the coins are in good order, and many of them as fresh as when they were struck.

THE COINS WITH CHRISTIAN EMBLEMS

are as follows:—

ON COINS OF HELENA[1] (RESTORATION).

Ob. FL. IVL. HELENAE AVG. Bust of Helena to right.

R. PAX . PVBLICA. Peace standing to left, holding olive branch in right, and long sceptre in left. In the field ☩ to left. 10 coins.

Do. to right. 4 coins.

All TRP and TRS. (Treveris Prima and Secunda).

Trèves 1st and 2nd Mints.

THEODORA (RESTORATION).

Ob. FL. MAX. THEODORAE AVG. Bust of Theodora to right, laureated.

R. PIETAS ROMANA. Piety standing, carrying an infant. In the field to right ☩.

7 coins. All TRP and TRS.

Trèves 1st and 2nd Mints.

As these ladies were Christians, the usual DIVA is omitted, though the legends are in the dative case.

CONSTANTINE THE GREAT.

Ob. CONSTANTINVS MAX. AVG. Head to right, diadem and paludamentum.

R. GLORIA EXERCITVS. Two soldiers, &c.; between them, near the ground, †.

4 coins: AQP, AQS

Aquileia Prima and Secunda.

Aquileia 1st and 2nd Mints.

[1] See *Num. Chron.*, vol. xvii., 1877, p. 265.

There is another form of cross, ☩.

Ob. Same.

R. Same, but between soldiers the Labarum with ☧.

34 coins. Small, poor coins.

No. of Coins.

3 P. CONST. Prima, and S. CONST. Secunda. } Constantina (Arles).

1st and 2nd Mints.

5 PLC Prima. 2 SLC Secunda. } Lugdunensis.

1st and 2nd Mints.

Ob. Same.

R. Same as above, but ☧ in field above standards.

2 coins. P. CONS.

Ob. Same.

R. ✣ or ✠ on Labarum. 3 coins, one of which has a † at top of spear. P. CONST. Prima Constantina (Arles).

TRP (Treveris Prima).

R. 4 coins have ☩ between soldiers. In ex.: PLC.

These types were used between A.D. 335 and A.D. 337.

Ob. Same.

R. Same, but ✳ (large and small) above standards.

1st or 2nd Mint, Constantina.

61 coins. All $\frac{P}{S}$ CONST.

Many of the coins of this Emperor have the letter X in "exercitus" greatly enlarged, and exactly in the middle the standards. On some with the Labarum, it is of actually touching the top of the spear. It may be intended as a latent representation of a cross.

Ob. Same.

R. Same, but the spear-heads terminate in crosses,

1st or 2nd Mint, Constantina.

In ex.: $\frac{P}{S}$ CONST.

CONSECRATION COINS.

Veiled head. Struck after the death of Constantine, A.D. 337.

Type.	No. of Coins.
1. DIVVS or DIV CONSTANTINVS PT AVGG.	
R. Chariot with four horses (Quadriga) driven by the anima of the Emperor, who holds out his hand to meet another large hand coming from the clouds.	
In ex.: PLC	1
In ex.: TRP	13
In ex.: TRS	6
Total	20
2. *R.* DIVO CONSTANTINO . . . . Veiled head. AETERNA PIETAS. Emperor standing. Helmet and paludamentum. Spear in right, globe in left, with ☧ in field over } or Ν ,, under } globe { S CONS / P CONS ...	2
One coin has ☧ above globe	1
With doubtful exergued letters	4
All small coins.[1]	
Total	7

CONSTANTINOPOLES.[2]

1. *Ob.* CONSTANTINOPOLIS. Bust of the City personified, helmeted, to left with sceptre.

   R. No legend. Victory, with wings extended, walking to left, holding a spear in right hand and resting the left on a shield. In the field to left ☧.

   Of these 10 coins.

   This type introduced A.D. 330, at the dedication of Constantinople, but struck at Constantina and Aquileia.

2. Same as above, but with ✳ in field.
   AQS and P. CONST.

[1] See *Nmm. Chron.*, vol. xvii., p. 284. [2] *Ibid*, p. 269.

3. Same as above; but the sceptre, in the left hand of City on obverse, ends in a cross, thus: ·/· SMKB.
4. *R.* Others have a cross upon the shield, thus: ·+·
   Struck at Carthage, 2nd mint.

URBS ROMA.

Ob. VRBS ROMA. Bust of the City personified, helmeted, to left.

R. No legend. Wolf suckling twins; above the Sacred monogram, between two stars with eight rays.

22 coins. All P. and S. CONST.

This type was introduced at the time of the dedication of Constantinople, A.D. 330, but struck at Constantina (Arles).[1]

DELMATIUS.

Ob. FL. DELMATIVS NOB CAES.

R. GLORIA EXERCITVS. Two soldiers, &c., between them Labarum with ☧

3 coins with P. CONST.
2 large size S. CONST.
1 small P. LC.

Issued after A.D. 335, as Delmatius was made Cæsar that year.

Ob. Same.

R. Same, but a cross below Labarum TRS

CONSTANTINE II.

Ob. CONSTANTINVS IVN. NOB. C. Bust of Constantine II. to the right, laureated, with cuirass. Some have diadem.

R. GLORIA EXERCITVS. Two soldiers, helmeted, standing, each holding a spear, and leaning on a shield; between them the Labarum, on which is the Sacred monogram.

24 coins, Small coins.

[1] See *Num. Chron.*, 1877, p. 270.

Ob. CONSTANTINVS . . . . .

R. Same, with + on Labarum, PLC

Ob. Same, but with a star of eight rays between soldiers.

10 coins. P or S CONST. Large coins.

Ob. FL. IVL CONSTANTINVS AVG.

R. SECVRITAS AVG. Security, with hasta n right, leaning on column.

In ex. : P?S. 1 coin.

Ob. Same as 1. This is a larger coin than the others.

R. Same as 1, but has + between soldiers.

2 coins. AQS.

CONSTANS.

1. *Ob.* FL. IVL. CONSTANS. AVG. Bust of Constans to right, laureated.

R. GLORIA EXERCITVS. Two soldiers standing, holding spear and leaning on shield; between them the Labarum, on which is the Sacred monogram.

Ob. CONSTANS AVG.

24 coins. All P. and S. CONST. or SIS. (Siscia.

R. Same as above.

2. *Ob.* Same.

R. Same, except that upon the Labarum is + or ☧.

6 coins.

3. *Ob.* Same as 2.

R. Same, but cross below monogram.

2 coins. SLC.

Ob. Same.

R. Has a star of eight rays between standards.

Many of the coins of this emperor have the X in EXERCITVS very much enlarged, and placed exactly overthe Labarum or between the standards.[1]

[1] See *Num. Chron.*, vol. xvii., p. 264.

CONSTANTIUS II.

Ob. FL. IVL. CONSTANTIVS NOB. C. Bust of Constantius to right, laureated. Paludamentum.

R. GLORIA EXERCITVS. Two soldiers, &c.; between them, in the field, ☧. The heads of standards end in small crosses.

1 coin. S. CONST.

Ob. Same.

R. Same, except that + is on the Labarum between the soldiers.

P or S CONST. 5 coins.

One coin has ☩ on Labarum. PLC. One coin ☩. SLC.

Ob. CONSTANTIVS AVG. Small coin.

R. Same, but Labarum has a cross below. PLC.

2 coins.

Ob. Same as 1.

R. Same, but Labarum has upon it ✠.

9 coins. TRP and TRS. P. CONST.

Ob. Same as 1.

R. Same, but star of *six* rays between standards.

35 coins. S. CONST.

On some coins of this reign the X in "exercitus" is not only greatly enlarged, but has expanded ends.

The following explanation of some of the letters in the exergue may be useful:—

P Prima ... ... 1st Mint.

S Secunda... ... ... 2nd Mint.

Greek letters, probably for numerals:—

A 1st Mint ... ...
B 2nd do. ... ...
Γ 3rd do. ... ...
Δ 4th do. .. ..
ϵ 5th do. ... ...

} Generally after the letter indicating the city where the coins were struck.

SM ... ... Signata Moneta. The mark of the money.

A or AL ... ... Alexandria.
AN or ANT ... Antioch.
AQ ... ... Aquileia.
AR or ARL ... Arles.
CON or CONS... Constantinople.
CONST ... ... Constantina (Arles).
K or KAR ... ... Carthage.
H... ... ... Heracleia.
LVC or LVG ... Lyons.
N... ... ... Nicomedia or Narbonne.
R or RO or ROM Rome.
RA ... ... Ravenna.
SIS ... ... Siscia.
T... ... ... Tarraco or Thessalonica.
TR ... ... Trèves.

J. W. Arrowsmith, Printer, Quay Street, Bristol.

PYRUS MINIMA LEY.

BY THE REV. AUGUSTIN LEY.

(PLATE.)

LITTLE has been discovered to throw fresh light upon this shrub since the short notice of it contributed by me to this Journal for 1895, p. 84. The publication of a plate of the plant affords me an opportunity for gathering up all the information upon it which I am able to give, and for publishing a somewhat ampler description.

PYRUS MINIMA Ley. A small spreading shrub, height 10–20 ft.; much branched, with slender branches. Leaves linear-oblong, *shallowly pinnatifid*, with three to four principal lobes, which are usually deepest at the middle or upper part of the leaf, the lowest one-third or one-fourth being without lobes; side-veins five to seven, making *a very acute angle* with the midrib, prominent on under, grooved on upper surface; under surface clothed with grey felt, which persists until the leaf falls.

Flowers produced late in May or early in June, in loose corymbs which are not flat-topped, small, resembling those of *P. Aucuparia* Gaertn.; petals cream-coloured, round; anthers on first opening *pinkish*, then dark brown; calyx erect and prominent on the unripe fruit, persistent until the fruit is ripe. Fruit *small, globose, bright coral-red*, bitter, ripening in the end of August or the beginning of September; perfume in the flowers resembling that of fresh *Cratægus Oxyacantha*.

Locality. On a limestone mountain cliff called Craig Cille, near Crickhowel, Breconshire; also on limestone rocks at Blaen Onnen, two miles westward from Craig Cille. Undoubtedly native, and in great abundance at the former station, where the shrubs clothe the limestone cliff to its head at 1600 ft.; seedlings also being frequent. *P. intermedia*, *P. Aria* var. *rupicola*, and *P. Aucuparia* occur on the same cliff; but the very distinct habit and fruit of the present plant, as well as other reasons, forbid the idea of hybridity.

P. minima differs from *P. scandica* Syme in the leaves being narrower, with a more linear outline, and much shallower lobes, except upon the young leading shoots; and especially in the fruit being globose, small, and bright red. Fresh specimens of this Arran form, kindly communicated to me by the Rev. D. Landsborough, show its anthers to be, as in *P. minima*, light pink upon first opening, becoming brown afterwards.

From *P. intermedia* Ehrh. (as represented by the Piercefield Park plant) it differs by the slender, branching habit; by the greyer felt of the smaller, much more linear leaves, which have the lobes terminating in a much sharper point; by the flowers being less than half the size; by the colour of the anthers; and finally by the small fruit. *P. intermedia* has long, thick, nearly undivided branches, very showy flowers larger than in *P. Aria* Ehrh., with long stamens and rather brightly pink anthers, and large fruit.

Pyrus minima is one of a series of closely allied forms, two of which have long been known to inhabit the Scottish Arran, and have been described under the names of *P. scandica* Syme and *P. fennica* Bab. Prof. Koehne, in an interesting communication made by him to the Edinburgh Botanical Society, the substance of which was reproduced in this Journal, 1897, p. 99, gives his judgment on these Arran and Breconshire plants, specimens of which were submitted to him through Prof. Conventz. Prof. Koehne thinks all the Arran plants, together with the Breconshire *P. minima*, to be members of a series of hybrids between *Aria suecica* Koehne (*Pyrus scandica* Ascherson) and *Sorbus Aucuparia* (*Pyrus Aucuparia* Gaertn.). *Aria suecica* Koehne is at least extremely rare in Britain as a native plant, and is far from common in cultivation. A single tree found by me near Merthyr Tydvil, Breconshire, about eleven miles from the station for *P. minima*, was pronounced by Prof. Koehne to be true *A. suecica*; but it seems still to be doubtful whether it occurs at all in Arran, where two of the supposed hybrids are found.

I venture to express a doubt of the desirability of naming such a series of plants as these *Pyrus*-forms, or, again, the Cinquefoils ranging between *P. reptans* L. and *P. silvestris* Neck., or, again, certain groups of closely-allied Brambles, simply as "hybrids." Although favoured by great authorities, and no doubt expressing an interesting theory of the origin of such races, its use in this way deprives us of a term to express the very different phenomenon of ordinary hybridity as affecting individual plants.

The figure of the flowering spray is from a drawing by Mrs. F. J. Hanbury; that of the fruit from one by Miss Marion Gee.

[*Reprinted from the* 'JOURNAL OF BOTANY' *for August*, 1897.]

Pyrus minima *Ley.*

SECOND REPORT

OF THE COMMITTEE

FOR PROMOTING THE

TRANSCRIPTION AND PUBLICATION

OF

PARISH REGISTERS,

WITH CALENDAR OF REGISTERS

Printed and transcribed since the first Report of 1892.

PUBLISHED UNDER THE DIRECTION OF THE CONGRESS OF
ARCHÆOLOGICAL SOCIETIES IN UNION WITH THE
SOCIETY OF ANTIQUARIES.

1896

Report of the Parish Register Committee, 1896.

The Committee in issuing the present supplement to their Report and Lists of 1892 have great pleasure in calling attention to the large increase in the number of Transcripts made; many of these, there is reason to believe, owe their existence to the help and stimulus given by the former report.

It is to be noted that a large number of the Transcripts have been made for the use of the various Parishes, and will therefore be accessible to the public.

It appears to the Committee that the evidence supplied by this supplemental List shows that the supposed impossibility of ever transcribing the whole of the Parish Registers of the Kingdom is imaginary, and that by enlisting and encouraging local effort, the very desirable object may be obtained at no great distance of time.

The list of Transcribers' names shows how much may be done by individual workers, and much more might easily be done by some organised effort by Diocesan authorities.

The Committee hail with satisfaction the successful formation of a Society for printing Parish Registers, under the patronage of the Archbishops and many of the Bishops. The Hon. Sec. is E. A. Fry, Esq., of 172, Edmund Street, Birmingham, who will be happy to give any information on the subject. The Society has already issued five Registers in return for the annual guinea subscription, and in the event of an increase in the number of subscribers will be able to print more Registers annually. In cases where some local help can be guaranteed, special arrangements can be made for printing Registers.

