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## TRANSACTIONS

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WOOLHOPE

## NATURALISIS FIELD CLUB.

No. 1.

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THE

# WOOLHOPE 

## NATURALISTS'

## FIELD CLUB.

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## ESTABLISHED MDCCCLI.

HEREFORD:
PRWTED BX WILLIAM PHILLIPS, 23 , HGE TOWN.
MDCCCLVI.

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STATEMENT OF ACCOUNT FOR 1855.


Hereford, January 22nd, 1856.

THE

## W00LHOPE NATURALISTS' FIELD CLUB.


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

IL-That the Mub consist of Fifty Members, with such Honorary Members as may be admitted from time to time; from which number a President and Honorary Secretary be appointed at the Annual Meeting to be held in Hereford, on the Fourth Tuesday of January in each year.
III.-That the Members of the Club shall hold not less than Three Field Meetings during the year in the most interesting localities for investigating the Natural History of the district. That the days and places of such regular Meetings be selected at the Annual Meeting, and that timely notice of each be com-
municated to the Members by a circular-card, from the Secretary; but that upon a requisition being signed by the President and five Members, the Secretary is 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.
IV.-That those Members to whom it may be convenient, shall breakfast together at the nearest country inn, at Nine o'clock, after which the researches of the day shall commence.
V.-That Four be the hour appointed for Dinner, after which any papers shall be read by the respective authors. Each Member may introduce a friend on such occasions, who must pay his own expenses.
VI.-That the Annual Subscription be Ten Shillings to be laid out in defraying the cost of Printing such papers as may be selected for that purpose by a Committee of five Members, selected at the Annual Meeting from the general body, and to meet any expenses which may be incurred for stationery, postage, \&c. That the cost of any lithographic or other illustrations be defrayed by the author of the paper for which they may be required.
VII.-That the Papers of the Club be printed in a cheap octavo form.
VIII.-That at the Annual Meeting, the President be requested to favour the Club with an address, containing a written summary of its proceedings at the
several Field Meetings during the previous year, together with such observations from himself 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 ballotted 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 Honorary Secretary.
XI.-That the Woolhope Naturalists' Field 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 Subscriptions shall remain for three years in arrear be held to have withdrawn, and their names shall accordingly be omitted from the List of Members at the ensuing Annual Meeting.
XIII.-That these Rules be printed, and a copy sent to each Member.

## DAYS AND PLACES

## FLXED EOR THE

## FIELD MEETINGS OF THE YEAR 1856.


TUESDAY, JUNE 3rd, ...............................BROMYARD.
TUESDAY, JULY 29th,.................................KINGTON.
TUESDAY, SEPTEMBER 9th, ...................ABERGAVENNY.

## AN ADDRE8S

Delivered to tie Members of the Woolyope Naturalsets' Fietd Cevi, at their Annual Meeting, held in Hereford, 24th January, 1854, by the Rev. Thos. T. Lewis, A.M. President.

## Gentlemen,

On quitting the office of President of the Woolhope Naturalists' Field Club, to which your kindness elected mo last year, it devolves upon me, in conformity with your rules, to submit to you a brief sketch of the year's proceedings.

On entering this task the thoughts of all present will be at once directed to the painful events by which a wise Providence within a few months deprived us of the society of two of our most active and valuable members, -the one regarded by us as the founiler of our little club, and the other as a very distinguished member of it,-under circumstances awfully sudden, and too distressing and well known to you for me to dwell upon. Suffice it to say, that we are daily and hourly sensible of the loss we have sustained in their removal, but console ourselves in the retrospect, that they were not more respected by all who had the pleasure of their acquaintance and friendship, than distinguished for their abilities and intellectual attainments, their high moral integrity, and the zeal with which they devoted thomselves to the promotion of science, and its application to the improvement of the condition of their fellow-creatures. Such ornaments of society ought not to pass away from this transitory scene as mere ordinary mortals. Amung the friends of Mr. Scobie a desire was at once expressed to
secure, if possible, a memorial of his personal appearance ; and this has happily been effected by Mr. Butler, with a fidelity which is bighly satisfactory to his nearest and dearest friends and connexions; and I have much pleasure in hearing that a mould of the bust is or will be prepared, which will enable such of his friends as are desirous to possess a copy.

With the members of tho Cotteswold and Malvern Clubs, whose districts had been illustrated by the botanical and geological researches of Mr. Hugh Strickland, and where he had long been known and valued, a subscription originated to place a window to his memory in his parish church of Deerhurst. I heartily call your attention to this laudable design, and shall be happy to communicate to Mr. Symonds-whose absence on this occasion I much regret-any contributions from our members towards this object.

I now pass to the business of our present meeting, so far as your retiring President is concerned.

The financial statement I will but briefly refer to. A laxity in the payment of the yearly subscriptions has already commenced, to which it is proper your attention should be at once called, with the view of preventing its recurrence. Little or no expense, beyond that of printing the yearly statement, has been incurred, so that no inconvenience has yet arisen ; all that need be said, therefore, is, that it is suggested that in future a statement of the year's receipts and expenditure be printed with the annual papers, and to request members to bear in mind that their subscriptions are due at the commencement of each year.

Though the last year has been productive of but few papers by our members, I may venture to say, the object for which the Club was formed, namely, the practical study of the Natural History of Herefordshire, has been strictly kept in view.

Four papers have been bronght before our meetings :-
I. An elaborate paper, by Mr. Hewett Wheatley, on the Fishes of the Herefordshire Waters, from the perusal of which no one at all acquainted with the subject can arise, without feeling convinced of the superior scientific attainments and practical knowledge of its author on a very curious and interesting enquiry.
2. We were favored by Mr. Symonds with a notice of lias and oolite fossils, found in the gravel near Cradley, (west of the Malvern Hills) and his speculations on these facts; which, trifling as they
may appear, are of great importance; affording real data in the discussion of questions, now of increasing interest, on the distribution of land and water, in times comparatively recent in the physical history of the earth.*
3. A more enlarged list of the birds of Herefordshire than any yet published, was afforded by Mr. Lingwood, which we may hope ere long to have recorded in our pages; and
4. An ingenious paper by Mr. Flavell Edmunds, on the distribution and causes of Colour in Plants, which has already been placed within the reach of the general reader.

Considerable progress has been made by our botanical members towards completing the flora of Herefordshire. The approximate number of species is regarded by them as little short of 800 . Of these, 723 flowering plants and ferns have been met with in our excursions, exclusive of such as have been regarded as doubtful, or escapes from cultivatiou, which have also with their habitats been carefully noted and excluded from the lists. The old catalogues of Duncomb and others (Agricultural Survey of Herefordshire) give the names of some plants which have not been met with; some of these may yet be discovered, whilst others, it may fairly be presumed, from the known distribution of British plants, will be looked for in vain within our area. We record with pleasure that several of the rarer species havo been brought to light by the Herbarium Prizes offered by the Club, at the Hereford Floral Meetings of the past year, which, under certain conditions, we propose continuing the ensuing year.

In the formation of a flora, it is not a mere catalogue of plants which the club has in view, but their distribution, as affected by soil, moisture, temperature, aspect and elevation above the sea; a design in which we have, I believe, the co-operation of the Cotteswold and Malvern Clubs, for their respective districts.

- In the discussion which arose on this paper, I stated that many years ago a Gryphæa incurva, very little worn, was brought to me by a person who assured me he had taken it from the gravel at Aymestry (perhaps 400 feet above the level of the sea), and that I had another specimen, much worn, which was taken from the gravel of the Wye, in the Oak Meadow, opposite to Ross. I quite believe these specimens were found in the localities above stated, and am confirmed in this opinion, by a statement made by Mr. Lingwood, at our last meeting, that he had found the Gryphæa in the gravel near Much Dewchurch.-Aug. 1854.

With this subject that of Meteorology is intimately connected. It is well known that considerable attention has been given to the ranges of the barometer and thermometer for many years, by many persons, in different parts of Herefordshire. The late Mr. Prendergrass' observations extended over a continuous period exceeding 30 years. Unfortunately, his instruments were, as those of many others of the time, imperfect, and his observations not up to the requirements of modern science. Within the last few years very considcrable improvements have been made in meteorological instruments, and methods of observation and correction much improved and facilitated. Under the direction of the Meteorological Society of Londou uniform and cotemporary observations are being organized in very distant parts of the world. In this then, the very infancy of the sulject, it has been priposed to our Club to purchase a set of improved instruments, which, if resolved on, Mr. Wheatley has kindly engaged to take charge of; and from his habits of accurate research, we may confidently look forward to a most fuithful, interesting, and useful record of his observations.*

\footnotetext{

* A Barometer by Barrow.-Wet and dry bull Thermometers,-maximum and minimum Thermometers,-1)ay and wight Thermometers for solar and terrestrial radiation; rain guage and wind guage ; by Negretti and Zambra, Hatton Ciarden, London, compared with the standard instruments by James Glaisher, Esq., F.k.S, Secretary to the Meteorological Suciety, have been obtained and placed in the care of Hewett Wheatley, Esq., of Eirn House. His observations are now forwarded monthly to Mr. Glaisher. 'I he first three months are recorded, as below, in the Meteorological Tables. published in the Resistrar-General's R-port, for the quarter ending 30th June, 1855.

| of station |  | Eipn. |
| :---: | :---: | :---: |
| Height $0^{*}$ cistern of the Barometer a | ve the level of the sea | 250 ft . |
| Mean pressure of dry air reduced to | level of the sea | 29,689 in. |
| Mean temperature of the air |  | $49^{\circ} 4$ |
| Highest reading of the Thermometer | - . | 85.6 |
| Lowest reading of the Thermometer |  | 21.5 |
| Mean daily range of temperature |  | 22.6 |
| Mean monthly range of temperature |  | 537 |
| Jange of temperature in the quarter | - | 1 |
| Mean temperature of evaporation |  | 47.0 |
| Mean temperature of the lew point | - - - | 44 |
| Mean estimated strensth of the wind |  | 0.1 |
| General direction of the wind |  | , ${ }^{\text {N }}$ |
| Mean amount of cloud |  |  |
| Number of days on which rain fell | - | 37 |
| Amount collected - |  | 5 |
| Mean weight of vapour in a cubic fo | of air | 3.6 grs . |
| Mean additional weight required to | urate a cubic foot of | 0.6 grs , |
| Mean degree of humidity |  |  |
| Nean whole amount of water in a ve | cal column of atmos- |  |
| phers - - - | - . . . |  |

The excursions of the year have been very fairly attended, and been productive of much social pleasure and improvement to those who had the privilege of taking part in them. Eastnor, Leintwardine and Kington were selected, as affording points of great interest in their respective neighbourhoods, which have been visited by several distinguished naturalists, who, since the year 1831, have contributed so much to the illustration of the natural history of our district, and given it an importance, not merely local, but cosmical.

The Eastnor meeting afforded us the gratification of the first joint meeting with the Members of the Cotteswold and Malvern Clubs, and together with the enjoyment of the most exquisite scenery, upon a most charming day, the opportunity of associating and forming friendships with many already engaged in the same exbilarating and ennobling pursuit-the promotion of science and truth. You will, with peculiar and melancholy pleasure, recollect, that on that occasion, you had the ligh privilege, under the direction of our lamented friend Mr. Strickland, to examine the structure of the south-western portion of the Malvern IIills and Eastnor Park, and were deeply interested and instructed by the lecture with which he then favored us; in which he communicated those views of the changes of surface, which modern science all but demonstrate must have taken place, since the deposition of the sedimentary strata, which flank that range on the western side; announcements which must have been regarded not less astounding than novel, especially by those amongst us, whose minc's had not been pre-engaged by objects of geological research, and disciplined and inured by the spirit of inductive philosophy. The centre of the Malvern chain was described as igneous; the successive sedimentary deposits, commmencing with the equivalents of the lower Silurian rocks of Sir Roderick Murchison, and continued to the old red sandstone, were enumerated. The effects of uphearal and denudation on the harder and softer strata, producing the domes, ridges and valleys which make up the more remarkable features of the nearer landscape from Malvern to Ledbury, Woolhope, Cradley and Abberley pointed out; the conditions assigned, under which the sedimentary rocks, in many places mineralogically unaltered, were deposited, upon beds of igneous matter already cooled down, in the bottom
and along the shore of an ancient sea, 一their elevated, inclined, and in some, not uufrequent cases, overturned position, in which they now remain, attributed to ebulition and efforts to rise of rocks in a state of fusion far below, and which found a vent here and therealong the range and amid strata of more recent origin many miles distant. These changes were attributed to forces, producing not merely the upheaval of the range itself, but also the great fault which has been satisfactorily traced from the British to the Irish Channel, elevating the greater part of Wales from the level of cotemporary strata, which lie underneath the new red sandstone on the Worcestershire side of the Malvern Hills, and other formations more recent still, of the eastern parts of England.

We are not to imagine that no changes of surface have taken place since this great catastrophe; the uplifted and denuded strata of Herefordshire and South Wales afford ample evidence of the extent of denudation, and data to reason out their restoration, which gives as a result, mountains of old red sandstone now washed away, in comparison with which, the greatest height of any portion of the existing deposit in South Wales is a mere fraction. This upward movement and denudation were inferred to have taken place, for reasons assigned, just before the period of the deposit which covered up the coal fields. It is quite foreign to my purpose, on this occosion, to go further into the evidence of this vast and interesting question, but I will confidently say, it is not built upon a mere ille fancy, but the result of an accurate investigation of facts, now recorded and reasoned out, with great patience of research. They who are anxious to follow up the train of thought springing up now, perhaps, for the first time in their minds, will find ample materials already prepared, the true value of which may be verified by a very few days' field-work, in the paper of Mr. Horner, in the first volume of the Geological Transactions of London, 1811; Sir Roderick Murchisnn's Silurian System, 1838; Sir Henry de la Beche's paper on the formation of the rocks of South Wales and south-western England; Mr. Ramsay's paper on the denudation of South Wales, and the adjacent counties of England ; and Professor Phillips's elaborate paper on the Malvern Hills: all to be found in the Memorials of the Geulogical Survey of Great Britain, vol 1, 1846, vol. 2, 1848; and a paper hy the lamenter Hugh E. Strickland, on
the elevatory forces which raised the Malvern Hills, in the Pbilosophical Magazine for November, 1851. I will only add, that, looking to the existing evidences of adequate forces, it may be fairly conjectured that the outburst of basalt, which forms the top of the Clee Hills, in Shropshire, between 20 and 30 miles distant ( $20^{\circ} \mathrm{N}$. of W.), and which there has not merely dislocated the coal field and elevated portions of it, 200 or 300 feet abore the level of the top of the Malvern Hills, to a higher position than that of any other coal field in Britain (?), carrying up the three lower seams of coal in ono place many yards above the corresponding strata on each side of the fault (the upper seam being now wanted), and overflowing them like the top of a huge mushroom, was obviously due to that period, and might not improbably have been connected with the convulsive throes to which the elevation of the Malvern Hills, and the continuation of the range to Abberley, and of the old red sandstone of Hereîordshire may be attributed.

Before passing to the Leintwardine meeting, with the riew of giving the matter a little more continuity, I will recall your thoughts to the last meeting of 1852, which took place at Mortimer's Cross, of which, in the absence of the President, I had the honour to have the direction. The object of it was to familiarize the eye with the best types of the upper Ludlow formation, which rising from below the old red sandstone of Herefordshire forms the top of the Silurian system. Commencing our walk at the North-field qnarry, in the parish of Shobdon (the equivalent of the Downton Castle building stone), we visited several sections and quarries along the slopes towards Croft Castle, observing the junction of the yellow sandstone beds, with the old red sandstone near Lucton, and following down the strata to the limestone in Croft Castle demesne valley (the equivalent of the Aymestry and Sedgley limestone, separating the upper from the lower Ludlow rocks), which we examined on each side of the valley, and again at the Whiteway Head (on the prolongation of the esaypment from Aymestry and Croft Ambrey), where the strata are highly inclined, and the structure well exhibited. (See the beautiful wood-cut page 243 of the Silurian System) Occasion was taken to explain the meaning of the strike or direction, and the dip of rocks; the use and measure of the same; anti and syn-clinal lines of action; the formation of domes, lasins, valleys of
eleration and denudation; the actual thickness of strata, in relation both to the horizontal aud vertical lines drawn through them;* deceptive appearances, of frequent occurrence pointed out, arising from faults, repeated strata and strata rolled over. Remarks were made on the sedimentary and mineral structure of rocks, the creation of organic beings, their duraion and extinction, and the importance of their imbedded remains in the identitication of cotemporary deposits. Several of the most remarkable fossils were collected. I need not trouble you with their well-known names. It is an advantage of our field days, that they must send us to our b ooks; whereas, owing to the vis inertioe of our nature, the perusal of the very best books on the subject will not necessarily send us into the field: for this reason, most strictly one of bodily and mental enjoyment, such clubs as ours are worthy of all encouragement. Our walk was continued over Croft Ambrey and along the escarpment of Yatton Hill, which afford most extensive and instructive views of the old red sandstone and Silurian districts, from the Cambrian ranges of North Wales, beyond the Cornden and Stiper stones to the basaltic top of the Clee Hills, Abberley, the Lickey, Malvern, Woolhope, May Hill, the Cotteswold, Forest of Dean, and South Wales. A grand physical feature, hereafter alluded to, the repetition of the upper Silurian rocks, exterinr to the south side of the Wigmore valley of clevation, in a great bow, commencing near Aymestry, and extending to the Ambrey and the Palmer's Cairn, in the parish of Orleton, was pointed out. In our descent to Aymestry we took the path of an old road, up which I had the honour of conducting Mr. Murchison (now Sir Roderick); in his first visit to Herefordshire, July, 1831, presenting in itself a continuous section from the lower Ludlow rock to the old red sandstone. I had at this time very fairly developed the structure of the surrounding country. My own researches in this district commonced with my residence, at Aymestry, in 1827: but I was working in the dark, and it was in that walk, which I continue to regard as one of the most interesting events of my life, there dawned upon me the vision of the deep interest of the

[^0]then comparatively unknown country, in which it was my good fortune and happiness to be dwelling, and to the true development of which I had, unknowingly, discovered the key, and made some progress. With what zeal, industry, ability and success Sir Roderick Murchison has followed up these beginnings, and prosecuted the identification of these rocks, through our own and the adjoining counties, and the greater part of the North of Europe, into Asiatic Russia, is shown by his great works on the silurian System, (1838,) and the Geolngy of Russia and the Ural Mountains, (1845) and the various scientific journals of the time; and how far it has been verified by the researches of others, more especially by the United States' naturalists, will be seen in their own reports, and Sir Charles Lyell's interesting volumes on his two visits to that country. We shall shortly have a condensed view of the known distribution of these rocks over the Globe, by Sir Roderick Murchison, in his new work "Siluria," now announced. The history of the Silurian system must be sought in the procceedings of the Geological Society of London : tho anniversary specches of its Presidents, and in an article by Dr. Fitton, in the Edinburgh Review, April $18+1$.

The Leintwardine meeting afforded us an excellent opportunity in the section along the new road to Ludlow, for examining the lower Judlow rocks, between the Aymestry and Wenlock ( $=$ Sedgley and Dudley) limestones; and passing through the Aymestry limestone, we came upon the upper Ludlow rocks, which we found again succeeded by the Aymestry limestone at Downton, and on both siles of the river Teme, near the Bow Bridge. Continuing thence along the Downton Castle walks, in the gorge of the river, through the upper Ludlow rocks, we arrived at their juncture with the yellow micacious sandstone (known as Downton Castle building stone), near the Castle bridge; noticing heret the hitherto disco-

[^1]vered northern limit of the $S$ lurian fish-bed, the exact position of which was pointed out, and fragments of it collected. Our section proceeding now in a descending order, again wo passed the upper limestone on the ridge of the Ludlow promontory, here forming the northern side of the Wigmore valley of elevation, over the obscured escarpment to the thinned-out strata of the Wenlock ( $=$ Dudley and Ledbury) limestone, to the productive organic shales (known as Wenlock Shales) at Burrington. The valley of Wigmore, though not so regular and perfect as that of Woolhope now so well known, deserves a more extensive examination than we were enabled to give it. Its physical features are very striking. The escarpment and slopes from the fault at the Bow bridge over the Temc, along Bringewood Chase to Mary Knoll, Whitcliffe and Ludlow; thence by Ludford to Richard's Castle, the High Winnals and Gatley, and tho exterior diverging escarpment from Orleton Common to Croft Ambrey and Aymestry, with the numerous transverse valleys by which they are cut into and through, especially Mary Knoll Dingle, the Hay Park, Croft Castle Dingle and Aymestry Valley, afford most instructive sections, in many places abounding with fossils. The broken-up strata of the lower escarpment, forming the picturesque knolls from Aston Common to Elton and Leinthall Starkes, cannot fail to attract attention; whilst the road from the finger-post at Elton, to Ricbard's Castle and Orleton presents excellent sections of the Wenlock Shales and limestone, the lower Ludlow beds, Aymestry limestone, and upper Ludlow with the Downton beds-in fact, the greater part of the upper Silurian-into the old red sandstone. The valley of Wigmore abounds with the detritus of the surrounding rocks, which is also found swept out over portions of the old red sandstone between Ludlow and Leominster. The absence of gravel within the valley of Woolhope has been remarked by Sir Roderick Murchison.

[^2]These visits having thus made us acquainted with good types of the upper Silurian beds in regular succession, in their most classical localities, the Kington meeting was designed, for the examination of the Nash-scar limestone, near Presteign, and the igneous outburst at Radnor and Stannar. The position of the Nash-scar limestone, originally regarded by Sir Roderick Murchison as the equivalent to Wenlock ( $=$ Dudley and Ledbury) limestone, has given rise to some controversy. Professor Sedgwick, in his first visit to the district, suggested that it was of an earlier date, the equivalent of a lower band, appearing in the centre of the TVoolhope valley, and which Sir Roderick had classed as Caradoc or lower Silurian. The Geological Staff of the Ordnance Survey adopted the Professor's views. The question has been carefully investigated by J. E. Davifs, Esq., of the Middle Temple, our honorary associate and happily on this occasion we had the benefit of his presence, and under his direction examined the most interesting points of the district. A paper on the age and positiou of this limestone was read by him before the Geological Society of London, in May, 1850 and which will be found in their journal of Nov. of that year, in which the question, confessedly one of difficulty, is very ably discussed. Since the question was mooted, more extended observations have removed the Woolhope limestone from the Caradoc into the Wenlock series; so that the question is now, to which of these bands-viz., the upper or lower Wenlock limestoues-is the Nash-scar limestone to be referred. The evidence collected by Mr. Davids, more especially, of the organic remains (for mineral structure quite fails in this case), inclines me to the position originally assigned to it, by Sir Roderick. The Nash-scar affords a fine example of metamorphic or altered limestone, occasioned by contact with igneous matter, injected against or between the strata, maintaining a high temperature, undor great pressure, for a considerable time, producing a complete change of mineral structure, destructive of stratification, and in some parts of almost all traces of organic remains. The actual junction of these rocks is not here seen, but the examination of similar phenomena at Radnor, where the igneous rock and limestone are actually fused together, and where traces of organisms are found within a few inches of the junction, leaves no doubt that the causes of these changes are
correctly assigned. A considerable thickness of Caradoc sandstone and conglomerate, undistinguishable from the Malvern conglomerate in its mineral and organic structure, is observed at Corton, and in Catm Wood, here highly charged with characteristic fossils of the upper portion of the lower Silurian rocks, and affording evidence of the very slow nature of the deposit itself, in the repotition of fine strata, distinctly marked by" regular lines of small well-rounded quartz pebbles, with organics, evidencing the recurrence of floods and flushes at short and unequal intervals.

From the summit of Nash Hill or Can Wood a view was obtained northward to the small outliers of old red sandstone, shewing the former continuity of that formation, over the older rocks of Siluria, traces of which are found many miles to the north in Shropshire.

With this imperfect sketch, our notice of the last year's excursions must terminate. Radnor and Sannar and the immediate neighbourhood of Kington demand an early visit. We do not appeal to these notices of our excursions as having contributed any considerable advance in science, but more mod stly, as evidence of the industry with which some of our members at least are actuated, and of the utilfity of such associations as our little club, in opening and rendering popular such researches; and we are confident that we shall not be unsuccessfully or uselessly employed, if in the progress of future years we follow up our enquiries with a little increasing interest and perseverance.

The strata of Herefordshire are now, as regards position, very well known. There is no longer a doubt, that the old red sandstone, which forms so great a part of its area, dipping in the south under the coal formation of the Forest of Dean, is of enormous thickness, and rests upon the deposits called Silurian, which are brought up from below in the country extending from the left
 Castle, Croft, Shobdon, Kington, along the north-western parts of Herefordshire, to Ilay, and so on to the sea coast of Pembrokeshire, supporting the great coal field of South Wales, and reposing itferme on the Cambrian or older rocks of that country; again, along the enstern burler from A!berley to Malvern, and are thrust through it at Tinker's Hill and C'ainham Camp, near Ludlow ; at Sucknell, and Hagley, near Lugwardine ; more remarkably round Woolhope,
and further south, at May Hill ; and again, on the left bank of the Severn at Tortworth, in Gloucestershire. The Gloucester and IIereford Ruilway exhibits a solitary section of these Silurian beds, contracted into a few yards at Blaisdon edge, but skirts within a mile the Woolhope upheaval on the leit bank, which furms the beautiful landscape of the river Wye, seen from the line near Holm Lacy; and the Hereford and Shrewsbury Kailway, cut through the old red sandstone, all but touches the Silurian outlier of Tinker's Hill, between Woofferton and Ludlow, and just exposes a junction of those rocks at the entrance of the Tunnel at the latter place. The intermediate line, from Blaisdon to Ludlow, a distance of between 40 and 51 miles, is altogether through the old red sandstone, exposing good sections of strata, with every degree ot inclination, and considerable beds of detritus. It is difficult to ascertain or even approsimate to the thickness of strata comprised in such an area; this must be sought for in the escarpments and ridges of the Black Mountain, and the river channels of South Wales, where a good succession is ubserved, and which, when fairly invoked, give an estimate of at least 10,100 feet. These strata in Herefordshire are pierced by a single trap dyke at Bartestree, near the Hagley dome, full particulars of which will be found iu the Silurian Sy-tem, as well as of a similar dyke at Brock Hill, on the left bank of the river Teme, near Shelsly Beauchamp, on the borders of Woriestershire. Let me add, that the name "Silurian" was happily selected by Sir Roderick Murchison to include the strata immediately below the old red, prevailing over the territory occupied by the ancient Silures and their neighbours, and superimposed on the Cambrian or oller rocks of North Wales; and the names of Ludlow, Wenlock, Caradoc, and Llandeilo direct the enquirer to those districts where he may find the strata instructively exhibited in a true descending order. Carefully as these strata have been examined, there is still detail to be made out, and abundant pleasure to be derived from their identification. The zealous explorer need not fear but that he will be rewarded with discoveries. The Hagley dome, replete with interest, brought to light by the late Mr. Scobie, had escaped for 20 years all other explorers, including the staff of the Ordnance Survey, who had bestowed with excellent results so much time and strength on the examination of the immediate distriot
round Woolhope. I cannot forbear the remark, that the names of those friends, whose premature departure we have so much reason to deplore, are associated in the record of this discovery,*

Few organics have yet been collected from the old red sandstone of Herefordshire, in comparison with what have been found in Scotland and elsewhere. I have not heard that the railway cuttings have produced a single specimen; but there are many localities where they have been found, and which have hitherto been scarcely examined. The detritus and gravel, of daily increasing interest, will be found a rich and productive field. The nature and distribution of soils and vegetables naturally invite our examination, and we trust will be followed up by some of our members who have already, in the previous year, shown themselves not unequal to the task, and who will thereby be enabled to vindicate the study of natural history, to the "cui bono" enquirer. There is, however, a higher view, which we must not lose sight of. Endowed with reason, man is called on all sides to the contemplation of God's works, and, enlightened by God's grace, to the study of His word. In one he sees the manifestation of Almighty power and wisdom; and in the other of Divinellove and mercy to mankind. In the words of Professor Sedgwick, to whom I have been privileged to listen as a master, in his delightful book on the Studies of the University of Cambridge:-"The studies of mankind have sometimes been divided into natural, moral, and religious. Each branch requires its appropriate training, and yields its own peculiar fruit. A study of the natural world teaches not the truths of revealed religion; nor do the truths of religion inform us of the inductions of physical science. Hence it is that men whose studies are confined to one branch of knowledge, often learn to overrate themselves, and so become narrow-minded. Bigotry is a besetting sin of our nature. Too often it has been the attendant of religious zeal, but it is most bitter and unsparing when found with the irreligious. A philosopher, understanding not one atom of their spirit, will sometimes scoff at the labours of religious men ; and one who calls himself religious will, perhaps, turn a like harsh judgment, and thank God

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that he is not as the philosopher, forgetting all the while that man can ascend to no knowledge, except by faculties given to him by his Creator's hand; and that all natural knowledge is but a reflection of the will of God. In harsh judgments, such as these, there is not only much folly, but much sin. True wisdom consists in seeing how all the faculties of the mind and all parts of knowledge bear upon each other, so as to work together to a common end, ministering at once to the happiness of man, and his Maker's glory."

Gentlemen,-I return you my most sincere thanks for the honor conferred upon me, in selecting me as President for the second year of your existence, and for the courtesy you have shown me during the period of my office ; and with pleasure I resign it to Mr. Symonds, whose ability and zeal for the promotion of natural science are well known to you all; assured, that you could not have made choice of anyone who will carry out the objects of ourclub with more advantage than he who so readily co-operated in its formation, and has been so successful in his attempt to establish a sister club at Malvern.

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## AN ADDRESS

Delivered to the Members of the Wooliope Naturalists' Field Club at their Aunual Meeting, held in Hereford, 23rd January, 1855, by the Rev. W. S. Symonds, F. G. S., President.

## Gentlemen,

Three summers have passed away since the naturalists of the Woolhope Club met for the first time, on a May morning, at Tarrington, to explore that Silurian valley of elevation from whence the Club takes its title. Sinco that period, we have experienced the storm as well as the sunshine, and our little Society has not been exempt from the vicissitudes which it is the lot of man while here below to meet with. The bust of our departed friend (the late Mackay Scobie, Esq., formerly Hon. Sec. to the Society), presented, by those who knew his worth, as a token of regard to his widow, (and which even at this moment seems to watch over our proccedings), must over remind this Society, when assembled in this room, of many pure and happy hours spent together in the investigation of God's Works!
We are now assembled together for the third time for our winter meeting, and to elect a new President; allow mo, then, without affectation or reserve, to thank you all cordially for the houour you have done me in calling me to the chair during the past year, as well as for the courtesy and kindness with which my humble efforts have been received.

It has been the custom that the President should each year address to the meeting a short recapitulation of the proceedings of the Club; but as, at both our Leominster and Monmouth Cap meetings, I
went through much of our "sayings and doings," it would be perhaps more interesting if I address you to-day upon some occurrences which bave since arisen, and which affect the Woolhope Club in their character of naturalists. You will remember the paper I had the honour of reading upon tho Old Red Sandstone, and the remarks I felt bound to make upon tho wretched collection of fossil remains from that system, so characteristic of this county, obtained by our working geologists.

The practical value of a local collection depends chiefly upon the history of individual specimens. $\Lambda$ fossil from the Old Red Sandstone of Herefordshire has a value far beyond any accident of fineness or rarity ; it is illustrative of the history of the geology of our native county. Chinese butterffies and Australian cuckoos are very well in their way, and gifts not to be despised when offered; I would rather, however, sco in IIereford an herbarium containing a good collection of IIerefordshire plants, presented by one of the many good botanists the county can boast of, than all the foreign specimens of the British Museum.

You will call to mind the delight we experienced in finding, on our Leominster expedition, a true fish bed, containing great numbers of the relics of those remarkable denizens of an ocean long since passed away, and rendered classical by the writings of Hugh Miller and Agassiz. I little thought at the time we were examining the plates, and heads, and tails of the Cephalaspides of Leyster Sprowle, that, in a few weeks, I should have the pleasure of making the acquaintance of the celebrated Scotch geologist, of examining in his cabinet the analogues of our IIerefordshire fishes, and conversing with him on the similarity of the deposit, and the identity of the organic remains that occur in spots so far distant as tho quarries of our native county and the north of Scotland. Most heartily do I thank the kind friend who afforded me the opportunity! Both Mr. Hugh Miller and Professor E. Forbes, alas, now no more! were anxious that I should introduce our Herefordshire specimens to the notice of the many distinguished geologists assembled at the British Association for the advancement of science, at Liverpool, and I immediately wrote to our Honorary Secretary (Mr. Suter) to furnish me with all the specimens he could collect at so short a notice. He
kindly and promptly acquiesced in my request, and I have to thank Mr. Suter, Mr. Barker, and Lord Ducie for the loan of those fossils which I had the honour of exhibiting. There is a distinguished botanist, who is also, I am happy to say, an active geologist, a member of our Club, who, since the meeting of the British Association, has found time and energy to follow up our discovery between Ludlow and Leominster-I allude to my friend Mr. Crouch, of Pembridge.This gentleman has managed to collect, in a few short months, the most valuable series of Cornstone fishes it has ever been my lot to examine, with the exception of those in Mr. Hugh Miller's cabinet. Sir Phillip Egerton, the British ichthyologist, having kindly offered to examine any specimens I could forward, I sent him those belonging to Mr. Crouch, and they now lie on the table. Sir Philip, as you may see, has already determined three species of Cephalaspis from the quarries of Leyster Sprowle, all of which are identical with the Scotch organisms.

As these fossil remains all appertain to the Cornstone, or middle group of the Old Red Sandstone, I would here revert shortly to those deposits as they occur in this immediate neighbourhood. Wherever in the Hereford district (of course always excepting Silurian upthrows, such as Woolhope and Dormington hills) you see verdant and wooded hill, there is the Cornstone formation, with its vallies denuded in the softer marls, and the hills mado ip of concretionary nodules and gritty sandstones. The fact that these hills have been preserved from destruction is owing to the hard impure limestone nodules of which they are composed. Occasionally the land of the Cornstone is spoiled by its contiguity to the upper beds of the mountain ranges, or the rocks of the Silurian region. In the parishes of Almeley and Lyonshall, and the upper part of Eardisley, for instance, whole tracks are rendered barren by the boulder stones and coarse gravel, composed of Silurian and trap rocks drifted from the neighbourhood of Kington and Aymestry.

The valley of the Wye is a deep denudation in the Cornstone beds; and the strata of Wall Hills, near Ledbury, Dinedor, near Hereford, Moccas, the hills of Weobley, Leominster, Bromyard, and Tenbury, were all once continuous. I suspect that the men of Herefordshire have very much to thank their Cornstones for, and that peroxide
of iron, combined with carbonate of lime, is the grcat secret of the rich soil of the county. Nothing is more certain than that Herefordshire apple trees, when transplanted to another soil, will not grow IIerefordshire cider. The cider of the Old Red Sandstone is altogether a different affair to the cider of the New Red, and no one ever saw a Dormington or Marden hop-yard upon the New Red Sandstone. You will remomber that our late lamented friend, Mr. Strickland, stated at the Eastnor meeting last year, in opposition to an opinion advanced by the well known botanist, Mr. Lees, that he did not believe plants affected any limestone soil in particular, but he evidently supposed that lime was a mineral they much required. An active botanist of our society (Mr. Edmunds) must allow me to quote his opinion upon the same subject. He says,"I attribute the number of wild flowers to be found on the Old Red, to the fact that the Silurians protrude in so many places, and that the soil and subsoil in all parts contain an unusual amount of lime, as compared with the New Red for instanco. You have thus a greater variety of soils in the district, according to the varying proportion of lime in different parts of it." It appears to me that lime is not the only ingredient that conduces to the fertility of Herefordshire. All limestone soils, the upper Silurian for instance, are not as fertile as the Cornstones. I believe, therefore, with Dr. Rowan, that the iron oxides, combined with the lime, make the soil of this part of the county the rich and fertile land it is; and for this reason, I have always in my addresses and lectures on the geology of Worcestershire, endeavoured to induce our farmers to use more lime. We have the same iron oxides, but the Worcestershire New Red contains little carbonate of lime, and I therefore feel convinced that our agriculturists would gain by its addition,- and that if a regular system of well liming the soil were persevered in for a few years, we should have finer crops, less squashy cider, and better beer.

As regards fossils, the Old Red Sandstone of Herefordshire is remarkably poor, there are no fossil shells, for the peroxide of iron las destroyed every vestige of their remains, and the relics of the fish of that perioci, so numerous in Scotland, and so celebrated through the works of Mr. Hugh Miller and Agassiz, are with us
imperfect as regards their preservation! We must not, however, forget that contemporary deposits in Devonshire contain abundance of fossir shells ; and that in Russia the fish of Scotland and Herefordshire are entombed in the same rock with the shells and corals of Devon. The upper Old Red beds contain forms typical of the carboniferous group which succeeder, while the lower forms of life partake of Silurian aspect and demeanour. The fishes too, die out through that long period during which the Old Red beds were depositing, for the Cephalaspis of the middle strata had ceased to exist long before the conglomerates of the Blorenge and Scyrrid were washed into their bed, and of sixty species of remarkable fish, but one (Holoptychius) ascends to the mountain limestone. The lower Old Red beds afford scarcely any traces of land plants, but its uppermost contain a considerable number, including tree ferns and Calamites, and thus shadow forth the period of the coal. There is no abrupt break between the Silurians and the Old Red, or the Old Red and the carboniferous epochs, but they seem, so to speak, to glide into one another, and yet "significant circumstance as to the lapse of time," we fearlessly assert that not one shell, fish, plant, or even coral, is common to them all!

There is another branch of the science of geology, connected with our discoveries in the Old Red Sandstone, io which I would, for a moment, draw your attention; it is that of "Ichnology", or the history and study of the footsteps of animals, that untold ages ago walked on the shores of our Old Red Sandstone seas. This intricate and difficult witness in the courts of geologic record, has in late years been put very closely to the question, and the Ichnology of Annandale, and the description of the footprints impressed upon the Bunter beds, is a work that will connect the name of Sir Wm. Jardine with the most difficult of geologic researches in modern times. The Leominster meeting was not only remarkable for the discovery of a habitat of fossil fish ; a distinguished geologist and former president of this society (Rev. T. T. Lewis) bore away in triumph a large slab, bearing thereon the evidence, not only of the ripple of the waves, but of an animal that had actually travelled over the sandy beach upon which those waves dashed.

## - This slab was brought forward by Sir Roderick Murchison at the

 meeting of the British Association, and the footprints thereon, were declared by thoso who have studied this branch of the science, to bo the traces of a crustacean.While speaking of Palaozoic crustaceans, I may recall to your memory the first discovery of the limbs of that remarkable Silurian " lobster," the "Pterygotus problematicus," by Mr. Scobie, and which is deseribed in the Geological Journal by Mr. Strickland and Mr. Salter. I give the passage at the commencement of Mr. Salter's paper in extenso-"The limbs of this interesting Silurian fossil not having hitherto been discovered, the present specimen is of considerable interest, as connecting it satisfactorily with the species so fully figured by Agassiz, which was obtained from the basement beds of the Old Red Sandstone of Forfarshire. But though of the same genus with the Scotch fossil, it presents characters that specifically differ." Not more than a fortnight since my attention was called to a collection of Upper Silurian fossils in the cabinet of Mr. Richard Banks, of Kington, and on examining those specimens I found he possessed a large drawer full of the very fossils which Palæontologists have so coveted to obtain. They were obtained from the "Tilestones" at the base of the Old Red Sandstone, at Kington; and what with the feet, plates, and claws (one of which is even more perfect than the Hagley specimen), I believe that from Mr. Banks' collection, an Owen or Agassiz would restore the Pterygotus, even as the Seraphim of the Scotch quarrymen stood forth, plate to plate restored, a monument of creation and design ! Mr. Banks has kindly promised, on the first opportunity, to forward his fossils to Mr. Salter, for examination and description."

* "Together with the Pterygoti, Mr. Banks found fossils formerly confounded with the genus Cephalaspis, $\mathbf{A g}$., but now separated. The species are new, but much like C. Lloydii, Ag., hitherto known only in the overlying Old Red." (Journal of Geological Society, Feb. 1, 1856, p. 23.) "Himanopterus Banksii," a remarkable crustacean, found by Mr. Banks, is described by Mr., Salter, page 32 of the same Journal. An excellent engraving of "Leptocheles," or triple tail spines of a Stomapod crustacean. in the possession of Mr. Lightbody, a member of the Woolhope Club, is engraved plate 8 of the Ediriburgh New P'hil. Journal, Oct., 1855. The Club have to thank Mrs. Salwey, of Ludlow, for the drawing from which the engraring was executed.-W. S. S., March 2, 1855.

There is another point respecting the Pterygotus to which I would call the attention of geologists, and that is the great range of that animal, as regards its period of existence. With the Downton beds, how little of Silurian life remains; with the Tilestones it altogether disappears, and yet the remains of the Pterygotus occur in the upper Caradoc of Malvern.

As regards the formation of a museum, it may be argued that the Old Red Sandstone of Herefordshire contains very fow fossils; perhaps so, the Silurian rocks of Herefordshire are, Lowever, particularly rich, and careful eyes would, I am convinced, detect the remains of many an Old Red fish, if careful eyes would but take the trouble to search! Gentlemen, I apprehend that the formation of these societies is to extend the love of natural history as an educational science, and that our aim lies beyond a dinner and a walk. I therefore think that every one of us should lend a helping hand towards making the Hereford Museum a practical Institution of the county and neighbourhood of Hereford. We are now engaged upon the same work at Malvern, and before another year has passed away we shail be enabled to give you tangible proof that the naturalists of Worcestershire have not been idle. Let me then call upon you as lovers of nature, to assist in the illustrations of the natural history of your own county. Gcologists, make the rocks ring and yicld up their treasures! Botanists, many a specimen you carelessly throw array would be worth noting and recording! We may one and all, if we choose, come forth with friendly aid, and render some good service towards the illustration of the natural history of Herefordshire, the dear old county of the "Old Red Sandstone."

## REMARKS

ON THE

## ICHTHYOLOGY OF HEREFORDSHIRE,

Read before an aggregate Meeting of the Woolmofe, Matvers, and Cotswold Naturalists' Field Clubg at Eastnor, June, 1853, by Hewett Wheatley, Esq.

In a short paper of this kind, it is impossible to enter upon even the briefest preliminary sketch of the Natural History of our British fishes:-with a few incidental observations, therefore, on Ichthyology in general, the following will be confined to the species of this county-Herefordshire.

One of the most striking curiosities of Natural History, is the close approximation of a higher order, to its immodiate inferiorthe nicely graduated degrees in the scale of being.

In the present subject-the lowest of the vertibrates, fish-there is established a clear deduction from its inferior-the highest invertibrate class, the Cephalopodous mollusks. The lowest rank of fish, the lamprey, has only a rudimental skeleton, a sort of gelatinous cord. Its affinity with the mollusk, is not only recognised in the skeleton, but in the skin, which ejects an abundant secretion, when the animal feels in danger;-in the process of respiration being carried on through the gill-apparatus, independent of the mouth; and from the eight filaments extending round the lips of some species; which Professor Owen considers "to represent the eight arms of one of the mollusks (Cephalopoda Dibranchiata), but arrested in their developement, by reason of the preponderating size of the caudal extremity of the body, which now forms the sole organ
of locomotion." One of this family-the lancelet-is the lowliest of all tishes: its organization is so very lumble, that it has even been mistaken for a mollusk, and not of the highest class eithor. Here then we see the fish emerging from a lower grade, by an almost imperceptible gradation; and the connection with a higher, the reptiles, is clearly established in the salamander and the frog, whose early lives are passed as fishes; for the tadpole, whether the young of the salamander or the frog, is, as a tadpole, a real fish-breathing by means of gills, and incapable of living out of water. Subsequently undergoing a wonderful metamorphosis, and becoming a true reptile, cannot invalidate its fish-like youth; but only shews, that though a step higher in creation, it is very closely allied to the race below it.

It is strange, that even now, the sciences enlighten but a comparatively narrow horizon; and this seems the more extraordinary, as neither their utility, nor the amusement derived from their pursuit, can be questioned; and because in the earlier historic ages, we find traces of the cultivation of many of them. But there is a spirit of enquiry now abroad, which bids fair to wipe away the stigma from our own times.

The Ichthyology of the Ancients is sufficiently confused. That they had some knowledge of it, as well as of other branches of Natural History, cannot be denied: they even made collections. Alexander gave orders to all liuntsmen, birdeatchers, fishermen, and others, to send whatever creatures they could procure, to Aristotle. Apuleius, caused all kinds of animals-particularly fish-to be brought to him, that he might study their anatomy, and thus determine their characteristic peculiarities.

It appears, indeed, highly probable, that the researches of the Ancients, on this subject, were far more extensive than we can glean from the fragments of their works which have survived to our day; as from these, it is known, that fish was a more highly esteemed delicacy, than either fowl or four-footed beast. Their culinary preparations are more frequently of fish, than of other creatures. Tho fasting of the Greek monks, was abstinence from what they considered the greatest of delicacies-fish : and if, at
the present day, we go through the markets of Greece, we find a large preponderance of scales over feathers. Indeed, Strabo, Plutarch, and others, tell us of a people called Ičhthyophagi (fisheaters), who, although they possessed cattle, mado no other use of them but to feed their fishes!

Yet early as we find the taste for fish, and for their natural listory, pervading the European world, and much as it has been cultivated of late, the history of ono of the finest fish that swims -the salmon-is to this hour a matter of dispute.

In our British rivers, we have, at least, fifty-four species of fish ; of which number, thirty-one, if not more, are found in this county.

Of tho salmonidx, wo have three species-the salmon, the common trout, and the grayling; with, I beliove, an occasional visit from two others-the sewin and the salmon trout. Of these, pre-eminence being universally accorded to the salmon, and in consequence of its commercial importance, and its hitherto disputed descent, a larger portion of this paper will be appropriated to that part of our present subject, than to any other.

A very remarkablo feature, disclosed by comparative anatomy, may here be mentioned; not only as in its connection with the gradual rise in the types of organized life, but as illustrated by Ichthyology :-most, if not all creatures, in their embryo or carly condition, pass through the gradations-perhaps they must bo considered degradations-of inferior life. The whole of the fossil fish of the Devonian era (for previous to that, geologists acknowledge but limited and obscure traces of this section of animate nature, ) are distinguished by the tail, formed of two branches of greatly unequal length. This one-sided sort of tail, is the characteristic of higher orders, at a certain point of their embryonic history. Such is the case with the salmon; which, as an embryo, possesses the tail, and also the mouth and vertibral column, of an inferior class.

By investigating the paternity of the fish, known by a great variety of local names, such as fingerling, graveling, parr, pink,
and lastspring-we may be able to elucidate the perplexed history of the salmon.

One or two facts are puzzling enough to the unobserving and unscientific. It is known that the salmon fry go down to the sea every spring; yet, at all seasons, this fish is in the river: hence, it has been denied, that as it is found all the year in the river, it can be same species as that which abandons the fresh water in the spring. Nor could it be, if the salmon fry really left the river soon after it was hatched-a belief which formerly pre-vailed-because in that case, all would disappear together. But since they are now proved to remain nearly two years in the fresh water, before they seek the sea, it is obvious there must be these fish in the river the whole of every year : those which have arrived at the age destined by nature for migration, accordingly migrate; the rest remain in their native stream, awaiting the appointed time ; and so on, in successional years.

The external appearance of others of the salmonidæ, when young, has sufficient resemblance to deceive many. The same dusky, transvers bars, mark their sides. But this is no perplexity to the naturalist. A family likeness, in early youth, is the common stamp of nature. The lion's whelp, and the young of the domestic cat, have alike the tiger's marks. Fawns, in their youthful days are spotted-though when adult, many kinds are perfectly plain. However closely outward forms may approximate, there is no instance, so far as I am aware, of a coincidence of formation in the osteology of different species of the same genus; and I may venture to affirm, that organic structure is incontrovertible evidence. Determine the anatomy of the salmon, and when a small fish of the migratory salmonidæ is found, having corresponding anatomy, that fish may fearlessly claim heirship to the salmon. The parr has sixty vertibre, and the salmon is the only one of the salmonidæ having the same number. He must be a daring naturalist, therefore, who, in classifying these, should assign them the parentage of others of their genus. If a race of men were found, having thirty-three vertibro-which is one more than we have-what would it be? of the genus homo, certainly,
but another species, In such rivers as the Teivi, where several migratory species of the salmon are found, those who know little of Ichthyology, may easily be deceived, in attempting to identify the different kinds. Let them visit your Herefordshire Wye, or the upper part of Bandon river, in the county of Cork, and they will have less to distract their attention; for the salmon is the only one of the migratory salmonidæ, that regularly visits those waters. Whence then, the multitudes of lastsprings in the Wye, and gravelings in the Bandon, if they be not young salmon. Here comes the assertion, that they are a distinct and separate species.

Since the laws stamped on nature, by the Creator, are inflexible, unswerving, and unerring, it results that a discovery in natural history, must, if true, be equally invariable and inflexible, and in harmony with the Creator's works, in that particular division of the great laboratory; else it is necessarily a misinterpretation of nature. If the fish of which we are speaking, be a distinct species of the salmonidæ, we are presented with that Ichthyological anomaly, "that monster which the world ne'er saw"-two species of the same genus, with precisely the same anatomical structure. Scientifically, therefore, it is at once pronounced not to be a separate species, or there would be some structural distinction. Besides, at nearly two years old, they have only attained a few inches in length; and with rare exceptions, not three ounces in weight. In the whole range of nature, we meet with no instance in which this tardy growth is exhibited, where smallness is maturity. It is contrary to the law of nature. All creatures that have arrived at their full size, and are yet small, have grown rapidly-a wise provision; for such are destined to a very brief existence; with which, a protracted advance toward the perfect stage, is inconsistent. The converse is equally true. The slow growing races, whether of animate or inanimate nature, are comparatively large and of long life. The slowly matured oak, and the aloe, endure for centuries-the quickly-íormed mushroom, for hours. The elephant continues to grow for nearly a quarter of a century-and lives long. The ephemera leaps
perfect from his grub state-and dies in an hour, or at most, in a few days. Why then argue against nature's decree? why stamp this little fish as an aberration of tho Creative Power? Again, every fish in our waters can be detected breeding, if they do breed there. But though the parr has been watched and examined, with the most scrupulous care and industry, it is miversally admitted "that its breeding is unknown." It lias been noticed, by all who have studied this part of tho subject, that when the male parr has porfected his milt, the female presents only the rudiments of ova. IIad they arrived at maturity-were they indeed a distinct species-both males and females must necessarily be complete in their organization; the one, as well as the other, would show a correspouding breeding condition. No more appropriate instance of this need be desired, than is shown in one of their own genus-the smallest of the migratory salmonidxthe smelt. I have, at different times, examiued considerable numbers of these little fish; and invariably found the milt and ova in an equally advanced stage, in every specimen. When near the spawning time-toward the end of March-the milt of the male, and the ova of the female, aro advanced, simultaneously, to that stato, when cither can be made to flow by slight abdominal pressure with the fingers. Hero we have a distinct species of the genus salmo, perfect, and scarcely larger than the parr, at his migratory stage; and were that parr an equally small, distinct, and perfect species, it is incredible to suppose, that the male could breed, and the female could not; that in short, the history of its breeding should be altogether unknown. Every experiment, too, has invariably ended in proving the parr to be the young of the salmon. Those now extensively carried on by the two Frenchmen, Gehin and Remy, but confirm the experiments of Shaw and others. The French government has lad the wisdom and patriotism to grant a sum of 30,000 francs, to these two men, for an extensive artificial production of fish; for the joint purposes of scientific objects, and an increase of the national resources.

In a scientific point of view, as well as in political economy, the breeding of fish is of some importance; and as many may not
be aware of the facility of producing fish, by manipulation, and of the enormous quantities to be so produced, I may be allowed an observation or two on these points.

Perhaps I ought, for a moment, to advert to the singular assertion of Dr. Robertson, of Dunkeld-namely, that he had produced trout, through the agency of the female only:-I mean, by extracting the roe from the female, without subsequent fecundation-that it had vivified. If this be true, previous impregnation must have taken place; which is Dr. Robertson's theory. How comes it, then, that the milt of the male, and the ova of the female, disappear at precisely the same time? If impregnation lad occurred before the female's deposit, the male would be void, or nearly so, of milt, at a period prior to such deposit; which is contradicted by the unanimous testimony of numberless observations. The milt is not only a secretion of gradual progress, but is imperfect, until the cavity in which it forms is entirely filled. This great accumulation suddenly dis-appears-completely and at once. Is it credible to suppose that intromission produces this. Eminent anatomists, have, from careful examinations, come to the conclusion, that, as in the caso of the frog, the organization of fish is such, as to render impregnation, in utero, impossible. My own testimony must be of little value; yet from the trifling practical knowledge I possess, I believe impregnation in utero, physically impracticable. If Dr. Robertson's theory be correct, it seems to me, that naturo has formed a superfluity in the excessive quantity of milt; a quantity easily accounted for, and necessary, on tho supposition of extra uterine impregnation ; the diffusion, in such an element as water, requires a proportionably large amount of milt, to ensure its contact with the bulk of ova.

The artificial production of fish, is exceedingly simple. By causing the spawn to flow from the female, into a vessel of water, and then the milt of the male, into the same vessel ; and by immediately stirring up the water, the ova are fecundated. That fecundation has been effectual, can be known instantly; for before the milt and ova have been mixed, the latter are of a pale
orange color. After they have been subjected to the influence of the milt, they aro suddenly changed from pale orange to brownish, and a minute black speck will be seen in the centre of each. Some fow white-looking eggs will be perceived among the rest, and these are barren.

Now if we consider the numbers thus produced, in comparison with those abandoned tg the open river, we shall at once see the immense benefit this branch of science must bestow. Estimating the salmon-large and small-to yield an annual average of 10,000 eggs each female; and calculating-I believe with a considerable degree of correctness-that not more than one per cent becomes a mature fish; 100 only, is therefore the produce of 10,000 ova, when left in a natural state.

The causes of this production of mere units from thousands, are sufficiently obvious. In some cases, a deposit of mud will accumulate over the spawn, and it will perish. The water-ousel hunts eagerly for his favorite food; and I have watched this bird, searching and scratching a salmon bed, and devouring the spawn with the greatest avidity. When hatched, the trout, the pike, the eel, and the perch, all prey upon the defenceless delicacy. Then comes man-perhaps as great a destructive as all the others together. Taking these various causes for the paucity of mature fish, compared with the mass of ova, it is perfectly credible, that not more than 100 result from 10,000 eggs.

Mark the difference of artificial production.
In 1852, Messrs. Gehin and Remy, obtained from 3,000,000 of eggs, $1,600,000$ fish-more than the half, instead of the hundredth part : and with sufficient care, I feel satisfied that scarcely ten per cent would be lost : thus introducing an enormous mass of food into the country, at comparatively a very trifling outlay; a subject which certainly ought to engage the attention of the political cconomist, and those having the means of improving our fisheries.

The most striking peculiarity of the salmon, and some few others, is the power they possess of living in either fresh or salt water ; in fact, that an alternation is essential to the continuance
of the species. The salmon, too, affords a remarkable example of the rapid growth of fish under certain circumstances. The salmon, which at one and a half years old, weighs only from two to three ounces, goes down to the sea for the first time, and returns in about three months, weighing from two to five pounds, and occasionally more.

Their arrival in our rivers varies very greatly; which I apprehend, depends much on the temperature of the water. This is strikingly exemplified in the Oikel and the Shin, in Sutherlandshire. The Shin joins the Oikel five miles from the entrance of the latter into the sea; it might therefore be presumed, that the salmon which entered the Oikel in the spring, direct from the sea, would continue a straight forward and upward course. The chief body of them, however, turns up the Shin. The temperature of the Shin is higher than that of the Oikel; and they do not journey up this latter river, till the advancing season has raised its temperature. Precisely the same thing occurs in the Esk and the Eden of Cumberland: though emptying themselves into the same estuary, salmon enter the Eden many weeks earlier than the Esk-the Eden is the warmer stream. For a similar reason, salmon remain some time within tidal influence. The water there is two degrees warmer than either salt or fresh water, separate ; chemistry having proved that when two fluids of different densities come in contact, the temperature is elevated for a time, in proportion to the difference in their densities; and as this mixture is constantly occurring at the mouths of those rivers which run into the sea, salmon remain there, a shorter or longer time, according to the warmth or coldness of the pure fresh water.

The salmon-trout and the sewin are such rare visitants to this county, and their habits so closely resemble those of the salmon, that they only need incidental mention as Herefordshire fishes; indeed, of my own knowledge, I cannot vouch for either of them being entitled to the honor.

The most universally distributed of the salmonidæ, is the common trout (S. fario). There is no purely fresh water fish
that varies more in appearance and quality. From the varictics of color-deviations in the spots-and external differences of shape, a plurality of species has been frequently inferred. But it seems now to be well ascertained that wo have only one single species in our rivers; and my own experience certainly confirms it. No matter how nature may clothe the skeleton of certain specimens, so long as the osteology remains unchanged, the species is unchanged. The apparent varieties are easily accounted for. The different strata through which the rivers flow, must impregnate the water with their peculiar chemical properties, and thus affect both the appearance and the quality of their inhabitants. I have witnessed this in some trout, taken from holes whence peat had been extracted, and which had become filled with water. These fish were not only dark, but very dark-scarcely a lighter color than the peat itself; while in the neighbouring river, from which they had, no doubt, been driven by floods, they were peculiarly bright and beautiful. The variety and quality of their food, will also make a difference. Yet neither the food nor the water are to be exclusively charged with this; for the brightest fish, in the clearest stream, if he take up his abode under a low bridge, or in a thickly sheltcred situation, becomes much darker than his brethren, who sport in more exposed positions. Hence it appears that light is essential to the brilliancy of fish, as well as of plants: and so is grod condition ; for we never see a bright colored fish immediately after spawning-the only season when they become thin and poor. Circumstances, therefore, determine these variations, and not distinction of species. Even the gilleroo trout of Ireland, whose stomach is unlike that of any other of the salmonidx (being thickened into a substance resembling the gizzard of a fowl), has still the fifty-six vertebreo of the common trout, and is clearly nothing else. It has been imagined, and with great probability, that the thickening and hardening of the stomach is an accommodation of nature to the peculiarity of the food; which is found to be, almost exclusively, small crustaceous animals: and we are too well satisfied of the adaptability of the animal frame to circumstances, to consider this as any thing very remartable.

The largest common river trout, of which I have ever heard, was taken in a small stream branching from the Avon, at Salisbury, in 1822. Its weight was twenty-five pounds.

Deformities are not common among fishes. But there is one curious malformation in the trout-the upper jaw is much shortened, and very obtuse. There is a specimen of one, thus imperfect, in the Museum of the Zoological Society; and in 1852, the Rev. Mr. Hill caught one in the Wye; which he lindly gave to me. I intended it for the Muscum of the Philosophical Institution of Hereford; but have never been able to recover it from the hands of the party who was to preserve it. As I have said already, that higher classes, in their early stage, pass through the forms of their inferiors; this shortened upper jaw of the trout is an example of an arrest in its progress to the perfect state, at a point which marks the completed organization of the lamprey-a grade preceding the bony fishes. What is always permanent in the lower animals, becomes occasionally so in the higher, and is then a deformity.

Though Ichthyological monstrosities are rare, the trout is by no means a solitary instance. The perch has been taken with the back greatly elevated, and the tail contorted. It is so found in some of the lakes of the North of Europe; as well as in Lyn Raithlyn, in Merionethshire ; and I once took one, thus deformed, in a small brook in Picardy. Another very remarkable malformation has been noticed in both the perch and carp; a female roe on one side, and a male roe on the other side of the same fish.

The grayling is the only other of the salmon family, which claims to be a Herefordshire fish; and considering its beautiful shape-the sport it affords-its excellence as an edible-and its best season being in the autumn and winter, when the rest of its genus are out of condition, it is extraordinary it should not be more widely disseminated. In the Monnow, for instance, where, though trout are abundant, they are of poor quality, I imagine the grayling would flourish; for it delights in rivers with a gravelly bottom, and an alternation of gentle stream and poolthe smallness of all its fins, except the dorsal, depriving it of power to stem a heary and rapid water.

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The mouth of this fish is so formed-the upper lip projecting considerably beyond the lower-that in rising at insects, it is compelled to turn on its back; yet with such celerity is this movement accomplished, that it formerly received the name of umber, from umbra, a shadow. With the exception of the salmon, I believe it is the only fish, which even when feeding on surface insects, always lies at the bottom of the water. The beautiful hues of the mackerel, when first taken, scarcely exceed those of "the flower of fishes," as St. Ambrose is said to have called the grayling. Its green, blue, copper, and golden shades, as seen in different lights, combined with the most symmetrical shape, establish it pre-eminent in beauty over all the fresh water fishes; and it is peculiarly grateful to the epicure, not less than to the sportsman.

The herring genus affords us two specimens- the twaite shad, and the alice shad (clupeidx). These fish were long considered the parents of the celebrated whitebait. Mr. Yarrell has satisfactorily disproved this, both from a comparison of their habits, and anatomically. There is a great distinction between these two species; the twaite shad has teeth, and several dark spots along the side, behind the gill-covers; whereas the alice shad has no teeth, and only one spot on the side. The latter, too, is a good fish on the table-the twaite valueless. They enter our rivers in May; seeking fresh water for the purpose of depositing their spawn.

The next family I shall mention, should, in point of numbers, if not of excellence, head the list of British fresh-water fishesthe carps (cyprinidæ). Of this genus, we have nineteen species in England ; at least nine of which are found in this county. For the most part, it is a toothless race-presuming the mouth to be the appropriate organ for teeth. Yet teeth they have-and strong ones too, but they are situated in pharinx-the upper part of the gullet.

I believe it has never been distinctly ascertained whence this fish was first imported; but it is generally understood to have been from the southern parts of Europe. Ichthyologists give the
name of cyprinus to this fish; probably from that designation having been bestowed by the ancients on a fish supposed to be identical with the carp. Cassiodorus is the oldest author who uses the word carpa. He lived in the sixth century; and where speaking of the most costly fish, which then appeared on the tables of princes, says, "among these is the carpa, which is produced in the Danube." It is probable, therefore, that we have to thank the Danube for its introduction into England. When that introduction took place, does not seem quite clear. According to Anderson's History of Commerce, they were first brought into England in 1514. But it is perfectly certain they were in this kingdom before 1486 ; for in that year was published, perhaps the only work on angling ever written by a lady-Dame Juliana Berners's Book of St. Albans. She says, speaking of the carp, "It is a dayntious fyshe; but there ben but few in Englonde, and therefore I write the lesse of hym." She however observes, "he is an envyll fisshe to take; and there maye noe weke harnays hold hym."

The great carp countries now, are Austria and Prussia. In the latter, I have seen many specimens weighing from sixteen to eighteen pounds each. They thrive well here, but seldom attain the size just quoted. There is a painting of one, however, at Weston Hall, Staffordshire, which weighed nineteen and a half pounds. They are probably the most productive of fresh-water fishes; Bloch having, he says, found 600,000 eggs, in a carp of nine pounds. Though still held in some estimation, they do not appear to be as highly prized by the moderns as by the ancients. if we are to believe Krunitz, Heliogabalus invented a fricassee of carp's tongues. Krunitz was, however, mistaken, the tongues were those of peacocks and nightingales. Bloch asserts they have no tongne. So does Aristotle. Athenæus says they have a tongue, but that it lies in the upper part of the mouth, or palate. The fact is, the palate of the carp is a thick soft substance, even now vulgarly called "carp's tongue;" and certainly it is the most dainty part of the fish.

Of the rest of this genus, with the exception of the tench,
which rosombles the common carp in its habits, it is composed of unimportant racos, such as roach, dace, gudgeons, loaches, and minnows. The loach is nevertheless remarkable in the want of union in the two parietal bones at the upper part of the headshewing a structural relation between fish and reptiles.

Of the true perches (percidæ) I am not aware that wo have more than one in this county-the common perch. The ruffe, or pope, is abundant in many rivers, and may be found here, though I have not met with it. We have, however, the stickleback, which is of another family of this class.

The Wyo is celebrated for the size and excollence of its perch. I have seen four, taken the same day in the salmon nets, weighing together, sixteen pounds.

These fish were well known to the ancients, and described by Aristotle. It is curious that a word, derived from its Greek name, and closely resembling it in sound, should be its common appellation in many countries. Thus, its Greek name was perkè ( $\pi \epsilon \rho \kappa \eta$ ) -its Roman, perca-its Italian is pergesa-its French, la perche —its Prussian, perscke-and its English, perch.

Fish will bear wonderful extremes of temperature without sustaining any apparent injury. In Bushman's Introduction to the study of Nature, we are told that perch have been frozentransported in that state considerable distances-replaced in water, near a firo, and recovered. If fish can endure great cold, some genera can also bear great heat. According to Saussure, both fish and infusoria are found in the hot springs of Aise, in Savoy, at a temperature of 113 Fahrenheit. Desfontaines and Shaw observed several kinds of fish in the hot waters of Cafsa, in Barbary; temperature 86 Fahrenheit. (Many years ago, I verified the fact of the existence of infusoria in the hot springs of Savoy; and a gentleman, who was with me, pronounced them to be of the second order-the leucophora.)

If fish can, uninjured, sustain these violent extremes of temperature, not less can their eggs continue their vitality, under the most remarkable vicissitudes. The tanks of India are dried up during the hot season, and every fish, of course, destroyed;
but soon after the commencement of the ranny season, the tanks are replenished, not only with water, but with fish. Though many fantastical reasons are assigned for so strange a phenomenon, the only rational explanation seems to be, that the ova of the former season, remaining dormant during the draught, were hatched on the recurrence of water, though continuing dry for many months. Nature thus playing pioneer for our benefit (if we choose to avail ourselves of it) by shewing us, that, as the impregnated ova may remain long productive, deprived of the element essential to after life, how easy is the transmission of spawn, even from remote countries; thus making the replenishment of our rivers, or the introduction into them of new kinds, a matter of great facility.

Perhaps the ugliest fish we have, is the bullhead; but it is said to possess a trait which would redeem the very personification of the hideous-care for its young. Unlike other fishes, it certainly lovers about its spawn for a long time after having deposited it, as if reluctant to abandon it to the merey of unknown enemies. It is found in most of our streams, but particularly abundant in the Monnow, Dwyr, and their small tributaries.

The six species of sticklebacks (gasterosteus), contribute three to this county. It is the smallest fish in our waters, and is chiefly remarkable as being the most pugnacions. Each species is furnished with spines on the back, varying in number. These they use, as cattle do their horns; and an adversary is not unfrequently killed by them.

Of the pike genus (esocidæ), we have only one species-the most voracious of fresh-water animals; around whose broad, obtuse muzzle, however, a glory has been thrown by Shakspeare; who paints the "dozen white lucies" (the heraldic name of the pike), as part of the armorial bearings of the immortal Justice Shallow.

The pike grows to a larger size than any other of our pure river fishes. I have repeatedly seen them, from the neighbourhood of Neufchatel, in Switzerland, between 25 and 40 pounds. Ges. ner relates it as a fact, that "in 1497, a pike was taken at

Hailburn, in Suabia, with a brass ring attached to it, stating that it was put there in 1230 ; it was therefore 267 years old; its weight, 350 pounds."

Whether this be fable or fact, certain it is, that many of the races live to a great age, and attain a great size. Does not this go far towards shewing what I have long boen inclined to believe -namely, that fish continue to grow till they die? a fact, if it be one, well worthy of establishment; as affording good evidence, and elucidating the mystery, of the few diseases that afflict them; for it is the gradual decay, consequent on a cessation of growth, which forms a large itom in the history of disease.

Although fish is more difficult of observation than land animals-which, at almost any time, and under a great diversity of circumstances, we have opportunities for studying-yet, I think, we may reasonably conclude that the diseases of fish are few. It is a rare occurrence to find one out of condition, except from spawning. If they suffered the deterioration of age-inevitably following completion of maturity-we should as inevitably meet with numerous specimens labouring under the signs indissolubly united to the stage when growth has long ceased. As far as I am aware, this is not the case. What then can we infer, but that they are exempt from the visible decline, inseparable from having passed the point of perfection? and therefore, that they increase in size as long as they live? There are even proverbs in support of the healthiness of fish; and though it by no means follows, that a common proverb must be true, there is usually some foundation for it. We say in England, "as sound as a roach:" and the Italians, "è sano come il pésce" "-as healthy as a fish.

It is said, that a pike will swallow a fish half its own weight, and I have reason to believe this. But the stories told of his voracity, from gorging a tailor's thimble, to fastening on the lip of a cow, while drinking at the river-are endless.

It is curious to note the different values placed on the same article by different generations. In the reign of Edward 1st, pike were dearer than salmon, and ten times dearer than turbot. In Henry 8th's reign, a small one, sold for more than a fat capon;
and a large one, for the price of two house lambs in February. In these degenerate days, I am afraid, neither fishmonger nor butcher, can be persuaded to give, the one, ten tarbots for a pike, and the other, a couple of lambs. As taste is often subservient to fashion-and as the dear, must, of course, be the fashionableprobably taste had no more to do with the reputation pike formerly enjoyed, than it has for the modern preference of house lamb.

The quality of fish, depends greatly on food. The pike of the Medway, at those seasons when feeding on smelts, are in the highest condition, and of remarkably fine flavour. Nor is this at all extraordinary. The honey, from bees which collect it from particular flowers, is peculiarly flavoured. The partridge which lives among heath, more nearly resembles the grouse, than the partridge of other localities. And this is natural. Since food replenishes evaporation, it is clear that food must impregnate the substance, with its own appropriate characteristics.