Mr. W. P. W. Phillimore (124, Chancery Lane) is also printing a series of complete Marriage Registers of Counties. Those of Gloucestershire are now being printed, and others for Hants, Kent, Northants, Notts, and Somerset are in active preparation. It is intended to arrange for other Counties.

Mr. Wm. Brigg, B.A. (Harpenden, Herts.), is printing in the "Herts. Genealogist" a useful series of Bishops' Transcripts for the periods for which the Parish Registers are lost.

It is gratifying to find that, at the instance of the Diocesan Conferences of St. Alban's and Worcester, Committees have been formed to obtain from all Incumbents in the Dioceses returns of the Registers existing in their Parishes, their exact dates and condition.

An effort will then be made to get the books put into proper repair.

The Rev. O. W. Tancock, of Little Waltham Rectory, Chelmsford, is Hon. Sec. of the St. Alban's Committee, and E. A. Fry, Esq., of the Worcester, and either of these gentlemen will be glad to answer enquiries as to their method of work, so that a uniform plan may be adopted in other Dioceses.

The St. Alban's "Diocesan Quarterly" for the past quarter (No. 15, price 3*d.* post free, W. Root, Halstead, Essex) contains an account of what has been done in the St. Alban's Diocese.*

It is to be hoped that an effort will afterwards be made to get all the Registers transcribed and indexed, and copies kept in the Parish for reference. A small fee should be agreed upon as to be charged for consultation of the Transcript for purposes of Genealogical research, the charge for certified extracts from the original Registers remaining, of course, as at present.

The Committee are again indebted to Geo. W. Marshall, LL.D. (Rouge Croix) for his revision of the list of Printed Registers. The somewhat arduous labour of compiling and editing the Calendar has been undertaken by Ralph Nevill, F.S.A. the Hon. Sec. of the Committee, and E. A. Fry, the Hon. Sec. of the Parish Register Society.

All who may publish to transcribe Registers in future are invited to send particulars to either of the above named gentlemen, who have undertaken to compile the next List.

RALPH NEVILL, *Hon. Sec.*
13, *Addison Cresent,*
Kensington.

The particulars obtained of the Registers of Herts. will be printed in Middlesex and Herts. Notes and Queries, commencing January, 1897 (*Messrs. Hardy & Page*, 44, *Chancery Lane, W.C.*).

* *The Worcester Diocesan Mag. for December*, 1896 (*Midland Education Co., Corporation Street, Birmingham, price* 2½*d. post free*), *contains a similar Report for the Worcester Diocese.*

The First Report of the Committee, issued in 1892, contains advice as to the transcription and publication of Registers, and a specimen alphabet of the characters chiefly used.

There are also Calendars of all Registers known to have been transcribed or printed up to the date of issue. The Calendars here given are supplementary to those in the First Report.

TABLE OF CONTENTS.

No. 1.—List of Parish Registers that have been printed as separate works.

BERKS.	READING, St. Giles, 1518–1546, Walter L. Nash.	
CHESHIRE.	BIDSTONE, 1581–1700, W. F. Irvine.	
	STOCKPORT, St. Mary, 1584–1620, E. W. Bulkely	1889
CORNWALL.	REDRUTH, 1560–1716, J. C. Peter, Redruth	1894, 4to
CUMBERLAND.	DALSTON, vol. i. 1570–1678, vol. ii. 1679–1812, Rev. J. Wilson, M.A., 1893 and 1896. Indexed, with corrections from Bishops' transcripts.	
	KIRK OSWALD, 1577–1609, Canon Thornley	1895, 8vo
	PENRITH, 1556–1601, G. Watson	1893, 8vo
DORSETS.	BERE HACKETT, 1549–1745, E. A. Fry, Par. Reg. Soc.	1896, 8vo
	CAUNDLE BISHOP, 1570–1814, Rev. Canon C. H. Mayo (Dorset Records)	1895, 8vo
	HOLNEST, 1589–1812, E. A. Fry (Dorset Records)	1894, 8vo
	LONG BURTON, 1580–1812, E. A. Fry (Dorset Records)	1894, 8vo
DURHAM.	DURHAM CATHEDRAL, 1609–1896, Harl. Soc. (in press).	
ESSEX.	FYFIELD, 1538–1700, F. A. Crisp, F.S.A., pr.	1896, fol.
GLO'STERS.	MARSHFIELD, 1558–1793, F. A. Crisp, F.S.A., pr.	
KENT.	BEAKESBOURNE, 1558–1812, Rev. C. H. Wilkie, pr.	dmy. 8vo
	ORPINGTON, 1560–1754, H. C. Kirby	Lond. 1895, 8vo
LANCS.	HAWKSHEAD, 1568–1794, H. Swainson Cooper, F.S.A.	dmy. 8vo
LINCOLNS.	HORBLING, 1653–1837, H. Peet	Liverpool, 1895, 8vo

LONDON. CHARTERHOUSE CHAPEL, Bap. 1696–1836, Mar. 1671–1754 and 1837–1890, Bur. 1695–1854, Francis Collins, M.D., Harl. Soc., vol. xviii.
CHRISTCHURCH, Newgate Street, 1538–1754, W. A. Littledale, M.A., Harl. Soc., vol. xxi.
ST. GEORGE'S CHAPEL, Mayfair, Bap. 1740– and Mar. 1735–1754 (wrongly entered in last list), George J. Armytage, F.S.A., Harl. Soc., vol. xv.
ST. GEORGE'S, Hanover Square, Mar. 1810–1836 (in press), Harl. Soc.
ST. JAMES', Clerkenwell, Bur. 1551–1754, Robt. Hovenden, F.S.A., Harl. Soc., vol. xvii., xix., and xx.

NORFOLK. NORWICH, St. George's Tombland, 1538–1707.

NORTHANTS. MAXEY, 1538–1712, Rev. W. D. Sweeting, M.A. (Mitchell & Hughes) 1892, 8vo

NOTTS. WELLOW, 1703–1812, Geo. W. Marshall, LL.D. Exeter, 1896, 8vo
WORKSOP, 1558–1771, Geo. W. Marshall, LL.D. Guildford, 1894, 8vo

RUTLAND. NORTH LUFFENHAM, 1572–1812, Rev. P. J. Dennis, Par. Reg. Soc. 1896, 8vo

SOMERSET. BRUTON, 1826–1890, Rev. T. A. Strong.

SUFFOLK. BARDWELL, 1538–1650, Rev. F. E. Warren, F.S.A. (Mitchell & Hughes).
BRAMFIELD, 1539–1889, Rev. T. S. Hill (Mitchell & Hughes).

SURREY. BANSTEAD, 1547–1789, F. H. Lambert, F.S.A., Par. Reg. Soc. 1896, 8vo

WARWICKS. FILLONGLEY, 1538–1653, Rev. A. B. Stevenson.

WESTMORELAND. ASBY, 1657–1798, T. R. Rivington 1894, 8vo
RAVENSTONEDALE, 1570–1812, Rev. R. W. Metcalfe 1893, 8vo

WORCESTERS. KNIGHTWICK WITH DODDENHAM, 1538–1812, Rev. J. Bowstead-Wilson, F.S.A. 1891, small fol.
WORCESTER, St. Alban's, 1630–1812, Rev. J. Bowstead-Wilson, Par. Reg. Soc. 1896, 8vo

YORKS. BATLEY, 1559–1800, M. Sheard.
BOLTON ABBEY, 1689–1812, Rev. A. P. Howes, M.A. Skipton, 1895, 8vo
BURNSALL, vol. i. 1559–1700, vol. ii. 1701–1739 and 1783–1812, Rev. W. J. Stavert, M.A. Skipton, 1893, 8vo
CONISTONE, 1567–1812, Rev. W. J. Stavert, M.A. Skipton, 1894, 8vo
FELKIRK, 1701–1812, A.N.J. Royds, Rochdale, 1894, 8vo
MONK FRYSTON, 1538–1678, Par. Reg. Soc. 1896, 8vo

YORKS. (*continued*) RYLSTONE, vol. i. 1559–1723, vol. ii. 1724–1812, Rev. C. H. Lowe, M.A. Leeds, 1895-6, 8vo
SADDLEWORTH, 1613–1751, J. Radcliffe 1887, 8vo
SKIPTON-IN-CRAVEN, vol. i. 1592–1680, vol. ii. 1680–1745, vol. iii. 1745–1812, Rev. W. J. Stavert, M.A. Skipton, 1894-6, 8vo
YORK, Holy Trinity, 1586–1760, Rev. E. Bulmer (in progress).
YORK, St. Martin-cum-Gregory, 1538–1745, Rev. E. Bulmer (in progress).

No. 2.—List of Parish Registers printed in books and periodicals.

BERKS. DIDCOT, Bap. 1562–1647, Berks Notes and Queries, Oct. 1890, to April 1891.

CAMBRIDGES. CAMBRIDGE, St. Michael, 1538–1837, J. Venn, Camb. Antiqu. Soc., vol. xxv. (complete part) 1891, 8vo

CHESHIRE. STOCKPORT, Cheshire Notes and Queries.

DURHAM. ESH, 1566– Pro. Soc. Antiqu., Newcastle-on-Tyne.

*GLO'STERS. FORTHAMPTON, Mar. 1678–1812, Rev. E. R. Dowdeswell, Glouc. Mar. Reg.
FROCESTER, Mar. 1559–1799, Rev. W. Symonds, Glouc. Notes and Queries.
KING STANLEY, Mar. 1573–1812, Rev. T. W. Cattell and Rev. R. H. Clutterbuck, G. M. R.
MAISEMORE, Bap. 1600–1663, Mar. 1557–1590, Bur. 1538–1599, G. N. & Q.
NYMPSFIELD, Mar. 1679-1812, Rev. J. Silvester, G. M. R.
OWLPEN, Mar. 1677–1895, W. P. W. Phillimore and Rev. W. B. Benison, G. M. R.
PEBWORTH, Mar. 1595–1700, Rev. T. P. Wadley, G. N. & Q.
QUEDGELY, Mar. 1559–1836, Rev. E. L. Bryan and Rev. W. Symonds, G. M. R.
RENDCOMBE, Mar. 1566–1812, Rev. G. E. A. Kempson, G. M. R.
SLIMBRIDGE, Mar. 1635–1812, Rev. W. Symonds, G. M. R
SWINDON, Mar. 1638–1838, Sidney Madge, F.R.H.S., G. M. R.
WHADDON, Mar. 1674–1711, G. N. & Q.

* The Glo'ster Marriage Registers are being printed in Glo'ster Notes and Queries, and will be issued in volumes, the first of which is now complete. *See* Preface.

HANTS. ASHE, Rev. J. Thoyts, Par. Hist. of Ashe, Clowes & Sons 1888

HERTS. CHIPPING BARNET, Bishops' Transcripts for sundry years, missing from Par. Reg., 1569–1682, Wm. Brigg, B.A., Herts. Genealogist, vol. ii.
NORTHAW, Bps. Trans., sundry years, 1564–1748, Herts. Geneal., vols. i. and ii.
ST. ALBAN'S ABBEY, 1558–1689, Wm. Brigg, B.A., Herts. Geneal. Supplement.
ST. ALBAN'S, St. Michael's in, Bps. Trans., sundry years 1572–1630, Herts. Geneal., vol. i.
ST. ALBAN'S, St. Stephen's in, Bps. Trans., sundry years, 1561–1600, Herts. Geneal., vol. i.
WIGGINTON, Bps. Trans., sundry years, 1609–1670, Herts. Geneal., vol. ii.

LINCOLNS. KINGERBY, 1562–1760 (in progress in Northern Genealogist), Bishop's Transcript.

MIDDLESEX. CHISWICK, Mar. 1678–1800 (in "Chiswick"), W. P. W. Phillimore.

NORTHANTS. CLAY COTON, 1541– (in progress, Northern Genealogist).
MAXEY, 1538–1712, Rev. W. D. Sweeting, M.A., Mis. Gen. et Herald. (*See* also List 1.)

NORTHUMBERLAND. ELSDON, 1672– , Proc. Soc. Antiqu., Newcastle-on-Tyne (in progress).
WARKWORTH, Bap. and Mar. 1688, Bur. 1674, J. C. Hodgson, Proc. Soc. Antiqu., Newcastle-on-Tyne (in progress).

NOTTS. NEWARK, Mar. 1650–1662, Northern Genealogist.
OLLERTON, 1592–1812, G. W. Marshall, LL.D., The Genealogist.
WELLOW, 1703–1812, G. W. Marshall, LL.D., The Genealogist.

SOMERSET. STREET, 1599– (in progress in The Genealogist).

SUFFOLK. FRESTON, 1538–1894, Rev. C. R. Durrant, "Life in a Suffolk village," 1887–91.

WARWICKS. SOUTHAM, 1539—Bap. 1633, Mar. 1657, Bur. 1647, W. Gardner, Hist. Notices of Southam 1895, 4to

WORCESTERS. INKBERROW, 1675–1778, Rev. T. N. Leeke, Par. Mag.
NORTHFIELD, 1560–1576, W. F. Carter, Par. Mag.
ROUS LENCH, 1538– , Rev. Dr. Chafy Chafy, Par. Mag.

YORKS. LEEDS, St. Peter's, 1572–1612, Rev. E. Cookson, Thoresby Society.
STARTFORTH, 1661–1691 (in progress in Northern Genealogist).
WHITKIRK, 1603–1700, J. W. Morkill, M.A., Records of Whitkirk Leeds, 1892

No. 3.—List of MS. Transcripts.

Those marked "Par." are in the custody of the Clergy for Parish use.

BEDFORDS. BIGGLESWADE, 1562–1598, John Powell.

BERKS. BISHAM, 1560–1845, Edgar Powell.
DIDCOT, Bap. 1562–1678, Mar. 1571–1674, Bur. 1568–1681, G. Tudor Sherwood.
UPTON-NEAR-BLEWBURY, &c., 1588–1741, J. F. Fry.

CAMBRIDGES. BABRAHAM, 1561– , Rev. T. D. Gray (in progress).
CAMBRIDGE, All Saints', 1538–1702, C. L. Acland (in progress).