Of the sturgeons (accipenser), there is one-the common sturgeon (A. sturio), which pays an occasional visit to the Wye: and a personal struggle has several times ensued between fish and biped-not always to the glory of the latter-for they are known to reach more than four cwt. This is the largest fish that seeks fresh water, for the purpose of spawning. In spite of its bulk, and alliance with the shark, it is perfectly harmless; and exhibits in its structure, a very low degree of organization. Its skeleton is cartilagenous, and not bony; and the tail has one lobe much shorter than the other. Its flesh is tolerably good; and it is particularly valuable for the eggs, which are manufactured into caviar; and for its air-bladder-from which the finest isinglass is prepared.

The flat fishes (pleuronectidæ), furnish one member of their family to Herefordshiro-the flounder. This is a very remarkable genus :- Whereas all other fishes swim on the belly, the flat fishes swim on their side. In the vertibrate kingdom, it is unique on another account-its want of symmetry in the head: both oyes are placed on one side; and an animal, to be symmetrical, must
possess the two sides counterparts of each other, supposing it to be vertically divided exactly in the middle.

Those who have been deceived by its changes, into the belief that the parr was not the young salmon; and who have thought, that from the many variations observable in trout, that there was a multiplication of species, might find some striking analogical reasons for a contrary opinion, in the natural history of the flounder. In this curious fish, one side is usually colored; the other, white. But we often find them colored on both sideswhite on both sides-with brown patches on the white-and even with their eyes and color, on the opposite side to which they are generally placed. These, are far greater, and more important deviations, than we tind in either salmon or trout; yet they are mere varieties of one species.

Of eels (murena), we have three species in this county-the broad-nosed, the sharp-nosed, and the snig. Strictly speaking, they are fresh-water fishes; yet, whenever they have the opportunity, it is said they migrate to the sea. It has been suspected, howerer, (and as far as my own observations extend, I think with truth) that a large majority of them, if not the whole, remain during winter, in the estuaries, Of all our fishes, it is the most susceptible of cold; and as I remarked when speaking of salmon, the mixture of salt and fresh water, is warmer than either, unmixed. When, therefore, they reach the higher temperature, it is unlikely they should pass through it, into a colder; particularly, as every-day experience shows us, that the sea is neither necessary to their health nor propagation. It has been said, too, that those eels which have the means of migrating, reascend the rivers, to deposit their sparn. It is probable, some may do so: but that great numbers of them spawn in the estuaries, or in the sea, if they penetrate as far, is certain. If not, whence comes those multitudes of young ecls, whose periodical passage up the Thames, is called eelfare? Whence the transit of those myriads of elvers, up the Severn and its tributaries? Obviously the result of fish which have spawned below. Both these names, eelfare and elver, appear to have the same derivation; being
compounded of eel and fare ; the latter, a Saxon word, signifying to go, or travel ; and it is still retained in our language, with its original meaning;-for instance, in the words, "thoroughfare," and "wayfarer."

That eels did spawn at all, was long denied. They were considered viviparous; and the presence of a multitude of threadlike living creatures, being found in them, at certain seasons, appeared to sanction the idea. These, were not, however, the young eels; but one of the internal parasites, to which this fish is peculiarly obnoxious.

Some very odd notions have prevailed, respecting the propagation of eels. Pliny, says they are produced from bits, separated from the parent bodies, by friction against rocks: thus degrading the fish, to at least a lovel with the polypi. But Helmont favors us with as strange a receipt for engendering eels, as can well be imagined. He tells us to "cut two turfs, covered with May-dew, and lay one upon the other, the grassy sides inward, and expose them to the heat of the sun. In a few hours, there will spring forth a great quantity of eels."

Though many fables have been related of the cel travelling by land, it certainly can make its way for some distance:-the singular arrangement of its gill-covering, by not exposing the gills themselves to the atmosphere, enables it to live, for many hours, out of its native element.

A curious discovery of pulsation in the tail of the eel, was made by Dr. Marshall Hall, in 1831. This pulsation is wholly unconnected with the heart; and beats more than double, in the same time. Dr. Muller, Professor of Physiology, at Bonn, found that these pulsating sacs in the batrachia-such as the frog, salamander, and others-contain lymph, and direct its motion. The pulsation in the eel is probably lymphatic.

The electric eel (Gymnotus electricus), not being one of our fishes, I merely allude to it, for the sake of noticing the singular fact, that so long ago as the days of Anthony and Cleopatra, their physician, Dioscorides, recommended, for medical purposes, the shock of the electric eel-the earliest record extant, of the application of electricity to medicine.

The last fish, to which $\mathbf{I}$ shall now refer, is the lowest, in this division of the animal kingdom-the lamprey (petromyzon). We have four species in England; three of which, if not the fourth, are found in the rivers of this county. Two of them (P. fluviabilis, and P. plauerii), are often called lamperns: why, it were perhaps difficult to say, unless to puzzle Ichthyologists. They are true lampreys. By means of their circular fleshy lips, they adhere firmly to stones or fish; piercing the strongest integuments of the latter, and preying on their substance.

To those, who have never cxamined this remarkable fish, it must seem utterly incomprehensible, how, when adhering closely to any object, by means of the mouth, the process of respiration can be carried on. But like every thing else, in nature, it is modified in accordance to the circumstances in which it is placed. Most fish have free gills, which open to expel the water that has been taken in by the mouth. But the lamprey is constantly so situated, as to make this process impossible : it is, therefore, supplied with a power of breathing, by means of external orifices, through which the water is both inhaled and ejected-altogether independent of the mouth.

The marine lamprey is found in the $\mathrm{Wye}^{\prime}$, as well as in the Severn, during summer. Like all sea fish that mount the rivers, its purpose is to spawn. This it does, in pairs, while the smaller species congregate in large masses.

The common river lamprey, was supposed to visit the sea. Mr. Yarrell says, that his own observations lead to a contrary conclusion. I have myself seen it in the Wye early in February -long before the marine lamprey has left the salt water; and bence conceive that Mr. Yarrell is right. The pride is much smaller than the others; and though often called the mud lamprey, it is not a real lamprey; for as the mouth docs not form a circle, it is incapable of adhering to stones, or any other object.

Between those fish that swim near the surface-such as the trout-and those that live at the bottom-as the flounder, loach, and eel-there is a great and important distinction. The former, have a higher standard of respiration-a lower degree of muscular

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irritability-a greater necessity for oxygen-die, almost as soon as taken out of the water-and whose flesh, quickly decomposes. While such as frequent the bottom, have a low degree of respiration-great muscular irritability-less necessity for oxygen -live long out of water-and the flesh, not so soon subjected to decomposition. Thus is each, peculiarly adapted to its general abiding place; for I need scarcely say, it is a mere vulgar error to suppose that fishes breathe water. Their life is sustained by air, as well as our own. The water taken in, either by the mouth, br by an apparatus fitted for the purpose, in passing through the filaments of the gills, imparts to these, the oxygen of the air it contains; receiving carbon in return; precisely like any of what are popularly considered, air-breathing animals. The water, in its passage through tho gills, is not decomposed; but merely the oxygen extracted from the atmospheric air contained in the water. Deprive water of this air, and no fish can live in it. Now as-especially in cold weather-the ground fish are partially, and often wholly, buried in sand or mud, their low degree of respiration, is perhaps necessary to existence; as in such a situation they must obtain a more limited supply of air, than in the free and open water : thus, not very remotely, approximating to the hybernating animals of earth.

I must close these slight remarks on the Ichthyology of Herefordshire, by adverting to one part of the economy of fishes, which remains unexplained-at least satisfactorily-the airbladder. Its office, is usually supposed to be that of enabling the fish to raise or depress itself in the water, at will, by a sudden and voluntary alteration of its own specific gravity. But this may reasonably be doubted; for at least one fourth of the race are without it. Were this large proportion, condemned to crawl at the bottom, we might have better reason to believe the airbladder necessary to empower the fish to rise. It is not so, however. The cartilagenous tribes, are deprived of it; and we have a familiar instance, in our two species of mackerel-both, having bony skeletons; and both possessed of precisely similar habits;-yet the one has an air-bladder, and the other has not.

If the air-bladder enable the animal to rise and sink, at pleasure, it is clear, that the one without such organ, and which can yet perform the same office, must either have some compensating power, hitherto undetected, or the air-bladder is not necessary for the purpose to which it is commonly presumed applicable. No scrutiny has been able to discover any equivalent, in those genera which have it not : and it would seem, at least, very anomalous, to be requisite in the progression of one, and not of another, unless the structural difference were far more considerable than it is found to be, in many instances. Chemical analysis has proved, that the air contained in these bladders, is not atmospheric air; nor is it universally the same in all fishes-nitrogen being in excess in some species, and oxygen in others; which would lead to the deduction, that it was not a mere swimming apparatus; for they are filled with an animal fluid; and I am not aware that in any branch of physiology, a natural secretion is elaborated, except in connexion with some vital function; which the simply moving upward, or downward, in the water, cannot be considered. We must, therefore, look for some faculty in those, to whom has been granted this additional organ, which is not held in common with such as are deprived of it: for in all animate nature, where the organism is varied, so I believe, are the demonstrations.

For such reasons as these, I am induced to conclude, with Dr. Priestley and the ancients, that the air-bladder in fishes, is designed for other purposes, than merely ascending, or descending, through the water.

The discovery of what these may be, is still to be made.

## NOTE.

P. 4.-"Hozever closely outward forms may approximate, there is no instance, so far as I am axare, of a coincidence of formation, in the osteology of different species of the same genus."

When this paper was read, at a Meeting of the Naturalists' Field Clubs of Herefordshire, Worcestershire, and Gloucestershire, the above position was denied; and the felidæ adduced in opposition to the text. I consider, however, that we can scarcely be justified, in illustrating one great division of animate nature by another. The laws which govern the one, may be totally different from those which influence the other. This must apply, with the greatest force, when two classes of animals, so far removed in the scale of creation as fishes and terrestrial mammalia, are compared. I was speaking of Ichthyology, alone. Nevertheless, I think it will be found to apply, as a general rule, to every grade of animal life-the felidæ not excepted. The numerous species of the genus felis, very closely approximate in their osteology: but even here, it is only approximation-not identity. Mr. Owen has shown a difference between the skull of the lion and the tiger, for instance. The structural distinction, however, between even the largest and the smallest of this genus-between the lion and the cat-is so trifing, that Zoologists determine the various species, by other than anatomical details. Still, I cannot but think-since the only permanent character is the skeletonthat wherever this principle is unrecognized, there must bo perplexity. So closely are the felidæ anatomically allied, that Temminck considers them zoologically indivisible. But what Naturalist, has ever so affirmed of any genus of fishes? However nearly external appearances may approach-as they do, in some of the salmon species-I am bound to say, that I am not aware of any instance, in which structural difference does not mark species; and therefore conclude that anatomy is the true basis to distinguish them. Even were this not recognized by Naturalists, and an observer of fish noticed, that there was a striking distinction between the anatomy of different species of the same
genus, he would be startled to find, in the course of his researches, two so called species, in which there was no structural distinction; and would judge them to be misplaced. So would an observer of the feline tribes, on finding the anatomy of various species to shew very trifling differences, be surprised to detect in two of them, a wide dissimilarity. I believe no instance of this has occurred: if it ever should, the supposed species would probably be removed from the genus to which it had hitherto been supposed to have belonged; and if not referable to any other, would either form a separate and new genus, or hold the isolated position of an anomalite.

I must therefore conclude, that where there is a very marked difference, between any two species, a similar marked difference will extend through every species of the genus; that where the difference is trifling between any two, such trifling difference will characterize the whole; and that there are no classes, which will not come under one or other of these rules.

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OF TIIE

WOOLHOPE

NAT'URALISTS' FIELD CLUB.

No. 3.

HEREFORD

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## THE ADDRESS

Of the retiring President, Charles Lingen, Esq., M.D., read in his absence before the Members of the Woolhope Naturalists' Field Club, at their Annual Meeting, held in Hereford, January 26th, 1858.

Mr year of office has closed, and it now becomes my duty-a somewhat embarrassing one I find-to give an account of our proceedings since you did me the honor, twelve months ago, to elect me your president ; but I must first record my acknowledgements for the honor conferred, which I felt to be as unmerited, as it certainly was unexpected ; indeed, had I known of your decision in time, I should have entreated you to reconsider, and reverse it: but I had no choice. My professional occupations, though scientific in their nature, only border on those branches of knowledge to which the attention of this Society is devoted, and leave little time for such pursuits. Being fully aware that those subjects demanded of your leader more than a general familiarity with them, I entered on my duties with timidity; yet thanks to the efficient and ready help of my fellow-members, my duties have been lightened, and my presidential cycle has passed off very pleasantly as regards myself, and not fruitlessly as regards the Club; if success has attended its labors, the merit of that success is essentially its own.

It is from combinations such as these, scattered throughout the kingdom, that so much has been effected, and is yet to be hoped for, in accumulating material for purposes of gencralization, and for
testing theories on a large seale: each member is expected to do something in his own department. In our ease, I hope we may feel this Club has done its part. Nature herself exhibits phenomena illustrative of this idea; the vegetable kinglom, with which I clain to be more familiar, perhaps as prominently as any. The prodigious results attained by vital actions coincident and long-sustained, manifested in trees that excite our wonder by their bulk and solidity, are the products of the minutest contributions unceasingly deposited and sent downwards from the leaves. Again, the enormous amount and exceeding variety of nutriment for man and animals, stored up in form of grains, fruits, or leaves: the supply, too, of silk and of cotton, that give clothing to half the civilized world, illustrate the same fact. Let these serve to remind us how essential is individual labor, and how much may be done by combined energy in the natural sciences.

I am indebted to so many of our friends for aid in preparing my report, that I find it difficult to make acknowledgements-yet I must mention especially the assistance I had from Mr. Ligertbody, Mr. Salifey, Mr. Barker, Mr. Banes, and Mr. Cocking, in the Geological department; to Mr. Edmunds I owe much in the Botanical section ; and to Mr. Smiti for his accurate observations on Meteorology, so ably drawn up.

We now turn to our three meetings during the year. The first, fixed for Tarrington, a convenient place whence to explore the Woolhope Valley of elevation, came off on the second of June, and as we were honored by the company of the Malvern Club, we mustered much stronger than usual--breakfasted at the "Foley Arms"-after which we visited the mansion and gardens at Stoke Edith; Lady Emily Foley, who was from home, having kindly ordered them to be thrown open for our inspection.

We next proceeded to the "Landslip," a spot conspicuous from afar to the tourist, and of great interest to the geologist. The obvious cause of this enormous "slip," was percolation of surface water: it took place suddenly some twenty years ago. The rock
itself consists of upper beds of Aymestrey Limestone, composed for the most part of Madrepores, Corals, and Shells of the Pentamerus, Atrypa, Leptrena, Orthis Orbicularis, Rhynconella, \&c.; but time and weather are fast effacing these memoranda, and vegetation is attempting to conceal the masses of rock that lie scattered over an area of two or three acres,
> "Like crags and rocks confusedly hurled, The fragments of an earlier world."

In proceeding hence along the outer northern border of the great upheaved valley, the botanist recognised an abundance of the Centaurea Scabiosa and Saxafraga Granulata. The party now proceeded towards the British Camp, known by the name of the Saxon "St. Ethelbert," where part of the earthworks are still discernible : hence were brought within view classic "Siluria," the Syenite of the Malverns, the Basalt of Titterstone, the Old Red of Radnorshire and Breconshire, the Cornstone ridges of Horefordshire, and the Limestone wall of the Forest of Dean, with the Oolitic formations of the Severn and Cotswold. It was on this spot that the Club experienced the hospitality of $\mathrm{Mr}_{\text {r }}$. Evans, of Sufton Court, who, though absent from the mansion, had ordered there an excellent supply of refreshments. After dispensing these beneath the lofty well-known Firs, we proceeded to Hutton's or "Adam's Rocks," at the eastern edge of the camp; from this place the "Valley of Elevation" is seen at a glance, and the central Dome of Caradoc Sandstone rises through the deposits before you to the south-east.

The geologists of the party then made for the Dormington Limekilns, as mentioned elsewhere ; the botanists met with Paris Quadrifolia, Hieraceum Murorum, Geranium Lucidum, Helleborus Frotidus, and Viridis; also the Allium Ursinum, or Wild Garlic, in abundance. In Dormington Wood, and near the Limekilns, were found the Ranunculus Parviflora, and the Columbine or Aquilegia Vulgaris, Chlora Perfoliata, Eurotium Cicutareum, Filago Minima, and Verbenum Lactanæ; the Convallaria Majalis was also met with plentifully in Checkley Wood.

Tre dinel at the Foley Arms, and were joined by the Members of the Nalverin Club and several visitors. After dimner Mr. Synonds (who had been prevented by indisposition from joining us at Adam's Rocks, and there giving the party the benelit of his complete knowledge of the subject, and the locality, by a lecture on the spot) favored us with an able address, noticing recent important discoveries in geology, such as animal remains found in the Long Mynde Rocks, near Church Stretton, hitherto believed to be azoic ; the discovery of the remains of fish in the South Wales Coal Fields by Dr. Bevan, and of a highly organized flowering plant in the Neweastle Coal Shale: also the new light thrown on the "tile-stones" by the researches of Me. Dinks, and the greatly enlarged range over which Trilobitic life extended, \&c. Then followed an animated discussion, sustained chiefly by Mr. Lees, of Worcester, and Mr. Flavel Edmunds, of Hereford, on the sudden appearance of plants, rare in the district, in railway cuttings ; Mr. Edmunds maintained that they clearly resulted from the germination of seeds, buried for ages, but still retaining vitality; $M_{\text {r }}$. Lees considered that such seeds must have been brought thithor by the winds, and rejected the admissibility of the other explanation.

Your President then called attention to an interesting specimen of a hybridized tree from the garden of Mr. Godsale, of Hereford: its stock was a yellow Laburnum, which had been ludded with a purple one, and for several years produced only the pruple flower of a Laburnum ; now, however, besides here and there perfect purple and perfect yellow flowers, appeared a third and distinct kind, the Cytisus, as separate and as perfect as either of the others ; indeed the small branch which was shown had all three on it. Mr. Elmes Steele subsequently wrote that Mr. Saunders, of Abergavenny, lad a tree in his nursery showing the same facts. Mr. Blashill also reported a similar case in the nursery of Mr. McPierson, of Plaistow, Essex. Several speculations as to the cause of this most xemarkable fact were hazarded, but it was eventually allowed that the whole was the result of Iarrs purely vital and beyond our
scrutiny; it is curious that in each case the Cytisus blossom was the last, by several years, to appear; one thing appears proven at all events, namely, the very close affinity of these several plants to each other. After a brief lecture from the President on sceds, and the essential differences 'twist the seeds of flowering and the spores of non-flowering plants-the chief distinctions being, that the former possess an embryo ready formed, the latter being formed at the time of germination-the meeting broke up.

Letters addressed to the President were read, among others from Sir Roderick Murchison, also from Professor Sedgitick and Mr . Lewis, expressive of their regrets at being unable to attend. The former venerable geologist, alluding to his early associations with the locality, and to a recent visit to it with Professor Ramsay, added, "I assure you that I never can visit that wonderful scene too often, and that I infinitely regret being prevented doing so on this occasion."

The second meeting, on July 21st, was at Ludlow; "Jupiter was not propitious"-the early part of the day was wet, yet we mustered well, and 22 sat down to dinner. The first rendezvous was Forge Bridge, the entrance on the Downton Silurian district; here the fine-grained compact Downton Limestone (a capital building stone) exhibits the topmost member of the Silurian system, and therefore the deposit immediately inferior to the "Old Red." Col Colvin acted as our guide, and conveyed a cordial invitation from Mr. Tarratt, to lunch at the Castle, which the Club accepted, though they had to regret the unavoidable absence of Mrr. Tarratt.

The geology of the day is recorded in another place. Among the plants bagged by botanists were Polypodium pryopteris, and Aspidium filix fomin: Cystopteris fragilis, Cetarach officinarum, and many more common ferns; the Trifol arvense, Campanula trachelium, Fedia Carinata, were among the Phanarogamous plants. We dined at Ludlow, after which Mr. Ballard exhibited specimens of wood (of the oak and poplar) illustrating the different results of artificial and natural pruning; he remarked that long and careful observation
convinced him that artificial proning was an error, for as in these cases the new wood blended imperfectly with the wounded part, leaving either a cavity or a knot, calculated to spoil the timber; and that such was not the case where pruning was the effect exclusively of a natural process. This led to a discussion on the nature of "adventitious buds," or buds produced otherwise than from the axilla of the leaf (the ordinary or normal source), as for instance from roots of some trees-the clm, the cherry, and the acacia; or from other parts of the ascending axis of certain trees-those of the willow and ash for instance, which have the power to produce adventitious buds in abundance, as shown by the ready supply of hop-poles from the branches produced by these buds. Your presi dent took cccasion to remark that to the late Mr Knight, of Downton, is due the merit of first calling special attention to the elucidation of this most interesting fact-the distinction 'twixt the ordinary leaif-bud and tize adventitious one ; and then proceeded, by the aid of diagrams, to compare the flower-bud with the leaf-bud, and to show that each part of the flower is really a modification of a leaf, or in othe: words is made out of a leaf, and that the flowerbud in all importaiat respects is the analogue of the leaf-bud, but destined for a different object, and a briefer existence.

Mr. Cocking exhibited various specimens of Protaster, and gave a brief history of their discovery in the Downton rocks. The Rev. Mr. Green gave a description of a curious and nearly prostrate pear tree, well known as "the Dig Pear Tree," in the Vicarage garden of Holme Lacey. It is remarkable from the circumstance of its slender and disproportionately long branches having extended in all directions, and then become depressed, so as to reach the ground, where eventually some of them have taken root, and thus become independent centres, if not detached trees! There are now about 18 of these branches, which from their peculiar spiral growth have a fantastic appearance, and cover a space of nearly 4000 square yards ; in years past it was known to cover nearly 7000 yards; different occupiers, however, of the Vicarage, have cut away many
of the limbs or centres. It has been said that 20 hogsheads of perry have been made in one year from this tree. There is a similar but smaller and younger tree in a meadow near, evidently grafted from this one. The spreading and spiral tendency of the branches is peculiar to the sort; the rooting of prostrate branches of such magnitude is perhaps without parallel in a pear tree, and worthy of record.

Our last gathering was at Shucknell Hill, Weston Beggard, selected for exploring the precipitous upcast of Silurian rocks there, the "Old Red" in the vale, separating it on the south east from the Woolhope elevation ; the "Trap" Dyke near Hagley Park, Bartestree, and the famed "Dome of Hagley," lie to the west of it. The route comprising the opposite side of the valley was chosen for the first meeting of the year. We commenced at Westhide, on the north slope of Shucknell Hill, where we were hospitably entertained at the Vicarage by the Rev. Henry Bulmer. Here a prodigious elm in his lawn gave occasion for a discussion on the age of trees, and their powers of repairing injuries. Much of its centre or heart-wood was decayed and gone, but by extraordinary efforts masses of new wood had found their way inwards, and in a fashion repaired the loss, by the formation of a spurious heart-wood. The party now made its way over the Hill, visiting quarries open here and there, and finally to the abrupt section that faces the south, and is so conspicuous from the Tarrington road, but were not successful in obtaining new fossils. Next followed the "Trap Dyke;" here a conical jet of Toadstone was traced through the Sandstone and Limestone, which latter still bears evident marks of the molten mass that was forced through it. It is evident that the erupted matter did not overflow, but cooled down as it reached the surface; it was noticed also, that Sandstone on either side of the chasm lay horizontally, probably owing, as was suggested by Mr. T. T. Davies, to the abrupt and sudden manner of its intrusion. Near this is "the Dome," an upheaved mass of Downton Sandstone and upper Ludlow-the scene of the discovery of the Fish bed by
the late lamented Mr. Scobie, the first Monorary Secretary of the Club. We dined at Hereford (Mitre Hotel). Afterwards the Honorary Secretary mentioned the discovery of the Romlstone fossil alluded to clsewhere (the specimen itself now being at the Museum of Economic Geology)-its discovery is esteemed one of the highest importance. Dr. Bull called attention to the rapid spread of the Anacharsis, and its presence in our Canal ; also to the circumstance that it had been found at Northampton in 1836, and that Dr. Hooker had noticed it in Scotland in 1841. Mr. Flavel Edmunds was now requested to revert to a subject discussed at Tarrington-that of buried seeds-he gave many instances, chiefly from excavations in railway cuttings, where plants, fresh to the district, had sprung up in great abundance: illustrating as he believed, the admitted fact that seeds may retain their vitality for an almost indefinite period, if separated from those essentials to germination, air, moisture, warmth, and darkness. Your President instanced a fact in support of these views, in the sudden appearance, and very great amount, of the equisetum in the Brick-yard at Shelwick, alongside the Shrewsbury and Hereford Railway, where previously none had been observed. Botanists made no important "finds." Campauula Potula and Lepidium Smithii were the most notable.

## THE GEOLOGICAL SUMMARY.

It will be expected that an Institution, whose field is Siluria, and which even takes its name from the most remarkable spot of that remarkable region-should have a word to say about geology. Nor will that expectation be disappointed, seeing that it is our good fortune to number among ourselves several acute and successful observers. No special discoveries, that I am aware of, were made by the Members in their Field Days during the past year, as had been the case in a former year, when they found the footprints of a
crustacean on the sandstone slabs in the large quarry at Puddlestone; yet by the kindness of Mr. Salifey, and Mr. Lightbody, and Mr. Banes, as well as of our late President, the Rev. William Symonds, I am enabled to announce to you the discovery of several interesting fossils in different localities of this County, or its immediate neighbourhood.

In the Ludlow district, the lower Ludlow beds at Churchill, near Downton, have yielded to the persevering researches of the two former gentlemen, Mr. Cocking, and other local observers, at least eleven different species of Asterias, or Starfish, which have been named Protaster ; a new genus intermediate between the Trilobite and the Limulus, and named Limuloides; three or four species of Phyllopod, a crustacean resembling the Shrimp, with a beautiful tail, and a new species of Cornularia.

In the same neighbourhood, at Forge Bridge, though in the upper Ludlow Bed, several imperfect specimens of the Pterygotus were found. In a similar situation, namely, at the top of the upper Ludlow Rocks, in Stoke Edith Park, Mr. Banks reminds me that the Members found a layer of carbonised fucoid plants, as well as a small species of the Trilobite family, which has been named Lichas Bucklandi (or Hirsutus). At Ludford, the same beds-those immediately below the Downton Sandstone-have yielded remains of Pteraspis, Cephalaspis, Eurypterus, and Pterygotus, also some pustulated curved plates, having teeth on the outside of the curve; they are supposed to belong to a fish. The railway cuttings of the same neighbourhood, through the beds at the bottom of the "Old Red," have furnished an immense quantity of remains of the Pterygotus, of two different species, Pterygotus Anglicus and Pterygotus Acuminatus; also two species of Eurypterus, and a Cephalaspis, named by Sir P. Egerton, "Ornatus," besides a smaller specimen which he considers to be generically distinct, and names Anchenropis Lateri. The same beds have also supplied specimens of the spines and skin of Plectrodus Mirabilis, and two species of bivalve Crustaceans. The lower strata of the "Old Red"
on the banks of the Teme, near Downton, contain a " fish bed," in which have been found the Pterygotus, Eurypterus, Cephalaspis Murchisoni, with the Ornichus and Lingulis.

Our friend Mr. Symonds, has also brought into notice a fine specimen of a crustacean allied to Eurypterns, which was discovered by an intelligent working man at Rowlstone, near Ewyas Harold, in this County, in a Sandstone bed of the upper Cornstones of the "Old Red" at Rowlstone, and which, through the kindness of the Rev. Mr. Wenman, in whose possession it now is, many of us have had the opportunity to examine.

Various fossils from this county and neighbourhood are to be described by Mr. Salter in the forthcoming number of the Decades of the Geological Society.

The Quarterly Journal of the Geological Society for August, 1857, contains a description, by Sir R. Murchison and Sir P. Egerton, of some entirely new fossil fishes, discovered by Mr. Saliwey and Mr. Lightbody ; by the former in the "Old Red" of Acton Beauchamp, and by the latter in the bone beds of Lucton.

And last but not least, the discoveries of organic remains in water, as low down in the scale as the Cambrian Rocks, has been made in the neighbourhood of the Malvern Hills by Dr. Grindrod, of Malvern. The green Hollybush Sandstone of the Malverns are generally ranked as of Cambrian age, inasmuch as the black shales above them contain Trilobites, found in other parts of Europe in strata older than the base of the Llandilo flags. The fossils discovered by Dr. Grindrod are the tubes of ancient marine worms, which have been named "Arenicola Antiquissima." It would appear more than probable, from certain specimens of Trilobites associated with shells-which as we learn from the Edinburgh Philosophical Journal were lately exhibited by Professor Dawa at the American $\Lambda$ ssociation for the Advancement of Science, as having been discovered in a deposit called the Potsdam Sandstone of the Cambrian age-that the Cambrian deposit was by no means so destitute of life as has been generally supposed.

## EXTRACT OF REPORT

Of Meteorological Observations taken at the Hereford Infirmary, from June 1st to December 31st, 1857.

Mr. Smith, the intelligent House Surgeon of our Infirmary, commences his report by enumerating the apparatus belonging to the Society, that came into his possession the 25th of April last, and consisted as following :-A Meteorological Observatory, Barrow's Barometer with attached Thermometer, Maximum Mercurial Thermometer, Minimun Spirit Thermometer, black bulb Maximum Mercurial Thermometer, Hygrometer consisting of a wet and dry bulb Thermometer with glass for holding water, Rain Guage, graduated Glass Jar for measuring rain, Glaisher's Hygrometrical Tables.

He then records the valuable aid he had in Mr. Glegg Bullock, in making punctual note each day from the first of June. So few occasions being missed as not to affect the averages importantly.

The Observations were taken twice in the 24 hours, viz, at 9 a.m, and $3 \mathrm{p} . \mathrm{m}$. A general summary has been made out at the end of every month, a copy of which he regularly forwarded to Mr. Glatsher, and one to each of the local papers.

Mr. Smith suggests for your consideration the following additions to the instruments : a good self-registering Anemometer, a proper Weathercock, another Rain Guage, a Minimum Thermometer for the grass, Ozone Papers, a Flood Guage or River Guage.

The following summary of the Meteorological Observations for the seven months from June 1st to December 31st, 1857, may contain points of interest to many of you, and be useful as a record of facts.


From this table it will be seen that the BAROMETER rose lighest in December, but the highest mean was in November; reached its lowest ( 28.563 in.) in October. The THERMONIETER was highest in June, but the highest mean was in August; was lowest and the mean lowest in November. The DRIEST MONTH was June; the dampest was December ; and every month from September increased in humidity. The ATMOSPIIERE was lightest in August, and heaviest in December ; its weight increasing through the Autumn to the end of the year. RAIN-the greatest amount fell in August, the smallest in December; the greatest number of rainy days was in October; the smallest number in July and November; the rain in December consisted chiefly of light showers. CLOUD-August was the brightest month ; October was the darkest. WIND-Westerly winds prevailed through. wut this period, about 21 to 1 over the East wind, about 5 to 1 in the first quarter, and 4 to 3 in the last; South winds prevailed over North in each quarter about 2 to 1.


## THE ADDRESS

Of the retiring President, G.P.Bevan, Ese., M.D., F.G.S., read in his absence before the Members of the Woolhope Naturalists' Field Club, at their Annual Meeting, held in Hereford, on Tuesday, January 25th, 1859, by the Chairman, The Rev. J. F. Crouch.

## Gentlenen of the Woolhope Club,

The time has arrived when in accordance with the rules of our Society, I give up the reins of office to a new and worthier successor, and I do so the more gladly as I feel on looking back at the past year, that I have ill performed those duties which devolved upon me on undertaking the honourable post to which your kindness elected me. Whatever may have been my shortcomings as President of this Club, I can assure you that in ardent love for the science of Natural History, and particularly in interest for the welfare of our body, I yield to none. My chief difficulties during the past year have been, first, an accession of work to which I did not at all look forward at the commencement of the year, and secondly, the great distance at which I reside from our head quarters, and indeed from the whole district which is the scene of our labours. The very earth itself has conspired against me in -this matter, for although a Welshman, I am not so good a Silurian as I ought to be ; and living amongst coal measures, I have been obliged, and I must say, not very unwillingly, to devote my principal attention to that interesting formation. In almost every science each man has his speciality, and in geology, more particularly, a
speciality is a necessary-for although every geolowist should be fairly up in the general principles and features of all the rocks that compose our earth's surface, yet few of us can ever hope to reach the general perfect knowledge of a Lyell or a Manteld-but each in his department can carefully and thoroughly work out that formation in which circumstances have placed him ; and even should he not succeed in becoming an authority in his department, the very humblest observer, if he observe with care and caution, is contributing to the more solid foundation of existing lnowledge, and adding lis mite to the ever increasing train of discovery.

It is the duty of the retiring President to chronicle the events of the past year in the proceedings of the Chub, more particularly with regard to the excursions. With your permission, then, I intend in my address, first, to touch briefly upon the affairs of the Club, and sccond, to give a short outline of the geological events and discoveries that have taken place in the past year in the Palæozoic formations. First then, the state of the Club; upon which, as regards the number of Members and the commercial state of affairs, we may congratulate ourselves and our Secretaries, thougin I fear they have often more trouble than they should have in obtaining the current subscriptions. But while congratulating ourselves on our full lists, we have to deplore a vacancy which will be long ere it is filled up. Death has robbed us of one of our Members-one, whose knowledge of science and contributions to geological discovery not only reflected honour on the Club of which he was so prominent a Member, but also on the whole body of English geologists. As a geologist, we are all aware how honourably the name of the Rev. T. T. Lewis was associated with the early labours in the Silurian strata, and of the important value attached to his discoveries by the greatest authorities of the day. As long as geology endures, the name of the Aymestry limestone will ever bring back to memory the loss of our friend and late President, who was beloved and respected by all, as much for his private virtues, as for his scientific attainments.

The proceedings of the past year have not been so satisfactory as those of other years, as regards the out of door work. Our excursions were respectively held at Ledbury, Bromyard, and Usk; though the first and last were considerably marred by unpropitious weather. At Ledbury, where we were joined by our friends of the Malvern, Cotswold, and Worcestershire Clubs, we were fortunate enough to hear an interesting panoramic lecture from Mr. Symonds, on the summit of Braidlow Hill. But scarce was it finished, when Jupiter Pluvius and Jupiter Tonans put in an appearance, and drove us under cover, where, however, we passed a tolerably pleasant afternoon. At Usk the weather was still worse, and in point of geological work, none was done. I regret to say that I was not able to be present at the Bromyard meeting, which I understand was very pleasant and instructive, though attended by only a few Members. I do not, however, regard Field Days generally as occasions when much work is done, but what is of great importance, they are social gatherings where friends may meet and communicate to each other points of interest, new facts and theories, and all the latest intelligence in the several departments of Natural History, while the real work is done quietly and steadily, each one for himself, in his own locality.' The Woolhope Club rejoices in several parties, thorough workers, who by their accumulation of new facts and specimens, are doing good service in the cause of geology. If there is one locality in the district on which I should like to see more attention bestowed, it is that of our head quarters, the City of Hereford and its neighbourhood-the fluviatile deposits of the valleys of the Wye and Lugg, the classic valley of Woolhope itself, Hagley Dome, and other places, which might be more thoroughly worked out than they are at present.