CHESHIRE. BARROW-BY-TARVIN, Bap. 1572–1623, Mar. 1590–1619, Bur. 1572–1622, mixed 1629–1679, T. Cann Hughes, M.A.
CHESTER CATHEDRAL, 1687–1871, T. Hughes, F.S.A.
CHESTER, St. John's, Bap. and Mar. 1599–1626, Bur. 1661–1723, T. Cann Hughes, M.A.
" St. Oswald's, 1580–1650, T. Cann Hughes, M.A.
" St. Peter's, T. Cann Hughes, M.A.
NORTHENDEN, T. Cann Hughes, M.A.
OVERCHURCH, *i.e.*, UPTON, 1660–1812, W. F. Irvine.
SWETTENHAM, 1570–1820, Cyril Lockett.
WARBURTON, 1611–1752, Rev. G. Egerton-Warburton, M.A.

CUMBERLAND. BRAMPTON, 1663–1702, Rev. H. Whitehead.
NEWTON REIGNY, 1571–1812, Rev. H. Whitehead.
PENRITH, 1602–1812, Geo. Watson.

DENBIGHS. GRESFORD, T. Cann Hughes, M.A.

DERBYS. REPTON, 1580–1670, Rev. F. C. Hipkins.
SOMERSHALL-HERBERT, 1537–1812, Rev. H. C. Fitzherbert (Indexed, &c.).
STAVELEY, Bap. 1558–1665, Mar. 1587–1666, Bur. 1538–1693, A. S. Scott-Gatty, F.S.A.

DEVON. *ALWINGTON, Mar., Bap. and Bur. 1550–1812, Rev. J. Ingle Dredge.
ANSTEY, EAST, Mar. 1674, Bap. and Bur. 1596–1812, Rev. J. Ingle Dredge.
" WEST, 1653–1812, Rev. J. Ingle Dredge.

* Transcripts of those Parishes thus marked were entered in the first Report as among the Chester MSS. These were copied from the Transcripts here entered.

DEVON. (*continued*)

ATHERINGTON, Mar. 1548, Bap. 1538, Bur. 1570–1812, Rev. J. Ingle Dredge.
BERRY NARBOR, Bap. 1550, Mar. and Bur. 1540–1812, Rev. J. Ingle Dredge.
BIDEFORD, 1561–1812, Rev. J. Ingle Dredge.
*BRADFORD, Mar. 1558–1754, Bap. 1558 and Bur. 1559–1812, Rev. J. Ingle Dredge.
BRAWNTON, 1538–1812, Rev. J. Ingle Dredge.
CHITTLEHAMPTON, a fragment, Mar. and Bur. 1576–78, Bap. 1575–79, Mar., Bap. Bur. 1637–1812, Rev. J. Ingle Dredge.
CLYST ST. GEORGE, 1567–1748, Rev. J. L. Gibbs.
DOLTON, Mar. 1610, Bap. and Bur. 1608–1812, Rev. J. Ingle Dredge.
FREMINGTON, Mar. 1602–1837, Bap. and Bur. 1602–1812, Rev. J. Ingle Dredge.
*HARTLAND, 1558—Mar. 1837, Bap. 1812, Bur. 1866, Rev. J. Ingle Dredge.
HEANTON PUNCHARDON, Mar. 1559, Bap. 1656, Bur. 1559–1812, Rev. J. Ingle Dredge.
HIGH BICKINGTON, Mar. 1754–1837, Bap. and Bur. 1707–1812, Rev. J. Ingle Dredge.
*HOLLACOMBE, 1638–1739, Rev. J. Ingle Dredge.
HUISH, Mar. 1600–1789, Bap. and Bur. 1595–1812, Rev. J. Ingle Dredge.
HUNTSHAW, Mar. 1755, Bap. and Bur. 1746–1812, Rev. J. Ingle Dredge.
*LITTLEHAM (BIDEFORD), 1538–1812, Rev. J. Ingle Dredge.
LITTLE TORRINGTON, 1672–1812, Rev. J. Ingle Dredge.
MARWOOD, 1602—Mar. 1812, Bap. 1784, Bur. 1800, Rev. J. Ingle Dredge.
MEETH, Mar. 1656, Bap. and Bur. 1653-1812, Rev. J. Ingle Dredge.
MERTON, Mar. 1688, Bap. and Bur. 1687–1812, Rev. J. Ingle Dredge.
*NEWTON ST. PETROCK, Mar. and Bap. 157 Bur. 1723–1812, Rev. J. Ingle Dredge.
*PARKHAM, 1537–1812, Rev. J. Ingle Dredge.
PLYMTREE, 1538–1800, Mrs. J. Rose Troup.
PULFORD, WEST, Mar. 1670—Bap. and Bur. 1668–1812, Rev. J. Ingle Dredge.
ROBOROUGH, 1549–1812, Rev. J. Ingle Dredge.
ROCKBEARE, 1645—Bap. and Bur. 1676, Mar. 1672, Mrs. J. Rose Troup.
ROSEASH, 1591–1812, Rev. J. Ingle Dredge.
ST. GILES-IN-THE-WOOD, Mar. and Bap. 1555–1743, Bur. 1556–1746, Rev. J. Ingle Dredge.
*SHEBBEAR, 1576–1812, Rev. J. Ingle Dredge.
STOKE RIVERS, 1553—Bap. and Mar. 1744, Bur. 1707, Rev. J. Ingle Dredge.

DEVON. (*continued*)

WEAR GIFFORD, 1583–1812, Rev. J. Ingle Dredge.
WEST DOWN, –1812, Rev. J. Ingle Dredge.
WESTLEIGH, Mar. 1561–1757, Bap. 1560–1776, Bur. 1559–1776, Rev. J. Ingle Dredge.
WINKLEIGH, Mar. 1569–1791, Bap. 1585, Bur. 1569–1812, Rev. J. Ingle Dredge.
WOOLFARDISWORTHY, 1723–1812, Rev. J. Ingle Dredge.
YARNSCOMBE, 1653–1812, Rev. J. Ingle Dredge.

DORSET.

CHIDEOCK, 1654–1812, Rev. C. V. Goddard.
LYDLINCH, 1559–1812, Rev. C. H. Mayo.
STURMINSTER MARSHALL, 1562–1694, Rev. J. Cross.
TARRANT HINTON, 1545–1812, Rev. A. S. Newman.
THORNFORD, 1677–1812, E. A. Fry.
WHITECHURCH CANONICORUM, Bap. 1558–1680, index form, Rev. R. G. Bartlett.

DURHAM.

DENTON, 1714–1812 (*continuation*), Rev. J. Edleston.
DIMSDALE, Bap. 1556–1806, Mar. 1564–1754, Bur. 1562–1812, Robt. Blair, F.S.A.
EBCHESTER, Bap. and Bur. 1619–1731, Mar. 1621–1731, Robt. Blair, F.S.A.
WHITBURN, Mar. 1579– , Robt. Blair, F.S.A. (in progress).
WILTON, Bap. 1571– , Robt. Blair, F.S.A. (in progress).
WILTON-LE-WEAR, 1558–1745, Robt. Blair, F.S.A.

ESSEX.

AYTHORPE RODING, 1559–1636, Par.
BOREHAM, 1559–1800, R. H. Browne, Par.
BRAINTREE, 1660–1812, R. H. Browne, Vicar.
BROOMFIELD, 1546–1812, Rev. O. W. Tancock.
CHELMSFORD, 1538–1812, R. H. Browne.
CHIGNALL, S. James', 1724–1812 (earlier lost), Rev. O. W. Tancock.
CHIGWELL, 1653–1812, R. H. Browne.
EARL'S COLNE, 1560–1812, R. H. Browne, Par.
EAST HAM, Bap. and Bur. 1700–1803, Mar. 1695–1804, A. S. Scott-Gatty, F.S.A.
LAMBORNE, 1582–1812, R. H. Browne (*see* also 1st Report).
LEIGHS, GREAT, 1556–1812, The Rector.
,, LITTLE, 1679–1812, Rev. O. W. Tancock.
MALDON, All Saints', 1558–1812, R. H. Browne, Plume Library, Maldon.
,, St. Mary, 1558–1812, R. H. Browne, Plume Library.
,, St. Peter's, 1556–1812, R. H. Browne, Plume Library.
MASHBURY, 1539–1812, Rev. O. W. Tancock.
NAVESTOCK, 1538–1812, Par.
PLESHEY, 1656–1812, Rev. O. W. Tancock.
RAINHAM, 1570–1812, R. H. Browne, Par.
ROXWELL, 1558–1812, R. H. Browne, Par.

ESSEX. (*continued*)
Springfield, 1570–1812, Rev. J. Harvey Bloom, M.A.
Stapleford Abbots, 1653–1812, R. H. Browne, Par.
Thaxted, 1538–1812, R. H. Browne (in progress).
Thurrock, West, 1668–1712 (made 1805), Par.
Totternhoe, 1558–1670, Rev. S. A. Woolward (Indexed).
Waltham Parva, 1538–1812, R. H. Browne, Par. and Guildhall Library.
West Ham, Mar. 1653–1801, A. S. Scott-Gatty, F.S.A.
White Colne, 1538–1812, R. H. Browne, Par. and Guildhall Library.
Widford, 1619–1812, R. H. Browne, Par.
Woodham Walter, 1558–1800, R. H. Browne, Par.
Writtle, 1634–1812, R. H. Browne, Par.

GLO'STERS.
Aston-sub-Edge, 1538–1812, Rev. J. Harvey Bloom.
" Mar. only 1539–1719, S. G. Hamilton. To be printed in Gloucester Marriage Registers.
Bishops Cleeve, Mar. 1563–1812, Sidney Madge, F.R.H.S.
Cam, Mar. 1569–1812, W. P. W. Phillimore, for G. M. R. (in progress).
Campden, Mar. 1616-1812, Rev. J. Harvey Bloom.
Charlton Kings, Mar. 1538–1812, Sidney Madge, F.R.H.S.
Chedworth, Mar. 1653–1817, Rev. S. Hope, for G. M. R.
Cheltenham, 1558–1812, Sidney Madge, for G. M. R.
Clifford Chambers, 1537–1812, Rev. J. Harvey Bloom, M.A.
Coaley, Mar. 1625–1812, W. P. W. Phillimore and Rev W. Symons, for G. M. R.
Dorsington, 1593–1812, Rev. J. Harvey Bloom.
Dursley, Mar. 1639–1676, W. P. W. Phillimore, for G. M. R.
Ebrington, 1567–1812, Rev. J. Harvey Bloom.
Hawkesbury, Mar. 1603–1728, W. P. W. Phillimore, and Rev. E. R. Mosley, for G. M. R.
Kemerton, Mar. 1575–1716, and in progress, Rev. J. J. Mercier, for G. M. R.
Lemington, 1685–1812, Rev. J. Harvey Bloom.
Leonard Stanley, Mar. 1570–1806, T. W. Cattell and R. Denison Jones, for G. M. R.
Lidmington, 1691–1812, Rev. J. Harvey Bloom.
Marston Sicca, Mar. only 1680–1812, Rev. J. Harvey Bloom.
Matson, Bap. 1553–1812, Mar. 1563–1879, Bur. 1555–1812, Rev. W. Bazeley.
Mickleton, 1594–1812, Rev. J. Harvey Bloom.
" Mar. 1594–1812, S. G. Hamilton, for G. M. R.
Moreton-in-the-Marsh, Mar. , Rev. J. Harvey Bloom.
Nether Swell, Mar. 1686–1812, Rev. D. Royce, for G. M. R.

GLO'STERS. (*continued*)
Painswick, Mar. 1562–1627, 1653–1705, 1710–1812, Cecil T. Davis, for G. M. R.
Pebworth, 1597–1784, Rev. J. Harvey Bloom.
Preston-on-Stour, 1540–1812, Rev. J. Harvey Bloom.
Quinton, 1537–1812, Rev. J. Harvey Bloom.
Sainsbury, Bap. 1563–1569, Mar. 1585–1590, Bur. 1786–1812, Rev. J. Harvey Bloom.
Stinchcombe, Mar. 1583–1812, W. P. W. Phillimore and Rev. P. Lynch Blosse, for G. M. R.
Stone, Mar. 1594–1812, Rev. C. Cripps, for G. M. R.
Stonehouse, Mar. 1558–1812, R. Denison Jones, for G. M. R.
Swindon, Bap. 1606—Mar. 1638–1838, Bur. 1638–1700, Sidney Madge, F.R.H.S.
Todenham, 1721-1812, Rev. J. Harvey Bloom.
Uley, Mar. only 1668–1812, W. P. W. Phillimore, for G. M. R.
Upper Slaughter, 1538–1812, J. E. K. Cutts.
Welford-on-Avon, Bap. and Bur. 1561–1768, Rev. J. Harvey Bloom.
Weston-on-Avon, 1685–1812, Rev. J. Harvey Bloom.
Weston-sub-Edge, 1626–1812, Rev. J. Harvey Bloom.
Willersey, 1721–1812, Rev. J. Harvey Bloom.

HANTS.
Faccombe, Mar. 1546–1754, W. P. W. Phillimore and Rev. F. H. Harding, for Hants. Mar Reg.
Headley, 1537–1895, Rev. W. H. Laverty.
Hurstbourne Tarrant, Mar. 1546–1754, W. P. W. Phillimore, for H. M. R.
Knight's Enham, Mar. 1683–1812, Rev. R. H. Clutterbuck, for H. M. R.
Linkenholt, Mar. 1585–1738, W. P. W. Phillimore, for H. M. R.
Monkston, Mar. 1716–1812, Rev. R. H. Clutterbuck, for H. M. R.
Penton Mewsey, Mar. 1642–1812, Rev. R. H. Clutterbuck, for H. M. R.
Vernham, Mar. 1607-1754, W. P. W. Phillimore, for H. M. R.

HEREFORDS.
Stoke Bliss, 1571–1717, Mrs. Baldwyn Childe.
Thornbury, 1538–1735, Mrs. Baldwyn Childe.

HERTS.
Aldenham, 1559–1659, Rev. K. F. Gibbs (in progress).
Flamstead, 1548—Bap. 1726, Mar. 1736, Bur. 1724, A. S. Scott-Gatty, F.S.A.
Hertford, St. Andrew, 1566–1653, Par.
Hertingfordbury, 1679–1813, A. S. Scott-Gatty, F.S.A.
Pelham Brent, 1539–1773, Par.
Redbourn, 1617–1701, J. E. K. Cutts.

KENT. Milton-next-Sittingbourne, Bap. 1538–1697, Mar. 1622–1698, Bur. 1538–1657, A. S. Scott-Gatty, F.S.A.
Newendon, 1559–1850, Rev. E. Jermyn (Indexed).
Reston, Bap. 1541–1684, Mar. 1540–1683, Bur. 1542–1685, A. S. Scott-Gatty, F.S.A.
Wickhambreux, Bap. 1563–1612, Mar. 1558–1652, Bur. 1558–1661, A. S. Scott-Gatty, F.S.A.
Wingham, Bap. 1568—Bur. 1569–1778, Mar. 1569–1770, A. S. Scott-Gatty, F.S.A.