With regard to the internal economy of the Club, a measure has been proposed which I hope ere long to see carried out, viz., the formation of a tabular list of fossils, arranged stratigraphically and locally, which have been found in the area embraced by the Woolhope Club. At present numbers of fossils, mostly typical,
and many new and rare, are in the cabinets of our Members, unknown save to the select few; and not only to the Members of the Club would it be a guide to what the district has furnished, but also an incentive to add to the list-while it would at once put the geological stranger in possession of the key to the fossiliferous localities, and would serve as an important feeder to the general stream of discovery, besides elevating our Club to something more than a mere local gathering.

I will now, in a few words, make some remarks on the recent researches and proceedings that have taken place in the Palrozoic rocks within the last year or two. Scotland has been the seene of greatest interest, owing to the vast expanse of country which was until lately but little understood and worked out. SirR. Murchison, who has been labouring hard at it, has pointed out, while laying down a more definite arrangement of the geological features of the country, many new and interesting facts, on which the new edition of Siluria, just published, has enlightened us. The Lower Silurian deposits in the northern part of Scotland, particularly in Sutherland, appear to be very different from the same deposits in this country, consisting of a series of quartzite with intercalated limestone highly crystalline, overlaid by quartzose and other crystalline rocks having a gucissose character. So little were these understood, that Profrssor Nicoll, of Aberdeen, was inclined to consider them as equivalents of the carboniferous rocks in the south of Scotland, while Hugi Miller regarded them as metamorphosed representatives of the Old Red Sandstone of the eastern coast. Mr. Peach however discovered in these crystalline rocks, fossils, which are determined to be of Lower silurian age, consisting of a Serpulites (S. Macculuchii) and a few fucoids from the quartzite, besides a series in the limestone-Maclurea, Ophiolite, Oncoceras, and Orthoceras, fussils which hitherto have been limited to the Lower Silurian series of North America, known as the Huronian rocks, and the limestones above them. With regard to the Upper Silurian beds, there have not been so many discoveries very lately - that is to say
in the old established Upper Silurian rocks-but it is in the dis. puted ground of the passage beds that the most important work is being done, and new creatures discovered in rocks which were formerly looked upon as unfossiliferous and uninviting. Some of the Members of our Club, especially our Ludlow and Kington friends, have been foremost in developing the strange forms of Pterygotus, Eurypterus, Auchenaspis, Ceratiocaris, that we are now familiar with; nor must I forget the Starfish bed which has yielded such uncommon fossils as the Palæocoma, \&c., to their diligent hammers. While they have been working ont their transition beds to such good purpose, Mr. Divid Page has exhumed even strangelooking forms from the Lanarkshire and Forfarshire beds, which until their exact positions have been defined, he styles SiluroDevonian rocks. From the Tilestones of the former be has got Pterinæa, Orthonota, Trincula, Avicula, Orthoceras, Eurypterus clavipes and Eurypterus spinipes, thus adding two new species to the twelve already known ; while the Forfarshire flagstones, which appear to the base of the Old Red, have yielded the gigantic tube of the worm (Scolithus) and two new crustaceans, which have been named Kampecaris and Stylonurus, as well as a small fish with kitelike head, armed with five spines, called Ictinocephalus granulatus. In the same beds he has also found a Cyclopteris and Lepidodendron. Perhaps these are the equivalents of the beds at Trimpley, where Mr. Roberts also found vegetable remains. The Old Red; since the days when Hugh Miller wrote his admirable little volume, "The Old Red Sandstone," has been so divided and subdivided that it has had a narrow escape of dying away altogether; but fortunately for it, the opinions which were for giving half of it to the Carboniferous system and the other half to the Silurian, have changed, and the Old Red is still Old Red.

Again, it is in Scotland that the most important work has been done. Sir R. Murchison has finally classed the rocks in the north-east under three divisions: the lowermost being conglomerates and sandstones, the equivalents of the Forfarshire beds and the
lower cornstones of this country ; the middle series or Caithness flagstones, bituminous and calcareous ; and third, the uppermost, consisting of yellow sandstones. These latter have been a vexata questio; for they have been described by Sir Richard Griffiths, in Ireland, as carboniferous, as also by Mr. Jukes. Their proper place seems to be now definitely settled as the uppermost member of the Old Red, and the equivalents of the Dura-Den beds in Fifeshire, which have proved so rich in fish remains. In this country, the same beds are to be found, according to Mr. Symonds and Dr. Melville, in the escarpment of the Daren, near Crickhowell, just underlying the mountain limestone and millstone grit of Pen Carreg Calch. Sir R. Murchison once found here a scale of Holoptychius nobilissimus, a very characteristic fish, which seems to corroborate the assumption ; and I hope some day in the course of the summer, to be able to examine it more thoroughly than I have yet done. The same beds are, I think, to be found on the opposite side of the valley of the Usk, under the limestone of the Llangattock quarries. At Dura-Den they appear to be one mass of fish remains in the most perfect preservation, and of the most characteristic type. A still higher point of interest lies in the fact that in these upper yellow sandstones, reptilian remains have been found of an organization still higher than even the Telerpeton Elginensis. The Stagonolepis, which was for long considered a fish, has been declared by Professor Huxley to present a very close resemblance in some points to the Crocodilian, and in others to the Lacertian tribes. In fact it diverges materially from all known and recent forms. This circumstance warns us not to pin our faith too strongly on the limits of animal life, for of late many an example has occurred which has forced us to become more liberal (to use a political phrase) in our determining points, both as to horizons of life, as well as individual features. Before I quit the subject of the Old Red, I must not omit to mention the discovery of the fish bed on the Wall Hills at Ledbury, which has yielded to the praiseworthy researches of two working men, Pteraspis and Cetiocaris,
associated with the Holoptychius, the earliest true carboniferous fish.
Ascending into the higher beds of the carboniferous system, I fear not so much has been done; although views have been lately put forth which will ere long change many of the theories of coal vegetation. One of the principal of these views is, that the waters of the coal measure age were all salt, and that there were no freshwater deposits whatever. I may mention here that water has frequently been found at the bottom of deep mines, strongly and thoroughly salt : and after all, the supposition that such fishes as the Cælacanth, the Palæoniscus, and the Amblypterus, belonged to fresh water, or that the Unio or Anthracosia was of fresh or brackish water origin, is very gratuitous, for Palæontologists are much in doubt whether the Uniones, the strongholds of the freshwater theorists, were not marine inhabitants. The botany of the coal measure flora is still dubious on many points, and there are several plants about which the geologico-botanists seem unwilling to pronounce a decided opinion. The great Stigmarian question seems finally set at rest, principally by the labours of my friend, Mr. Binney, of Manchester, but there are others still waiting to be solved, such as the true place of the Sigillaria, whether Asterophyllites is an aquatic plant or not, and several other exclusively botanical points, which it would be out of place to enter upon now.

As regards our local work, I have, in company with Mr. Adams, one of the Members of the Club, found seven species of fish remains, and upwards of fifty shells; and what is of more importance, I have succeeded in tracing a very abundant marine shell bed for nearly sixty miles throughout the coal basin. With Mr. Saliter's help in naming and classifying my fossils, some minor discoveries were made, further exemplifying the uselessness of limiting our zones of life too severely-for some 700 feet up in the coal measures, a shell was found, hitherto considered to have perished with the end of the mountain limestone series.

And now I trust you will not have considered me very tedious in my attempt to review some of the principal points interesting to us
as a Society, feeling assured, that though they are not all of local interest, yet they affect us all, for while we individually are local and minute workers, we are, or ought to be, cosmopolitan in geological and scientific knowledge. In bidding yout, therefore, farewell as President of Woolhope Club, let me remind you of the somewhat hackneyed but deeply significant proverb :-

"Ars longa vita brevis."

## NOTE.

While these sheets were passing through the press, a discovery was made, which, though not actually occurring in the area embraced by the Club, will be of sufficient interest to record; and that is, the observance of a protrusion of Upper Silurian rocks close to Cardiff, in a district hitherto entirely unsuspected, and indeed marked by the Government Surveyors as Old Red Sandstone. My attention was called to the fact by a letter which appeared in the Geologist for April, 1861, and I immediately visited the spot. The deposits occur in the rising ground of Pcu-y-lan Hill, about one and a half miles to the east of Cardiff, and are bounded on the west, east, and south by the Drift valley of the Taff, the valley of the Rhymney, and the alluvial marshes on the sea-shore respectively. On the west and south they are covered by drift, and on the north are overlaid by old Red Sandstone. The whole area, as far as I have at present made it out, is about one and a half miles in breadth, by one and a half in length. A quarry, the mouth of which faces the Bristol Channel, has been extensively worked. The beds appear to be Wenlock shale, of which there are also capital sections in the lanes around. They dip to the north-east at an angle of thirty degrees. The following fossils have been found-some by Mr. Glass, of Kensington, who first called attention to the facts, and a few by me. Bellerophon dilatatus, Athyris tumida, Ilænus, Calymene, Phacops, Acidaspis, Ormoceras, Natica, Rhynconella, \&c. I should be very glad if any Hereford Member would devote a day to a further examination of these beds with me.
April, 1861.
G. P. B.


## METEOROLOGICAL REPORT FOR 1858.

BY J. E. SMITH, ESQ.

All the instruments of the Society are in good order and preservation. To those already in our possession, the following have been added:-

1. A Black-bulb Maximum Thermometer.
2. Minimum Spirit Thermometer, for terrestrial radiation on the grass.
3. Lind's Anemometer for ascertaining the force of the wind.
4. Dr. Moffat's Ozone papers, and wooden box for suspending them.

I have also had a River Guage painted on the wall of the Infirmary lawn, to show the rise of the Wye at periods of flood; and a Weathercock fixed on the top of the building.

The Record of Observations has been kept with tolerable regularity throughout the year, and the monthly summaries, with the deductions from them, accompany this report.

Suveral interesting Meteorological phenomena have occurred during the past year.

A Total Eclipse of the Sun happened on the 15th of March, and in compliance with a request from the Meteorological Society, which I lay before you, I made observations every five minutes during the eclipse, and sent the results to the secretary, Mr. Glaisher. The clouded state of the atmosphere, both here and at most other stations, prevented these observations from being so useful as they otherwise might have been. The collected results of observers at various stations have been published by the Meteorological Society, and a copy forwarded me by the Secretary, which I lay before you.

The pamphlet contains much useful information, and some that may be interesting. I will merely read the concluding general remarks of the Secretary, Mr. Glaisher, and my own observations made at the time. "At 9 h . the sky was overcast, principally with cirrhus ; occasional glimpses of blue sky. At 11h. the sky still overcast ; clouds more dense ; wind sinking. At 12 noon, the clouds very thick; a slight darkness was to be perceived; birds were singing cheerily. At 12 h .15 m . the air still duskier ; birds were chirping, but less than before, and getting out of sight; blackbird began to sing as at evening; wind rising. At 12 h .30 m . very dusky ; clouds to the south of a ruddy tinge ; blackbird singing as before, but sparrows disappeared; the clouds very thick, and in riven shapeless masses, in layers towards the horizon ; wind rising; small rain. At 12 h .45 m . the clouds rather breaking, but very low; the sun visible for about $5^{\prime \prime}$ at the middle of the eclipse (about 1 p.m.) ; the glimpse of sky thus afforded was of a bright light blue ; the clouds continued to break up; light rain. At 9 h . the crocus was open; at 11 h . half open; at 12 h .30 m . nearly closed; at 12 h .45 m . quite closed. 1 p.m., from this time the clouds gradually cleared, allowing frequent glimpses of the sun, when a dark spot was observed on its face through the blackened glass."

I have received another pamphlet from Mr. Glaisher, on the mean temperature of every day in the year, as deduced from "Daily Observations taken at Greenwich, during forty-three years, from 1814 to the end of 1856 ," of which I have made some use in my own deductions.

Donati's Comet was decidedly the great Meteorological feature of the year 1858. Few of us ever saw so glorious and wonderful an object, night after night lighting up its marvellous transparency in the western sky, as it were a flaming sword to protect the gardens of the Hesperides; and when Arcturus shone through it like a brilliant diamond in the hilt of that sword, it certainly surpassed in beauty and grandeur all that I had ever witnessed before; and
even our elders, generally so loth to acknowledge that anything in these later degenerate days is equal to what was in the good old times, were obliged to confess that this equalled, if it did not surpass, the Comet of 1811. I have no remarks to make on this subject in addition to what have already appeared in the local journals.

The high temperature of August, the small amount of rain fallen, the damp and foggy atmosphere of October, the remarkably low temperature of November, and the mildness of December, are also remarkable features of the year.

A partial Eclipse of the Moon happened on the 27th of February, but was invisible from the clouded state of the sky.

On December 2nd, as Mr. Lingen was passing through the Vale of Wye, he observed a meteor in the clear sky at 4 r.m., the sun shining brightly all the time. It appeared in the N.N.E., and after moving a short space, leaving a trail behind, it suddenly disappeared. An account of this phenomenon having been published in The Times newspaper, elicited letters from observers in various parts of the country, who saw the same meteor. I have reduced and tabulated their observations, and forwarded them to Mr. Glatsher; a copy of the same is attached to this report.

METEOR SEEN AT FOUR, P.M., DECEMBER 2ND, 1858.

| Station. | Altitude at instant of dis- appearance. | $\left\|\begin{array}{c}\text { Direction at } \\ \text { instant of dis- } \\ \text { appearance. }\end{array}\right\|$ | Direction ot motion at instant of disappearance. | Remarks. |
| :---: | :---: | :---: | :---: | :---: |
| Brighton | $70^{\circ}$ | $\begin{gathered} \text { N.W. } \\ \text { by } \\ \text { N. } \end{gathered}$ | Towards N. E. obliquely down from zenith. | Trail $8^{\circ}$ long, only seen just at disappearance. |
| Hereford | $45^{\circ}$ | N.N.E. | Towards N.E. |  |
| Derby | $20^{\circ}$ to $30^{\circ}$ | S. by E. | From N.W.toS.E. first ascending, then descending in an arc. | Trail of bright sparks. Larger than star of first magnitude. Blue colour. |
| Alford, Lincolnshire. | About $40^{\circ}$ | S.W. | Perpendicular, started at about $45^{\circ}$ and descended $5^{\circ}$ | Started from thin belt of clouds, and disappeared in clear sky. |

In the month of June I received a communication from $\mathrm{Mr}_{\mathrm{o}}$. Glaisher, requesting me to record all observations of seasonal phenomena respecting the changes in the animal and vegetable world, such as the period of leafing and flowering of trees, the migrations of birds, the state of the crops, \&c. This letter was published in the local papers, and I soon after received from Mr. Woodiouse, of Aymestry, a very obliging communication of the observations he had made for several years past on this subject. He also kindly promised to continue his observations and send them to me from time to time.

Last summer the Quarterly Reports of the Registrar General usually supplied to us gratis, were stopped by order of the Government. Dr. Barker, of Bedford, took up the case on behalf of the Meteorologists, and after extensive correspondence, much trouble and expense, he succeeded in obtaining for us a continuation of the supply of their reports, which have since been regularly forwarded. It has been proposed to present Dr. Barker with a small testimonial, in the shape of a timepiece, as an acknowledgment of his exertions on our behalf, the subscription to be limited to five shillings; the greater number of observers have already paid their subscription, and a proposition respecting this matter will be laid before you to-day.

J. E. SMITH,<br>Meteorological Observer.

Hereford Infirmary, January, 1859.

| 1858. | Barometer. |  |  | Thermometers. |  |  |  |  |  | HyGROMETER.  <br> Degree Weight <br> of hu- of a <br> midity. of abio <br> 1000- cubat of <br> satura-  <br> foot  <br> tion. Air. |  | Wind. |  |  |  |  |  | Rain. |  | Weatiler. |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Mean. | Highest | Lowest. | Mean | highest. | Lowest. | Highest in sun. | Lowest on gras | $\begin{gathered} \text { Menn } \\ \text { of } \\ \text { Low- } \\ \text { est } \end{gathered}$ |  |  | N. | E. | S. | W. |  |  | No. of days. | Quantity collected | $\begin{aligned} & \text { Days } \\ & \text { fair. } \end{aligned}$ | Days over cast. | $\left\lvert\, \begin{aligned} & \text { Days } \\ & \text { vari- } \\ & \text { able. } \end{aligned}\right.$ |
|  | in. | in. | in. | 0 39.7 | ${ }_{56.1}^{0}$ | $\stackrel{0}{0}$ | 0 74.0 | 0 | ${ }^{0} 32.6$ | 899 | 552. | 6 | 7 | 8 | 10 |  | 6.3 | 8 | in. | 8 | 9 | 14 |
| February | 29.757 | 30.155 | 29.235 | 39.7 37.7 | 54.8 | 21.8 | 74.5 |  | 31.8 | 827 | 549.5 | 6 | 12 | 4 | 6 |  | 6.8 | 7 | 1.17 | 10 | 12 | 6 |
| March .. | 29.699 | 30.339 | 28.819 | 44.6 | 70.0 | 23.4 | 95.5 |  | 34.5 | 773 | 541.1 | 9 | 5 | 6 | 11 |  | 6. | 10 | . 24 | 10 | 15 | 6 |
| Quarter | 29.838 | 30.461 | 28.819 | 40.7 | 70.0 | 21.8 | 95.5 |  | 32.9 | 833 | 547.5 | 22 | 26 | 20 | 29 |  | 6.4 | 25 | 1.72 | 28 | 36 | 26 |
| April | 29.685 | 30.133 | 28.888 | 50.7 | 77.3 | 25.5 | 94.6 |  | 38.6 | 740 | 532.8 | 4 | 13 | 6 | 7 |  | 6.4 | 13 | 4.39 | 9 | 16 | 5 |
| May | 29.670 | 30.244 | 28.854 | 54.8 | 77.8 | 33.4 | 100.0 |  | 42.4 | 750 | 535.6 | 3 | 8 | 8 | 12 |  | 6.8 | 14 | 1.64 | 9 | 16 | 6 |
| June | 29.818 | 30.156 | 29.571 | 63.5 | 84.8 | 41.1 | 102.0 |  | 51.8 | 718 | 516.3 | 2 | 2 | 11 | 15 |  | 6. | 6 | 1.53 | 11 | 10 | 9 |
| Quarter | 29.724 | 30.244 | 28.854 | 56.3 | 84.8 | 25.5 | 102.0 |  | 44.3 | 736 | 528.2 | 9 | 23 | 25 | 34 |  | 6.4 | 33 | 7.56 | 29 | 42 | 20 |
| July | 29.709 | 30.000 | 29.189 | 62.8 | 80.8 | 39.2 | 100.1 |  | 48.6 | 749 | 518.4 | 5 | 2 | 7 | 17 |  | 7. | 17 | 2.11 | 10 | 14 | 7 |
| August | 29.762 | 30.187 | 29.467 | 64.8 | 86.8 | 41.1 | 102.0 |  | 48.8 | 740 | 517.7 | 6 | 3 | 11 | 11 |  | 6.4 | 14 | 2.56 | 12 | 12 | 7 |
| September | 29.794 | 30.263 | 29.296 | 61.9 | 82.6 | 39.7 | 104.5 |  | 51.3 | 835 | 517.5 | 2 | 4 | 12 | 12 |  | 7.5 | 14 | 2.14 | 4 | 12 | 14 |
| Quarter | 29.755 | 30.263 | 29.189 | 63.2 | 86.8 | 39.2 | 104.5 |  | 49.6 | 775 | 517.9 | 13 | 9 | 30 | 40 |  | 6.9 | 45 | 6.81 | 26 | 38 | 28 |
| October | 29.778 | 30.399 | 29.092 | 52.8 | 69.8 | 31.8 | 88.6 |  | 43.5 | 788 | 531.5 | 7 | 6 |  |  |  | 7.1 | 12 | 3.04 | 8 | 17 | 6 |
| November | 29.682 | 30.271 | 28.771 | 40. | 57.1 | 14.0 | 75.8 | 13.4 | 31.8 | 866 | 544.5 | 8 | 12 | 3 | 7 | 1.0 | 6.8 | 8 | 1.19 | 7 | 11 | 12 |
| December | 29.715 | 30.093 | 28.946 | 42.4 | 57.2 | 28.1 | 75.4 | 25.6 | 36.8 | 898 | 544. | 1 | 11 | 8 | 11 | 3.1 | 7.7 | 20 | 1.72 | 3 | 16 | 12 |
| Quarter | 29.725 | 30.399 | 28.771 | 45.1 | 69.8 | 14.0 | 88.6 | 13.4 | 37.4 | 851 | 540.0 | 16 | 29 | 20 | 27 | 2.1 | 7.2 | 40 | 5.95 | 18 | 44 | 31 |
| Year | 29.761 | 30.461 | 28.771 | 51.3 | S6.8 | 14.0 | 104.5 | 13.4 | 41.1 | 799 | 533.4 | 59 | 87 | 95 | 128 | 2.1 | 6.7 | 143 | 22.04 | 101 | 160 | 104 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

WEATHER, \&c.
Thunderstorms occurred.-April 16th, May 13th, June on 4 days, July 3 days, August 3 days, September 2 days, December 18th, and at several places round.
Thunder or Ligetning.-May, June 5 days, July 17th, August 30th, September 5th and 17 th.
Lunar Halos.-August 22nd, November 17th, and several other days.
Snow fell.-February 4 days, April 3 days $=7$ days.
Remarkable Rain.—January 30th and 31st, March 21st, April 7 th and 16th, June 3rd, July 16 th and 25 th, September 22 nd, December 18 th, 21 st, 22 nd, and 23 rd, with high winds.
Hoar Frost.--January, 10 days; February, 5 days; March, 4 days; April, 3 days; November, 8 days.
Fog prevalent.-Sanuary, 4 days; February, 4 days; September, 2 days; October, 11 days; November, 9 days; December, 7 days. Morning or Evening.-March, 3 days; April, 7 days; June, 2 days; August, 2 days.
Shootivg Stars.-January 4th; September, several nights; October 1 st, 8 th, and 30 th ; November 6th, 7 th, and 11th (none 12th, and on 13th and 14th too cloudy).
Meteors.-Zodiacal light several evenings in January ; a large meteor at 4 p.m. ; December 2nd, at Woolhope, by Mr. Lingen ; and at several other places in the County.
Aurora Borealis.-March 12th and 13th; October 8th.
Wye rose-January 9 th and 30 th ; March 14th; April 8th; June 17th; September several times; December 1st, 4 ft. ; 19th, 5ft.; 25th, 6ft. Very low in February; lower in August than had been known for 25 years.
Vegetation.-Leaf-earlier shrubs in March; trees in April; Pyrus Japonica in flower, February, March and April; Flower-ornamental trees in June; change colour-most trees in October ; fall of leaf-most trees in November.
Martin, cuckoo, and whentear about April 18th.

Cuckoo not heard after June.
Martins, \&c., depart in September.

## GENERAL CONCLUSIONS FROM THE FOREGOLNG TABLES.

In comparing the results of this year with the average of the same parallel of latitude, viz., between latitude $52^{\circ}$ and $53^{\circ} \mathrm{N}$., we find that for Hereford

The barometer is nearly the same as that average.
The mean temperature is $1.4^{\circ}$ above the average.
The degree of humidity ( 1000 saturation) is 799 , only 14 less than the average.

The weight of a cubic foot of air is 533 grains, being 9 grains less than the average.

Wind.-Less amount of N. and S., greater of E. and W.
Rain.-No. of days- 6 days more than the average- 1 inch more.

In comparing the same with the average of 4 years ( 1846 to 1849) taken at Hereford,

The barometer and mean temperature are higher.
Of rain there have been 10 days more and 13 in . less.
South and West winds have prevailed over North and East, iu the ratio of 3 to 2 nearly.

The fair days, or those with nearly cloudless sky, and therefore sunny, are about equal to the variable ones, and the overcast exceed them by about 60 days, so that rather less than half the year consists of overcast days, and of the remainder one half are fair and the other, or rather more than 3 months, are variable.

The following Table shows the mean temperature of each month at Hereford, and Greenwich Observatory, for the year 1858, and the same at the latter place as deduced from daily observations of 43 years, from 1814 to 1856.

| Month. . | 1858. <br> As corrected by Mr. Glaisher. |  | Average of 43 years. |
| :---: | :---: | :---: | :---: |
|  | Hereford. | Greenwich. | Greenwich. |
| January ... | $\stackrel{0}{38.8}$ | o 37.5 | 0 36.6 |
| February ... | 37.0 | 34.6 | 38.6 |
| Marchil ...... | 42.9 | 41.4 | 41.4 |
| April ......... | 47.8 | 46.2 | 46.2 |
| May ......... | 52.2 | 51.7 | 53.0 |
| June ........ | 63.0 | 64.9 | 59.0 |
| July ......... | 59.8 | 60.6 | 61.8 |
| August ...... | 61.2 | 62.0 | 61.1 |
| Sehtember... | 59.4 | 60.3 | 56.5 |
| October...... | 50. |  | 49.9 |
| November ... | 39.1 |  | 43.2 |
| December ... | 42.2 |  | 39.3 |

From this we observe that in 1858 February was the coldest, and June the hottest month, though in general January (9th) is the coldest, and July (30th) the hottest. The temperature at Hereford was above the average in all the months except February, May, July, and November. The first five months of the year were warmer at Hereford than at Greenwich. That August, though very hot on some days, exceeded the average by only one-tenth of a degree.

## WITH RESPECT TO THE SEVERAL MONTHS.

The Barometer.-Was highest ( 30.461 in .) in January, and lowest ( 28.771 in. ) in November. The highest mean was in January, and the lowest in May. Every month in the year it has risen above 30 inches, and has gone below 28 inches only 5 months.

The Thermometer.-Mean temperature increased from February to August, being higher in January than February From August it decreased to November, and was again higher in

December than it had been in January or February. The mean temperature of April was not quite $1^{\circ}$ below, and that of October just $1 \frac{1}{2}^{\circ}$ above the average of the year, 51.3 .

Moisture.-January and December were the dampest months, and June the dryest by a great excess. During the last quarter there was more moisture in the air than during the other three. The weight of the atmosphere was greatest in January, and least in June, from which month to September it varied but slightly.

Cloud.-The average amount of cloud was greatest in December, least in March and June, so that these last were the sunniest months; but the greatest number of overcast cloudy days was in October, 17 days, and the smallest number, 9, in January, and 10 in June. The greatest number of fair sunny days was 12 in August, and the smallest 3 in December, and 4 in November. In every month the overcast days exceeded the fair, except in June, when there was one more of the latter, and in August they were equal. The variable days, or those on which sunshine and cloud were tolerably balanced, were generally about the same as the fair days, occasionally exceeding them, at other times being less by a few days. In the first two quarters the variable days were less, in the last two, more than the fair ones.

Wind.-Westerly prevailed above all others in every quarter; next to these the Southerly winds, though these were surpassed by the Easterly in the first and last quarters. North and East winds prevailed in November, and were fewest in June. The wind's force on December 23rd was about 151b. to the square foot.

Rati.-The greatest number of days rain fell was in December (20) ; the smallest was in June (6). The greatest amount fell
in April, 4.39 inches; next to that in October, 3.04 inches. The least was in March, $\frac{1}{4}$ inch, and in January not quite $\frac{1}{3}$ inch. In the first quarter only 1.72 inches fell.

Ozone.-Only recorded the last two months. In November it was present 24 days, in December 29 days, and generally was most plentiful during Westerly winds


# TRANSACTIONS 

OF THE

WOOLHOPE

NA'TURALISTS' FIELD CLUB.

## No. 4.

HEREFORD:
PRINTEED RY VILLIAM PHILLIPS, HIGH TOWN.

MDCCCLIXII.

## THE ADDRESS

Of the retiring President, R. W. Banks, Esq., read before the Members of the Woolhope Naturalists' Field Club, at their Annual Meeting, held in Hereford, on Thursday, February 7th, 1861.

Gentlemen,-On retiring from the office of President, it becomes my duty to present to you a summary of the proceedings of the Club during the past year, and to offer such suggestions as will, in my opinion, best promote the objects which it has in view. I enter upon the subject with a feeling of diffidense, as my remarks are founded more on the discoveries and observations of others, than of myself, and I must therefore request your indulgence for any errors into which I may fall, and for the want of anything novel in my address.

The addresses of preceding Presidents have in many respects anticipated the remarks which I might have made, and have somewhat circumscribed the field over which I have to travel. I shall however, endeavour, as far as $I$ am able, to avoid a repetition of their views and suggestions, merely calling your attention to them as I proceed.

We must deem it a fortunate circumstance, that during an unusually wet season, we were able to hold our Field Mectings on the days originally fixed, and to enjoy on each of those days, uninterrupted fine weather.

Lou will all remember the hospitable reception which we mot with at Lyston, the residence of one of our Vice-Presidents, Mr. Lingwood, prior to our excursion on the 5th of June. The object of our meeting was to explore that well defined ridge, known as Sadulebow Hill, which appears to an observer from the northern part of this County, as one of the southern barriers to the valley of the Old Red Sandstone. Mr. Lingwood had discovered a head of Pteraspis Lloydii in the cornstones of Orcop ; there was therefore a reasonable hope that we might on our way find some traces of the old red fishes. In this we were disappointed ; but, although we failed to find any fossil remains, we obtained an admirable survey of the country. Having ascended the hill from Lyston, we looked down on the well wooded grounds of Mynde Park, and passing near Orcop, and over Saddlebow Hill, arrived at Garway Hill, the extremity of the range. From its summit a magnificent prospect opened to our view ; to the west lay the Skyrrid, and the hills of the upper division of old red, which surround Abergavenny-to the north-west the long range of the Black Mountains, and in the same direction, considerably in advance, the comparatively low range of cornstone hills which extends from St. Devereux to the Wye at Whitney ;-looking to the north, over the wide valley of old red, Lady Lift and Dinmore hills appeared-beyond them the Ludlow rocks, represented by Hergest ridge and Bradnor, and, in the extreme distance, Radnor Forest, occasionally hidden by passing showers; - to the east, the well-known features of the Titterstone Clee-hill and Wenlock-edge, and the somewhat tafne outline of the Longmynds, the oldest of our fossiliferous rocks, thus affording a view of the whole range of Palæzoic rocks.-Turning round to the south, Monmouth and Ross lay before us, and the valley of the Wye, flanked by the coal basin of the Forest of Dean-to the east, the Malvern hills, with the range which runs along the vale of the Severn, and the more distant Cotteswolds, representatives of the Oolite formation, in the background. It would be difficult, perhaps, to find a spot where a better view can be obtained of the Old Red

Sandstones of Herefordshire, which at Pen-y-cadir-fawr rise to the height of 2545 feet, and which are in this district estimated to be 10,000 feet thick.

I shall not notice the evidences of upheaval and denudation which must have struck every reflecting observer, but will refer you to the address of our late lamented member, The Rev. Thomas T. Lewis, where the subject has been discussed with all that local knowledge and ability which peculiarly distinguished his investigations ; and to Mr. Symonds' able paper on the Old Red Sandstone of Herefordshirc.* Descending Garway Hill, our road lay through Kentchurch Park, to Kilpeck and St. Devereux, whence the railway conducted us to Hereford. I cannot conclude the notice of this day's proceedings, without referring to the pleasure which the members experienced from the presence of Capt. Guise, the president of the Cotteswold Club, whose knowledge on all subjects connected with Natural History, particularly Entomology, is as accurate and methodical as it is various. He has kindly favoured me with a list, which I subjoin, of the Beetles, which he met with during the day, by the roadside and on the swampy parts of Garway Hill.

Our second meeting was at Ludlow, on the 24th July. The members proceeded to Downton Castle ; our indefatigable member, Mr. Ligetbody, undertook to be our guide for this day's excursion. After examining a section of the Old Red on the left bank of the Teme, we crossed at Forge Bridge, and walked down the river for a short distance, as far as Tin Mills, to examine the passage from the Ludlow rocks into the Old Red. On our way, a quarry of the Downton Sandstone, the beds of which dipped at a sharp angle to the south west, was examined. On one of the slabs of building stone, recently raised by the workmen, numerous heads and other portions of Eurypterus pygmœus and Pterygotus Banksii, with parts of the body rings of another species of Pterygotus (probably P. Gigas) were observed. Passing onwards, some olive grey coloured

[^5]beds of shale were examined by the side of the old watercourse, which were considered by Mr. Ligutbodr to be identical with the upper passage beds in the railroad cutting at Ludlow. These beds are on a lower level than the Downton beds before referred to, and may probably graduate upwards into the old red, but no opportunity was afforded of ascertaining on what beds they repose. Supposing that they are the upper passage beds, their relative position to the Downton beds, which were ascertained to lie here conformably on upper Ludlow rock, can only be reconciled by the supposition of the occurrence of a fault, which lias placed these shales in a position apparently inferior to the Downton beds. Retracing our steps for a short distance, our course was up the river, through the beautiful and richly-wooded gorge of the Teme-the picturesque rocks on either bank, in many places whitened by a calcareous deposit, affording excellent sections of the upper Ludlow rock. Near the Bowbridge a fine perpendicular escarpment of Aymestry limestone was passed ;-here the Botanists, who had separated to pursue their researches in the Downton Castle grounds, rejoined the party. Our course was now directed to Leintrardine. At Trippleton a quarry of lower Ludlow was examined, and a fine specimen of Ceratiocaris discovered. Near Leintmardine, either side of the lane leading to Church-hill exposed beds of lower Ludlow, in which numerous Graptolites and other characteristic fussils occurred. At Church-hill, famous for having furnished Pterygotus punctatus and many new species of star fishes (several of which have been described and figured by Mr. Shlter), the day's excursion terminated. Here the custodians of the quarry appeared, and offered for sale some fair specimens of star fishes, which ere now probably grace the cabinet of Professor Geinitz, of Dresden, our companion during the day, whose able researches in the Permian and lower Silurian strata of Saxony are so often mentioned by Sir Roderick Murchison in Siluria. I will not quit the Church-hill quarry without expressing a wish that the Club will use its influence to persuade the owner of the land in
which the quarry is situate, to allow the working of it to be continued within fixel and reasonable limits, and thus enable our enterprising Members to continue their researches, which have already thrown so much light and additional information on the forms of extinct Star fishes and Crustaceans.

Before I pass to our next day's excursion, I must again refer you to Mr. Lewis' Address for an account of previous meetings of this Club at Leintwardine and the Nash Lime Rocks, which the Club again visited on the last Field-day of the past year.