LANCS. Burnley, 1562–1722, W. Ecroyd.
Hawkshead, 1568–1704, H. Swainson Cowper, F.S.A.

LINCOLNS. Doddington, 1690–1812, Rev. R. E. G. Cole.
Epworth, Bap. 1538–1602, Mar. 1564—Bur. 1538–1593, A. S. Scott-Gatty, F.S.A.
Scrivelsby, 1565–1812, Rev. Canon Lodge, Par.

LONDON. Bermondsey, St. Mary Magdalen, 1609–1643, A. S. Scott-Gatty, F.S.A.
Holy Trinity, Minories, Bap. 1563–1813, Mar. 1579–1664, Bur. 1566–1813, A. S. Scott-Gatty, F.S.A.

MIDDLESEX. Willesden, 1568–1865, Fred. A. Wood (Indexed).

NORFOLK. Bawsey, 1537–1773, Rev. J. Harvey Bloom.
Blo' Norton, 1562—Bap. 1713, Mar. 1712, Bur. 1714, Rev. Aug. G. Legge, Par.
Guest, Bap. 1557–1707, Mar. 1560–1706, Bur. 1558–1723, Rev. Aug. G. Legge, Par.
Newton-by-Castle Acre, 1558–1812, Rev. J. Harvey Bloom.
West Acre, 1665–1748, Rev. J. Harvey Bloom.

NORTHANTS. Aldwinkle, All Saints', 1653–1726, A. S. Scott-Gatty, F.S.A.
Aldwinkle, St. Peter's, Bap. 1563–1689 and 1701–1711, Mar. 1654–1711, Bur. 1653–1679, A. S. Scott-Gatty, F.S.A.
Lilford, Bap. 1559–1779, Mar. 1564–1770, Bur. 1568–1778, A. S. Scott-Gatty, F.S.A.
Moulton, 1565–1895, Sidney Madge, F.R.H.S.
Wadenhoe, 1559–1684, A. S. Scott-Gatty, F.S.A.
Warkton, 1559-1742, A. S. Scott-Gatty, F.S.A.

NOTTS. Cotham, 1587–1811, J. E. K. Cutts.
Flawborough, Mar. 1681–1812, W. P. W. Phillimore, for Notts. Mar. Reg.
Orston, Mar 1590–1812, W. P. W. Phillimore, for N. M. R.
Scarrington, Mar. 1571–1812, Rev. J. Standish, for N. M. R.
Screveton, Mar. 1640–1780, Rev. J. Standish, for N. M. R.

NOTTS. (*continued*) Thoroton, Mar. 1583–1606, W. P. W. Phillimore, for N. M. R.

OXFORDS. Wigginton, 1558–1813, Rev. A. D. Mozley.

RUTLAND. Caldecot, 1605–1783, A. S. Scott-Gatty, F.S.A.
Liddington, Bap. 1562—Mar. 1604, Bur. 1561–1725, A. S. Scott-Gatty, F.S.A.

SHROPSHIRE. Alveley, 1561–1721, A. S. Scott-Gatty, F.S.A.
Battlefield, 1662–1812, Shrewsbury Free Library.
Cleobury Mortimer, 1574–1847, Mrs. Baldwyn Childe.
Hanwood, 1559–1763, Shrewsbury Free Library (Original since burnt).
Kinlet, 1657—Bap. 1868, Mar. 1841, Bur. 1860, Mrs. Baldwyn Childe.
Neen Savage, 1575–1700, Mrs. Baldwyn Childe.
Shawbury, 1561–1595 and 1618–1646 (1595–1618 lost), Rev. F. Vernon, Par.
Shrawadine, 1645–1812, Shrewsbury Free Library.
Westbury, 1637–1743, — Morris, Shrewsbury Free Library.

SOMERSET. Bath, Abbey Church, 1569—Bap. and Mar. 1754, Bur. 1800, Harl. Soc.
Christow, 1553-1812, E. F. Wade.
Compton Bishop, 1641–1807, E. F. Wade.
Cucklington, 1558–1837, Rev. E. H. Bates (Indexed).
Goathurst, St. David Kemeys Tynte.
St. Michael Church, 1697–1812, Rev. R. G. Bartlett.
Stoke Trister, 1751–1837, Rev. E. H. Bates, Par. (Indexed).
Thurloxton, 1558–1812, Rev. R. G. Bartlett (Indexed). Another copy by St. David Kemeys Tynte.
Tickenham, 1538–1812, Rev. J. Byrchmore.

STAFFORDS. Checkley, 1625–1825, W. Morton Philips, J.P., D.L.
Leigh, nr. Stoke-on-Trent, 1541–1700, Archdeacon Lane.

SUFFOLK. Burstall, 1540– , Rev. E. Cookson, M.A., and Par. (Indexed).
Combs, Bap. 1558—Mar. 1568, Bur. 1569–1732, A. S. Scott-Gatty, F.S.A.
Easton, Mixed 1561–1742, Bap. 1742—Mar. and Bur. 1745–1777, A. S. Scott-Gatty, F.S.A.
Ickworth, 1566–1890, Rev. S. H. A. Hervey.
Ipswich, St. Clement's, Bap. and Bur. 1563–1666, Mar. 1564–1666, Rev. E. Cookson.
,, St. Lawrence, 1539—Bap. 1812, Mar. 1754, Bur. 1811, Rev. E. Cookson.
,, St. Mary-atte-Key, 1559– , Rev. E. Cookson, and Par. (Indexed).
,, St. Mary Elms, Bap. and Bur. 1557–1812, Mar. 1554–1753, Rev. E. Cookson, M.A.

SUFFOLK. (*continued*)
IPSWICH, St. Matthew's, 1559—Bap. 1695, Mar. 1702, Bur. 1701, Rev. E. Cookson (Indexed). Index with parish.
„ St. Nicholas, Bap. and Mar. 1539–1728, Bur. 1552–1731, Rev. E. Cookson, Par. (Indexed).
„ St. Peter's, Bap. 1657–1790, Mar. 1662–1786, Bur. 1658–1789 (older books lost), Rev. E. Cookson, M.A., Par. (Indexed).
„ St. Stephen's, Bap. 1585–1690, Mar. 1586–1678, Bur. 1586–1679, Rev. E. Cookson, M.A., Par. (Indexed).
KIRKLEY, 1700–1812, Rev. J. Harvey Bloom.
PAKEFIELD, 1682–1812, Rev. J. Harvey Bloom.
RATTLESDEN, 1558–1662, Rev. J. R. Olorenshaw.
SOUTHWOLD, 1602–1802, A. S. Scott-Gatty, F.S.A.
WOOLPIT, 1558–1895, P. H. Page.

SURREY.
BATTERSEA, St. Mary's, 1559–1700.
CRANLEIGH, 1566–1790, W. Welch.
HASLEMERE, Bap. 1594—Mar. and Bur. 1573–1812, J. W. Penfold.
WEYBRIDGE, 1625—Bap. 1797, Mar. 1812, Bur. 1820 (names only from 1797), Miss E. Lloyd.
WOODMANSTERNE, 1568–1710 (to 1750 in progress), F. H. Lambert, F.S.A.

SUSSEX.
GRINSTEAD, EAST, 1558–1760, R. Payne Crawford.
LAVANT, EAST, 1653—Bap. and Bur. 1810, Mar. 1753, W. H. Rylands, F.S.A.
„ MID., 1567–1748, W. H. Rylands, F.S.A.
SOUTHWICK, 1670–1837, H. Hall.
STOPHAM, 1543–1694, Mrs. Vernon L. Guise (*to be continued*).
TREYFORD, 1728–1811, A. S. Scott-Gatty, F.S.A.
WESTBOURNE, 1550–1769, E. A. Fry.

WARWICKS.
ALVESTON, 1539–1769, R. Savage.
ATHERSTONE-ON-STOUR, 1654–1812, Rev. J. Harvey Bloom.
BARCHESTON, 1589–1812, Rev. J. Harvey Bloom.
BARFORD, Mar. 1539–1721, Rev. J. Harvey Bloom.
BISHOPTON, 1591–1752, R. Savage.
BURMINGTON, 1582–1812, Rev. J. Harvey Bloom.
CHARLECOT, 1543–1812, Rev. J. Harvey Bloom.
CHESTERTON, Mar. 1538–1731, Rev. J. Harvey Bloom.
CLIFTON-UPON-DUNSMORE, 1594–1787, A. S. Scott-Gatty, F.S.A.
COFTON HACKET, 1550–1627, Rev. J. Harvey Bloom.
EATINGTON, 1671–1783, Rev. J. Harvey Bloom.
HALFORD, 1541–1812, Rev. J. Harvey Bloom.
HONNINGTON, 1571–1812, Rev. J. Harvey Bloom.
KINETON, 1538–1639, R. Savage.

WARWICKS. (*continued*)
LIGHTHORNE, Mar. 1539–1734, Rev. J. Harvey Bloom (in progress).
LOXLEY, 1540–1812, Rev. J. Harvey Bloom.
LUDDINGTON, 1617–1638, R. Savage.
PILLERTON HERSEY, 1539–1812, Rev. J. Harvey Bloom.
„ PRIORS, 1604–1629, Rev. J. Harvey Bloom.
PRESTON-ON-STOUR, 1540–1812, Rev. J. Harvey Bloom.
SOUTHAM, Bap. 1633—Mar. 1657, Bur. 1647–1812, F. W. Gardner. (*See* also List 2.)
STRATFORD-ON-AVON, 1558–1733, R. Savage.
WELLESBOURNE, 1560–1812, Rev. J. Harvey Bloom.
WHATCOTT, Bap. and Mar. 1572–1617, and Bap. and Bur. 1746–1812, Rev. J. Harvey Bloom.
WHITCHURCH, 1561–1812, Rev. J. Harvey Bloom.

WESTMORELAND. BAMPTON, 1637–1812 (in progress), Miss Noble.

WILTS.
AMESBURY, Rev. C. Ruddle.
BAVERSTOCKE, Bap. 1557—Mar. and Bur. 1561–1715, Chas. Penruddocke.
CHITTERNE, All Saints', Bishops' Transcripts to 1672 by Rev. R. G. Bartlett, Par. (originals lost).
COMPTON CHAMBERLAYNE, 1747–1812, Chas. Penruddocke.
DINTON, 1558–1812, Chas. Penruddocke.
GREAT BEDWYN, Bap. 1553—Mar. 1539, Bur. 1538–1717, Rev. J. Ward, Par.
MADDINGTON, 1611–1812, Canon Bennett and Rev. G. Bartlett, Par.
MILSTON-CUM-BRIGMERSTON, 1540–1700, Rev. R. G. Bartlett, Index copy and Par.
ORCHESTON ST. MARY, Bishops' Transcripts to 1700, Rev. R. G. Bartlett (original registers lost).
PRESHUTE, 1607–1707, E. Ll. Gwillim.
ROLLESTONE, 1652–1812, Rev. R. G. Bartlett, Index copy.
SHREWTON, 1548–1812, Canon Bennett.
„ 1548–1700, Rev. R. G. Bartlett, Index form, Par.

WORCESTERS.
ALDERMINSTER, 1628–1812, Rev. J. Harvey Bloom.
CLEEVE-PRIOR, 1557–1812, Rev. J. Harvey Bloom.
CLENT, 1562–1812, J. Amphlett (wrongly inserted in first Report under Staffordshire).
EVESHAM, All Saints', Bap. and Mar. 1539–1784, Bur. 1538–1546 (in progress), Rev. J. Harvey Bloom.
„ St. Laurence, Bur. 1556 (in progress), Rev. J. Harvey Bloom.
HARTLEBURY, 1540–1579, Rev. R. A. Wilson (*to be continued*).
HONEYBOURNE, 1673–1812, Rev. J. Harvey Bloom.
KYRE WYARD, 1694–1812, Mrs. Baldwyn Childe.

WORCESTERS (*continued*)
- Little Cumberton, Mar. 1540–1627, Rev. J. Harvey Bloom.
- Littleton, North and Middle, 1661–1787, Rev. J. Harvey Bloom.
- ,, South, 1537–1812, Rev. J. Harvey Bloom.
- Offenham, 1538–1706, R. Savage.
- Shipston-on-Stour, 1572–1812, Rev. J. Harvey Bloom.
- Stretton-on-the-Foss, 1538—Bap. and Bur. 1733, Mar. 1754, Rev. J. Harvey Bloom
- Tredington, Mar. 1560–1615, Rev. J. Harvey Bloom (in progress).
- Worcester, St. Helen's, 1538–1812, Rev. J. Bowstead Wilson, F.S.A.
- ,, St. John-in-Bedwardine, Mrs. W. R. Carr.

YORKS.
- Almondbury, 1557–1652, R. C. Oldfield.
- Bradfield, 1559–1670, A. S. Scott-Gatty, F.S.A.
- Burghwallis, 1596–1693 (with gaps), A. S. Scott-Gatty, F.S.A.
- Ganton, Bap. 1556—Bur. 1552–1794, Mar. 1653–1737, A. S. Scott-Gatty, F.S.A.
- Harthill, 1586–1697, A. S. Scott-Gatty, F.S.A.
- Hatfield, Bap. 1566—Bur. 1565-1679, Mar. 1566–1681, A. S. Scott-Gatty, F.S.A.
- Hemsworth, 1553–1688, Rev. J. Harvey Bloom.
- Hooton Roberts, Bap. and Mar. 1702–1803, Bur. 1703–1813, A. S. Scott-Gatty, F.S.A.
- Hovingham, 1642–1742, A. S. Scott-Gatty, F.S.A.
- Kirk Ella, 1588–1812, A. B. Wilson Barkworth.
- Linton-in-Craven, 1562–1896, Rev. F. A. C. Share, M.A., Par.
- Old Malton, Bap. and Mar. 1606—Bur. 1609–1765, A. S. Scott-Gatty, F.S.A.
- Saddleworth, St. Chad's, 1571–1800, John Radcliffe. (From 1613–1751 are printed.)
- Slingsby, 1687–1737, A. S. Scott-Gatty, F.S.A.
- Tankersley, Bap. 1593–1742, Mar. 1599–1754, Bur. 1598–1755, A. S. Scott-Gatty, F.S.A.
- Thorne, 1565–1698, A. S. Scott-Gatty, F.S.A.
- Whitkirk, 1603–1700, J. W. Morkill, M.A., Par. (*See* also List 2.)
- Wintringham, 1558–1700, A. S. Scott-Gatty, F.S.A.

No. 4.—Registers of Other Churches.

Printed Registers.

LONDON. French Church, Threadneedle Street, 1600-1639, Huguenot Soc. Lymington, 1896, 4to

WESTMORELAND. Ravenstonedale, Presbyterian, 1775–1809, Congregational, 1811–1837, Soc. of Friends, 1655-1834, Rev. R. W. Metcalf 1894, fol.

MS. Transcript.

KENT. Rochester, (Presbyterian) 1706–1806 (some entries from 1700), Humphrey Wood, F.S.A. (original deposited with Registrar-General).

No. 5.—Sundry Records (printed).

CAMBRIDGE. Ely, Mar. Licences, allegations for, 1582–1591, A. Gibbons, F.S.A.

HANTS. Mar. Licences by Bp. of Winchester, allegations for, W. T. C. Moens, F.S.A. Harl. Soc., vols. xxxv. and xxxvi.

HERTS.
- Huntingdon Archdeaconry, Mar. Licences, Abstracts, W. Brigg, B.A., Herts. Genealogist.
- St. Alban's Archdeaconry, Mar. Licences, Abstracts, W. Brigg, B.A., Herts. Genealogist.

KENT.
- Canterbury, Mar. Licences, 1568–1618 (First Series), J. M. Cowper. 1892 pr.
- ,, Mar. Licences, 1619–1660 (Second Series), J. M. Cowper.
- ,, Mar. Licences, Vicar-Gen. of Archp., 1660–1679. Extracts by Col. Chester. Harl. Soc., vol. xxiii. and complement to do., vols. xxxiii. and xxxiv.
- ,, Mar. Licences, Vicar-Gen., &c., 1679–1687 and 1687–1694, Harl. Soc., vols. xxx. and xxxi.
- ,, Mar. Licences, Faculty Office of Archbp., 1543–1869, Harl. Soc., vol. xxiv.

LINCOLNS. Lincoln, Mar. Licences, allegations for, 1560–1670, A. Gibbons, F.S.A. (in progress).

LONDON. LONDON, Mar. Licences, 1520–1610 and 1611–1828, Harl. Soc., vols. xxv. and xxvi.
WESTMINSTER, Mar. Licences by Dean and Chapter, 1558–1699, Col. Chester, Harl. Soc., vol. xxiii.

YORKS. YORK, Mar. Licences by Dean and Chapter, A. Gibbons, F.S.A. (in progress).

SOMERSET. COMMONWEALTH Mar., 1653–1656, Somerset and Dorset Notes and Queries II. 73, 104.

GENTLEMAN'S MAGAZINE. Index to Mar., 1731–1868, H. Farrar, Swan Sonnenschein (in press). dmy. 8vo

Harrison & Sons, Printers in Ordinary to Her Majesty, St. Martin's Lane.

REPORT

OF THE

SUB-COMMITTEE

ON A

PHOTOGRAPHIC SURVEY

OF

ENGLAND AND WALES.

PUBLISHED UNDER THE DIRECTION OF THE CONGRESS OF ARCHÆOLOGICAL SOCIETIES IN UNION WITH THE SOCIETY OF ANTIQUARIES.

1895

CONGRESS OF ARCHÆOLOGICAL SOCIETIES,

1894.

Report of the Sub-Committee on the Photographic Survey of England and Wales.

The Sub-Committee has considered the subject referred to it by the Congress, as to the best method of promoting a general Photographic Record of the Country on the lines adopted by the Society for the Photographic Survey of the County of Warwick.

The Sub-Committee is of opinion that the establishment of such a general Photographic Record of all works of antiquity is of the highest importance, and that the Societies in Union should use their best efforts to establish, for their particular counties, associations on the basis of that so successfully initiated by the Warwickshire Society, and followed by the Royal Society of Antiquaries of Ireland.

It may be expected that Societies organized on these lines, besides being of the greatest value to antiquaries, will be readily supported by the many interested in photography, who will be glad to feel that their efforts are incorporated and preserved for ever in what will eventually become a national collection. A more intelligent interest will be created in what is often at present a desultory and useless amusement, and the Archæological Societies will doubtless be strengthened by the addition of many intelligent members.

The following Regulations are suggested for adoption:—

1. That all photographs be as large as possible, whole plate being preferred, but in no case less than $\frac{1}{4}$ plate.

2. That they be printed in permanent process.

3. That while artistic effect is a valuable addition to a picture, it should not be achieved at the sacrifice of the work illustrated, but the point of view should be chosen to show as clearly as possible the details of the subject.

This is especially important in the case of tombs, effigies, and various architectural details, where it will often be impossible to combine picturesque effect and valuable record. While, therefore, it will be necessary to keep up a certain standard of artistic skill, plates should be preferred which clearly show architectural or other facts that can only be adequately recorded by the deliberate sacrifice of picturesque effect.

4. That some arrangement should be made to supply a scale in all illustrations, since without this many are practically valueless.

Particulars of size can be added in the accompanying description, but it is far better that an actual scale should be given by the inclusion in the picture of a graduated staff or a 3 ft. rod or walking stick, which may generally be unobtrusively introduced. In a series of photographs of Roman masonry now in preparation for the Society of Antiquaries a graduated scale,* marked clearly with English and French measures, is in all cases included. The scale must, of course, be placed in the same plane as the object to be photographed.

The Congress most strongly recommends the adoption of the double scale, which will render the photographs of European value, and materially assist English scholars in the work of comparison.

5. That a description in all cases accompany the photograph, giving the size, general condition, and as many particulars as possible of the object illustrated.

6. That all particulars as to history, date, etc., be carefully edited by competent authorities, as otherwise much false and often ridiculous information may be spread and perpetuated.

7. That the copies of the photographs for the collection be mounted by the curator on stout cards, uniform with those of the Warwickshire Survey, and the descriptive particulars legibly written or printed on the back, and the title on the front.

The plan adopted in Warwickshire of selecting a Hundred for the work of each year, and committing one square of the 6-inch Ordnance Map to individual or associated workers, provides for a systematic and exhaustive record that will be much more valuable than desultory or haphazard contributions. The jealousies that might arise in the selection of examples of prominent interest will also be avoided.

Where a county is divided amongst several Photographic Societies, the number of localities to be illustrated can be increased accordingly.

The following Rules are copied from those of the Warwickshire Survey Section of the Birmingham Photographic Society:

"That the 6-inch Ordnance Map be adopted as the basis of the Survey.

"That the work be conducted, as far as may be convenient, on the lines of the Hundreds.

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* Printed copies of this scale (Price 6d., post free, or 5s. per dozen), can be obtained on application to the Assistant-Secretary of the Society of Antiquaries, Burlington House, London, W.

"That in order to systematise the work it is desirable that members shall confine their work, as far as possible, to the Hundred selected for the ensuing year.

"That each square of the Ordnance Map (containing, roughly, six square miles) shall be considered a distinct field for work, and that any member may have allotted to him such square as he may select, unless such square has been previously allotted."

Another and perhaps better way, which has been adopted by the Guildford Society, is to divide the 6-inch Ordnance Map into distinct blocks, with natural boundaries, and to furnish the members to whom a block is allotted with a corresponding plan cut from the 1-inch Ordnance Map, and mounted on card.

To facilitate access to objects to be illustrated, cards of introduction should be provided, and issued to those who undertake work. It is suggested that the cards be made to run for one year only, and be not re-issued except to those who are doing satisfactory work.

It is desirable that a Committee should prepare a schedule of the principal objects of which it is desired to obtain records, but such a list should not be regarded as in any way exhaustive, and may be supplemented by individual observation.

The photographing of portraits, already begun by the Warwickshire Society, is also of great value where it can be effected.

Besides objects of archæological interest, photographs should be welcomed that give types of natives and groups of school children. These will be of the highest value to ethnological students. The ethnological photographs should, if possible, be taken in accordance with the directions laid down by Mr. Francis Galton. These may be obtained from the British Association, at Burlington House.

Photographs of objects of natural history, and of landscapes or geological features, should be encouraged and accepted, as they may be ultimately gathered into a separate collection.

Many of the County Societies are for the study of natural history as well as of archæology, and where this is not the case proper custodians can eventually be found for the various collections.

It is desirable, to avoid risk of loss by fire, that at least three sets of Prints should be preserved by way of record: one by the County Society; a second by the British Museum; and a third, of archæological plates, by the Society of Antiquaries. The third prints from those plates which illustrate science might be deposited with the societies representing the various subjects, such as the Anthropological Institute or the Geological and Linnæan Societies.

It is thought that, pending the general adoption of County Museums, the various County Archæological Societies would be the best custodians of the collections; but it will probably be more acceptable to those who photograph that it should be clearly understood that the custody is temporary and may be withdrawn at any time.

It will constantly be the case that photographs of a neighbourhood will be taken by strangers, but it is thought that the general adoption throughout England of such a scheme as that proposed will be sufficiently widely known to induce such photographers to communicate their work to the various centres, although they may not be personally interested in such centres.

The Sub-Committee suggests that the various Archæological Societies should take the initiative in founding local associations for the preparation of the Photographic Record.

These associations should have their own executive, and the County Society should suggest the names of certain competent archæologists to serve on the councils. Where Photographic Societies already exist, efforts should be directed to bringing these into union and supplying the necessary information.

Sir J. B. Stone, who had so much to do with initiating the Birmingham scheme, strongly urges that a national society should be formed for the purpose of promoting the Photographic Record, and the Committee are of opinion that a strong central body would be of the greatest service, and they recommend the Congress to do their best to assist such a scheme, should it be put forward under good auspices.

The Sub-Committee wishes to point out that it is not necessary and, perhaps, not altogether desirable, that the County Archæological Societies should add to their work, already arduous enough, this of the Photographic Record.

It will be sufficient that they should promote local Photographic Societies, form a medium of union, and supply skilled advice on the subject of archæology.

RALPH NEVILL,
GEORGE E. FOX,
W. H. ST. JOHN HOPE.

Forms of Schedule prepared by a Committee of the British Association for the Advancement of Science, appointed to Organise an Ethnographical Survey of the United Kingdom.

MEMBERS OF THE COMMITTEE.

Francis Galton, F.R.S., J. G. Garson, M.D., and E. W. Brabrook, F.S.A. (Chairman), representing the Anthropological Institute.

Edward Clodd, G. L. Gomme, F.S.A., and Joseph Jacobs, M.A., representing the Folklore Society.

G. W. G. Leveson Gower, V.P.S.A., George Payne, F.S.A., and General Pitt-Rivers, F.R.S., representing the Society of Antiquaries of London.

Sir C. M. Kennedy, C.B., K.C.M.G., and E. G. Ravenstein, representing the Royal Statistical Society.

A Member representing the Dialect Society.

Dr. J. Beddoe, F.R.S.; Arthur J. Evans, F.S.A.; Sir H. H. Howorth, F.R.S.; Professor R. Meldola, F.R.S.

John Rhys, M.A., Jesus Professor of Celtic in the University of Oxford, and also Professor Boyd Dawkins, F.R.S., E. S. Hartland, F.S.A., Edward Laws, the Ven. Archdeacon Thomas, F.S.A., S. W. Williams, F.S.A., and J. Romilly Allen, F.S.A. Scot. (Secretary), representing the Cambrian Archæological Society, and forming a Sub-Committee for Wales.

Joseph Anderson, LL.D., Secretary of the Society of Antiquaries of Scotland.

Professor D. J. Cunningham, F.R.S., C. R. Browne, M.D., and Professor A. C. Haddon, M.A., representing the Royal Irish Academy, and forming a Sub-Committee for Ireland (Prof. Haddon, Secretary).

E. Sidney Hartland, F.S.A., Secretary.

This Committee has already made two preliminary reports to the Association, in which the names of 367 villages or places in various parts of the United Kingdom have been indicated as especially to deserve ethnographic study. The list, large as it is, is not exhaustive. For these and such other villages and places as may appear to be suitable, the Committee propose to record—

(1) Physical types of the inhabitants;
(2) Current traditions and beliefs;
(3) Peculiarities of dialect;
(4) Monuments and other remains of ancient culture; and
(5) Historical evidence as to continuity of race.

*** All communications should be addressed to 'THE SECRETARY OF THE ETHNOGRAPHIC SURVEY, British Association, Burlington House, London, W.'

The most generally convenient method of organising a simultaneous inquiry under these five heads appears to be the appointment of a sub-committee in each place, one or more members of which would be prepared to undertake each head of the inquiry. For the ancient remains advantage should be taken of the work of the Archæological Survey where it is in operation. The general plan of the Committee is discussed in an article, On the Organisation of local Anthropological Research, in the 'Journal of the Anthropological Institute' of February 1893.

For the use of inquirers copies on foolscap paper of the Forms of Schedule have been prepared, giving a separate page or pages of foolscap for each head of the inquiries, on which are the questions and hints prepared by the Committee, the lower portion of each page, to which should be added as many separate sheets of foolscap as may be required, being left for answers; and, with regard to the physical observations, a single page of foolscap has been set aside for the measurements of each individual to be observed. The requisite number of copies of the foolscap edition of the schedules and of extra copies of the form for the persons to be photographed and measured will be supplied on application.

Communications should all be written on foolscap paper, and the writing should be on one side only of the page, and a margin of about one inch on the left-hand side of the page should be left, with a view to future binding.

Directions for Measurement.

Instrument required for these measurements:—The 'Traveller's Anthropometer,' manufactured by Aston & Mander, 25 Old Compton Street, London, W.C.; price 3*l.* 3*s.* complete; without 2-metre steel measuring tape and box footpiece, 2*l.* 10*s.* With this instrument all the measurements can be taken. In a permanent laboratory it will be found convenient to have a fixed graduated standard for measuring the height, or a scale affixed to a wall. For field work a tape measure may be temporarily suspended to a rigid vertical support, with the zero just touching the ground or floor.

A 2-metre tape, a pair of folding callipers, a folding square, all of which are graduated in millimetres, and a small set-square can be obtained from Aston & Mander for 1*l.* 6*s.*: with this small equipment all the necessary measurements can be taken.

Height Standing.—The subject should stand perfectly upright, with his back to the standard or fixed tape, and his eyes directed horizontally forwards. Care should be taken that the standard or support for the tape is vertical. The stature may be measured by placing the person with his back against a wall to which a metre scale has been affixed. The height is determined by placing a carpenter's square or a large set-square against the support in such a manner that the lower edge is at right angles to the scale; the square should be placed well above the head, and then brought down till its lower edge feels the resistance of the top of the head. The observer should be careful that the height is taken in the middle line of the head. If the subject should object to take off his boots, measure the thickness of the boot-heel, and deduct it from stature indicated in boots.