We met at Corton Turnpike on the 7th August, and after passing the quarry of upper Llandovery, or Mayhill sandstone, here worked for road materials, we ascended the hill and passed round to the sand-pits on the northern side. Here Wenlock shale and Woollope limestone, resting on upper Llandovery beds, dipping 40 degrees to the north, appeared cropping out on the surface-the anti-climal beds of which are seen on the southern side, affording, in the upper Llandovery beds, specimens of Petraia and other characteristic fossils. Sir Roderice Murchison in his Silurian System, expresses an opinion that the same volcanic forces which disturbed the strata on Old Raduor Hill, and threw up the volcanic masses of Stanner Rocks, Worzel and Hanter Hills, had also exercised a powerful operation here, uphearing the limestone and Llandovery beds-altering the limestone of Nash into an amorphous, unstratified rock, and causing the numerous faults in the Old Red sandstone, which occur in the immerliate vicinity, although the igneous rocks did not present themselves to his view ; subsequent investigations have confirmed the correctness of his opinion. At Old Radnor the igneous matter has burst through the limestones, altering in a similar manner the portions which came immediately into contact with it, and converting the Wenlock shale, with the Trilobites and Encrinites which it contains, into a fractured coal-like shale.

We shall add fresh interest to the subject, if we can ascertain the period when this outburst took place; we know that these Syenitic or hypersthenic rocks are supposed to have been formed under
water, when the whole district was submerged. The searchor for fossils in the upper Ludlow rock in the immediate neighbourhood of Kington will be struck by the fact that he cannot find the Orthoceratites and larger Mollusca in the same symmetrical state as in the neighbourhood of Ludlow ; at Kington they are generally flattenel, compressed, or broken ; now this flattening, or compression, is attributable to either direct or oblique pressure on the mould or cavity which the shell itself once occupied, before the cast, which we now find, was perfectly formed. The outburst of a large igneous mass, upheaving and bending the strata of the adjacent rocks, would account for the pressure which these fossils exhibit. If we continue our search upwards we shall find further evidence of the period of the outburst, in the fact that at Ivy Chimney and on other parts of Bradnor Hill, waterworn pebbles of the syenite of Stanner, pieces of partially calcined limestone, and boulders of the rel and white quartz (upper Llandovery conglomerate) of Old Radnor are met with, imbedded in the Downton sandstone. I think therefore it may reasonably be assumed that the outburst took place when the upper Ludlow rocks were in an unconsolidated state, and while the deposits, which form the Downton sandstone, were taking place. Hoping that you will excuse this digression, I will now return to the subject of the day's excursion. Passing through Cann Wood, our party halted on the summit of Nash scar, to admire the view of the Nash and Knill valley, the plain of Herefordshire, and distant Malvern hills, while our Honorary Member, Mr. J. E. Davis, and his father, Dr. Davis, who first investigated these limestone rocks and their fossil contents, pointed out the numerous faults in the broken and wooded ground around, and the outlying patches of Old Red sandstone. Proceeding to Evenjobb, we ascended Evenjobb hill, where quarries afforded good sections of the lower Ludlow rocks. A small portion of Pterygotus was here discovered. Descending the hill, and passing by Discoyd, we reached Presteigne, examining on our road several quarries of upper Ludlow rock. Thus terminated the last excursion of the year.

I am able to reccrd but few geological discoveries during the past year within the district which the Woolhope Club considers to be its own.

The Ludlow bone-bed, since the publication of the Silurian System, has been considered to afford the earliest traces of vertebrated animals, but we now know that the lower Ludlow and upper Ludlow rocks contain a species of Pteraspis, nearly allied to the Pteraspides of the Downton sandstone, which have been definitely placed among the Fishes by Professor Huxley, on a careful comparison of their structure with that of Cephalaspis.*

Mr. Lightbodr, in a letter of some length, has kindly communicated to me the result of his labours; among other discoveries he mentions a new species of Ampyx, and a shell of small size, which Mr. Salter considers to be a new genus allied to Siphonotreta in the Caradoc shales of the Onny valley; a new species of Lingula in the Bala limestone at Hordesley ; and a new species of Asaphus found by Mr. Marston in the shales above this limestone. Mr. Lightbody also tells me that Professor Wrville Thompson is writing on a new Echinosphærites, found in Church-hill quarry, somewhat similar in character, but larger and more spiny than Palæodiscus ferox. I regret that I am unable to refer at greater length to the subject of Mr. Ligetbody's letter, but I trust that he will supply my omission by reading a paper at one of our meetings for the present year. Mr. Crouch has met with Pterygotus punctatus, and a species of Ceratiocaris in the lower Ludlow shales of Bradnor wood, Kington. Mr. Salter, when he heard of it, rejoiced in the probable discovery of the zone of the Star fishes, and spent a day during last summer with Mr. Croucr and Mr. Ligetbody, in a search for traces of them in these beds without result. As none of the Old Red fishes have been yet met with in the neighbourhood of Kington, I may mention that I found, last

[^6]summer, in a quarry of grey sandstone, on the Rodds farm, Kington, a good specimen of the head of Cephalaspis Lyellii. I had previously met with slight traces of fishes in the same quarry, but the fragments were too small for reference to any known species. Mr. Alfred Marston, who has done so much to bring to light the extinct animals of the Lu:llow district, has kindly furnished me with a list of the fussil Crustaceans, Star fishes, and fishes, found in the neighbourhood of Ludlow, during the last four or five years. I have made additions to the list, and, having submitted it for correction to Mr. Ligutbody, have added it to my address, as a record of some of the discoveries of the Woolhope Club.

I have dwelt at some length on these details, because it appears to me that the Field Clubs may more usefully employ themselves in the collection and co-ordination of facts relating to Natural History in all its branches, than in speculations, which, however ingenious, would crumble to pieces when they were handled, on account of the limited range of our researches.

As it is a part of my duty to-day to offer suggestions for the promotion of the objects of the Club, I feel I cannot do better than call your attention to the following suggestions of our kind friend $M_{\text {R. }}$ Salter, in a letter to myself;-" We shall never really know what the true nature of our boundary lines is until people of leisure will note on their maps the facts as they arise. Nay I beg you, in the name of science, to do this for your district-a yellow colour for Downton-a blue for Ludlow-a brown for passage beds, dotted down in the exact spots where they occur, would point to the true arrangement of the faults and anticinals in a way that no guess work in London could do ; then, when such coloured spots increased in number, a visit from any practised field worker would clear up whole lines of work, and our maps would begin to look like what no other country has done. There is a special reason for doing so on the borders of Siluria and Devonia, since the information is all valuable among transition beds." I would suggest, in addition, to any Members of the Club who way carry out Mr.

Salter's suggestions, that they will do the Club a great service if they will bring the maps on which the facts have been so noted, to the Field Meetings, in order that their notes may be there compared and criticised, and the result recorded on a map belonging to the Club.

Notwithstanding all the attention which has of lato years been paid to the subject of the Old Red Sandstone of Herefordshire, it still remains an object for our careful investigation. Fresh discoveries are continually throwing a new light on the relations of the Herefordshire beds to those of Scotland. The Lesmaharo black flags proved on a comparison of the similar, although varying, species of fossils which at the same time were discovered in the Downton beds, to be the equivalents of the latter,* and are now known $\dagger$ to be overlaid by red shales in which Cephalaspis Lyellii occurs-the relation of the passage beds of the Ludlow railway cutting to the Old Red have recently been elucidated by the able investigations of Mr. Symonds, $\ddagger$ in the Ledbury tunnel. He traces a gradual succession from the Aymestry limestone through the upper Ludlow and the Downton sandstone, which has there scarcely a representative, to the equivalents of the Ludlow passage beds, identified by the occurrence in them of Auchenaspis and Pterygotus Ludensis, and he finds that these beds pass upwards into a series of red marls, with yellowish, grey, and pink sandstones, containing Pteraspis and Cephalaspis.

At Trimpley, near Bewdley, Mr. Roberts has found in the cornstones Cephalaspis Lyellii and Pteraspis Lloydii, and in the

* Murchison's "Lesmahago Siluriaus," Quarterly Journal, Geological Society, vol. 12, p. 15. Salter's "Himantopterus," ibid, p. 26. Banks' "Tilestones of Kington," ibid, p. 93. Mr. D. Page, F.G.S., remarks that this last paper " might as well. have been written for the Tilestones of Forfar as for the Tilestones of Kington, so entirely similar are they in all their organic remains." + Geikie's "Old Red Sandstones," Quarterly Journal, Gcological Society, vol. 16, p. 214.
$\ddagger$ Symonds "Ou Passage Beds at Ledbury," ibid, p. 193.
immediately underlying grits, Pteraspis Banksii, Pterygotus Ludensis, and Parka decipiens. When we add to these facts the occurrence of Cephalaspis Lyellii and Pteraspides in the cornstones of Laysters, and numerous other parts of Herefordshire, and the discovery of Eurypterus Symondsii in the cornstones of Rowlstone, we cannot doubt that we have in Herefordshire the equivalents of the Perthshire and Forfarshire * beds, in which Cephalaspis Lyellii, Pterygotus Anglicus, and Stylonurus are associated. These beds have been styled by Sir Roderick Murchison as the Lower Old Red. $\dagger$

I am not aware that we have any trace of the middle division (or Caithness flags) characterised by Ptericthys oblongus, Cocosteus, Dipterus, Diplopterus, and other fishes. Very recently, the Rev. Huge Mitchell has discovered one of these fishes, Dipterus, associated with Cephalaspis Lyellii, in the Lower Old Red of Forfarshire. $\ddagger$ Here then is a subject for our researches; fresh discoveries are continually made, and there is no reason why we may not, in the Woolhope district, find some remains of fishes, which may either establish, or negative, the existence of this threefold division of the Old Red. We have some traces of the upper division. A scale of Holoptychius nobilissimus, found by Sir Roderick Murchison on the Daren, near Crickhowell, prior to the publication of the Silurian System, was the only indication we had

[^7]of the upper beds, until the discovery at Farlow, in Shropshire, two or three years ago, of a new species of Ptericthys in yellow sandstone, overlaid by the shale of the carboniferous limestone of Clee-hill, and the more recent discovery at the same place, by Mr. Ligetbody \& Professor Melville, of the remains of Holoptychius.* I hope, therefore, our indefatigable Ludlow members will pursue their researches further in this direction, and that Dr. Bevan and our Abergavenny members will vie with them in the endeavour to trace the limits of the uppermost beds of Old Red. + I cannot help noticing, before I quit this subject, an erroneous notion (adopted by Sir Roderick Murchison in the appendix to the last edition of Siluria, p. 559) that the Old Red sandstone is necessarily a red rock. He says, "the true base in Shropshire and Herefordshire of the Old Red sandstone, properly so called, is, I repeat, seen to be a red rock, containing Cephalaspis and Pteraspis, and gradually passing down into the grey Ludlow rock." Now, although this is generally the case in the Old Red of Herefordshire, we know that it is not universally so; the sandstones in the neighbourhood of Kington, Hay, and other parts of the northern side of the County, are overlaid with a red soil, arising from the denudation of the Black Mountains and other elevated masses of the Old Red, but the rocks beneath, including those which contain Cephalaspis Lyellii, are generally a grey micaceous sandstone. In this as in other similar cases, we must look to fossil contents rather than to colour and lithological composition as the truest indicator of the age of rocks.

But the geological observer may not only view the imbedded fossils as the indicators of the stratigraphical position of the rocks in which they are found; but he may view them with the eyes of a naturalist, and compare them with animals which now exist,

[^8]tracing the affinity of extinct to existing species; he will thus note their differenees, learn their habits, and form a notion of the conditions under which these animals of the past existed-he will marvel that the worm should have Ieft its track and burrows, the ebbing tide its ripple, and the raindrop its record on the surface of the rocks; he will observe the trilobite, one of the earliest crustaceans, attain its greatest developement in the Silurian period, and gradually become extinct in the carboniferous rocks-he will be struck with its varied form, elaborate structure, and the countless facets of its eye-he will compare the Orthoceratites and the numerous Cephalopods with their allies, the extinct Ammonites, and the Nautilus of the present seas ; and will see in each species the same chambered structure and the same provision for floating on the surface of the water, although the forms are so various and unlike ; he will admire the numerous and varied series of corals and Crinoids in the limestones, the elegant Star-fishes and numberless Mollusca of the Silurian seas, and when the these last are gradually dying amay, he will see the Pterygoti and Euryptendæ, the largest of Crustaceans, for a brief time the principal occupants of the deep, in their turn succeeded by the Fishes, and at last a Flora, of which faint traces before appeared, of gigantic Ferns, Palms, and Conifers, covering the service of the earth with a luxuriant tropical vegetation, and he will rise from the contemplation of the subject more and more impressed with the infinite wisdom, power, and goodness of God in the works of creation.

When we consider in how few places the crust of the earth is broken, and how seldom, when the rocks are exposed to our view, we have an opportunity of arriving at their contents, we may reasonably expect that fresh discoveries will from time to time reward the persevering searcher of the Palæozoic rocks. We know how the accidental discovery of a Star-fish at Church-hill, led to a further search, and an addition of thirteen or fourteen new species of Star-fishes to the three or four species previonsly known in the Silurian rocks, and to the discovery of several new species of

Crustaceans; -how the discovery of the contents of the Downton sandstone at Bradnor, and of its equivalent at Lesmahago, induced a general search in the beds which range upwards into the Old Red, and the results; and how the beautifully preserved forms of the Lanarkshire Pterygoti enabled Mr. Salter to arrange the scattered members of Pterygoti in other rocks, and by comparison to discriminate the different species. We know, too, that the cornstones of Herefordshire have recently yielded several new species of fishes, and many more specimens of previously known species than were a fews years since supposed to exist in the Herefordshire Old Red, and we have every reason to believe that the contents of these beds are still unexhausted mines, which will gradually unfold new facts to the diligent and constant observer.

I feel that I am promoting the interests of the Club when I call your attention to the Museum at Ludlow, and urge the members of this Club to give it their aid and support, either by contributions to its funds, or the gift of specimens of those brauches of Natural History which it contains. Those of us who have visited it must feel the aid which we have derived from the inspection of the specimens of ornithology and fossils in its well-arranged cases, and from the valuable works of reference which its small but wellselected library contains.

I may reasonably be expected to touch on other subjects, which the idea of a Naturalists' Field Club embraces, such as the Ornithology, the Entomology, and Botany of the district. The fact that none of these subjects have, during the past year, been brought under the notice of the Club, in some measure relieves me from a charge of omission. I must, however, admit my inability to offer any useful observations or suggestions on these subjects, and confine myself to a request that any members, whose taste and inclinations lead them to the study of any of these branches of Natural History, will record the result of their observations in a written paper, and bear in mind that the collection of a number of common-place facts leads to a useful result.

Mr. Croued, in his Presidential Address, has very clearly and ably explained to you the scope of the Flora of Herefordshire, which has been prepared under the direction of Mr. Purceas; hopes were entertained that a part of it would be placed in the publisher's hands during the past year. Mr. Symonds, of Pendock, undertook to supply, by way of preface, a short account of the geology and soil on which the plants grow. If I remember rightly, the manuscript, although in a forward state, was not ready for the printer, and therefore the publication was delayed. On behalf of the Club, I venture to express a hope that Mr. Purchas will endeavour to carry out, in part at least, during the present year, the completion of a work which will so greatly assist the systematic Botanist, and will reflect so much credit on himself.

One other subject occurs to me as worthy of a few remarks. The Aquarium, now so easily procured and managed, enables us to observe the structure, and study the habits, of the numerous animals which frequent our streams and ponds-the gradual developement of the tadpole, of the frog, and the newt; and the transformation of the insects whose larve are aquatic, as the gnat, the dragon fly, and the may-fly, and the beetles and other insects whose life is spent in the water-we may watch their movements and see how the countless forms of animal life, which abound in the water, are reduced in number by the predatory habits of each other-we may watch the sportive activity of the smallest of our fishes; the mode in which the crayfish propels himself, the use which it makes of those jaw feet, which were so fully developed in the Pterygoti, and in how wonderful a manner it periodically emerges from its shelly covering, and withdrawing all its members, even the delicate antenuæ, casts aside in an entire form its oll coat, and appears in all the splendour of a new one. But, in addition to these recorded facts, I think the Aquarium will enablo us, by careful observation, to record many new facts which otherwise would escape our observation, especially in the winter season, under the influence of a low temperature, when these inhabitants of the water
disappear, and fall more or less into a state of torpidity or comparative sleep.

A suggestion has been made to me that the Club might with great advantage increase the number of its members, and have six field meetings in the course of the year. As regards the number of members, I think, if occasion should require, the Club might advantageously alter the rule which limits our Club to fifty members, but I am not aware that at present we have any candidates for admission to justify its alteration. If we increase the number of our field days, I fear our meetings will not be so well attended as they are at present, for if we look over the list of our members we shall see that by far the larger portion has engagements which have a prior claim on its attention, and can only make the study of Natural History an "employment for its idle time which is then not idly spent;" but I see no reason why those members, who have leisure time, may not with great advantage to the Club, visit localities which are now comparatively inaccessible to the Club as a body, report the result of their discoveries to the field meetings, and thus extend our knowledge of the district.

I cannot conclude without expressing to the members generally my deep sense of the honour which they conferred on me in my election as President of the Club, and tendering to them my sincere thanks for the kind support and friendly aid which they have so readily given me at the field meetings, and whenever I have had occasion to seek for information during the past year. I resign my office to my successor in the fullest confidence that the members will heartily co-operate with him in an endeavour to make the field meetings of the present year as attractive as possible, to promote the objects of the Club, and to increase its prosperity.

RICHARD W. BANKS.

7th February, 1861.

## CAPT. GUISE'S LIST.

## Coleoptera.

| Elaphrus cupreus. | Garway. |
| :---: | :---: |
| Ctenicerus pectinicornis | Kentchurch Park. |
| Saperda ferrea | Ditto. |
| Onthophagus fracticornis. | Garway. |
| Aphodius merdarius. | Ditto. |
| Luperus flavipes | Saddlebow. |
| Galeruca cratrgi | Kentchurch. |
| Mecinus semicylindricus | Hedges. |
| Magdalinus atramentarius | Ditto. |
| Rhimonchus pericarpius | Ditto. |
| Sciaphilus muricatus | Ditto. |
| Phyllobius argentatus | Ditto. |
| Polydrosus cervinus... | Ditto. |
| Tropiphorus mercurialis | Ditto. |
| Otiorhynchus picipes | Ditto. |
| Anthonomus rubi. | Ditto. |
| ulmi | Ditto. |
| Balaninus pyrrhocerus. | Ditto. |

Homoptera.
Centrotus cornutus
Hawthorn Blossoms.
IUUTACEA.

$$
\begin{aligned}
& \text { Acidaspis Caractaci } \\
& \text { A Coronata } \\
& \text { Ampx parvulus .... } \\
& \text { A pennatus } \\
& \text { A n. np. } \\
& \text { Ceratiocaris robustus }
\end{aligned}
$$

leptodactylus
cassia ...
gigas ..
princeps
Cyphaspis megalops
Eurypterus sp. ? ...
Eurypterus pygmæus
megalops ...
acuminatus
linearis
abbreviatus

n. sp
Limuloides n. sp. (Marston)




## THE ADDRESS

Of the retiring President, Robert Lightbody, Esq., read before the Members of the Woolhope Naturalists' Field Club, at their Annual Meeting, held in Hereford, on Thursday, February 20th, 1862.

Brother Members,-I am very much at a loss how to address you on this occasion, as I feel strongly my incompetence to discharge properly the duties of my position. It was very repugnant to my feelings to assume the responsible post of your President, and I was only induced to do so because I felt that as a member of your body, I was bound to take my share of its duties when called upon by you. I trust, however, that in future you will be more fortunate in selecting a leader who will be able to amuse and instruct you.

In referring to the Field Meetings we have had during the past year, I may express my regret that the first meeting at Ludlow was so unfortunate in some of its circumstances. Though intended to be a joint meeting of the Malvern Club and our own, our numbers came very short of what might have been anticipated-principally in consequence of the railway trains from and to Hereford not suiting our arrangements, though we were entitled to expect that in May the summer passenger traffic would have been commencedAnother time, however, it would be well to have our first meeting near Hereford so as to avoid this annoyance.

Another point on which I would remark, is, that so few Members of our Club are sufficiently interested in Geology (which I think is our leading object), that it is hardly wise to make arrangements, involving their passing a night from home, thereby incurring expenditure of both money and time which may not be convenient to some of them.

Further I may observe, that my conduct at the Ludlow meeting having been commented on, both verbally and in print, by some of our friends, I am compelled, in self-defence, to say that I felt boumd in courtesy to the learned President of the Malvern Club (who was visiting our territory on that occasion), to consult his wishes as much as possible; and though I fear it produced considerable annoyance to some, it was my misfortune more than my fault, that I could not be in two places at once. The inconvenierce too, might have been"lessened, if one of our Members, who knew the ground, had accompanied us from Ludlow, instead of walking to Leintwardine. Fortunately all our meetings of the past year were favored with fine weather, except the last hour of our Tarrington mecting, and a few light showers at Abergavenny. I am not aware that any great discoveries were made on any of these occasions, but perhaps I ought to give a glance at the ground passed over with more or less interest.

On the 23rd of May we left Ludlow by train for Marshbrook, near which place, at Acton Scott, we examined the Caradoc beds, which are there full of heads and tails of Phacops conophthalums, as well as the usual Caradoc Orthides, \&c. Thence we walked to Horderley, passing on the way some very faulted ground, where we found the Upper Llandovery partially shewn at White Birches, with its characteristic Petraia subduplicata, and traces of Pentamerus oblongus. Some distance further along the road we came to beds of the Lower Caradoc or Bala Limestone, which were thrown up on edge between two faults, and do not contain many fossils. Immediately after passing this we found ourselves on the barren Cambrian rocks which skirt the way to Horderley turnpike. Near here we were joined by some of the party from Hereford, who arrived too late for our train, and had walked from the Craven Arms up the valley of the Onny. After enjoying our luncheons, and a little rest, we proceeded down the Onny, passing the prolongation of the bed of Bala Limestone, at a quarry in which a number of fragments of an unnamed Lingula, and one or two entire ones, were found.

These beds are almost vertical, and the shale lying above them is well worth a close examination, as it contains, with abundance of Trinucleus concentricus, several other rare or new Trilobites,-and abundance of Beyrichia complicata. There has since been found here a new Beyrichia, which Mr. Ropert Jones has called B. Wilkinsoni. We then crossed the Onny, and after passing the thick hard beds of Horderley Sandstone, which in some of its layors contains abundantly Bellerophon bilobatus, Leptrna serricea, Strophomena grandis, and Modiolopsis orbicularis,-and, growing among the loose stones, great quantities of the lovely Polypodium dryopteris, or oak fern,-we came to a road cutting leading to Cheney Longueville, where in one stratum is found the curious Sphærospongia hospitalis, so named by Mr. Salter in commemoration of the hospitality displayed by the kind hearted Duppa Duppa, Esq. A little lower down the river, we came to the Trinucleus shales, at the well-known Onny section, where the slight unconformableness of the superimposed Llandovery beds is seen. These shales are full of heads and tails of Trinucleus, with rarely an entire one, and also occasionally a head of Amphyx pennatus, and part of the head of Remopleurides radians. The Upper Llandovery beds overlying these shales were inaccessible without a wetting. They are very thin here, and are succeeded by the Purple shales, forming here the lowest part of the Wenlock shale. In them have been found tails of Cheirurus bimucronatus, but our party were not so fortunate as to find any. It was now time to return to Ludlow after a very pleasant day.

On the 24th we took carriages to Mocktre, where thore is a remarkably fine section through the Upper Ludlow and Aymestry Limestone, down into the Lower Ludlow-in which latter bed such fine specimens of Lituites and Phragmoceras, and also Ischadites Königii have been found. Our labours were not, however, well rewarded, and we went on to Leintwardine. Here we dropped some of our party, who went to look for Star-fish in the celebrated Church-hill quarry, but I am gricved to say, that, partly from want
of a guide, but chiefly from the state of the quarry, they were not successful in finding the right beds. In the meantime, my brother President persuaded me take him, and some others of the party, to Pedwardine, where there is a fine exhibition of the Lingula flag beds (containing abundance of Dictyonema sociale, and a few Lingulella ), lying at an angle of $25^{\circ}$ to $30^{\circ}$, and covered nearly horizontally by beds of Llandovery conglomerate. These beds were peculiarly interesting to Mr. Symonds, as being similar in character, though superior in productiveness, to some in the south end of the Malvern Ridge. Unfortunately we spent too much time here, and consequently were unable to examine the interesting ground between Leintwardine and the Forge Bridge, as several Members were obliged to get back to Ludlow in time for the train to Hereford.

Of our next meeting at Tarrington I will say nothing, as it was all old beaten ground for us, except that the Rev. Charles Smitr gave us a sumptuous breakfast on his lawn, which was done full justice to by his friends.

On our last meeting at Abergavenny, we were splendidly breakfasted at the Asylum by our friend Dr. McCullough, who was determined not to be outshone by any one in his entertainment. Here we were on new ground for us, it not having been supposed formerly that the Old Red beds in that neighbourhood were fossiliferous. However our brother Members, Messrs. Elmes Steele and MoCullougr, having seen the Fish remains of the Old Red near Ludlow, were stimulated to search their own neighbourhood, and were fortunately rewarded by finding, not only shields of Pteraspis Lloydii and Pteraspis Crouchii, as well as Cephalaspis Lyellii and Cephalaspis Asterolepis, but also another species of Cephalaspis, which is declared by Professor IUuxley (who has the specimens before him) to be quite new. After seeing a large number of specimens-some very fine-and breakfasting, we betook ourselves to the quarry in the grounds of the establishment, whence the stone for the building was oltained. The loose stones there,
however, had been too diligently investigated to yield us much heyond fragments, and we soon proceeded to the romantic sides of the Skyrrid, where we had hoped to enjoy the magnificent views of the neighbourhood. Unfortunately a sharp scud of rain came on, and the mountain tops were obscured by mist. However, after sheltering for a few minutes, we resumed our walk, and while one party went up to the top of the Skyrrid, the rest of us lookel (but nearly in vain) at a quarry of Cornstone on the east side of the mountain, where some of the choicest specimens had been found. We soon moved on again, and rejoined the Alpine party on the west side, in the wild ravine, which seems formed by a fracture and slip of a great mass of the Old Red beds, which have parted, leaving a huge cliff on either side. Here we were entertained by listening to a very instructive address by Dr. Bevan, on the various strata in which Iron Ore is found, which I trust will be printed for our benefit, if, as I hope and believe, our friend had written it out, but had forgotten to bring it with him.

Having rested here on the rocks for some time, we walked on, with the occasional mishap of losing one another in the tall gorse, till we got to another quarry, not far from Pandy Station, where we found in the Cornstone some fine shields of Pteraspis, shewing how well worth more close examination than it has hitherto received, this neighbourhood is. After a very pleasant day, we returned to Abergavenny, much indebted to our kind friends Drs. McCullovair and Steele, for exhibiting to us the treasures of their quarries; and I trust their further investigations will be crowned with success. If each of our Members would as actively and continually examine the rocks in his own neighbourhood, whether Silurian, Devonian, or Carboniferous, I feel sure the result would amply reward himif not in new species, at least in health and geological knowledge, and probably in all three.

And now having (I fear in a tedious manner) gone over the routine of our Excursions, I should wish, if you are not already tired, to say a few words in reference to the classification of the Upper Ludlow, Aymestry, and Lower Ludlow rocks. Our great authority, Sir Roderick I. Murchisos, as well as the Maps of the

Geological Survey, have latid down the whole of Whitelifi at Ludluw as Upper Ludlow. Our friend Mr. Cocking, soon after I came to live at Luhlow, hintel to me his belief that, notwithstanding these alssertions, the Aymestry Limestone was shown there; and though I was then a novice, and quite incompetent to offer on opinion on the sulbject, I bore his observation in mind. Some time after, I lad the great advantage of secing Mr. Salese at Ludlow, and called his attention to the subject. On breaking ofi a few frazments of rock at the foot of the hill, he unhesitatingly pronounced that, from a fault existing in a line with the New Bringe, as far as the green slope on the north side of the quarry opposite the next weir, the bels at the bottom of the hill were Aymestry Limestone, as evinced by the aboudant presence of Strophemena filosa. Since that time, I have continually examined both these beds and corres.. ponding beds in other localitics, and feel convinced that the line of demareation between the Aymestry Limestone and the Upper Lulluw has been drawn in the wrong place-the Aymestry including within its limits the bands of Phyuchonclla navicula which Sir li. Muncuison considers as the base of the Upper Ludlow. Let it nut be considerel a matter of no moment whether this band be called the luttom of one, or the top of the other, of two contignous heds, remembering that the only way in which different beds can be distinguished is by the fussils contained in them respectively. Now the bancl of rock in question, reaching from the recognized Aymestry Limestone for about thirty or forty fcet, perhaps, in thickness, though included in the Aymestry, cannot be called Limestone, although it is much more calcareous than any bed I Fnow of in the true Upper Ludlow,-but it contains abundantly Strophomena bilosa and depressa, Atrypa reticularis, and in the lower part Lingula strictat, Encrinurus punctatus and variolaris, and Proctus Stokesii, all of which belong emphatically to the Aymestry beds. None of these fossils, I believe, can be found above this horizon, while they run tbrough the Aymestry Limestone, and at least to the bottom of the Lower Ludlow.

Another indication of their nature occurs in the existence, in 11, sse bede orer the limestune, of the honeyeomb structure of the
faces of the joints, where we find lines of cavities formed by the solution of the calceareous matter in the fossiliferons layers,-the very character on which Sir R. Murchisox lays stress as indicating the Aymestry Limestone. This honcycomb formation may be seen more or less, nearly as far as the turn of the sloping walk leading up Whitcliff from the New Bridge.

Does it not then seem clear that the classification should be altered, so as to include all beds in which these fossils and honeycomb markings are found, in the Aymestry Limestone, and only refer those above them, which are destitute of such forms, to the Upper Ludlow. The great advantage of this would be, to enable us to separate (wherever these fossils are found) the Upper Ludlow from the Lower Ludlow, instead of having them confounded together in the maps by the same colour, wherever the limestone happens to be absent. No doubt the error arose from the Surveyor at that time being unaware of the faults, and fancying the Whitcliff beds all of the same nature, because they had nearly the same dip, and all contained Chonetes lata, Rhynchonella nucula, Orthonota amygdalina, and other common Upper Ludlow forms; but these forms also run down to the bottom of the Lower Ludlow. When, however, the fossils of the beds I am speaking of were classed with the Upper Ludlow, of course the discrimination of the Lower Ludlow from the Upper Ludlow became inpussible, except where the limestone intervened-which yet is often wanting. Still I am far from assuming that we shall always be able to say whether a certain rock is Upper Ludlow or Lower Ludlow, because in the western parts of these beds, not only is the limestone absent, but the fossils are very few in number, so that, unless we by chance break open a characteristic Lower Ludlow fossil, we shall be still in the dark. It will, however, answer well in many places; and even if it did not, that would be no reason why we should not endeavour to discriminate as much as possible.

The examination of this point, has suggested to me the probability of another alteration being required. Looking at the general identity of the fossils of the Aymestry Limestone and Lower Ludlow; at the general prevalence of calcareous beds in both formations
-only varying in thickness and frequency; and at the difficulty, if not impossibility, of pointing out, even in the best sections (such as Mocktre), where one euds and the other begins; will it not be better to merge the one in the other, and to call the whole series Lower Ludlow?

Wre have lately scen a further confirmation of this view, in a quarry on the west side of the old Mocktre road, where we find a bed of Pentamerus Knightii at least eight feet thick, surmounted by two or three feet of laminated shales, similar to those in the Lower Ludlow quarry at Church-hill, and containing the same fossils, and especially at least two species of Starfish, and two or three species of Ceratiocaris. Above this comes another bed of Pentamerus Knightii, twelve to eighteen inches thick, covered by more shales, which last we have not yet examined closely. However, this occurrence of the Lower Ludlow Starfish, in shale lying above a thick bed of palpable Aymestry Limestone, is a very strong indication of identity between the two series of strata.

Perhaps it may be well to observe, in reference to the Lingula flags at Pedwardine, that when I was there the other day, to procure some Dictyonema for a friend, I found what I believe to be part of the head of a small Trilobite, which I immediately sent off to Mr. Salter, who writes that he can make nothing of it, though it may be a Trilobite head; but another fossil from the same place he thinks is a new shell. We have never previously found anything else here, except Dictyonema and Lingulella, though several Trilobites belong to the formation.

And now, gentlemen, having, in one way or another, got through my year of office, I take leave of you, rejoicing, not only at returning to private life, but also that you will have, as I am led to believe, a much more efficient President to succeed me.


## LIST OF ANIMALS, BIRDS, \&c.,

OF HEREFORDSHIRE.

R. II. LINGWOOD.

The names are according to L. Jenyns in his Manual of British Vertebrata.

## MammaLLA.

Meles taxus
Mustela foina

|  | Rare. Moccas. |
| :--- | :---: |
| putorius | Pole-cat. |
| vulgaris | Weasel. |
| erminea | Stoat. |

Badger.
Martin-cat.
Pole-cat.
Weasel.
Stoat.
In white winter garb, Feb., 1840, at Mordiford. Ditto, 1855, at Llanwarne.

Lutra vulgaris
Canis vulpes
Talra europcea
Sorex araneus

- fodiens

Otter.
Fox.
Mole.
Shrew.
Water Shrew.
Mordiford and Lyston.
Erinaceus europæus
Hedgehog.
Rhinolophus Hepposideros Lesser horse-shoe Bat. Over kitchens at Sufton Court.
Vespertilio noctula
Noctule.
Forty-seven individual found in a hole in ash-tree, at Sufton Court.
pepistrellus Pepistrelle.
Caught on the wing, December, 1839.
auritus

Sciuons vulgaris
Myoxus avellanarius
Mus sylvaticus
-- musculus
-- decumanus
Avvicola amphibia
-- agrestis

Squirrel.
Dormouse.
Field Mouse.
House Mouse.
Brown Rat.
Water Rat.
Field Vole.

Excerlingly mumerous in the summer of 1839 , more than 200 being eanght in making hay on 25 acres.


Two specimens only have come into my hands.
Lepus timidus
Hare.
May 27, 1839. My keeper drew my attention to a hare carrying something in her mouth, she passed about four yards from us in the open field, and we distinctly saw she had a leveret, a few days old, in her mouth.
Lepus cuniculus Rabbit.
Black and yellow varieties occasionally.

## AVES.

Falco peregrinus
Peregrine Falcon.
Stoke Edith, March, 1855. Alton Court, 1857.
-_ subbuteo
Hobby.
Rare. Bred in Haugh Wood, Mordiford, 1846. Shot at Peucoyd, 1854, by Mr. Palmer.

- Esalon

Merlin.
Seen ou wing, 1858, at Llanwarne. Killed at Kinnersley, 1845.
—— Tinnunculus Kestrel.
Accipiter fringillarius Sparrow Hawk.
Milvus ictinus Kite.
Rare. Killed at Stricksteyning, Much Birch.
Buteo vulgaris
Buzzard.
Hen Harrier.
Llanwarne, 1854.
Otus brachyotus Short-eared Owl.
Shot at Marden, 1845. Ditto near Ross. Mordiford, 1839.
Strix flammea White Owl.

Syrnium aluco
Lanius collurio

Tawny Owl.
Red-backed Shrike. Not common.
Muscicapa luctuosa
Pied Flycatcher.
Shot a pair at Sufton Court, June, 1839. Saw a pair at Aymestry, 1854.