Height Sitting.—For this the subject should be seated on a low stool or bench, having behind it a graduated rod or tape with its zero level with the seat; he should sit perfectly erect, with his back well in against the scale. Then proceed as in measuring the height standing. The square should be employed here also if the tape against a wall is used.

Length of Cranium.—Measured with callipers from the most prominent part of the projection between the eyebrows (glabella) to the most distant point at the back of the head in the *middle line*. Care should be taken to keep the end of the callipers steady on the glabella by holding it there with the fingers, while the other extremity is searching for the maximum projection of the head behind.

Breadth of Cranium.—The maximum breadth of head, which is usually about the level of the *top* of the ears, is measured at right angles to the length. Care must be taken to hold the instrument so that both its points are exactly on the same horizontal level.

Face Length.—This is measured from the slight furrow which marks the root of the nose, and which is about the level of a line drawn from the centre of the pupil of one eye to that of the other, to the under part of the chin. Should there be two furrows, as is often the case, measure from between them.

Upper Face Length.—From root of nose to the interval between the two central front teeth at their roots.

Face Breadth.—Maximum breadth of face between the bony projections in front of the ears.

Inter-ocular Breadth.—Width between the internal angles of the eyes. While this is being measured the subject should shut his eyes.

Bigonial Breadth.—Breadth of face at the outer surface of the angles of the *lower* jaw below the ears.

Nose Length.—From the furrow at root of nose to the angle between the nose and the upper lip in the middle line.

Breadth of Nose.—Measured horizontally across the nostrils at the widest part, but without compressing the nostrils.

Height of Head.—The head should be so held that the eyes look straight forward to a point at the same level as themselves—*i.e.*, the plane of vision should be exactly horizontal. The rod of the Anthropometer should be held vertically in front of the face of the subject, and the upper straight arm should be extended as far as possible and placed along the middle line of the head; the shorter lower arm should be pushed up to the lower surface of the chin. When measured with the square the depending bar must be held vertically in front of the face (with the assistance of the spirit-level or plumb-line), and the small set-square passed up this arm from below in such a manner that its horizontal upper edge will come into contact with the lower contour of the chin. The distance between the lower edge of the horizontal bar of the square and the upper edge of the set-square can be read off, and this will be the maximum height of the head.

Height of Cranium.—The head being held in precisely the same manner as in measuring the height of the head, the instrument is rotated to the left side of the head, its upper bar still resting on the crown, and the recording arm (or the set-square) is pointed to the centre of the line of attachment of the small projecting cartilage in front of the ear-hole.

Note.—It is essential that these rules should be strictly followed in order to secure accuracy. All measurements must be made in millimetres. If possible, the subject's weight should be obtained, and recorded in the place set apart for remarks. The observer is recommended to procure 'Notes and Queries on Anthropology,' 2nd edition, from the Anthropological Institute, 3 Hanover Square, London, W.; net price, 3*s.* 6*d.*

Place _____ *Name of Observer* _____

Physical Types of the Inhabitants.

Number	Date of Measurement	Surname	Christian Name	Age	Sex	Town or Village	County

Surnames	Surname of your Father	Surname of your Mother before she was married	What district do your Parents' people come from ?	
			Your Father's ?	Your Mother's ?

Have your Father's people occupied that part of the country for long ? if not, state what you know of their original locality	Occupation

	General Condition : (1) stout ; (2) medium ; (3) thin.	Photograph number. (N.B.—The photograph of the person measured should be sent along with this schedule.)
	Skin : (1) pale ; (2) ruddy ; (3) dark.	Freckled (?).
	Hair : (R) red ; (F) fair ; (B) brown ; (D) dark ; (N) black.	(1) straight ; (2) wavy ; (3) curly.
	Colour of Beard : (R) ; (F) ; (B) ; (D) ; (N).	
	Eyes : (1) blue ; (2) light grey ; (3) dark grey ; (4) green ; (5) ight brown ; (6) dark brown.	
	Shape of Face : (1) long and narrow ; (2) medium ; (3) short and broad. (*a*) cheek-bones inconspicuous ; (*b*) cheek-bones prominent.	
	Profile of Nose : Compare with outline figures at foot, and give the number with which the nose under examination most closely corresponds.	
	Lips : (1) thin ; (2) medium ; (3) thick.	
	Ears : (A) Flat ; (B) outstanding ; (*a*) coarse ; (*b*) finely moulded.	
	Lobes of Ears : (1) absent ; (2) present ; (*a*) attached ; (*b*) detached.	

Height		Cranium		Face				
Standing	Sitting	Length	Breadth	Length	Upper Face Length	Breadth	Inter-ocular Breadth	Bigonial Breadth

Nose		Height of Head	Height of Cranium	Remarks
Length	Breadth			

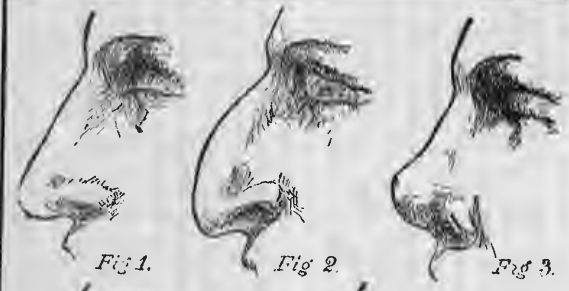

Fig 1. *Fig 2.* *Fig 3.*

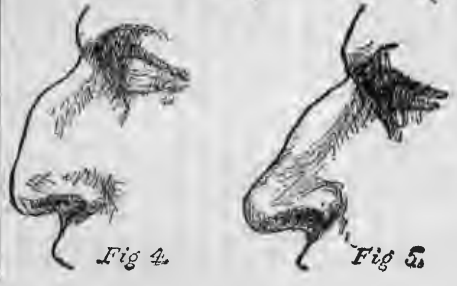

Fig 4. *Fig 5.*

Physical Types of the Inhabitants—(continued).

PHOTOGRAPHIC PORTRAITS.

Facial characteristics are conveniently recorded by means of photographs, taken in the three ways explained below. Amateurs in photography are now so numerous that it is hoped the desired materials may be abundantly supplied. At least twelve more or less beardless male adults and twelve female adults should be photographed. It will add much to the value of the portrait if these same persons have also been measured. The photographs should be mounted on cards, each card bearing the name of the district, and a letter or number to distinguish the individual portraits; the cards to be secured together by a thread passing loosely through a hole in each of their upper left-hand corners. Three sorts of portrait are wanted, as follows:—

(*a*) A few portraits of such persons as may, in the opinion of the person who sends them, best convey the peculiar characteristics of the race. These may be taken in whatever aspect shall best display those characteristics, and should be accompanied by a note directing attention to them.

(*b*) At least twelve portraits of the *left* side of the face of as many different adults of the same sex. These must show in each case the *exact* profile, and the hair should be so arranged as fully to show the ear. All the persons should occupy in turn the same chair (with movable blocks on the seat, to raise the sitters' heads to a uniform height), the camera being fixed throughout in the same place. The portraits to be on such a scale that the distance between the top of the head and the bottom of the chin shall in no case be less than $1\frac{1}{4}$ inch. Smaller portraits can hardly be utilised in any way. If the incidence of the light be not the same in all cases they cannot be used to make composite portraits. By attending to the following hints the successive sitters may be made to occupy so nearly the same position that the camera need hardly be refocussed. In regulating the height of the head it is tedious and clumsy to arrange the proper blocks on the seat by trial. The simpler plan is to make the sitter first take his place on a separate seat with its back to the wall, having previously marked on the wall, at heights corresponding to those of the various heights of head, the numbers of the blocks that should be used in each case. The appropriate number for the sitter is noted, and the proper blocks are placed on the chair with the assurance that what was wanted has been correctly done. The distance of the sitter from the camera can be adjusted with much precision by fixing a looking-glass in the wall (say five feet from his chair), so that he can see the reflection of his face in it. The backward or forward position of the sitter is easily controlled by the operator, if he looks at the sitter's head over the middle of the camera, against a mark on the wall beyond. It would be a considerable aid in making measurements of the features of the portrait, and preventing the possibility of mistaking the district of which the sitter is a representative, if a board be fixed above his head *in the plane of his profile*, on which a scale of inches is very legibly marked, and the name of the district written. This board should be so placed as just to fall within the photographic plate. The background should be of a medium tint (say a sheet of light brown paper pinned against the wall

beyond), very dark and very light tints being both unsuitable for composite photography.

(*c*) The same persons who were taken in side-face should be subsequently photographed in *strictly* full face. They should occupy a different chair, the place of camera being changed in accordance. Time will be greatly saved if all the side-faces are taken first, and then all the full faces; unless, indeed, there happen to be two operators, each with his own camera, ready to take the same persons in turn. The remarks just made in respect to (*b*) are, in principle, more or less applicable to the present case; but the previous method of insuring a uniform distance between the sitter and the camera ceases to be appropriate.

It is proposed that composites of some of these groups shall be taken by Mr. Galton, so far as his time allows.

Place _____ *Name of Observer* _____

2. *Current Traditions and Beliefs.*

FOLKLORE.

Every item of folklore should be collected, consisting of customs, traditions, superstitions, sayings of the people, games, and any superstitions connected with special days, marriages, births, deaths, cultivation of the land, election of local officers, or other events. Each item should be written legibly on a separate piece of paper, and the name, occupation, and age of the person from whom the information is obtained should in all cases be carefully recorded. If a custom or tradition relates to a particular place or object, especially if it relates to a curious natural feature of the district, or to an ancient monument or camp, some information should be given about such place or monument. Sometimes a custom, tradition, or superstition may relate to a particular family or group of persons, and not generally to the whole population; and in this case care should be exercised in giving necessary particulars. Any objects which are used for local ceremonies, such as masks, ribbons, coloured dresses, &c., should be described accurately, and, if possible, photographed; or might be forwarded to London, either for permanent location, or to be drawn or photographed. Any superstitions that are believed at one place and professedly disbelieved at another, or the exact opposite believed, should be most carefully noted.

The following questions are examples of the kind and direction of the inquiries to be made, *and are not intended to confine the inquirer to the special subjects referred to in them, or to limit the replies to categorical answers.* The numbers within brackets refer to the corresponding articles in the 'Handbook of Folklore' (published by Nutt, 270 Strand, London), which may be consulted for advice as to the mode of collecting and the cautions to be observed.

(4) Relate any tradition as to the origin of mountains or as to giants being entombed therein.

Are there any traditions about giants or dwarfs in the district? Relate them.

Is there a story about a Blinded Giant like that of Polyphemus?

(13) Describe any ceremonies performed at certain times in connection with mountains.
(16) Relate any traditions or beliefs about caves.
(19) Are any customs performed on islands not usually inhabited? Are they used as burial places?
(25) Describe any practices of leaving small objects, articles of dress, &c., at wells.
(29) Are there spirits of rivers or streams? Give their names.
(32) Describe any practices of casting small objects, articles of dress, &c., into the rivers.
(33) Are running waters supposed not to allow criminals or evil spirits to cross them?
(39) Describe any customs at the choosing of a site for building, and relate any traditions as to the site or erection of any building.
(42) Is there a practice of sprinkling foundations with the blood of animals, a bull, or a cock?
(43) Does the building of a house cause the death of the builder?
(48, 49, 50) Relate any traditions of the sun, moon, stars.
(62) Describe the customs of fishermen at launching their boats.
(63) Give any omens believed in by fishermen.
(66) Is it unlucky to assist a drowning person?
(84) What ceremonies are performed when trees are felled?
(85) Describe any custom of placing rags and other small objects upon bushes or trees.
(86) Describe any maypole customs and dances.
(87) Describe any customs of wassailing of fruit trees.
(90) Are split trees used in divination or for the cure of disease?
(98) Describe any ceremonies used for love divination with plants or trees.
(105) Describe the garlands made and used at ceremonies.
(110) What animals are considered lucky and what unlucky to meet, come in contact with, or kill?
(132) Describe any customs in which animals are sacrificed, or driven away from house or village.
(133) Describe customs in which men dress up as animals.
(137) Give the names of the local demons, fairies, pixies, ghosts, &c. Have any of them personal proper names?
(139) Their habits, whether gregarious or solitary. Do they use special implements?
(140) Form and appearance, if beautiful or hideous, small in stature, different at different times.
(144) Character, if merry, mischievous, sulky, spiteful, industrious, stupid, easily outwitted.
(145) Occupations, music, dancing, helping mankind, carrying on mining, agricultural work.
(146) Haunts or habitations, if human dwellings, mounds, barrows, mines, forests, boggy moorlands, waters, the underworld, dolmens, stone circles.
(190) Give the details of any practices connected with the worship of the local saint.
(191) Are sacrifices or offerings made to the local saint; on what days; and when?

(192) What is the shrine of the local saint?
(210) Witchcraft. Describe minutely the ceremonies performed by the witch. What preliminary ceremony took place to protect the witch?
(294) Are charms used to find evil spirits and prevent their moving away?
(295) Are amulets, talismans, written bits of paper, gestures, &c., used to avert evil or to ensure good? If so, how; when; where?
(297) Are skulls of animals, or horses, or other objects hung up in trees to avert the evil eye and other malign influences?
(298) What methods are employed for divining future events? What omens are believed in?
(353) What superstitions are attached to women's work as such?
(356) Are women ever excluded from any occupation, ceremonies, or places?
(358) What superstitions are attached to the status of widowhood?
(366) Are particular parts of any town or village, or particular sections of any community, entirely occupied in one trade or occupation?
(368) Have they customs and superstitions peculiar to their occupation?
(369) Do they intermarry among themselves, and keep aloof from other people?
(373) Have they any processions or festivals?
(422) What parts of the body are superstitiously regarded?
(432) Are bones, nails, hair, the subject of particular customs or superstitions; and is anything done with bones when accidentally discovered?
(436) Is dressing ever considered as a special ceremonial; are omens drawn from accidents in dressing?
(452) Are any parts of the house considered sacred?
(453) Is the threshold the object of any ceremony; is it adorned with garlands; is it guarded by a horseshoe or other object?
(454) Are any ceremonies performed at the hearth; are the ashes used for divination; is the fire ever kept burning for any continuous period?
(456) Is it unlucky to give fire from the hearth to strangers always, or when?
(467) Is there any ceremony on leaving a house, or on first occupying a house?
(509) What are the chief festivals, and what the lesser festivals observed?
(515) Explain the popular belief in the object of each festival.
(516) Describe the customs and observances appertaining to each festival.
(540) When does the new year popularly begin?

State the superstitions or legends known to attach to—

(*a*) Hallowe'en.
(*b*) May Eve.
(*c*) Midsummer Day, and St. John's Eve.
(*d*) Lammas, or August 1.
(*e*) New Year's Day.
(*f*) Christmas.

Both old and new styles.

Is there any superstition as to the first person who enters a house in the New Year? Is stress laid upon the colour of complexion and hair?

(567) What are the customs observed at the birth of children?
(588) Describe the ceremonies practised at courtship and marriage.
(623) Describe the ceremonies at death and burial.
(669) Describe any games of ball or any games with string, or other games.
(674) Describe all nursery games of children.
(686) Is there any special rule of succession to property?
(703) Is any stone or group of stones, or any ancient monument or ancient tree connected with local customs?
(706) Are any special parts of the village or town the subject of particular rights, privileges, or disabilities; do these parts bear any particular names?
(711) Describe special local modes of punishment or of lynch law.
(719) Describe special customs observed at ploughing, harrowing, sowing, manuring, haymaking, apple-gathering, corn-harvest, hemp-harvest, flax-harvest, potato-gathering, threshing, flax-picking, and hemp-picking.

The collections under this head will be digested by Professor Rhys and the representatives of the Folklore Society.

Place _____ *Name of Observer* _____

3. *Peculiarities of Dialect.*

Directions to Collectors of Dialect Tests.

1. Do not, if it can be helped, let your informant know the nature of your observations. The true dialect-speaker will not speak his dialect freely or truly unless he is unaware that his utterance is watched. In some cases persons of the middle class can afford correct information, and there is less risk in allowing them to know your purpose.

2. Observe the use of consonants. Note, for example, if *v* and *z* are used where the standard pronunciation has *f* and *s*. This is common in the south.

3. Observe very carefully the nature of the vowels. This requires practice in uttering and appreciating vowel sounds, some knowledge of phonetics, and a good ear.

4. Record all observations in *the same* standard phonetic alphabet, viz., that given in Sweet's 'Primer of Phonetics.' A few modifications in this may be made, viz., *ng* for Sweet's symbol for the sound of *ng* in *thing*; *sh* for his symbol for the *sh* in *she*; *ch* for his symbol for the *ch* in *choose*; *th* for the *th* in *thin*; *dh* for the *th* in *then*. If these modifications are used, say so. But the symbol *j* must only be used for the *y* in *you*, viz., as in German. If the sound of *j* in *just* is meant, Sweet's symbol should be used. On the whole it is far better to use no modifications at all. Sweet's symbols are no more difficult to use than any others after a very brief practice, such as every observer of phonetics must necessarily go through.

5. If you find that you are unable to record sounds according to the above scheme it is better to make *no return at all*. Incorrect returns are misleading in the highest degree, most of all such as are recorded in the ordinary spelling of literary English.

6. The chief vowel-sounds to be tested are those which occur in the following words of English origin, viz., *man*, *hard*, *name*, *help*, *meat* (spelt with *ea*), *green* (spelt with *ee*), *hill*, *wine*, *fire*, *soft*, *hole*, *oak* (spelt with *oa*), *cool*, *sun*, *house*, *day*, *law*, or words involving similar sounds. Also words of French origin, such as *just*, *master* (*a* before *s*), *grant* (*a* before *n*), *try*, *value*, *measure*, *bacon*, *pay*, *chair*, *journey*, *pity*, *beef*, *clear*, *profit*, *boil*, *roast pork*, *false*, *butcher*, *fruit*, *blue*, *pure*, *poor*, or words involving similar sounds.

The best account of these sounds as tested for a Yorkshire dialect, is to be found in Wright's 'Dialect of Windhill' (English Dialect Society, 1892), published by Kegan Paul at 12*s.* 6*d.* Sweet's symbols are here employed throughout.

Sweet's 'Primer of Phonetics' is published by the Oxford Press at 3*s.* 6*d.*

A list of test words (of English origin) is given at p. 42 of Skeat's 'Primer of English Etymology,' published by the Oxford Press at 1*s.* 6*d.*

7. The task of collecting words which seem to be peculiarly dialectal (as to form or meaning, or both) has been performed so thoroughly that it is useless to record what has been often already recorded. See, for example, Halliwell's (or Wright's) 'Provincial Glossary' and the publications of the English Dialect Society. In many cases, however, the *pronunciation* of such words has not been noted, and may be carefully set down with great advantage.

The Rev. Professor Skeat has been kind enough to draw up the foregoing directions, and the collections under this head will be submitted to him.

Place _____ *Name of Observer* _____

4. *Monuments and other Remains of Ancient Culture.*

Plot on a map, describe, furnish photographs on sketches, and state the measurements and names (if any) of these, according to the following classification:—

Drift implements. Caves and their contents.
Stone circles. Monoliths. Lake dwellings.
Camps. Enclosures. Collections of hut circles.
Cromlechs. Cairns. Sepulchral chambers.
Barrows, describing the form, and distinguishing those which have not been opened.
Inscribed stones.
Figured stones. Stone crosses.
Castra (walled). Earthen camps.
Foundations of Roman buildings.
Cemeteries (what modes of sepulture).
Burials, inhumation or cremation.
Detailed contents of graves.

Types of fibulæ and other ornaments.
Coins. Implements and weapons, stone, bronze, or iron.
Other antiquities.
A list of place-names within the area. No modern names required.
Special note should be made of British, Roman, and Saxon interments occurring in the same field, and other signs of successive occupation.
Reference should be made to the article 'Archæology' in 'Notes and Queries on Anthropology,' p. 176.
These relate to England only. The sub-committees for other parts of the United Kingdom will prepare modified lists.

The collections under this head will be digested by Mr. Payne.

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*Place*_____ *Name of Observer*_____

5. *Historical Evidence as to Continuity of Race.*

Mention any historical events connected with the place, especially such as relate to early settlements in it or more recent incursions of alien immigrants.
State the nature of the pursuits and occupations of the inhabitants.
State if any precautions have been taken by the people to keep themselves to themselves; if the old village tenures of land have been preserved.
Has any particular form of religious belief been maintained?
Are the people constitutionally averse to change?
What are the dates of the churches and monastic or other ancient buildings or existing remains of former buildings?
Do existing buildings stand on the sites of older ones?
How far back can particular families or family names be traced?
Can any evidence of this be obtained from the manor rolls; from the parish registers; from the tythingmen's returns; from guild or corporation records?
Are particular family names common?
In what county or local history is the best description of the place to be found?
Evidences of historical continuity of customs, dress, dwellings, implements, &c., should be noted.

The collections under this head will be digested by Mr. Brabrook.

Notes Explanatory of the Schedules.

By E. Sidney Hartland, *F.S.A., Secretary of the Committee.*

The object of the Committee is to obtain a collection of authentic information relative to the population of the British Islands, with a view to determine as far as possible the racial elements of which it is composed. The high interest of the inquiry for all archæologists need not be here insisted on. A satisfactory solution of the problems involved will mean the re-writing of much of our early history; and even if we can only gain a partial insight into the real facts it will enable us to correct or to confirm many of the guesses in which historians have indulged upon data of a very meagre and often delusive character.

The methods it is proposed to adopt have regard to the physical peculiarities of the inhabitants, their mental idiosyncrasies, the material remains of their ancient culture, and their external history. In modern times great movements of population have taken place, the developments of industry and commerce have brought together into large centres natives of all parts of the country, and even foreigners, and thereby caused the mingling of many elements previously disparate. These have enormously complicated the difficulties of the inquiry. They have rendered many districts unsuitable for every purpose except the record of material remains. Scattered up and down the country, however, there are hamlets and retired places where the population has remained stationary and affected but little by the currents that have obliterated their neighbours' landmarks. To such districts as these it is proposed to direct attention. Where families have dwelt in the same village from father to son as far back as their ancestry can be traced, where the modes of life have diverged the least from those of ancient days, where pastoral and agricultural occupations have been the mainstay of a scanty folk from time immemorial, where custom and prejudice and superstition have held men bound in chains which all the restlessness of the nineteenth century has not yet completely severed, there we hope still to find sure traces of the past.

The photographic survey, which has been carried out so well at Birmingham and elsewhere, and has been initiated in our own country, will prove a most valuable aid to the wider work of the Ethnographical Survey. Photographs of the material remains of ancient culture are explicitly asked for in the schedule. In addition to them, photographs of typical inhabitants are urgently desired. Some judgment will, of course, require to be exercised in the selection of types, and a considerable amount of tact in inducing the subjects to allow themselves to be taken. It has been found effective for this purpose, as well as for that of measuring the people, that two persons should go out together, and setting up the camera in the village, or wherever they find a convenient spot, *coram populo*, they should then proceed gravely to measure and photograph one another. This will be found to interest the villagers, and some of them will gradually be persuaded to submit to the operation. A little geniality, and sometimes a mere tangible gratification of a trifling character, will hardly ever fail in accomplishing the object. The experience of observers who have taken measurements is that it becomes

extremely fascinating work as the collection increases and the results are compared.[1]

This comparison, if the subjects have been selected with judgment, and accurately measured and photographed, should enable us to determine in what proportions the blood of the various races which have from time to time invaded and occupied our soil has been transmitted to the present population of different parts of the United Kingdom. From the ancient remains in barrows and other sepulchral monuments, and from the study of the living peoples of Western Europe, the characteristics of the races in question are known with more or less certainty, and every year adds to our information concerning them. A much more complex problem, and one wherein archæologists have a more direct interest, is how far the culture of the races in question has descended to us, and how far it has been affected by intruding arts, faiths, and inventions. To solve this, appeal is made first to the historic and prehistoric monuments and other material remains, and secondly to the traditions of many kinds that linger among the peasantry. Here the first business, and that with which the practical work of the survey is immediately concerned, is the work of collection. To photograph, sketch, and accurately describe the material remains; to note and report the descriptions and drawings already made, and where they are preserved; to gather and put into handy form the folklore of each country already printed; and to collect from the surviving depositaries of tradition that which may still be found—namely, tales, sayings, customs, medical prescriptions, songs, games, riddles, superstitions, and all those scraps of traditional lore stored in rustic memories, impervious and strange to the newer lore of to-day—these are the necessary preliminaries to the study of the civilisation of our ancestors.

Archæologists have paid too exclusive attention to the material remains. They have forgotten to inquire what light may be thrown upon them by tradition. By the term tradition I do not mean simply what the people say about the monuments. Antiquaries soon found out that that was always inaccurate, and often utterly false and misleading. Hence thay have been too much inclined to despise all traditions. But tradition in the wide sense of *the whole body of the lore of the uneducated*, their customs as well as their beliefs, their doings as well as their sayings, has proved, when scientifically studied, of the greatest value for the explanation of much that we must fail to understand in the material remains of antiquity. To take a very simple instance: when we find in Gloucestershire barrows, cups, or bowls of rough pottery buried with the dead, we call them food-vessels, because we know that it is the custom among savage and barbarous nations to bury food with the dead and to make offerings at the tomb, and that this custom rests on a persuasion that the dead continue to need food and that they will be propitiated by gifts; and we further infer that the races who buried food-vessels with their dead in this country held a similar opinion. Or, to take another burial custom: General Pitt-Rivers reported last year to the British Association that he had found in excavations at Cranborne Chase bodies buried without the head. If we were ignorant of the practices of other races we should be at a loss to account for such interments. As it is, we ask ourselves whether these bodies are those of strangers whose heads have been sent back to their own land, or their own tribe, in order to be united in one general cemetery with their own people; or whether the heads were cut off and preserved by their immediate relatives and brought into the circle at their festive gatherings to share the periodical solemnities of the clan. Both these are savage modes of dealing with the dead, one of which, indeed, left traces in Roman civilisation at its highest development. The knowledge of them puts us upon inquiry as to other burials of the prehistoric inhabitants of this country, which may help us in reconstructing their worship and their creed. I for one do not despair of recovering, by careful comparison of the relics preserved to us in the ancient monuments with the folklore of the existing peasantry and of races in other parts of the earth, at least the outlines of the beliefs of our remote predecessors.

[1] The Ethnographical Survey Committee has a few sets of instruments for taking the measurements, which can be placed temporarily at the disposal of the local committee. Perhaps I may here also express the opinion that if the personal photographs and measurements called for expenditure beyond what could be met by local enthusiasm, the Committee might not be indisposed to contribute by way of a small payment for each photograph and set of measurements.

Any such conclusions, however, must be founded on the essential unity that science has, during the last thirty years, unveiled to us in human thought and human institutions. This unity has disguised itself in forms as diverse as the nationalities of men. And when we have succeeded in piecing together the skeleton of our predecessors' civilisation, material and intellectual, we are confronted by the further inquiries: What were the specific distinctions of their culture? and How was it influenced by those of their neighbours or of their conquerors? This is a question only to be determined, if at all, by the examination of the folklore of the country. We may assume that the physical measurements, descriptions, and portraits of the present inhabitants will establish our relationship to some of the peoples whose remains we find beneath our feet. And it will be reasonable to believe that, though there has been a communication from other peoples of their traditions, yet that the broad foundation of our folklore is derived from our forefathers and predecessors in our own land. In Gloucestershire itself we have strong evidence of the persistence of tradition. Bisley Church is said to have been originally intended to be built several miles off, 'but the Devil every night removed the stones, and the architect was obliged at last to build it where it now stands.' This is, of course, a common tradition. The peculiarity of the case is that at Bisley its meaning has been discovered. The spot where, we are told, 'the church ought to have been built was occupied formerly by a Roman villa;' and when the church was restored some years ago 'portions of the materials of that villa were found embedded in the church walls, including the altars of the Penates, which are now, however, removed to the British Museum.'[1] Here, as Sir John Dorington said, addressing this Society some years ago at Stroud, is a tradition which has been handed down for fifteen or sixteen hundred years. This is in our own country, and it may be thought hard to beat such a record. But at Mold, in Flintshire, there is evidence of a tradition which must have been handed down from the prehistoric iron age—that is to say, for more than two thousand years. A cairn stood there, called the *Bryn-yr-Ellyllon*, the Hill of the Fairies. It was believed to be haunted; a spectre clad in golden armour had been

[1] *Gloucestershire N. & Q.* vol. i. p. 390 quoting an article in the *Building News*. See also Sir John Dorington's Presidential Address, *Trans. B. & G. Arch. Soc.* vol. v. p. 7.

seen to enter it. That this story was current before the mound was opened is a fact beyond dispute. In 1832 the cairn was explored. Three hundred cartloads of stones were removed, and beneath them was found a skeleton 'laid at full length, wearing a corslet of beautifully wrought gold, which had been placed on a lining of bronze.' The corslet in question is of Etruscan workmanship, and is now, I believe, to be seen in the British Museum.[1]

Examples like these—and they stand by no means alone—inspire confidence in the permanence of what seems so fleeting and evanescent. Folklore is, in fact, like pottery, the most delicate, the most fragile of human productions; yet it is precisely these productions which prove more durable than solid and substantial fabrics, and outlast the wreck of empires, a witness to the latest posterity of the culture of earlier and ruder times.