- grisola

Cinclus aquaticus
Turdus viscivorus
__ pilaris
Very numerous in December, 1839.
——musicus
Song Thrush.
Redwing.
Blackbird.
Occurs with white marks in its plumage.
——torquatus Ring Ouzle.
Black Mountains. Migrates in September.
Accentor modularis
Sylvia rubecula
———Phænicurus
———Phragmitis
——— Luscinia
Hedge Sparrow.
Redbreast.
Redstart.
Sedge Warbler.
Nightingale. Not common.
——atricapilla
Blackeap.
Whitethroat.
Lesser Whitethroat. Not common.
__ sibilatrix
—— trochilus
—_hippolais
Regulus aurocapillus
-_ ignicapillus
Wood Wren.
Willow Wren.
Chiff Chaff.
Gold-crested Wren.
Fire-crested $W_{r e n}$.
Sufton Gardens and Lyston. The more generally dispersed species. Motacilla alba

Pied Wagtail
Gray Wagtail
A constant resident.
neglecta?
Blue-headed Wagtail
Only seen and not handled, therefore a little doubtful. At Lyston, Nov., 1840 .

| Motacilla flava | Yellow Wagtail (rare) |
| :---: | :---: |
| Anthus pratensis | Meadow Pipit |
| - arboreus | Tree Pipit |
| Not common. | Near Ross, 1849. |
| Saxicola œnanthe | Wheatear |
| rubetra | Whinchat |
| rubicola | Stonechat |
| Parus major | Great Titmouse |
| creruleus | Blue Titmouse |
| patustris | Mark Titmouse |
| ater | Cole Titmouse |
| caudatus | Long-tailed Titmouse |
| Bombycilla garrula | Bohemian Waxwing |
| In flesh at Baker' | s, in Hereford, 1856. |
| Alanda arvensis | Skylark |

Observed perched on hedge, and then on a low bush. Short-toed Lark?
_-_ aborea - Woodlark
Emberisa nivalis Snow Bunting
In flesh at Baker's, December, 1854. Shot at Pool Cottage, 1856.
-_miliaria Common Bunting
Not common.

| $\ldots$ Schoeniclus | Reed Bunting <br> Citrinella |
| :--- | :--- |
| Yellow Dunting |  |
| cirlus | Cirl Bunting |

Near the Callow Turnpike, 1852. June, 1863.
Fringilla cælebs Chaffinch
——montifringilla Mountain Finch
Killed at St. Weonarls, March, 1855.

| $\ldots$ House Sparrow |  |
| :--- | :--- |
| $\ldots$ domestica | Tree Sparrow |
| coccothraustes | Grosbeak |

At Lyston, 1847. Ayleston Wood, May, 1849, nesting! Lyston, March, 1860

| _ chloris | Greenfiuch |
| :--- | :--- |
| carduelis | Goldfinch |
| spinus | Siskin |

Appears every winter.

| Fringilla Linaria | Redpole |
| :---: | :---: |
| - cannabina | Grey Linnet |
| - montium | Twite |
| Black Mountains. |  |
| Pyrrhula vulgaris | Bullfinch |
| Loxia currirostra | Crossbill |
| In flesh at Baker's, Gunsmith, Hereford, 1855. |  |
| Sturnus vulgaris | Starling |
| Corvus corax | Raven |
| Bred in several places, but each year becoming more rare. |  |
| corone | Crow |
| cornix | Hooded Crow |
| Shot at Llanwarne, Jan., 1850. $\qquad$ frugilegus | Shot at Perrystone, Feb., 1860. Rook |
| - monedula | Jackdaw |
| - Pica | Magpie |
| Garrulus glandarius | Jay |
| Picus viridis | Green Woodpecker |
| - major | Great spotted Woodpecker |
| Mordiford, 1840. |  |
| minor | Small spotted Woodpecker |
| Yunx torquilla | Wryneck |
| Certhia familiaris | Tree Creeper |
| Troglodytes europæus | Wren |
| Upupa epops | Hoopoe |
| Rare. Callow Hill, 184 | 7. At Baker's, 1856. |
| Sitta europœa | Nuthatch |

Two specimens killed themselves by flying against the glass of Conservatory into which they had entered by open doorway.
Cuculus canorus
Alcedo ispida
Hirundo rustica
-urbica
-_riparia
Cypselus apus
Cuckoo
Kingfisher
Swallow
Martin
Sand Martin
Swift

Caprimulgus curoprus Goatsucker
Not very generally dispersed, but numerous in some localities, (Orcop).
Columba palumbus Ringdove
$\begin{array}{ll}\text { Enas } & \text { Stockdove } \\ \text { Turtur } & \text { Turtledove }\end{array}$
Phasianus colchicus Pheasant

- torquatus Ring-necked Pheasant

Pied varieties occasionally.
Tetrao tetrix Black Grouse
Occasionally on the borders of Radnorshire.
—— scoticus Red Grouse
Black Mountains, heavier than Scotch birds.
Perdrix cinerea Partridge
———coturnix
Quail
Killed at Belmont, near Hereford, 1847. Killed at Llanwarne, 1852, R. M. L. Killed at Fawley.

| Charadrius pluvialis | Bolden Plover |
| :--- | :--- |
| Black Mountains, rare, 1849. |  |

Bred near Newcourt, but not for some years past.


Bittern
Shot on the Wye, by J. Grifiths, Esq., 1849.
Numenius arquata Curlew
Very rare. Seen in the flesh at Bakcr's, gunsmith, Hereford ; whether killed in the County (?).
CEdicnemus crepitaus Thick-kneed Plover
Seen in the flesh at Baker's, 1854 ; killed at Lyde.
Totanus hypoleucos Sandpiper
Limosa rufa Bartailed Godwit
Shot on Lugg at Mordiford, 1839.
Scolopax rusticola Woodcock
Has bred at Trepenkennet and Dinmore Hill Wood.

- gallinago Snipe
gallinula Jack Snipe
Phalaropus lobatus Grey Phalarope
Shot at Allensmore, 1847.


| Larus canus ? | Gull |
| :--- | :---: |
| - tridactylus | Kittiwake Gull |
|  | Mr. Moss, Ross. |

## REPTILIA.

| Lacerta agilis | Lizard |
| :--- | :--- |
| Not common. | Doward Hill. |
| Anguis fragilis | Blind Worm |
| Natrix torquala | Snake |
| Vipera communis | Viper |

Specimen killed at Mordiford by myself, measured 2 ft . 9 in . in length.

Rana temporaria
Buteo vulgaris
Triton palustris
—_ punctatus

Frog
Toad
Warty Eft.
Common Eft.

## PISCES.

Perca fluviatiles
Cottus gobio
Gasterosteus aculeatus

Perch
Bull-head
Three-spined Stickleback
Two or three varieties.
Clupea finta
Shad
Occasionally ascends the Wye as far as Hereford.
Cyprinus carpio

- gobio
—__ tinca
_ rutilus
——— leuciscus
Carp
Gudgeon
Tench
Roach
Dace
Chub
Minnow
Loach

| Esox lucius | Pike |
| :--- | :--- |
| Salmo salar | Salmon |
| Thymallus vulgaris | Trout |
| Platessa flesus | Grayling |
| Mouth of Lugg, December, | Flounder |
| Anguilla acutirostris | caught with a worm in angling. |
| Sharp-nosed Eel. |  |
| Petromyson fluvialitis | Broad-nosed Eel. |
|  | River Lamprey. |

## PERIODIC PHENOMENA

## Observed at Lyston and Llanwarne, Herefordshire, average date of occurrence for seven years, from 1850 to 1857.

Song Thrush sings January ..... 8
Chaffinch sings ..... 10
Mezereon flowers ..... 16
Hazel flowers ..... 27
Snowdrop flowers ..... 30
Lesser Periwinkle flowers February ..... 18
Yew flowers ..... 19
Frogs croaking ..... 20
Yellowhammer sings ..... 3
Rooks begin building ..... 5
Pilewort flowers ..... 10
Apricot flowers ..... 14
Ringdove cooing ..... 14
Alder flowers ..... 15
Coltsfoot flowers ..... 18
Elder buds burst ..... 20
Sulphur Butterfly seen March ..... 20
Daffodil flowers ..... 20
Frog spawns ..... 22
Tortoiseshell Butterlly seen ..... 24
Cooseberry flowers ..... 30
Larch flowers ..... 31
Wych Elm flowers ..... 2
Cowslip flowers ..... 2
Chiffchaff Warbler seen ..... 4
Herb Mercury flowers ..... 5
Humble Bee seen ..... 5
Horse-chesnut buds open ..... 9
Fieldfares last seen ..... 9
Field Wood-rush flowers ..... 9
Meadow Ladysmock flowers ..... 11
Queen Wasp seen ..... 14
Cuckoo heard ..... 17
Swallow seen ..... 17
Blackthorn flowers ..... 17
Blackcap Warbler singing ..... 22
Redstart or Firetail seen ..... 22
Martin seen ..... 22
Nightingale heard ..... 27
Sand Martin seen ..... 27
Strawberry flowers ..... 28
Germander Speedwell flowers ..... 28
Orange tip Butterfly seen. ..... 28
Horse chesnut fiowers ..... 4
Spotted Flycatcher seen ..... 9
Whitethorn flowers ..... 16
Swift seen ..... 16
Oak flowers ..... 20
Large Cockchaffer seen ..... 20
Maylly seen ..... 21
Laburnam flowers ..... May 25
Oxeye Daisy flowers ..... 29
Landrail heard ..... 6
Foxglove flowers ..... 9
Small Garden Chaffer seen ..... 9
Strawberries ripe ..... 12
Wasps plentiful ..... 14
White Water Lily flowers ..... 21
Lime-tree flowers ..... 18
Apricots ripe ..... 24
Swift last seen ..... August 6
Swallows and Martins congregating ..... 24
Winged Ants appear ..... 24
Meadow Saffron flowers ..... 24
Yew Berries ripe ..... 26
Elder Berries ripe September ..... 16
Ivy flowers ..... 22
Swallow last seen ..... 16
Martin last seen ..... 23
Woodcock first seen ..... 23
Redwings and Fieldfares seen November ..... 18

I would add that there is only a difference of three days in the arrival of the Swift, and four days in that of the Cuckoo, during a longer period of twelve years.

R. M. LINGWOOD.

Listron, April, 1860.


# TRANSACTIONS 

OF THE

WOOLHOPE

NATURALISTS’ FIELD CLUB.

## No. 5.

## HEREFORD :

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## THE ADDRESS

Of the retiring President, C. Wren Hoskrns, Esa., read before the Members of the Woolhope Naturalists' Field Club, at their Annual Ifeeting, held in Hereford, on Thursday, March 17th, 1864.

Gentleyfar of the Wooliope Naturalists' Field Clob,
I am afraid to say how many years have passed since I was standing one day in a Bookseller's shop in Warwick, when a gentleman, personally unknown to me, came in and took up a pamphlet from the top of a heap fresh from the Printer's, which had my own name on the Title page, and contained the first year's Transactions of the Naturalists' Field Club of that County.

I experienced a very agreeable sensation on seeing the stranger immediately take out his purse, with the apparent intention of buying it. But Capital is proverbially timid, and self-love liable to disappointment. As he looked closer at the Title page I had the mortification to observe that his purse gradually made a retrograde movement towards his pocket; the ungrateful action being accompanied and explained by his utterance of the words " $O$, it's only an Annual Address !"

As soon as he had left the shop, little aware of the slaughter inflicted upon my hopes in that short pantomime, the publisher, who was himself at the counter, looked across at me with the consolitary smile of
'the fiend who never spoke before,
But cries, 'I warn'd you,' when the deed is o'er''
and almost literally recited 'the Fiend's part' by saying to me "I told you, Sir, how it would be if you put 'Annual Address' on the Title page!" The incident was instructive.

Nevertheless, owing either to a dearth of disengaged presidential material, or a too easy acquiescence in "the ills they had" in the Club, I still had, for many succeeding years, to encounter the annual experiment of reviewing our pleasant field excursions of the past summer; but always under a somewhat stinging remembrance of the fate that impends over an "Annual Address," and a taste on entering upon the task, of that after instinct which makes a horse shy extempore on approaching the spot where an accident has happened to him; and which you may have often seen exemplified in a certain leading article of the Times which appears about quarterday, in which after enticing the eye through half a column of agreeable preface, the writer lands you high and dry in the statistics of the Registrar General's Quarterly Report of Births, Deaths, and Marriages.

I cannot, however, enter upon the duty of endeavouring to recall the proceedings of the Woolhope Naturalists' Field Club during the "past year, without indulging a reflection, which occurs to me very strongly, upon the great extension of interest which has taken place in those pursuits which form the out o'door study and objects of Societies like our own, and have led to their increased establishment in the surrounding counties and districts. Nothing, perhaps, in the year has been more remarkable than the evidence of this which it embraces, in the growth of these kindred associations around us, and the joint meetings, and augmented interests to which they have from time to time given rise

Besides the Malvern, the Cotteswold, and the Warwickshire Clubs, which we formerly recognised in the adjoining or neighbouring counties, we have now to wolcome the restoration of the Dudley and Midland Geological and Scientific Society, the Severn Valley Field Club, the Oswestry, the Bridgnorth, and the still more recently established Caradoc Club, occupying areas that well deserved the scrutiny of separate Societies, while their es-
tablishment has increased the opportunities of mutual acquaintance and united labour amongst the $M$ embers resident in the different districts.

There can be no doubt that the Geology alone of each of these districts, as now occupied, affords an ample field of operations; and it is impossible to witness the rise of these numerous local societies without being struck by the prospect of the immense accession they promise to the scientific knowledge of the areas they represent, an advantage likely to be rapidly extended to the whole kingdom. I only wish-and I will take the liberty of here expressing it-that some medium more central and comprehensive might be made available, than the annual reports of each separate society, for giving to those acquisitions to our knowledge a form more easily accessible, and condensed, such as has suggested itself to me on looking over the various papers that have been printed, (to say nothing of those of equal value that have been read but not printed,) in the detached form of publication which the nature of the Societies at present necessitates.

The Clubs that I have named have already a certain bond of union in the reciprocal acceptance of the officers of each as honorary Members of all. The path is therefore open for a joint publication of the most valuable discoveries and papers of each Society during the year, which might also include a list of the whole of the places visited by each. The expense of such a publication jointly borne by the associated Societies would be but trifling, while the form of publication would enchance the character of the papers themselves and the importance of the meetings in a general point of view. The very nature of Geological study suggests such a co-operation, because its working out cannot, like the boundaries of a County, be limited by any artificial line, but radiates through and across the districts of several or all; like the medullary rays which traverse the annular rings in the growth of wood, connecting each year's deposit with the central pith, and ensuring the united structure and solidity of the whole stem.

But I would not be understood to speak too exclusively of our Geological pursuits, though, from its comparative novelty of research, and study, that science has been allowed to occupy a prominent and almost exclusive attention from many of the most active members of these Societies. We can hardly be too often reminded that it is the special privilege of Field Clubs to study the secrets of Nature, not as they are cut up by books into the jealous divisions of distinct 'sciences', but upon her own broad field where she is all one, and, in a certain sense, indivisible, the materials of every science being found in union with all others. It is the limitation of our own faculties, not of anything in Creation itself, which compels separation of pursuit and object, and subdivision, as it were, into chapter and verse. This is more powerfully felt, though insensibly conveyed to us, by one day out of doors, surrounded by men of science, (however each may have wisely compressed his studies into one channel) than it ever can be understood from books themselves.

There is, however, one class of out-door investigation which is of course an exception to this remark, and does not strictly fall under the category of science, but for which I would venture to say a word-I mean the study of Archæologyon this ground, that whereas the records afforded by the earth's geological structure are permanent, and its botanical features constantly renewed; those records which tell of the hand of man, claim our prompt and early attention on account of the destructive hand of time, and the obliterating effects of the winter's frost and the summer's vegetation.

Nature's monuments remain: while those of art follow the perishable hand that reared them, and allow of no delay. The County of Hereford is unfortunate in the want of a completed History; and I confess that I should like to indulge the hope that a Club which is so ubiquitous in its action, and operations, will not omit to render its out-door labours as much as possible in union with the objects of the literary and philosophical Society. "We are a Brotherhood for mutual and self help" says

Mr. Hayes in his address this year to the Severn Valley Field Club, "and we should deem it a duty as well a privilege to contribute to the instruction of others, fully hoping to receive instruction in turn. The object should be not to exhibit learning but to gather it and impart it, reciprocally. Each branch of enquiry should have a fair if not an equal consideration; and the addresses given should be rather those of fellow-students assisting each other, than set lectures ex cathedra. Much will of course depend on the points of interest existing in the place we visit; but those who plan the day's ramble should remember that all the Members have not the same pursuit or object, and that the wants of each branch should be provided for."

I entirely agree with these plain and obvious remarks of my brother President, and can confirm the value of his suggestions from the spontaneous remembrance that occurs to me of the peculiar pleasure of Field Club days and wanderings as arising from the variety, and if I may so say, the flexibility of scientific topics brought together; a pleasure of extreme rarity at scientific meetings in Town and Country; where speciality of subject and treatment is so apt to drift into a monotony and conventionalism of language, and laborious classification, and worse than these, a referential and esoteric style understood only by a small knot of devotees to particular branches of art or study. I merely allude to this subject in passing, because I have in frequent instances found that those who would become ralued members of our Society have been deterred by the fear that they were not sufficiently learned in particular Sciences to join us.

Certainly our rambles of the past year would not have left upon the minds, even of the most sensitive in that respect, any such impression. Our First Meeting which look place on the 9th of June, at the Nitcheldean Road Station, near Ross, and led us into the Forest of Dean, formed a most cheerful and agreeable opening of the season. The day was fresh and fine, exactly suited for a long walk, and that we had, passing through some good sections of the carboniferous Limestone, which were
examined at its outcrop, and some af its characteristic Fossils obtained. Our walk, which was directed to Cinderford, led us by some newly erected mining works, where Iron Ore has been obtained from the Limestone beds. The last part of our walk, for a couple of miles before we reached Cinderford, was through some very picturesque Forest Scenery, through the openings of the foliage of which the smoke of the town and works of Cinderford "gracefully curled" in a manner more pleasing than on nearer acquaintance. The Members had walked quite far enough to enjoy a very primitive luncheon at a small but by no means quiet Inn which, to misquote Goldsmith,
"Did seem contrived a double debt to pay, An Inn by night, a Butcher's shop by day"
and adapted rather to test the power of appetite than to satisfy it. On returning past the Town some curious sections were noticed of the disturbed Limestone beds thrown into very nearly vertical Strata. On their return the Members dined together at Ross.

This little raid into the Forest was such as to make me feel very jealous of a subsequent Forest tour undertaken by our valued Secretary elect, which I hope will, together with a more detailed account of our Club day, form the subject of a paper for this Evening.

The Second Meeting of the Society, which took place on the 7th of July at the Craven Arms, near Ludlow, was one that will be long remembered by those who were present. It was a joint assemblage, in fact, of not less than Five Societies, consisting of the Oswestry, the Dudley, the Bridgenorth, and the young and promising Caradoc Club with our own. The place chosen presented several attractions-The Ruins of Stokesay Castle, for the inspection of the Archæologist, the Wood of View Edge, said to be the only place in England where the Astrantia Major is supposed to grow wild, of which abundant specimens were found, and to the judgment of some, rather cruelly brought away,
suggesting to the mind of our late Secretary the very just remark that "it is not wise to talk too loudly about a scarce plant," for several of our number who climbed the heights of the wood, in search of it, came out of it with the rare Astrantia ruthlessly torn up, in some cases by the roots, and borne in ruinous triumph on their hats, and other parts of their dress. "I took twoo speci-mens-for I do not like to exterminate"-adds his communication, but if all the septuagint of naturalists assembled on that day were equally forbearing, the exterminating process will hardly have received a very exemplary check.

But the Wood of View Edge contained another attraction in its celebrated Quarry of Aymestry Limestone, where nearly the whole of the rock, exposed to a thickness of from 30 to 40 feet, is composed of Pentameris Knightii cemented together.

As the very interesting ruin of Stokesay Castle is the subject of a printed account, I will not attempt any extended notice here of its almost indescribably angulated Tower, and its old Court Yard, and very curious and grotesquely carved Gateway. The brief notice of it in Hudson Turner's "Domestic Achitecture of the 12th and 13th Centuries" places it in the catalogue of what may be called the classic ruins of our early history. I should be wanting in justice if I did not mention that it owes its preservation in the existing condition of interest to the Archæologist entirely to the tasteful interposition of Mrs. Stackhouse Acton, who took a most kind interest in the opening it for the scrutinising inspection of the Society, at which she was present during the whole day, affording the aid of her own accomplished archæological experience, towards the explanation of the original plan of the ancient Hall, and other parts of the building. I must add that the presence of Mrs. Acton during the day, and with a large party of Ladies of the neighbourhood at the dinner of the Society at the Craven Arms, will be remembered by the Members present, of many Clubs, almost as an illustration of what may be done to render these Meetings interesting and useful both to the Societies themselves, and to the residents of the districts
risited. The dinner was one which furnished very cogent illustrations of the maxim "the more the merrier," the double-room of the rather astonished host of the Craven Arms being as full as it could or rather couldn't hold, and something over. Several short but useful papers were read, in the intervals of a rather brisk discussion, chiefly on botanical questions suggested by doubts as to the indigenous character of the Astrantia Major.

On the 2nd of the following month, August, the Club assembled at Pontrilas Station for its 3rd Mecting, and the Members walked, by Ewyas Harold Common, as far as the beautiful vestige of the ancient border Abbey of Dore; of which the historical account (if such it can be called) that we have, is so defective that the detruncated relic (for the nave is gone) remains a perfect mystery of architectural beauty and labour, affording a school of transitional work, of that choice period when the Norman treatment had not disappeared from Early English work, and the latter had not begun to yield to the temptations of the Decorated style: a period, to my mind, the most attractively beautiful, and the most permanently interesting of all that come under the general title of Gothic Architecture. The plain and shallow work of the exterior enhances the surprising beauty of the chiselwork in the groining of the Lady Chapel or Ambulatory which encloses the Chancel, almost the only portion which remains quite entire. Even through the stubborn coat of whitewash, which is half an inch thick, the deep yet delicate work of the artist may be appreciated in all its rich and never self repeating profusion. Scarcely any of the capitals or corbelled projections are alike: indeed the execution of the groin work of the Ambulatory on the north side is unsurpassed by any work of the kind I have ever seen. To examine it is to wonder more and more, after approaching it over so many miles of bad road, and in so wild a district. To the traveller from the Abbey of Dore to that of Llanthony the world would not appear to have advanced much during the last five centuries. The thanks of all admirers of Aıchitecture are due to the present

Vicar, Mr. James, for the labour of love which he has expended, at his own unaided cost, in clearing a considerable portion of the plaster away, and revealing the exquisite work beneath.

The portion of the building now used for worship is disfigured by the wooden fittings of the Transept, which bear the stamp of James the First's time: amongst which is to be classed a curious old Altar monument in the Choir to Serjeant Hoskyns, covered with latin verses by Bonham of Essex, Daniel, Dr. Donne, and others, in the extravagantly laudatory fashion of the day. I trust the time may not be far distant in this Church-restoring day, when this gem-like relic may be wholly relieved of its mask of white-wash, and the unsightly intrusion of its Jacobite wood fittings and pews. After inspecting Dore Abbey and Ewyas Harold Church with its curious Tower, the Members dined under Canvas, and were joined by the present High Sheriff, and separated after a most interesting day's excursion.

The last Meeting of the year, which was a joint assemblage of the Malvern, Worcester, and Cotteswold Clubs with our own. at Malvern, on the 7th of September, I have to express my great regret to have been prevented attending. The Excursion was to the Worcestershire Beacon, where Mr. Symonds, President to the Cotteswold Club, lectured on the Geology of the surrounding Country. Dr. Bour has promised to make this Meeting the subject of a separate paper to be presently read to you.

I can hardly conclude my address without some reference to a subject which appears to have lately revived much of the same feeling between Science and Theology, which those who are old enough to remember it will call to mind as having characterized the discussions which arose at the infancy of Geological Science in our day-I allude to the subject of Sir Charles Lyeli's late work on the Antiquity of Man. The conclusions that have been indicated by men of science and exaggerated (as is often the case) by their followers on this topic, have naturally startled the minds of many by the conflict suggested with some received theological views. I do not think it is sufficiently
borne in mind that the whole history of physical science during the last four centuries affords sufficient confirmation of the belief that there is no just cause for the least apprehension on this ground. But this is not all. It is not enough to say that any existing or apparent antagonism between Science and Religion will die out: this would be the truth, which we often hear: but it is wanting in fairness to Science because it is not the whole truth. A reflection, in some respects even more important, may be derived from looking back upon the influence which Science,-however once shrunk from and dreaded for the conclusions it seemed to threaten-has eventually produced, in its gradual and insensible absorption within the very centre of religious thought and language, enlarging and expanding the views it was once apprehended that it would overturn, and was at any rate believed to invade. The history of Astronomy in the seventeenth century is apt to be forgotten in this day. But it may be appealed to with advantage as that of a campaign far more fierce and lasting than probably advancing Science will ever witness again, and compared with which our disputes are a mere mockery of warfare, and an echo of the fear that once overspread Christendom. Yet who, in the present day, would exchange the chart and title-deeds of Christian faith for those maintained before the progressive hand of Science had spread in our view the field of creative wisdom and goodness as it is now understood and appreciated?

Had Wicliffe been asked what he thought of the progress of Physical Science in reference to Revelation, it is possible he would scarcely, if at all, have recognised the pertinence of the question. The very relation between them had not sufficiently awakened to assume the form of antagonism. Of the storm raised in the theological world by the discoveries and doctrines of Copernicus and Galileo, we can scarcely, at this distance of time, form a conception. In the case of Astronomy, this storm has long passed away;; but it has not left a mere negative atmosphere behind it. As the antagonism with theological opinion, mistaken for discrepancy with religious Truth, died away, the relation
that suggested it survired, and the scientific study of the wonders of Creation was found in powerful alliance with the very truths it had been supposed to threaten. It entered into the very language of religion; it did more, it became a part of religious thought, and practical devotion. It is one of the purest pleasures of a life devoted to scientific persuits, to mark, when once the true reading of a complicated problem has been obtained, how all the difficulties which had previously blocked up the path like piles of ruin, are one by one cleared away, not by being destroyed, but by being harmonised and reduced to consistency and order. Things which appeared hopelessly antagonistic, are found necessary to the elucidation of each other, and to the comprehension of the whole of which they form a part. And thus from what seemed at one time a wild chaos of facts driven about at random by each conflicting current of hypothesis, there emerges at last that compact symmetry and simplicity which we recognise at once as truth. What inward misgiving is it that makes us distrust or despair of this result in Theology? If we could look back to the occurrence of the first great mediæval discoveries in Geography, in Astronomy, even in Literature, we should see convulsion of existing opinion, processes of mental revolution, far greater, for many obvious causes, than any which scientfic discovery can cause to-day. Yet the pyramid which seemed to many, perhaps most thinkers of that day, to be trembling on its point ready to topple down upon the next generation, if not their own, still rests upon its base; and to the thinking of most, even of the timid of our day, a good deal more firmly than it did, as it depended on man's previous opinions and creeds. The progress of physical discovery knows no respite, nor pity, for the most persistent theological opposition, any more than the blind forces of nature will pause in obedience to the will of man.
But in the progress of time he learns to harness to his own use the very agencies at which his ignorance once trembled, and discovers that Creation is in unison, not in opposition to his wants and happiness, and was framed to be in subservient accordance with that of which it appeared to threaten the Fery existence.

A heathen writer tells us that the first Mariner was deemed guilty of impiety. We know, from much more recent history, that the first man who used the Telescope, the first man who drew Lightning from the clouds, nay, the first man who dared to raise the wind artificially to winnow his wheat, was thought little better than an Atheist. But nobody now considers Christanity in danger from Lord Rosse's ten-foot Reflector, from the Electric Telegraph, or from Hornsby's Corn Dressing Machine with its internal hurricane almost enough to blow a man's head off.

In this age, as well as in those before it, we mistake the discordance with our own readings and opinions for opposition to Christian Truth. We mistake the ideas we have associated with our religious views, for religion itself. Time, the greatest of revolutionists, insensibly corrects the error, and supplies the reconciliation better than any argument. In matters of science it is far better to keep the work separate at first, to let each investigator go on in his own track, undisturbed by perpetual challenge of disagreement with received opinions. The Chinese foot does not become more symmetrical by the attempt to restrain it within the shoe that fitted its infancy; and the Study of Nature if left unconfined will best preserve the symmetry of Truth while the proportions of human Thought are enlarged.

## THE DAY at malyern

## AND THE

## MISTLETOE IN HEREFORDSHIRE.

## Read by Dr. Boll, at the Annual Meeting of the Woolhope Naturalists' Field Club, March 17th 1864, with some additions.

On the 7th of September the Club met at Malvern Link for a grand field day, with the Members of the Malvern, Worcestershire, Cotteswold, Dudley, Severn Valley, and Caradoc Clubs.

Having partaken of the kind hospitality of The Reverend Troorss Kina, at Lyttelton House, and transacted the ordinary business of the Club, our Members joined the general assemblage in a visit to the very interesting Abbey Church at Great Malvern, which has been recently restored by Mr. Gilmert Scort. A brief history of the Abbey was given by J. S. Waleer, Esq., with an explanation of the curious and very old glass in the South west Chapel.

The Museum of the Malvern Club at the house of the Messrs. Burrows was next visited, and after a short inspection of some of the many interesting fossils of the district, which it contains, a general move was made for the summit of the Worcestershire Beacon. From this, (the highest point of the Malvern Hills), a most interesting and cloquent Lecture was given by the Rev W. S. Sruonds, F.G.S., President of the Malvern Club, on the Geology of the surrounding district. It was thoroughly appreciated by every one, but enjoyed the more especially by those gentlemen who had wisely carried up with them their great coats.

The Geologists, under the guidance of $\mathrm{D}_{\mathrm{B}}$. Honl, then pursued their way across the Llandovery conglomerate of Miss Phillips to the Upper Silurian Rocks, and thence by Ham Green, Backburrow Wood, and Stoctons Copse, to the lime-kilns near the Croft Farm, and on down the valley to inspect the trap bosses in Comleigh Park.

The Botanists present, attracted irresistibly to Mr. Edwin Lees, had a delightful ramble under his special guidance. This district is peculiarly his own. No one knows so well the localities of its rarest plants, and happily no one knows how, with better tact, to guard them from ruthless destruction.

The whole party, some 60 or 70 strong, met to dine at the Link Hotel, and such as could remain for the night were kindly invited by Dr. Grindrod to a soiree at Townshend House, when his fine collection of Silurian fossils was exhibited, and where several very interesting papers were afterwards read.

A day on the Malvern Hills-weather propitious-must always be enjoyable, but with Mr. Srmonns to descant on the rocks he loves so well, and Mr. Lees to explain all that grows upon their surface--it would be strange indeed if this particular Meeting should not ever be of pleasant memory to those who had the good fortune to be present.

Our Club, with the others, may be considered to have been on a visit to the Malvern Club, and it would ill become your Reporter to trespass on the rights of hospitality. To those therefore who wish for more exact details of the day's proceedings and the papers read, I must answer, Are they not written in the Archives of the Malvern Club? I don't think much real work was done, and perhaps never is on such grand gatherings. All present most thoroughly enjoyed the day, and returned home with a store of information, and a renewed enthusiasm, let us hope, to carry on the work of observation in their several districts.

I prefer asking you, on the present occasion, to leave Worcestershire, and come with me along the top of the hills to our own Herefordshire Beacon, and descending by the long spur called the "Ridgeway" leading from it to Eastnor Park, to visit the Oak Tree upon which the Mistletoe grows so luxuriantly.

## MISTLETOE

## IN

## HEREFORDSHIRE

deserves the especial attention of the Members of our Club. The Viscum Album is indeed so much more common here than in any other County of England, that it may truly be said to be more distinctive of Herefordshire than the Apple tree itself. It is not my intention to give the Botanical characteristics of the Mistletoc, which books contain; nor do I propose to give any special description of the graceful clegant plant you all know so well; but take this opportunity of bringing before your notice, some of the chief points of interest with regard to it, which have been more or less overlooked, viz:-

1st. The Mode of its Propagation and growth :
2nd. The Trees it lives upon in this County :
3rd. The recorded instances of its growth on the Oak in England : and

4th. The Romance of its history as devoloped in times past and present.

## I. THE PROPAGATION AND GROWTH OF THE MISTLETOE.

The mode in which tho Mistletoe is propagated has given rise to much discussion.
> "The Naturalists are puzzled to explain How trees did first this stranger entertain, Whether the busy birds engraft it there, Or, else some Deity's mysterious care, As Druids thought,"
> or rather taught adds Withering severely.

This plant has long been the object of close observation from the religious veneration in which it was held-Aristotle (De Gen. Animal. lib. 1, c. 1.) and other of the ancient writers imagine that the seeds will not grow unless passed through the intestines of a bird.

In olden times-long before the birds had cause to dread the invention of gunpowder-the Mistletoe was the chief source of the birdlime which caught them,** and the Mistletoe Thrush (turdus viscivorus) in thus making the seed grow, might be said to produce the cause of its own destruction, and hence arose the

(Turdus cacat suum malum,) or, as the old doggrel expresses it
"The Thrush when he pollutes the bough Sows for himself the seeds of woe."
Baudin, Scaliger, and others, more modern writers, have treated this view as fabulous, but have committed a still greater crror themselves in fancying it a mere excrescence from the tree on which it grew. Virgil represents them in the lines;
"Quale solet sylvis brumali frigore viscum
Fronde virere nova quod non sua seminat arbor Et croceo foetu teretes circumdere truncos."
(Eneid lib. vi. l. 205.)
and still later it has been supposed that the glutinous berries stick to the beaks of the birds that eat them, and as they clean

[^9]their beaks on the neighbouring trees the seeds are sown-a view, it is sufficient to say, which supposes that the birds don't know how to eat the berries they like so much.

There is no longer any question that the natural mode in which the Mistletoe is propagated from one tree to another is that so graphically represented by the ancient observers; and it is a fact that many modern experimentalists succeed so much better in growing the seeds that the birds have thus dropped, that they seek for them, in preference to using seed fresh from the plant itself. It is equally beyond all doubt, however, that fresh seeds will grow without undergoing any such process.

The artificial propagation of the Mistletoe from the natural seeds, on trees adapted to receive the parasite, is by no means difficult in this county with ordinary care. Fasten the seeds of the berries by the glutinous matter surrounding them to the boughs of a crab or an apple tree, or a black poplar, and if they escape destruction from small birds, Sparrows, Bullfinches, or especially Tom-tits, some of them will be sure to germinate and take root. Many persons however, even here, have found such great difficulty in growing the seeds that the following precise rules for doing so are added. Raise a considerable piece of the bark by a sloping incision, nearly an inch long, on the under side of the branch to be experimented upon: the cut should only be made through the bark itself, and not into the wood of the branch; or, more simply still, a broad notch may be cut in the bark, then having chosen some fine well ripened berries, open the skin of one of them, remove the seed with great care and place it in the base of the notch thus made, with the embryo directed towards the trunk of the tree, and restore the raised bark over it. In this way it is best secured from the sun and winds that might dry it up; from the rains that might wash it off; and from the birds also. The branch experimented upon should not be less than five feet from the ground.