But if these traditions have thus been preserved for centuries and even millenniums, they have been modified—nay, transformed—in the process. It is not the bare fact which has been transmitted from generation to generation, but the fact seen through the distorting medium of the popular imagination. This is a characteristic of all merely oral records of an actual event; and this it is which everywhere renders tradition, taken literally, so untrustworthy, so misleading a witness to fact. The same law, however, does not apply to every species of tradition. Some species fall within the lines of the popular imagination; and it is then not a distorting but a conservative force. The essential identity of so many stories, customs and superstitions throughout the world is a sufficient proof of this, on which I have no space to dwell. But their essential identity is overlaid with external differences due to local surroundings, racial peculiarities, higher or lower planes of civilisation. There is a charming story told in South Wales of a lady who came out of a lake at the foot of one of the Carmarthenshire mountains and married a youth in the neighbourhood, and who afterwards, offended with her husband, quitted his dwelling for ever and returned to her watery abode. In the Shetland Islands the tale is told of a seal which cast its skin and appeared as a woman. A man of the Isle of Unst possessed himself of the seal-skin and thus captured and married her. She lived with him until one day she recovered the skin, resumed her seal-shape and plunged into the sea, never more to return. In Croatia the damsel is a wolf whose wolf-skin a soldier steals. In the *Arabian Nights* she is a *jinn* wearing the feather-plumage of a bird, apparently assumed simply for the purpose of flight. In all these cases the variations are produced by causes easily assigned.

The specific distinctions of a nation's culture are not necessarily limited to changes of traditions which it may have borrowed from its neighbours or inherited from a common stock. It may conceivably develop traditions peculiar to itself. This is a subject hardly yet investigated by students of folklore. Their labours have hitherto been chiefly confined to establishing the identity underlying divergent forms of tradition and explaining the meaning of practices and beliefs by comparison of the folklore of distant races at different stages of evolution. But there are not wanting those who are turning their attention to a province as yet unconquered, and indeed almost undiscovered. Even if they only succeed in establishing a negative, if they show that all traditions supposed to be peculiar

[1] Boyd Dawkins, *Early Man in Britain*, p. 431, citing *Archæologia* and *Arch. Cambrensis.*

have counterparts elsewhere, they will have rendered a signal service to science, and produced incontrovertible testimony of the unity of the human mind and the unintermittent force of the laws which govern it.

Alike for the purpose of ascertaining the specific distinctions of culture and the influences of neighbouring nations and neighbouring civilisations, an accumulation of facts is the prime requisite. If we have reason to believe in the persistence of tradition, we shall have confidence that relics will be discovered in our midst of the faith and institutions of our remoter ancestors; and, in accordance as we venerate antiquity or desire to preserve what remains of the past, we shall hasten to collect them. Nor can we be too quick in so doing. The blood of our forefathers is a permanent inheritance, which it would take many generations and a large intermingling of foreigners seriously to dilute, much less to destroy. But tradition is rapidly dying. It is dwindling away before the influences of modern civilisation. Formerly, when the rural districts were isolated, when news travelled slowly and nobody thought of leaving his home save to go to the nearest market, and that not too often, when education did not exist for the peasantry and the landowners had scarcely more than a bowing acquaintance with it, the talk by the fireside on winter evenings was of the business of the day—the tilling, the crops, the kine. Or it was the gossip and small scandals interesting to such a community, or reminiscences by the elders of the past. Thence it would easily glide into tales and superstitions. And we know that these tales and superstitions were, in fact, the staple of conversation among our fathers and generally throughout the West of Europe, to go no further afield, down to a very recent period; and they still are in many districts. In England, however, railways, newspapers, elementary education, politics, and the industrial movements which have developed during the present century have changed the ancient modes of life; and the old traditions are fading out of memory. The generation that held them is fast passing away. The younger generation has never cared to learn them; though, of course, many of the minor superstitions and sayings have still a considerable measure of power, especially in the shape of folk-medicine and prescriptions for luck. We must make haste, therefore, if we desire to add to the scanty information on record concerning English folklore.

As a starting-point for the collection of Gloucestershire folklore I put together, a year or two ago, the folklore in Atkyns, Rudder, and the first four volumes of *Gloucestershire Notes and Queries*; and it was printed by the Folklore Society and issued as a pamphlet.[1] Other works remain to be searched; and it is probable that a good deal more may be found already in print, if some who are interested in the antiquities of the country will undertake the not very arduous, but very necessary, labour of collection. When all is gathered, however, it will only be a small part of what must have existed at no distant date—if not of what still exists, awaiting diligent inquiry among living men and women. How to set about the inquiry is a question that must be left very much to the individual inquirer to answer. Valuable practical hints are given in the *Handbook of Folklore*, a small volume that may be bought for half-a-crown and carried in the pocket. Confidence between the collector and those from whom he is seeking information is the prime necessity. Keep your notebook far in

[1] *County Folklore. Printed Extracts—No.* 1, *Gloucestershire.* London: D. Nutt, 1892. 1*s.*

the background, and beware of letting the peasant know the object of your curiosity, or even of allowing him to see that you are curious. Above all, avoid leading questions. If you are looking for tales, tell a tale yourself. Do anything to establish a feeling of friendly sympathy. Never laugh at your friend's superstitions—not even if he laugh at them himself; for he will not open his heart to you if he suspect you of despising them.

There is one other division of the schedule to which I have not yet referred. The Dialect is perishing as rapidly as the folklore; it is being overwhelmed by the same foes. Peculiarities of dialect are due partly to physical, partly to mental, causes. From either point of view they are of interest to the investigator of antiquities. Hence their inclusion among the subjects of the Ethnographical Survey. Nobody who has once understood how much of history is often wrapped up in a single word can fail to perceive the importance of a study of dialect, or how largely it may contribute to the determination of the origin of a given population. The reduction of dialect into writing requires accuracy to distinguish the niceties of pronunciation, and some practice to set them down; but a little experience will overcome most difficulties, which, after all, are not great. It is believed that most of the words—as distinguished from their pronunciation—in use have been recorded in the publications of the English Dialect Society or elsewhere. But it is better to record them again than to leave them unrecorded. Nor should it be forgotten in this connection that a word often bears a different shade of meaning in one place from what it bears in another. In recording any words, care should therefore be taken to seize not only the exact sound, but the exact signification, if it be desired to make a real contribution towards the history of the country, or the history of the language. Of the method of collection and transcription it is needless to add to the directions in the schedule.

The Collection, Preservation, and Systematic Registration

of

Photographs of Geological Interest

In the United Kingdom.

Information relative to the Collection of Geological Photographs,

and Hints as to the

Selection of a suitable Camera for Geological Field Work.

ISSUED BY THE COMMITTEE, 1898.

CIRCULAR NO. 7. (1898.)

[*British Association.*]

GEOLOGICAL PHOTOGRAPHS COMMITTEE.

THIS Committee was appointed by the British Association for the Advancement of Science in 1889, for the purpose of arranging for the **Collection, Preservation, and Systematic Registration of Photographs of Geological Interest in the United Kingdom.**

Since its formation the Committee has been successful in obtaining a number of Photographs, of which 2,000 were received and registered up to the month of August, 1898, when the Ninth Report was presented at the Bristol meeting of the British Association.

The Collection cannot yet be regarded as in any sense complete, for many districts are still poorly represented in it. A great effort is being made to fill up the numerous lacunæ.

The Committee would, therefore, urge upon geologists and photographers the desirability of further assisting the scheme, with the object of completing a NATIONAL COLLECTION OF PHOTOGRAPHS to illustrate the GEOLOGY OF OUR OWN COUNTRY.

The Collection has been deposited at the Museum of Practical Geology, 28, Jermyn Street, London, where it is accessible to the public for purposes of reference.

It is desired to obtain photographs, illustrative of characteristic rock exposures, especially those of a typical character or temporary nature; important boulders; localities affected by denudation, or where marked physiographical changes are or have been in operation; landslips; raised beaches; old sea-cliffs and other

conspicuous instances of marine erosion; characteristic river-valleys or escarpments, and the like; types of rock-structure, jointing, folding, and faulting; glacial phenomena, such as *roches moutonnées*, moraines, drums, and eskers; or any natural views of geological interest. Photographs of microscopical sections and typical hand-specimens of rocks and fossils are also admissible.

It is important that copies of photographs which have been processed for illustrating articles and papers in journals should be deposited in the collection; they should be accompanied by an exact reference to the publication, and, if possible, a copy of the plate.

Duplicate collections of about 200 prints and about 100 slides have been formed, and the Secretary will gladly forward either or both of them to any Local Society that contemplates joining in the work, or wishes to see what has already been done.

APPARATUS FOR GEOLOGICAL PHOTOGRAPHY.

The Committee has had under consideration the question of the most suitable form of camera for geological field work. The following is a *précis* of communications from experts who have been invited to offer suggestions on the subject:—

The *best camera* to use is probably that to which the worker is himself most accustomed. These hints are added for those who have not yet adopted any particular camera:

The camera should be as light as possible, but *rigidity* when set up is absolutely necessary.

Double swing-back and rising and falling front are essentials, to allow of correct perspective and the true rendering of lines and curves.

The camera should admit of long extension to permit the use of lenses of various *foci*.

It is sometimes desirable to take photographs of inclined or horizontal rock-surfaces at distances of a few feet, for the purpose of showing minor features, such as veins, glacial markings, structures of gneissose rocks, &c. To effect this, two boards hinged together with some arrangement for fixing them at the desired angle are all that is required. The lower board must, of course, be screwed to the stand and the upper one to the camera.

A spirit level should be used with the camera or attached to it.

It is well to have three lenses:—(1) A rapid rectilinear doublet of 10 to 12-inch focus (for ½-plate size); (2) A wide-angle meniscus, focal length about 6 to 7 inches, for interiors of quarries and craters; and (3) A long-focus lens of focal length equal to three or four times the length of the plate, for distant hills and inaccessible cliffs.

If only one lens is used, it should be a rapid rectilinear of about 9-inch focal length (for ½-plate size), and should be by some reputable maker. It must be the best of its kind obtainable. Though films materially decrease the weight to be carried, they are not recommended for general use; plates should be used whenever possible. Good general work can be done with a ¼-plate or 5 by 4 camera, and subsequent enlargement on bromide paper. In this case it is essential that the lens should be of first-rate make, and be used with a small stop. For direct printing, the Cold-bath Platinotype method is recommended as the most permanent, and it is now very easy to work.

It is advisable, when measurements are unattainable, that a "scale object" should be included in the photograph. (A hammer is sometimes used, but it is not suitable; a walking stick or the human figure seem to be satisiactory.)

RECOMMENDATIONS FOR THE COLLECTION OF GEOLOGICAL PHOTOGRAPHS.

I.—Societies are urged to form small committees for the purpose of noting sections suitable to be photographed, and arranging such work as may be possible in each district. To this end it is anticipated that the services of many amateur photographers may be secured.

II.—Size of photograph recommended: 8½ by 6½ inches ("whole plate"); but this is *optional*. In view of the difficulty of carrying a heavy camera and plates, it is not desired to exclude smaller views when these are well-defined and clear. In the case of small negatives, when sharp, an enlargement to whole plate size is desirable. The views should be printed by a permanent process whenever practicable. Isochromatic plates are strongly recommended.

III.—In order to preserve its scientific value, each photograph should be accompanied by *as many* of the following details *as can be conveniently given*. Forms for this purpose will be supplied on application; see page 7.

(*a*) Name and position of section or locality.

(*b*) Special features shown, with illustrative diagrams when necessary. (Further details may be given, if more convenient, on a separate tracing.)

(*c*) Height and length of section, and compass direction. If possible, a scale of some kind should always be given.

(*d*) Name and address of photographer, or of the society under whose direction the view is taken.

(*e*) Date when photographed.

(*f*) Indication of direction of light and shade; *i.e.*, state whether taken in "direct light" or "in shade."

IV.—Each photograph sent in for registration should bear a *local* number, and the accompanying form should be numbered at the top right hand corner in accordance therewith.

V.—Photographs should be sent *unmounted*. This is essential in order to secure the proper geographical arrangement of the collection. They will be mounted by the Committee on cards of uniform size, with perforated edges for binding, to hold one whole-plate, two ½-plate, or four ¼-plate views.

VI.—Copies of photographic prints, lists of photographs, and information relative thereto, should be sent under cover to the Secretary of the Committee, AT THE EARLIEST POSSIBLE DATE, in order to facilitate the work of registation. They should be sent in *not later than August 1st* in each year.

VII.—It adds very much to the usefulness of the collection when amateurs are willing to place their negatives, or copies of them, in the hands of a professional photographer, with instructions to supply prints or lantern slides, at a price, to those who apply for them. The Secretary would willingly help in giving advice on this point, as he is frequently asked where copies of the contributed prints can be obtained.

Detailed Lists of Photographs officially received are published in the Annual Reports of the Committee, which also state where the Photographs may be obtained. These Reports are published in the "Annual Report" of the British Association, and a copy will be forwarded to the donor of each photograph.

Further information may be obtained from the members of the Committee, or from the Secretary, W. W. WATTS, Mason University College, Birmingham, to whom communications should be addressed.

[*Reduced Copy of* FORM A.]

FORM A.

BRITISH ASSOCIATION COMMITTEE ON GEOLOGICAL PHOTOGRAPHS.

Local No.*

County.		Photographed under the direction of	
Name and position of Locality or Section.			
Special features shown			
Details of Section.	Height. / Length.	Compass Direction. Camera Pointing.	"In shade" or "direct light." Time: a.m. p.m.

Sketch, or other particulars, if necessary, may be given here :—

Name of Photographer. / Address. Date photographed.	Registered No.

* This number should also be placed on the back of the Photograph.

NOTE.—Copies of the above Form will be supplied on application to the Secretary, to enable Donors of Photographs to insert the requisite particulars.

William Pile, Steam Printer, 26, High Street, Sutton, Surrey.