The seeds of the Mistletoe require to be handled with great delicacy, a light crush will destroy their ritality by injuring the embryo, and the pulp surrounding them is so very
glutinous that it is difficult to place them right and keep them there without pressing on the seed; many experiments have doubtless failed from want of care in this respect. Some persons have used with advantage a covering of moss and bass to protect them still further from injury and to keep them damp. An old tree in a damp situation will render the success of the experiment still more probable.

The best time for sowing the seed is January or February, the young plant is at first very slow in its growth, and will spend one, and sometimes two years, in the formation of roots only, before sending out any regular stems.

Mistletoc can also be artificially propagated by grafting or budding, and with still greater certainty by inarching, but it is very unnecessary in this county to adopt either of these plans.

The Continental experimentalists do not seem to find much difficulty in making Nistletoe seeds grow. M. Du Hamel made a long series of experiments with regard to its mode of propagation, and succeeded on all trees but the fig, the oak, the hazel, and the juniper. He could always make the seed germinate, even on earthen pots, stones, dead pieces of wood, or even upon the ground, but though the radicles would shoot out freely at first they quickly died, shewing that it was a true parasite and would only grow upon trecs.
M. Dutrociet proved by a series of delicate experiments that they do not obey the usual law of plants in germinating, by at once directing their radicles towards the centre of the earth, but alway direct them towards the centre of any object against which they are grown. He caused Mistletoe seeds hanging from threads to germinate on all sides of round balls, and in cases even when the ball was of metal, the radicles were directed towards the centre of the ball, and not towards the earth-that is, the seeds beneath the ball directed their radicles upwards, those at the top sent them downwards, and those at the sides horizontally.

Paley in his Natural Theology brings formard the Mistletoe as a singular instance of what he terms "compensation" in his argument to prove the design and contrivance of nature, that inasmuch as its seeds could not grow in the earth like those of other plants, nature has provided them with an adhesive property, which no other seeds have, to enable them to stick to the tree on which they do grow.

The following observations on the mode of growth of the young plant are taken from a paper by Dr. Joni Habley, on the "Parasitism of the Mistletoe," which was read before the Linnean Society, in March 1863. This paper contains a very careful and elaborate investigation into the anatomical relation of the Mistletoe to the plants on which it grows, and draws some very interesting conclusions as to their physiological relations to each other.
"The Mistletoe attaches itself to the nourishing plants, by roots, some of which are horizontal and confined to the bark, while the others are contained within the wood. Hexslow, Griffiti, Unger, Sciracet, and Pitra, all agree in the following particulars:--The young plant first sends into the bark of the nourishing plant a single root, sucker, or senker, which, pressing inwards, comes into perpendicular relation to the wood of the nourishing plant, in the cambial layer of which the point rests, and there ceases to grow. In its passage towards the wood, it gives off several horizontal or side roots, which run along the branch in the bark, or upon the surface of the wood. These side roots give origin to perpendicular suckers, which come into contact, like the original root, with the surface of the wood." "The wood and bark of the mother plant, in their periodical increase, form layers around the suckers, which grow in exactly the same manner in the cambial stratum." (Pitra) and thus the hardened suckers come to be imbedded in the body of the wood. "Dr. Harley gocs on to state, amongst many other interesting particulars relating to the growth of the plant; that their perpendicular roots are tapering, diminishing in size from
the circmmference towards the centre; that there are usually three or four and sometimes five or six such perpendicular roots; that their terminations are always composed of delicate tubular cells joined end to end, and arranged parallel to cach other and to the long axis of the root, and that these roots are always arranged strictly parallel to the medullary rays of the nourishing plant. "The young cellular root of viscum may be regarded Ecnerally as a prolongation of the central pith of the parasite, and contiguous medullary rays of the nourishing plant are successirely confluent with its surface."

Having minutely described the loose porous structure of the stem and base of the Mistletoe, Dr. Harley says "with regard to the direction and arrangement of the roots of the Viscum which lie within the wood, this is determined by the arrangement of the medullary system of the nourishing plant, the roots always lying strictly parallel to the medullary rays ;" a conclusion to which he was led by the fact, that the Mistletoe and the supporting branch grow at right angles to each other, and that on a transverse scction the Mistletoe roots are always shown to be arranged like the radii of a circle from the circumference towards the central pith.
"The horizontal ramifications (side roots) of the base of the Mistletoe have plainly the same structure as the young perpendicular roots. Whichever dircction they take, they produce at frequent and pretty regular intervals, other tapering cellular roots which guided doubtless by the medullary rays of the bark press towards the surface of the wood and are thus brought in contact with the ends of its medullary rays. They are subsequently found embedded at various depths in the hard wood of the nourishing plant, like the primary roots. These lateral roots also give origin to budlike processes, which, deepening in colour, grow up obliquely through the bark, and appear as little shoots in its chinks, soon developing leaves and stems as a 'separate plant.'-Dr. Harley also gives good ground for believing the perpendicular roots penetrate the hard wood by their own growth, in the absorption they occasion in the wood itself, and
in the depth to which they enter-a conclusion which all who have made careful sections of the bough with the Mistletoe attached to it, will have no difficulty in believing. It forms another example of the common law in organic life, that when two living structures impinge on each other in a confined space, the one possessing the lowest power of vitality must give way to the other, and here it is the dense wood of the tree that is gradually caused to be absorbed by the pressure of the soft cellular growth of the perpendicular roots of the Mistletoe.
"When the roots of the Viscum Album" says Dr. Harlet again, "have become fairly infixed into the medullary system of nourishing plant, their outer portions become gradually thickened by the formation of woody layers upon their surfaces. This increase in the lateral dimensions of the root takes place, pari passu, with that of the branch upon which it grows; for every layer of wood deposited on the branch, a corresponding one is deposited upon the Mistletoe; and the growth of the two plants proceeding thus uniformly, the concentric rings of the stock pass uninterruptedly into those of the Mistletoe, and the woody layers become co-incident. Whilst the roots thus undergo increase and lignification about their outer portions, their inner extremities which now lie deeply within the hard wood, constantly retain their original soft cellular condition; they are in fact to the viscum, what the cellular rootlets of terrestrial plants are to them."

## II.-THE TREES UPON WHICH THE MISTLETOE GROWS IN HEREFORDSHIRE

so far as I have been able to ascertain them by my own obserration, and with the kind assistance of several members of our Club, and ot ers, are as follows; and I give the list, as closely as may be, in the order of the frequency of its occurrence on the trees at this time:-

1st.-Tife Aprle Tree, (Pyrus malus domestica) general throughout the County.

On the English Poplars.-

2ad.-The Ablele Tree or White Poplar, (P.albc;) not common.
3rd.-The Grey Poplaf, ( $P$. canescons;) rare.
4th.-The Aspen, ( $P$. tremula;) occasionally;
and on the following introduced varieties of Poplar.
5th.-Tife Blace Porlar, ( $P$. nigra; ) the earliest introduced species; very common.
6th.-The Black Italian Poplar, (P. monolifera;) introduced in 1772, and has now for the last 30 years been substituted by nurserymen for the Canadian Poplar ; very freely.

7th.-The Canadian Poplar, ( $P$. Canudensis) formerly much more generally planted than at this time; very common.

8th.-Tite Ontario Poplak, (P. candicans) a balsam bearing Poplar, introduced from North America in 1772, and now much distributed by Nurserymen ; common.

The Mistletoe grows more or less on all these varieties of Poplar. I bracket them together as a class, for in the reports sent to me, no distinction has been made between them, and when the leaves are off the trees it is very difficult to do so.

9th.-On the Hawthorn, (Crategus Oxyacantha) not uncommon throughout the County, where old trees are found. Round Haywood Forest: Belmont: Breinton: Dinedor: Lyde: The Weir, Hereford : Holm Lacey : Harewood Park: Ledbury district: Ross district, (Rev. W. H. Purchas :) Leominster district, (Rev. Thomas Hutchinson :) Garnons, (Thomas Blashill, jun., Esq.) Croft Ambry, very abundantly, (Rev. Thomas Woodhouse.)

10th.-The Crab, (Pyrus malus.) general throughout the County where it is found.

11th.-The Line Tbee, (Tilia Europra) Belmont: Lower Bullingham: Cagebrook: Stoke Edith: Whitfield: Ross district, (Rev. W. H. Purchas :) Yarkhill : (Thomas Blashill, jun., Esq. :) Wigmore road, Aymestry, (Rev. Thomas Woodhouse)

12th.-The Maple, (Acer campestre) Belmont: Vennwood, (three trees:) Marden, (several trees :) Much Dewchurch : Holm Lacey, (several trees :) Putley near Ledbury, (several trees:) Garnons, (T. Blashill, Esq.:) Leominster, (Rev. T. Hutchinson.)

13th.-Tae White Flowering Acacia, (Robinia pseudoAcacia) Blackmarston: Litley : Belmont, (2 trees:) Breinton: Lugwardine, (several trees :) Harewood Park: Brinsop: Garnons, (Thomas Blashill, jun., Esq.) Foxley, and Kings Meadow, Wigmore, (Rev. Thomas Woodhouse.)

14th.-The Mountain Ash, (Pyrus Aucuparia) Aylestone Hill : Stoke Edith: Withington: Sutton Court: Yatton Court, Aymestry, (Rev. Thomas Woodhouse:) Leominster, (Rev. T. Hutchinson:) Dormington, (Rev. T. Bird:) Lyonshall, (Rev. J. F. Crouch:) "In the vicinity of Ledbury" (Lce's "Botanical Looker out.")

> Rare Mrstcetoz.-At the shop of Mr. J. H. Whit nurseryman, of this city, is to be seen a mistlet gathered from the hazel bush, on which it is rare to fil this parisitical plant growing. The plant, thoug specifically the same as that growing on the apple, somewhat noticeable in that the berries are more opaq and more numerous than those of ordinary mistletc the number of berries growing in clusters at the axbeing generally as manvas twelve. 乌acuary $1 / 38 ¢$

15th.-Tie Ast, (Fraxinus excelsior.) Beyond the "Three Elms," Hereford, on the Burghill road : near Mr. Hooper's yard, Canon Frome: Abbot's Meadow, Brampton Abbots; Strangford-on-the-Wye, opposite Fawley; and near Carey Island, Kings Caple: (A. Lee, Esq.)

16th.-Connson White Willow, (Salix alba.) over pool in front of Sugwas House: River Lugg, bank opposite Freens Court Narden: Strangway bank, Bodenham : over pool beyond Thruxton: Mathon near Malvern, (Mr. Baxter, by Mr. Haywood.)

17th - The Hazel, (Corylus avellana.) near Pope's pool, Putley, Ledbury: Kimbolton, (Rev. T Hutchinson:) Swinmore brook-side, opposite Upleadon, Ledbury, (P. Ballard, Esq.)

18th. The Pear Tree, (Pyrus communis.) Orchard behind Graftonbury farm: in the pleasure ground of Graftonbury House: and said also to grow, on reputable authority, on one tree in Mr. Martin's perry orchard at Monkhide, Ledbury : and on one tree at Wigmore.

19th.-Tiee Oar, (Quercus robur.) the Ridgeway drive, Eastnor Park, Ledbury: and Tedstone Delamere, Sapey, (Revs. Dr. Cradock, and Gregory Smith, M.A.)

20th.-Tue Alder, (Almus glutinosa.) banks of Lugg, opposite Lugwardine, (two trees.)

21st.-Tie Round Leaved Saliow, (Salix caprea.) field near Ruckhall Common, Eaton Bishop.

22nd.-The Srcamore, (Acer pseudo-platames.) in belt of trees by road-side, Sufton Court.

23rd.-The Common Dog Rose, (Rosa Canina.) Vennwuod, Bodonham: on a stom layered in a hedge one foot from the ground.

24th.-Tie Mrdlar, (Mespilus Germanica.) At East hampton Lodge, Shobden, (Rev. Thomas Woodhouse.)
25.-Tre Wrai Elar, (Ulmus montana.) near Bockleton, (Rev. J. Miller, lately deceased, by Rev. Thomas Hutchinson.)
(There is some little doubt whether this example exists in Herefordshire or Worcestershire.)

The Mistletoe also grows spontaneously on the following cultivated trees in this County:-

26th.-The Yellow Hobse Chesndt, (Esculus fava.) In the Rectory Gardens, Stretton Sugwas. (Rev. H. C. Key.)

27th.-The Pink Hobse Chesnot, (Esculus rubicunda) in the Gardens of Harewood. (Chandos Wren Hoskyns, Esq.)

28th.-On the Western Maple, (Acer occidentalis.) The Lawn, Belmont, Hereford.
29th.-On the Eastern Maple, (Acer orientalis.) The Island of Belmont Pool, Hereford.
30th.-The Axrebican Cbab, (Pyrus malus Americanus.) Mr. Godsall's Nursery Ground, Hereford.
The favourite site of the Mistletoe is certainly the Apple Trfe. There is scarcely an orchard of any standing in the county without it, and in many it grows far too luxuriantly. The proportion of Apple trees which bear Mistletoe in the central districts of the County, as obtained by a separate examination of more than two thousand trees, as they came, in sereral orchards, is as follows: in orchards of comparatively new kinds of fruits, principally French and Italian Apples, the average number of trees which bore Mistletoe ranged from 13 to about 30 per cent; in old long established orchards, the proportion varied from 30, to as high as 90 per cent; whilst the general average from all the trees marked down was 39 per cent of Mistletoe bearing trees. The actual numbers were 784 with Mistletoe, and 1218 without it.-Nor can this very high average be an over statement; for the trees were examined in March and April, after they had supplied the Christmas and New year's day requirements, for this and other Counties, and had been subjected moreover, to the usual annual pruning.

Mr. Adams, of Marden, who kindly undertook to obtain for me, a fair reliable average of the number of Apple trees in full vigour, which bear Mistletoe in that district, has sent me the following result of his examination of all the trees in six different orchards. Mr. Adams was careful to select orchards in which the trees had attained their full growth and were in full bearing-avoiding on the one hand, orchards of very young trees, where comparatively few were affected by the parasite, and on the other, those containing very old trees, where almost all of them bear Mistletoe.

| ORCHARDS. | Trees with Mistletoe. | Trees without Mistletoe. | Average per centage of Mistletoe bearing trees. |
| :---: | :---: | :---: | :---: |
| No. 1, containiug 120 trees, chiefly Cider fruits. | 40 | 80 | or 33 per cent. |
| No. 2, with 225 trees cider fruits. | 71 | 154 | or 32 per cent. |
| No. 3, containing 80 trees, $\frac{4}{5}$ cider, $\frac{1}{5}$ pot fruits. | 41 | 39 | or 51 per cent. |
| No. 4, with 41 trees in a damp and sheltered situation, mostly choice hoarding fruits of the old sorts. | 34 | 7 | or 83 per cent. |
| No. 5, with 48 trees, cider fruits. | 10 | 38 | or 21 per cent. |
| No. 6, with 76 trees, chiefly French fruits. | 6 | 70 | or 8 per cent. |
| Total 590 trees. | 202 | 388 | or 34 per cent on the general average. |

It is the gencral belief amongst orchard proprietors that the Mistletoe when in moderation, injures neither the tree itself, nor the fruit it bears, as used formerly to be thought. It is not therefore pruned out so much as would otherrise be the case, Mr. Edwin Lees in his "Botanical Looker Out," goes further, indeed, and thinks that the tendency in apple trees to form knots in the wood arises from orer-abundance of sap, and that the Nistletoe relieves the tree, as cupping would do : a view so unphysiological, that I prefer to look for the true explanation in the opinion of Dr. Harley, that the presence of the Mistletoe causes an increased quantity of sap to be drawn up for its supply from the soil, and thus the tree would not be much injured, so long as the soil was not exhausted.

Whether the Viscum Album shews any preference for any particular sorts of Apples, is a point requiring further investigation. There are certainly some facts, which seem to shew that this is the case. Some observers, with much orchard experience, think it likes best the more acid kinds of fruit, as the varieties of the Crab, the "old Bromley," "Skyrme's Kernal," "Hampton's delight," \&c., \&c., and is much less common on the "Bitter-Sweet," the "Royal Wilding," the Norman, French, and Italian fruits, and on "pot fruits," in general. Mr. Adams has observed, that trees bearing white-fleshed apples are much more liable to be attacked by Mistletoe, than those which bear yellow-fleshed apples: The former correspond to the acid fruits, whilst the latter embraces nearly the whole of the new, and French fruits of recent introduction, called Bitter-sweet apples, and from which the best and mildest cider is made.

I have myself observed in some orchards, I chance to know well, that there is scarcely a tree of the "Foxwhelp," "Old Cowarne red, or Cowarne Queening, or Quining, that is not inhabited by the Mistletoe, and it signifies not whether the tree may be old or young. This has been confirmed by several close observers, who have also added that it is the same also with the "Redstreak," the "Old Styre," the "Garter Apple," the "Woodcock,"
and indeed with almost all the old Herefordshire Apples. It is the general opinion, that Mistletoe is much less common in the orchards of the French, Norman, and Italian fruits lately so much planted: even here though, the viscum seems to make a selection, and will attack young trees of the "upright Normandy," and "Italian Apple."-It may be perhaps, that, as most of the old sorts of apples named, are rapidly dying out (and the two last, though recently introduced, may belong to the same category) this parasite, following the example of parasites in general, as well animal as vegetable, takes advantage of weakness, and thrives best, where it finds the least power of resistance. This view moreover, is supported by the gencral observation of its greater frequency on old and cankered trees, or on those growing badly from want of drainage, or from some other cause. It is not by any means the case, however, that all weak and decaying trees are attacked in orchards with plenty of Mistletoe in them; so that from the trees it will attack when young and strong on one side, and those that resist it when weak and old, on the other, there seems a promising field for careful observation. Whoever may enter it, to find the secret of the requirements for Mistletoe life, or Mistletoc predilections, will have in the first place, to master the confusion that prevails amongst the Apple trees themselves, and the ignorance of their owners, as to their right names and virtues, and sorts, and kinds, always excepting, however, the knowledge of the quality of the cider they will make. *

[^10]Next to the Apple tree, the Mistletoe certainly likes best the quick-growing Poplaks, taken generally as a class, and in particular the Black Italian, Canadian, and Ontario varieties. Here its luxuriant branches thrust themselves into notice, as well by their contrast to the tree itself, as by their lofty situation. These trees are now very much planted throughout the county, and no sooner do they attain any size, than a number of them are sure to become inhabited by the Mistletoe. In the central parts of the country the proportion of trees which bear the viscum may be said to vary from 10 to 30 per cent. according to the age and position of the trees; but in some districts, and in some isolated groups of trees, they probably reach a still higher average. On the upright Lombardy Poplar, (Populus fastigiata,) on the contrary, there is no recorded instance of its growth in this county, nor in England, that I am aware of, although examples have been occasionally found on the Continent.

On the Hawthorn the growth of Mistletoe is widely extended through the county, though it is much more common in some districts than in others. Mr. Edwin Lees has observed the Mistletoe to grow on Thorns, in lines extending across the country, which he accounts for by the long observed fact, of the Field-fares and Thrushes flying across the country in direct lines:* Thorns within the line are numerously affected, whilst the Oaks and such uncongenial trees seem passed over, and the Thorns out of this line are also comparatively free.

On the Line Tree, the Maple, the Wiite Fiowering Acacia, and the Mountann Ase, the Mistletoe is not uncommonly observed-considering the number of trees, the Maple does not seem to bear Mistletoe so frequently here as in some other districts; but the Mountann Asm seems a favorite site for it, though this tree is not very common in the County.

It is singular that its growth on the Pear Trie should be so very uncommon. In many works of reference this tree is

[^11]placed next to the Apple as a Mistletoe-bearing tree, but in this County it is extremely rare to find it. Mixed up together so commonly, as these trees are here, the absence of the Mistletoe upon it is very marked. At the present time, after very extended enquiries-enquiries which must have caused some thousands of trees to be examined-the only instances of its occurrence in this County are on two trees at Graftonbury, one an old tree loaded and almost killed by it, in the orchard by the fold-yard, at Graftonbury farm, and the other a younger tree, in the pleasure ground of Graftonbury House also bears a large bunch of Mistletoe; and on authority which I have no reason to doubt, it is said to grow on one tree in Mr. Martin's Perry-orchard at Monkhide, near Ledbury-the only example to be heard of in this great perry district of the County-and lastly, it is also said to grow at Wigmore, in five or six places, on one pear tree.

On all other trees it is certainly rare. Besides the recorded instance of the growth of the Mistletoe on the Wildrose, it formerly grew spontaneously on a briar, with an engrafted rose, in the garden of Thomas Cam, Esq., one of our members, for many years, but was destroyed in 1860 to make way for improvements; and I have also heard of another example of its growing wild on the briar in this County at Westhide, which was unfortunately destroyed some time since.

There is but little doubt that the list of trees which the Mistletoe occasionally inhabits in Herefordshire may, and will be extended by more general and careful observation. The Viscum Album is by no means particular in its selection of a home. I will briefly notice all the other trees upon which it has been observed to grow in England so far as I have been able to ascertain :

31st.-The White Beamr, (Pyrus Aria) "On the rocks near the western portal of Chepstow Castle is a fine tree with much Mistletoe upon it." (Lee's "Botanical Looker Out") and at Cobham in Kent. (Jesse.)

32nd.-The Bock-тworn, (Rhamnus Catharticus) named in a paper of Thomas Willisels in the Philosophical letters of Mr. Ray and friends. (N. \& Q. Vol. iii., p. 396.)

33rd.-The Labornom, (Cytisus Laburnum) at Hampton Court Gardens; and the Slopes, Windsor Park. (Jesse.)

34th.-The Red Swasrp Maple, (Acer rubrum) near the ranger's house, Bushy Park. (Jesse.)

35th.—The Horse Cressut, (Esculus hippocastanum) in Bushy Park, Middlesex. (Jesse.)
36.-The Filbeet, (Corylus avellana alba) at Wigmore, Bishops Cleave. (Mr. J. S. Haywood.)

37th.—Tere Catalpa, (Catalpa syringafolia) in Kent. (The Rev Gerard Smith.)

38th. -The Enalish Elas, (Olmus campestris) at Longdon near Upton-on-Severn, (Rev. W. S. Symonds:) at Bushy Park Farm, near Tewksbury, ("Botanical Looker -out" :) Monmouthshire, (The Rev. J. Hibbert:) and at Strensham Court, Worcestershire. (Mr. Taylor, in Jesse.)

39th.-The Goosfberry, (Ribes Grossularia) on some large old Gooseberry bushes, Maidstone, Kent. (Journal of Horticulture December 1863.)
40.-The Plane Tree, (Platanus occidentalis) at Wick, near Worcester. (Mr. J. S. Haywood.)

41st.-The Yew Tree, (Taxus semper-virens) near Sheffield, "on a venerable tree of many centuries growth." (W. S. Sheffield, N. \& Q. Vol vii. p. 199.)

42nd.-The Cedar, (Cedrus Libani) in Somersetshire. (W. C. Trevelyan, N. \& Q. Vol. vi, p. 249.)

43rd.-The Larci Fir, (Abies Larix) plentifully at Cold Weston, Shropshire. (Jesse.)

The Mistletoe has never been observed to occur spontaneously in England, so far as I am aware of, on any of the following trees, although it has been successfully propagated on several of them :-

The Beech, (Fagus Sylvestris:)
The Birch, (Betula Alba:)
The Bird Cherry, (Prunus Padus:)
The Wild Cherry, (P. avium:)
The Sloe Tree, or Blackthorn, ( $P$. spinosa ;)
nor on any of the cultivated cherry or plum trees.

The Hornbeam, (Carpinus Betulus:)
The Elder, (Sambucus nigra:)
The Holly, (llex Europaa:)
The Dogwood, (Cornus Sanguineus:)
The Box Tree, (Buxus semper-virens:)
nor has the Mistletoe been observed on any of the following trees naturalized here:-
The Lombardy Poplar, (Populus fastigiata:)
The Sweet Chesnut, (Castanea vesca:)
The Walnut, (Juglans regia)
The Laurel, (Cerassus Colchicum :)
nor on any of the other many introduced varieties of trees, and evergreens.

Why the Mistletoe should attach itself to certain trees in preference to others, is a mystery not yet fully solved. Common observation always refers it to some peculiarity in the bark, and seems, oddly enough, pretty equally divided in opinion as to whether the Viscum prefers a smooth and hard bark, or one that is rough and porous. Db. Harley from his observations, was led to suppose, "that a difference in size, number, and arrangement of the medullary rays might explain it, and serve to determine, in any given case, the attachment of the Nistletoe;" and he, accordingly, guided by their minute anatomical structure, has arranged a list of thirty trees in the supposed order of their liability to become the site of the parasite.-On dividing the list into three groups, the ten trees most predisposed to bear Mistle-toc-and in the order in which they stand,-are stated to be:-
$\left.\begin{array}{l}\text { The Vine } \\ \text { Maple } \\ \text { Walnut } \\ \text { Elder } \\ \text { Holly } \\ \text { Plum } \\ \text { Acacia } \\ \text { Cherry Laurel } \\ \text { Portugal Laurel } \\ \text { Plum }\end{array}\right\}$

All these trees are common in this County, and yet it is only found on the Maple and the Acacia.

The middle group, or those only moderately liable from their structure to bear Mistletoe are thus given : -


The group least liable to become affected by the parasite, is framed as follows:-
$\left.\begin{array}{l}\text { The Pear } \\ \text { Elm \& Birch } \\ \text { Fir } \\ \text { Larch } \\ \text { Lilac } \\ \text { Oak } \\ \text { Beach } \\ \text { Spanish Chesnut } \\ \text { Hazel } \\ \text { Horse Chesnut }\end{array}\right\}$

The Mistletoe is found in this County on three of these trees-and on the Hazel, at least three instances are known, inconspicuous as it is on this tree.

It is rery clear then, that there must be some predisposition of a kind which this list does not represent and which has yet to be discovered.

Mr. Buckmann, late Professor at the College of Cirencester, gives the following table of the comparative frequency with which trees are prone to bear Mistletoe.-The various kinds of Apple, 25 : Poplar, mostly black, 20 : White-thorn, 10 : Lime, 4. Maple, 3: Willow, 2: Oak, 1: Sycamore, 1: Acacia, 1. (N. \& Q. Vol. iii. p 226.) In Herefordshire, the proportion for the Apple tree must certainly be raised considerably, and the Acacia, also must be put higher on the list.

It is a remarkable fact, that when the Mistletoe has once established itself on any kind of tree-and the rule holds equally good for those it but seldom inhabits-it frequently grows in several branches at the same time, as if the tree no longer possessed its original power of resisting the intruder. The tree shews it too, and soon puts on a desolate woe-begone look, with fading leaves, and dying branches. It is thought that the Limes in this condition in Datchet Mead-a place often mentioned in the "Merry Wives of Windsor,"-gave Shakespeare the illustration cmbodied in these lines:-

> "Have I not reason to look pale? These two have 'ticed me to this place; A barren, detested vale you see it is: The trees, though Summer, yet forlorn and lean, O'ercome with moss, and baleful Mistletoe." $$
\quad \text { (Tit. And. Act II., sc. 3.) }
$$

Dr. Harley has so well described the effects of the Mistletoe on the supporting branch, and the struggle for life between them, that I must again make a free extract from his interesting paper. "The roots of the Mistletoe stand to the nourishing plant in the relation of a hypertrophied (increased) medullary system and one which induces an excessive flow of sap to the branch, resulting at first in the local hypertrophy (thickening) of its tissues, but subsequently the supply of sap, or the power of
transmitting it, failing, the central portion of the wood becomes exhausted and dies, involving in its death that of its destroyer also. The branch however, still maintains its vigour, and slowly buries the inveterate intruder by its subsequent growth. But other roots are meanwhile penetrating the newly formed layers of wood, and its whole circumference is in time more thickly beset with parasites than ever. The branch is heaved out into a spindle-shaped swelling, and the outer layers of the bark are rent into wide breaches favourable to the continued encroachments of the invading parasite, while its inner layers become immensely thickened, and form a suitable nidus for its increase. After a while the second crop of roots spread distruction still further outwards, and like the former crop, implicate themselves in it. The branch still struggles vigorously with its enemy, but as fast as one generation of roots are dying, a later and more numerous progeny attack it. The affected branch morover assumes various contortions being twisted sometimes in one direction, and sometimes in another ; it is frequently found bent at right angles to itself. But it wrestles in vain with a veritable hydra, which having killed its centre, spoiled, and occupied its bark, and invaded anew the living wood that remains, now gradually completes the work of destruction." An excellent example of this struggle, as here pictured, is to be seen in a Lime tree at Yarkhill,-a thoroughly Mistletoe-possessed tree, its branches all knotted and dying but yet sending off fresh shoots at all angles below the knots, in the vain effort to overcome the enemy; and in other trees in a lesser degree too numerous to mention.

## III.-THE OCCURRENCE OF THE MISTLETOE

## ON THE OAK.

The Viscum Album but rarely "gains a settlement" on the Oak tree-as seldom in our own day, as in the Druidical times of old, when its very rarity heightened the veneration with which it was regarded when fonnd. "Est autem id varum admodum inventum, et repertum magnâ religione petitur" says Pliny in his Natural History. (lib. xvi. c. 44.) In an excellent note by Dr. Gilss in his translation of "Richard of Cirencester," (p. 432.] he gives the opinion of Dr. Daubeny, that Mistletoegrowing oaks were exterminated after the Druids were destroyed." [N. \& Q. Vol. ii.] It is highly probable that this was the case, but since all their oaks too have been gone centuries since it can make no difference as to its occurrence at the present time. Whatever may be the conditions necessary for the germination and growth of the Mistletoe on the oak, they must be such as rarely coincide, or it certainly would be much more common in this County. Oak may be considered the weed of Herefordshire, Oak timber and Oak bark form two of our chief exports. Oak woods and Oak trees border Mistletoe-aboundingorchards very generally, and the trees themselves are often mingled in very close alliance: indeed it would not be too much to say, from the great abundance of Oaks in the vicinity of orchards, that the birds must sow the Mistletoe seeds upon them more frequently than upon any other kind of tree in the County. Nevertheless so far as is known, there are but two instances of its growth on the Oak in Herefordshire, the one in Eastnor Park, which has been so well known for many years, and the other in an outlying district of the County at Tedstone Delamere, discovered by Dr. Craddock in 1857.

The occurrence of the Mistletoe on the Oak is at once, so rare, and so interesting, that I have not confined myself to this County in my enquiries about it, but have taken some pains to ascertain its existence, at the present time, in all the instances which have been recorded as occurring in England. The following instances $I$ have been able to get well authenticated :-

No. 1. The Oak at Eastror.-Ten days since I visited this Mistletoe-bearing Oak. It is situated by the side of the drive leading from the Park up the Ridgeway hill towards Malvern, about two hundred yards beyond the Lodge. The Oak may be some 80 or 90 years old and the Mistletoe grows freely upon it. It is most luxuriant high up in the tree where three large branches grow very near each other, having in each instance destroyed the bough beyond the place where it is situated. It is also growing in four other places in the tree, one fresh yearling plant shooting straight out from the main stem of the tree about twelve feet from the ground. One large bunch of Mistletoe growing in a large branch many feet from the main stem was dead and decaying but without having killed the branch. The Mistletoe plants are of both sexes, and the females bear berries freely. It is more slender, and pendulous, with smaller and thinner leaves; or in other words, it is not so stiff and rigid, and short jointed, as it usually is when growing on the Apple tree. During the twelve years I have known this tree the Mistletoe has increased upon it, and the Oak is already beginning to shew signs of suffering severely from the parasite. Upon the large moss covertd branches it was curious to observe the great number of Mistletoe seeds which had been deposited by the birds.

No. 2. The Oak at Tedstone Delanebe-In 1853, Dr. Cradocr, (Principal of Brazenose College) discovered the Mistletoe growing on a thriving Oak in the parish of Tedstone Delamere. It had been known for some time before by a woodman who kept it a secret but occasionally produced a piece of it on particular occasions. The Incumbent of the Parish at this
time, The liev. Gregory Smiti, M.A, has kindly sent me the following description of its present appearance: "The Mistletoo is still growing where Dr. Cradock observed it, on an Oak some 60 jears old, and there it has been, according to the Woodman, for some 30 years or more. The Mistletoe grows in one bunch of five stems from the trunk of the tree about 50 feet from the ground." It does not bear berries although from the small portion Mr. Smith was good enough to inclose, it is the female plant.*

No. 3. On a Fine Oak at Badams Codet, Sedbury Park, mear Chepstow, the Mistletoe is also now growing luxuriantly.G. Ormerod, Esq., has kindly forwarded the following description of its condition at this time. "The Mistletoe is still growing on an Oak here, the tree is about 85 years old and situated on the northern mound of Badams Court, once a moated mansion of the Herberts, or Ap Adams of Beachly and Lllanllowel, but now forming part of the Sedbury Park estate. There is only one branch of Mistletoe on the tree, but it has become very luxuriant and has now a diameter of at least three feet. It is more thin and straggling in its growth than it usually is on the apple tree, though it is very healthy and bears berries freely. It grows from the side of a large branch some yards from the main stem of the tree and about 20 feet from the ground. The Oal itself is healthy and vigorous, and does not seem to be injured by the parasite." (April 5th, 1864.)

No. 4 The Mistletce is also now growing on an Oas at Burningrold Farm, Dunsfold, Surrey.-The Proprietor of the Estate, W. Layland Woods, Esq., has been good enough to send me the account of its present condition. "The Mistletoe at Burningfold grows on an Oak, not less then 150 jears old. The tree is more upright than spreading, and the branch grows on the side of an upright limb at about 50 feet from the ground. There is only one branch on the tree, it has grown there for many years but in January 1849, it was broken very severely by a high wind.

[^12]Howerer, it flourished afterwards better than before, it is nearly three feet long, of a pendulous nature, not growing so rigid as Mistletoe usually does. During the past summer a Sparrow built her nest in the midst of the bunch. It does not injure the tree at present, but has in fact been the means of its preservation, for the Mistletoe branch saved the tree from the axe some jears ago. The Oak grows alone in a piece of pasture, but another which formerly stood near it, has spoilt the beauty of the tree. The soil of the district is the weald clay of Surrey and Sussex where the Oak used to flourish and abound." (April 19th. 1864.)

No. 5. On an Oak in Hackiood Pari, near Basingstoke, Mistletoe has long been know to grow.-C. Hooper, Esq., of Eastrop House, Basingstoke, has very kindly obtained for me the following account of this tree. "The first Lord Bolton, [grandfather of the present Lord] sent a specimen of the Mistletoe from this tree to Sir Joseph Banks, who gave an account of it in the Philosophical Transactions. The Oak is still a fine large tree, but evidently very old and reduced in size from what it formerly was, but whether this is from the presence of the Mistletoe, or from storms, it is difficult to say. The Mistletoo grows near the middle of the tree at a considerable height from the ground and in several places among the branches." [April 28th 1864.]-Mr. Hooper had not seen the tree himself but described it from a sketch which had been shewn to him by Mr. Hill, of Basingstoke.

No. 6. The Plynsouti Oak.-On recent authority, that of Mr. Edward Lees as quoted by Mr. T. W. Giping in the Phytologist [vol. i. p. 151.] it grows in an Oak tree not far from Plymouth by the side of the South Devon Railway. A single bush grows in the topmost branches of a scraggy Oak tree. It is the first wood that occurs by railway north of Plymouth and two or three miles distant from that town. I am unable to state whether this Oak is still in existence with the Mistletoe upon it. The authority for it however, is so good and so recent, that I am prepared to have faith in it.

These are all the instances of the growth of the Viscum Album on the Oak that I have been able to authenticate, or believe in, as existing at the present time. I fully thought to have been able to give some examples of Nistletoe Oaks in this paper, which had not been recorded before, but one after the other, they have all failed me, and I have had, on the contrary, to reduce those before known to this small number.

I will now notice all the other instances which I have found recorded in books, and shall be able to shew that most of them have ceased to exist either from the removal of the Oaks, or the death of the Mistletoe in them.-The Frampton Mistletoe-bearing Oak, as one of the most recently discorered, shall head the list.

In the third volume of Notes and Queries, Mr. Bocraman states that Mr. Baker, the then President of the Cotteswold Field Club, and himself, were taken by Mr. Clifford, to see an Oak near Frampton-on-Severn, in which Mistletoe was growing: "The tree was a century old, and the branch, with a good bunch of Mistletoe on it, was about forty years old." This example no longer exists. In answer to a letter of enquiry about it, Mrr. Clifford of Frampton Court has politely written to say: "A large party of us went to examine the Mistletoe Oak yesterday, and were sorry to find, that the branch of the tree on which it grew was decayed, and the Nistletoe dead. The tenant intends to observe whether the Mistletoe grows again upon it." [April 19th, 1864.]

Jesse in his "Scenes and Tales of Country Life" [1844] states that Mistletoe then grew on an Oak, near Godalming in Surrey; at St. Dials, near Monmouth; near Usls; and also at Penporthlenny, Goitre, Monmouthshire. I have been unable to learn the fate of the Godalming Oak, but through enquiries which have been made for me with great diligence and perseverance, I am able to state positicely that the Mistletoebearing Oaks in the three Monmouthshire localities named, no longer exist. "The Oak at St. Dials which bore Mistletoe, was cut down by the bailiff about twelve years since, and the owner of the estate, Sir Lionel Pilkington, dismissed him immediately
for doing so." The Nistletoe Oak near Usk, can be heard of up to five years since, and shortly afterwards it is reported to have been cut down with its neighbours. The loss of the Goitre example, is thus sadly accounted for by a Gentleman who kindly wrote about it-"I remember about 25 years ago there was a very large bush of Mistletoe growing in an Oak in the parish of Goitre, but it was most sacrilegiously cut down and hung up over the President's chair at the Cymrygyddian held at Abergavenny. I saw it there myself as, no doubt, hundreds of others did also." [J. M. N. April 19th, 1864.]

In 1817, Mr. Diceson, at the Linnean Society, stated that he had seen Mistletoe growing in an Oak four miles from Maidstone, by the side of the Medway, but since this has never been recently confirmed, it has most probably ceased to extst.

The late Mr. Loudon, also, was shewn it in an Oak on the estate of the late Miss Woods of Shopwjke, near Chichester, but this tree can no longer be heard of. It has doubtless passed away with its observer, and the proprietor of the land it grew upon.

Mr. Dovaston, in Loudon's Magazine of Natural History, (Vol. v. p. 203,) says he saw it at the Marquis of Anglesea's Park, at Plas Newydd, Isle of Anglesea, "hanging almost over a very grand Druidical cromlech." (Lees' "Botanical Looker Out.") but this not only wants recent confirmation, but is indeed denied by the statement in the same book, that Mistletoe is not now to be found on the Island.

The following examples are interesting, though they have never been publicly recorded, nor are they any longer in existence:-

The late Sir Hungerford Hoskyns, Bart of Harewood, in this County, saw the Mistletoe growing on an Oak in the parish of St. Margarets, near Moorhampton, and used to tell the anecdote that when staying at Moccas, he mentioned the fact to Sir George Cornewall Bart., who would not believe it. As usual, in those days, a wager was to decide the point, and the next morning, both
gentlemen rode off to the tree. Since Sir George paid the $£ 10$ we may be quite sure the Mistletoe was there upon the Oak, though it has never since been heard of.

It formerly grew on an Oak in Rockingham Forest, near Moorshay Lawn, Northamptonshire, where the tree was notched for the convenience of climbing up to get the Mistletoe. (J. Percival Smith, Esq.)

It grew some years since on the lower bough of an Oak in the Vale of Neath, Glamorganshire, about two miles below Aberpergwm House, but the Oak was afterwards blown down in a storm.

It grew on an Oak at Mersham Hatch near Ashford, Kent, where the tree was cut down: it grew on another Oak, at Ledbury, which was also cut down accidently: and it also has grown upon several other Oaks, if the most positive statements of trustworthy intelligent people are to be relied on; but it is unnecessary now to mention them further, since they have never been noticed publicly, and are admitted no longer to exist.

Mr. Edwin Lees (Phytologist 1851, p. 357.) thinks "that Mistletoe occurs much more frequently on the Oak than is generally imagined but that the instances are not made known." The present enquiry about it, gives a result precisely the reverse. The belief in its frequent occurrence is very general, it is the fact that fails. Many persons hare seen it, and are sure of it, but no one can shew the tree with the Mistletoe on it. Time after time have I followed up the most precise statements to my repeated disappointment. "The Nistletoe on the Oak" writes an energetic searcher for it in Monmouthshire, "is like a ghost, it vanishes into thin air, when you try to grasp it; everybody has seen it long ago, but the tree is always cut down, or somehow or other the result is-nil." - Nost woodwards will tell you, and in good faith too, that they have seen it, and indeed will generally mention the exact tree, and the place where it grows, but the result of their further examination has always been the same: for some cause or other, the instance fails, and the Mistletoe can never be shewn on the Oak. The tree has been felled, or blown
down, or it may be, the isolated bunch of wild ivs, or honeysuckle which deceived them, is revealed now the leares are off the the trees. Or perchance, where nothing is found, as most frequently happens, they have been misled by a cluster of small twigs from the Oak branch itself, and indeed, at certain periods of the year they do resemble Mistletoe more closely than would be credited by those who have not closely observed them. In some instances the mistake has arisen from one tree being intermingled with another, the Mistletoe bush is in the Oak tree, but it is found to be upon a branch of Maple, or Thorn, or Apple tree.

I cannot do better than insert here the following lively passage from the letter of one of members. It shews at once, very graphically, his own zeal in the pursuit of science, and the caution essentially necessary in dealing with facts of rare occurence. I regret that the excellent sketch sent with it must be omitted. "You, of course, will be particular in verifying every case of its occurrence on the oak, and the following instance of my experience will only be valuable to you in proportion to your capacity of enjoying the spectacle of pain in others. After our Annual Meeting, I was staying with a friend whom I knew to have a very excellent practical acquaintance with Natural History. I asked if he had met with Mistletoe on the Oak. He at once said he knew of one example which he had discovered himself two years before. It was growing on a scraggy bush of Oak that overhung the edge of a quarry in a coppice wood. I was glad to accept his offer to point it out to me and we made a special pilgrimage to see it. I was to climb, and tear, and scuffe through the underwood and briars so as to come round on the top over the brink of the quarry, whilst my friend remained below to point out the position-with difficulty I got there, creeping down on all fours-and there sure enough it was, as pretty and healthy a bunch of Mistletoe as I ever saw. I thought I would have a specimen, not quite believing my own eyes (though both would have made affidavit of its genuineness on the spot;) with much trouble and care at length $I$ got hold of the branch and was
immediately struck by something unusual in the colour of the bark (the leaves were not out) so I at once tasted and found it Apple; one single small branch was growing out from under the stock of this Oak bush, the exact counterpart of all the other shoots. My disappointment you may conceive, but not the chagrin of my kind guide who had treasured up for two years the know. ledge of this magnificent "find," and in his own parish too!"

A writer in the Quarterly Review (Vol. 114 p. 219,) speaks of the Mistletoe as "deserting the Oak" in modern times. "It is now so rarely found on that tree, as to have led to the suggestion that we must look for the Mistletoe of the Druids, not in the Viscum Album of our own trees and orchards, but in the Loranthus Europæus, an allied parasite, which is frequently found growing on Oaks in the south of Europe." A very unnecessary confusion it seems to me, has been ereated between the plants, and I purposely avoid entering further into the subject for the reason given in the Review. "There is no proof that the Loranthus ever grew further North than at present; whilst the Mistletoe figures not only in the traditions of the Celts, but also in those of Northern nations, as will be shown in the next section.

## IV. THE ROMANCE OF THE MISTLETOE.

"When the Romans first invaded Britain" says Dr. Hentry, (Hist. of Gt. Britain, Vol. I. p. 136,) 'the inhabitants of it were famous, even among foreign nations, for their superior knowledge of the principles, and their great zeal for the rites of their religion. This circumstance we learn from the best authority, the writings of that illustrious and observing general Julius Cæsar, who informs us; "that such of the Gauls as were desirous of being thoroughly instructed in the principles of their religion, (which was the same with that of the Britons) usually took a journey into Britain for that purpose" (Cæsar de Bel. Gal. lib. vii c. xiii.) and he then goes on to sher its antiquity-that its first and purest principles had descended with the language from Gomer, the eldest son of Japhet, from whom the Gauls, Britons, and all other Celtic nations derived their origin, (Pezron Antiq: Celt. c. iii.) but that by tradition it had degenerated into "an absurd, wicked, and cruel superstition."

Mr. Davies in his learned work on the "Mythology and Rites of the British Druids," has endeavoured to trace out "the threads of connection" between the Druidical and Patriarchal religion, from the writings of the ancient Celtic Bards, Talicsin, Aneurin, Llywarch, Hên, Merddin, \&c., who were themselves professed Druids.

One of these old poems, the "Chair of Taliesin" (Kadeir Taliesin *) furnishes a long list of the apparatus requisite for the due celebration of the feast of Ceridwen, and there we find the Mistletoe mentioned, as one of the ingredients of the celebrated "IIystical Cauldron," which was always prepared with the most careful and elaborate ceremony. From this Cauldron, Genius,

[^13]Inspiration, Science, and Immortality, were supposed to be derived. "It purified the votaries of Druidism for the celebration of certain mystical lites which commemorated the preservation of mankind in the ark, and the great renovation of nature." I give the passage in the poom, with Mr. Davies' literal translation, and the explanatory note he has appended to it.

> "Dawn ei lif Dofydd
> Neu pren puraur fydd
> Ffrwythlawn ei gynnydd
> Rei ias berwidydd Oedd uch pair pumwydd."
(Kadeir Taliesin.)
"a flood which has the gift of Dovydd, or the tree of pure gold which becomes of a fructifying quality, when that Brewer gives it a boiling who presided over the cauldron of the five plants."
Note-"Pren Puraur, the tree of pure gold-the Mistletoe-Virgil's Aurum frondens, and ramus aureus-which the Arch-Druid gathered with a golden hook. Amongst the extraordinary reported virtues of this plant, was that mentioned by our Bard, of promoting the increase of the species, or preventing sterility. The names of the Mistletoe in the Welsh language preserve the memorial of its ancient dignity. It is called Pren Awyr, the Etherial tree: Pren Uchelvar, the tree of the high summit; and has four other names derived from Uchel, or lofty." (page 280.)

There is no mention made in the poem of any particular tree, from which the Mistletoe was to be gathered, nor of the ceremony requisite for doing so, but there can be little doubt from other authorities, that it must have been from the Oak. "Nor must the admiration of the Gauls for the Mistletoe be unnoticed," says Pliny, "The Druids (thus they call their chiefpriests,) hold nothing in greater veneration than the Mistletoe, and the tree on which it grows, provided only, that it be the Oak. They select groves of Oak trees, standing by themselves, and perform no sacred ceremonies without green oak foliage. Indeed, they truly believe, that whenever the Mistletoe grows upon the Oak, it has been sent from heaven, and they consider it a sign of a chosen tree. \% But the Mistletoe is very rarely found

[^14]upon the Oak. When it is discorered, they proceed to collect it with very great devotion and ceremony, and especially on the sixth day of the Moon. This period of the Moon's age, when it has sufficient size without having attained the half of its ful-ness-makes the beginning of their [months, and years, and of an age, which consists but of thirty years." (C. Plinii Nat. His. lib. xvi. c. 44.)

The grand ceremony of cutting the Mistletoe from the Oak, was the New-year's day festival of the ancient Britons, and it was held on the sixth day of the moon, as near to the 10th of March, as the age of the Moon permitted. 'The Nerr-year's day festival of our forefathers would have fallen, this present year, on the 14th of March, and if we, and the Eastnor Oak with its fine luxuriant bunches of Mistletoe, could throw ourselves back into history some 2000 , or 3000 years, this grand festival would have been held last Monday, and we should now, doubtless, have been discussing the events of the day. The exact proceedings of the Druids on this great Annual Festival, are thus described by Pliny. "Calling the Nistletoe in their manner of speaking-a cure-all, (or all-heal) and having got the sacrifices, and the good things for the feast, all properly ready under the tree, they lead up two white bulls, and begin by tying them by their horns to the tree. The Arch-Druid, clothed in a white robe, then mounts the tree, and cuts the Mistletoe with a golden sickle. It is caught, as it talls in a white cloth. Then they offer up the victims as a sacrifice, praying that God would make his gift prosperous to those to whom it had been presented. They believed it would give fruitfulness to all barren animals, and would act as a remedy against all poisons." (ibid.)

The Animals were killed, cut up, and cooked; meantime prayers were offered up; hymns were sung; and the heavenborn plant, thus carefully saved from pollution by any touch of the earth, was distributed in small sprigs amongst the people, as a sacred relic for the new year; a charm to ensure fecundity; a panacea against every discase; a remedy for poisons; and a safe
protection against witcheraft, and the possession of the devil. Many a good wife has travelled for days, perchance, on a pillion behind her husband, through bogs and fords, and over wide tracts of uncultivated land and primeval forest, to attend this festival ; leading a sumpter horse, laden with their offerings to the priesthood, and all the good things they could muster for the festival; venison and salmon; roasted bustards and boars' hams; with cakes and other delicacies; not forgetting some well filled skins of Metheglin, or mead: happy, in being able, as a recompense for so much toil, to procure from the hand of the ArchDruid, for herself and her husband, so many blessings in the coming year. $\dagger$

The memory of the Druidical ceremonies is still kept up in Normandy, as they give Mistletoe to each other on new year'sday, by the saying "Au guy l'an neuf," and in Picardy they add the word "plantez" to wish a plentiful and prosperous new-year to each other. (Chambers' Encyclopædia.)

The Mistletoe has entered into the Mythology of other nations besides the Britons and Gauls. The fact of its great peculiarity in ripening its fruit and thus coming to its perfection in the winter solstice, has been very happily rendered in Icelandic poetry, where Baldur, the Sun, is supposed to be slain by a sprig of Mistletoe, as the only plant capable of injuring him. In the poem of Voluspa, or Visions of Vala, in the CEdda of Somund, Vala tells of the death of Baldur in the following stanza, translated from the French of M. Bergmann :-
$\dagger$ "You recognise amongst the Druids the conditions of all primeval people, as they are found in the East amongst the Egyptians, the Israelites, \&c. They bad combined completely is themselves the whole conduct and rule of the people as the Priest-physicians, and many of their customs accorded fully with those of the East. The Druids communicated their fundamental doctrines and customs only to the initiated whom they taught in sacred groves and remote places (Cæsar lib iii., c. 14.) In the exercise of the sacred services, the Druids, like the Egyptians and the Pythagoreans were clad in a white robe. They healed sicknesses and diseases by magical practices; while they professed to have intercourse wirh the Gods; they proclaimed future events: they were also acquainted with the means of producing ecstasy; and as one of the most excellent magical meansand as one adapted to nearly all possible cases-they used the Mistletoe of the Oak, which they gathered at certain times and with certain ceremonies. (Ennemoser's Histury of Magic, Vol. ii., p. 87, translated by Mary Howitt.)
'I foresaw for Bāldur, for that bloody rictim, For that son of Odin, the destiny reserved for him: He was raising in a charming valley, A tender and beautiful Mistletoe.
From that stalk, which appeared so tender, grew
The fatal arrow of bitterness, that Hoder took upon himself to dart."
(Madame Ida Pfeiffer's "Visit to Iceland," p. 329.)
But the idea is so much more fully and beautifully expressed in the legend on the death of Baldur, given in the tale of "The Young Norseman," by Mr. W. B. Rands, which appeared in the "Boys' Own Volume" that I attach it entire, as an appendix to this paper. $\dagger$
"More than one sword of a Northern Champion was named 'Mistilteinn,' after the weapon which had slain the white god. The story affords one of many points of resemblance between the mythology of Northern Europe, and those of Persia and the far East. In the Shah Namêh, the hero Asfendiar is represented as invulnerable, except by a branch from a tree growing on the remotest shore of the ocean. Desthân his enemy found it, hardened it with fire, and killed the hero. Both legends possibly refer to the 'death' of the Sun; perishing in his youthful vigour, either at the end of a day struck by the powers of darkness, or at the end of the sunny season stung by the thorns of winter." (Max Muller's "Comparative Mythology" in Oxford Essays for 1856.) "The 'Marentakken,' or 'branch of spectres' which still in Holstein is believed to confer the power of ghost-seeing on its possessor, is unquestionably the true Viscum Album."(Quarterly Review, Vol. 114, p. 220.)

It is very difficult to trace down in history, the customs relative to the Mistletoe after the overthrow of the Druidical

[^15]ceremonies in which it played so important a part. We know that in more serious matters-superstitions of deeper import, and more injurious tendency,-our stubborn ancestors resisted for many centuries all attempts to set them aside: "so deeply rooted" says Dr. Henry, "were these pernicious principles and superstitious practices in the minds of the people, both of Gaul and Britain that they not only baffled all the powers of the Romans, but even resisted the superior power and divine light of the Gospel for a long time after they had embraced the Christian Religion. This is the reason we meet with so many edicts of Emperors, and canons of Councils in the sisth, seventh, and eighth centuries against them, and even so late as in the eleventh century, in the reign of Canute it was found necessary to make the following law against these heathenish superstitions. "We strictly discharge and forbid all our subjects to worship the Gods of the Gentiles; that is to say, the Sun, the Moon, fires, rivers, fountains, hills, or trees, or woods of any kind." (Leges Politicæ Canuti Regis, c. 5. apud Lendenbrog in glossar. p. 1473.)

It is not likely that the Mistletoe could possibly escape the effect of so much authoritative denunciation. As the object of the New year's-day festival, it had become a sign of the religion itself; and the very mention of its name and certainly, of the virtues attributed to it with so much pomp and "ceremony, would be strongly condemned. The Mistletoe however was not thus to be lightly set aside. Laws might denounce it, as an emblem of Paganism, but no power could prevent its private use. It had become a household, or rather, perhaps, a personal mark of the religious faith of the people. The belief in the chief virtue given to it so solemnly, was a part of their religion itself, and the more it was denounced, the more strongly would it maintain a place in their faith.

When at length the Old Style of computing time had passed away, with the Druidical priesthood, and their ceremonies, and the New Style had become established, the sixth day of the moon's
age must obviously have lost more and more of its significance. As the people became accustomed to the change in their Newyear's day, we can readily imagine that the Mistletoe would become associated with the change, as still the sacred charm for prosperity in the coming year, and the cherished symbol of their old superstitious festivities.

Medical writers of all times seem to have regarded the belief in the fertilizing powers of the Mistletoe, as a mere fanatical superstition and unworthy of scientific notice. Hippocrậes, Dioscorides, Galen, Matthiolus, Paracelsus, Kolderer, Cartheuser, Colbatch, Loseke, Van Swieten, \&c., \&c. whilst they extol its virtues, as a remedy for Epilepsy in chief, and also for Paralysis, Chorea, Hysteria, and other Nervous, and Convulsive diseases;and the glutinous matter of the berries for external uses-say nothing whatever of any more special virtue. Even in Epilepsy, says Pliny "Quidam id religione efficaciùs fieri putant, prima Lufa collectum e robore sine ferro. Si terram non attigit, comitialibus mederi." (p. 442.)*

The real properties of the plant itself are those of a slight tonic. (Barton and Castle British Flora Medica, Vol. ii. p. 146.) The leaves and shoots have an astringent and rather bitter taste, and "strong extracts made from them are nauseous, bitterish, and sub-austere." (Lewis's Mat. Medica, p. 575.) The berries are reputed to act as a purgative, and are even now sometimes given to sheep for this purpose.

[^16]In Prussia in times of great scarcity the branches and leaves of the Mistletoe have been used, says Bock, (Nat. Hist. of Prussia, Vol. iii. p. 367) powdered and mixed with rye flour, to make bread, which is by no means unwholesome. In this County before turnips were so abundantly grown, the plant used regularly to be given to sheep in frosty or snowy weather.
> "If snowe do continue, sheepe hardly that fare Crave mistle and ivie for them for to spare."

(Tusser's Husbandry.)
There can be no question, however, that the chief virtue ascribed to Mistletoe from the Oak by the Druids was the "fructifying quality;" as Taliesin has it, or of "giving fertility to all animals" as described by Pliny; and it was for this virtue, when worn as an amulet, or when drunk in infusion, that the sprig of Mistletoc was so anxiously sought from the hands of the ArchDruid on the New-year's day festival. It is always necessary to remember this in endeavouring to trace down the domestic history of the Mistletoe in succeeding ages. It explains fully the personal hold it had gained in the esteem of the people -and its continued private use in spite of all opposition. Though books ceased to mention it, tradition would perpetuate its use, and it will be shewn presently to have done so, even to our own day.

This peculiar virtue may perhaps serve to explain some points with regard to it, which have not been otherwise satisfactorily accounted for. "In one of Colepeper's M.S.S. at the British Museum in a curious notice of Sir Peter Freschville's house at Stavely, Derbyshire, is this passage: "Heare my Lord Freschville did live, and heare.grows the famous Mistletoe tree, the only oake in England that bears Mistletoe. $\dagger$ and to this tree the following letter from The Countess of Danby to Mrs. Colepeper probably refers. It is without date but was written between the years 1663 and 1682.

[^17]"Dear Cozen,
Pray if you have any of the Miselto of yo ${ }^{\mathrm{r}}$ fathers oke, oblidge me so far as to send sum of it to yo ${ }^{\mathrm{r}}$ most affectionat servant Bridget Danby."
(N. \& Q. Vol. vii. p. 119., 1st s.)

Let us hope that the Countess's desires were fulfilled in all respects!

It has occured to me whether the "fructifying virtue," given to the Mistletoe by the Druids might not explain, in part, why the Mistletoe should never hare been generally used in decorating our Churches. As a symbol of the Paganism of the Druids, its significance has passed away centuries since; and if this were the objection to its use, the Holly also should be rejected. "The Holly" says Shibley Hibberd, (Notes \& Queries 1st ser. Vol. v. p. 208,) "owes also its importance in the Christmas festivities to Paganism. The Romans dedicated the Holly to Saturn, whose festival was held in December; and the early Christians, to screen themselves from persecution, decked their houses with its branches during their own celebration of the Nativity." It may be, however, that the fact of the Mistletoe being the especial emblem of the New-year's-day festivities, has prevented its use for Christmas decoration : or it may be also, I must add, that this favourite parasite has taken too prominent a place in the rejoicings of the kitchen, to secure for itself a place in the Church.

For a time, indeed, it seems to have been used in decking the church, the poet Gay, (Trivia, Book ii. p. 437.) thus refers to it:-
"When rosemary and bays, the poets crown, Are bawl'd in frequent cries through all the town;
Then judge the festival of Christmas near, -
Christmas, the joyous period of the year;
Now with bright holly all the temples strow, With laurel green and sacred Mistletoe."
"It seems something liko eaprice" says a writer in the Quarterly Review, "which has excluded the Mistletoe as well from the decorations of our Churches at present, as from their ancient sculpture and carvings. We know of one instance only of its oc-currence-Sprays of Mistletoe, with leaf and berry, fill the spandrels of one of the very remarkable tombs in Bristol Cathedral, which were probably designed by some artist monk in the household of the Berkeleys, whose ample and hroad lands are among the chief glories of the west Country, in which the Mistletoe is now for the most part found." We do not remember to have seen it elsewhere, even lurking among quaint devices of 'Miserere'; whilst the oak-every portion of which, in the days of Celtic heathenism, was almost as sacred as the Mistletoe which grew on it-was one of the principal trees 'studied' by mediæval sculptors, when, during the so called 'Decorated' period, they reproduced leaf and flower with such exquisite beauty and fidelitywitness the oak leaves laid into the panels of the Cantalupe shrine at Hereford, or the twisted sprays of oak, clustered with acorns, which form one of the most graceful corbels in the choir of Exeter Cathedral." (Quarterly Reriew, Vol. 114, p. 220.)
"Certain it is "says a writer in Notes and Queries, (Vol. vi. p. 523, w.s.) "that Mistletoe formerly had place amongst Christmas decorations of Churches, but was afterwards excluded. In the earlier ages of the Church many festivities not tending to edification had crept in-mutual kissing amongst the numberbut as this soon led to indecorum, kissing and Mistletoe were both properly bundled out of the Church." (Hone. Hook. Moroni. Bescherelle. Du Cange. \&c.. \&c.)

Mr. Edwin Lees, says quaintly in one of his books, * "the Druids thought the Mistletoe would cure everything, we only think it worth . . a kiss." When it received this specific valu-

[^18]ation seems a mystery. "Why Roger claims the privilege to kiss Margery under the Mistletoe at Christmas," says the learned Editor of Notes and Queries, "appears to have baffled our Antiquaries." Brand states that this Druidic plant never entered our sacred edifices but by mistake, and consequently assigns it a place in the kitchen, where, says he, it was hung up in great state with its white berries, and whatever female chanced to stand under it, the young man present either had a right, or claimed one, of saluting her, and of plucking off a berry at each kiss. Nares, however, makes it rather ominous for the fair sex not to be saluted under the famed Viscum Album. He says the custom longest preserved, was the hanging up of the bush of Mistletoe in the kitchen, or servants' hall, with the charm attached to it, that the maid who was not kissed under it at Christmas, would not be married in that year." (1st s., Volv. p. 13.,) Mr. Shirley Hibberd thinks this account altogether unsatisfactory "would it not be more reasonable" he says "to refer it to the Scandinarian mythology, wherein the Mistletoe is dedicated to Friga, the Venus of the Scandinavians." (Ibid p. 208.) It seems rather doubtful whether this custom would be likely to originate in any deduction from "reason" at all; and I am quite sure the privilege could not rightly be claimed on Christmas Day. The only other suggestion that offers itself is, that tradition should have handed down this pleasant ceremony from the New-year's day festivities of Druidical times. If it be not so, where history is silent, and antiquaries at fault, we are only left to suppose the present existence of some mutual attraction-given, the feasting and festivities below stairs-and the conduct of Roger and Margery seems natural enough. *

[^19]Herefordshire may be considered the centre of the Mistletoe district of England; with Shropshire to the North, and Worcestershire, Gloucestershire, and Monmouthshire, to the East, South, and West : and when, moreover, it is considered, how comparatirely isolated its situation was before the introduction of Railways, here we might expect to find remaining, if anywhere, the existence of a belief in its special Druidical repute, and here-though authors for centuries have ceased to mention it-it still docs exist. It is somewhat altered in character as might be expected. I have asked the question of many old agriculturists and people learned in country customs, 'Is the Mistletoe ever used for any purpose now"? and it is a fact that the one answer I have had from every single person has been "Yes it is an excellent thing to give sheep after lambing," and some add, "and for cows too after calving." * I have several times been told that it must not on any account be given to them before, and know that accidents in the families of our domestic Animals are sometimes attributed to its having been eaten prematurely. I may say indced, with truth, that it is a common practice in this county now to give it to sheep at this particular time. It is true that the Mistletoe is a gentle tonic, that the animals like it, and will often eat something fresh and green when they will not take anything else, but it is very remarkable that it should only be given to them on this occasion, and never for weakness produced from any other cause. Tradition has somerwhat altered its original Druidical repute if it be so, but the common practice still

[^20]bears so close a relation to the "increase of the species," that I cannot but regard the general belief in its efficacy in this special way, as a very singular and interesting example of Druidical influence carried down, century after century, for near 2000 years. The fact of its taking, in our day, a somewhat modified form, only strengthens the probability that this supposition is correct.

The Mistletoe still holds well its place in the esteem of the people, if not in their veneration. There is scarcely a house or cottage in this County that has not its bunch of Nistletoe for New-year's day. The ancient custom is still observed aright in most of the farm houses through the County, by all the old true Herefordshire inhabitants; and especially by the lower classes. The Mistletoe bough is cut on New-year's Eve, and hung up in state as the clock strikes twelve; the old one, which has hung throughout the year, is at the same time taken down and burnt.*

The Mistletoe does not appear to have been considered a Christmas evergreen, until the close of the sisteenth or the beginning of the seventeenth century. "We have Christmas Carols in praise of Holly and Ivy," says Timbs ("Things not generally known," 1st series p. 159.) of even earlier date than the
*"The Mistletoe bough," says Mr. Haywood, of Worcester, "should always be gathered by the last male domestic that has entered the family. It is then dressed with nuts, apples, ribbons, \&c., and suspended in the centre of the room, sometimes with a cord attached to a pully, to allow of Jts being lowered for the lady to pick a berry. The berry should then be thrown over the left shoulder. I once saw, at an old mansion near Worcester, a large bunch of Mistletoe beautifully bedecked, and so cleverly suspended, that by means of strings it could be pulled to any part of the ceiling, and thus be brought aver the heads of any ladies, who could not be induced to go under it."-The proper time for hanging up the Mistletoe however, Mr. Haywood states, very decidedly, to be Christmas Day, by Worcestershire custom-thus giving very clear proof of a border district for Mistletoe, where the true traditious with regard to it have been lost at a much earlier period than in the centre. "This is the common custom of North Worcestershire, to this day," Mr. Haywood goes on to say, "and it is also usual to keep part of the Mistletoe bough used at Christmas, in the house until the following Christmas, when the new one is brought in and the old one burnt. It is said to be most wonderfully efficacious in expelling witches, and keeping hubgoblins away. I knew a poor woman upwards of 70 years of age, who walked two miles for a bit to put in some "broathens" for her pig, that had been bewitched by a bad neighbour. I saw lier with it, and laughed at her credulity: but she was not to be shaken in her faith. I afterwards found that the pig recovered and made a good one."
fifteenth century ; but allusion to Mistletoe as a Christmas evergreen can scarcely be found for two centuries later, or before the time of Herrick:-
"Down with the rosemary, and so, Down with the baies and mistletoe ; Down with the holly, ivie, all, Wherewith ye dressed the Christmas Hall."
Coles in his "Knowledge of Plants," (1656), says of Mistletoe: "It is carried many miles to set up in houses about Christmas time, when it is adorned with a white glistening berry," and in the tract "Round about our Coal fire, or Christmas Entertainments," published early in the last century, it is said "the rooms were embowered with holly, ivy, cypress, bays, laurel, and mistletoe; and a bouncing Christmas log in the chimney."
"Kissing a fair one under the Mistletoe," says Trabs, "and wishing her a happy new year, as you present her with one of the berries for luck, is the Christmas custom of our times; and in some places persons try lots for the bough with most berries, by the crackling of leaves and berries in the fire:"-this conclusion is certainly inconsistent, and tends itself to prove the newyear character of the Mistletoe.

Gay's description has already been given, and many more might be added to shew it a Christmas evergreen in later times, but it is unnecessary, since they are chiefly written by authors who were not acquainted with Mistletoe lore. They lived beyond the range of true Mistletoe customs; where the plant did not grow naturally, or only very sparingly; and where, consequently, there were no traditions existing amongst the common people with reference to it.

The old new-year's-day custom, indeed, is rapidly chang-ing,-even here, in the very centre of the Mistletoe districtand where, as I have shown, its traditions endure so tenaciously. Partly from lapse of time, perhaps, but chiefly from change of inhabitants, the Mistletoe is changing its character as a symbol of new-ycar's-day, to take its place with the holly, as an emblem of the festivities of Christmas

No man, perhaps, has done more to effect this change, than he, who of all modern writers would the most regret it-Sir Walter Scotr.-Great lover as he was of foll-lore, and the traditions of the people, he was quite ignorant of the history, and legendary lore of the Mistletoe. His spirited description of Christmas-tide, in the introduction to the sixth Canto of Marmion, ever hangs on the memory :-

England was merry England, when Old Christmas brought his sports again.
'Twas Christmas broached the mightiest ale ;
'Twas Christmas told the merriest tale;
A Christmas gambol oft would cheer:
The poor man's heart through half the jear.
On Christmas eve the bells were rung; On Christmas eve the mass was sung.

The damsel donn'd her kirtle sheen; The hall was dressed with holly green, Forth to the wood did merry men go To gather in the Mistletoe."
Had a single sprig of Mistletoe grown in the domain of Abbotsford, we may safely say that the two last lines would never have been written. Who can wonder that lesser writers should follow, year by year, with increasing devotedness, in the same track. One of these productions it behoves me to notice for the very name it bears, and the popularity it has gained, albeit, the song of "The Mistletoe Bough," does injustice to the plant itself; is a modern-antique of a mild order; and worse than all, owes its renown and its interest, to an unacknowledged plagiarism;
"The Mistletoe hung in the Castle hall, The holly branch shone on the old oak wall, The Baron's retainers were blythe and gay, Keeping their Christmas holiday."
The burden of the song-which has made most of us tremble with horror-is the tale of Generra, the bride, shut up in the old oak chest, from Rogers' "Italy."

In the Midland and Northen Counties the Mistletoe is very rare, and it could not be expected that its traditions should be
known. Nerertheless the interest in this plant is so universal, that this deficiency-like many of another kind-has been met by the improved means of transit in modern times. The Mistletoe has now actually become an established export from tbis Counts, and there, perhaps, never was a jear when so many people rejoiced in its presence at their Christmas festivities as during that which has just passed. Through the politeness of the Traffic Managers for the Great Western, and London and North Western Railways at Hereford, (Messrs. Wall and Caftwbigit) I am enabled to give you an approximation towards the correct return of the quantity of Mistletoe actually sent out of this County last December. The exact returns are as follows:-

|  | Tons. | Cwt. | Qrs. |
| :---: | :---: | :---: | :---: |
| Hereford sent off. | 25 | 0 | 0 |
| Withington | 7 | 15 | 0 |
| Ledbury | 15 | 2 | 3 |
| Moreton | 2 | 11 | 1 |
| Dinmore | 3 | 3 | 0 |
| Leominster | 12 | 14 | 0 |
| Berrington | 0 | 16 | 0 |
| Woofferton | 2 | 0 | 0 |
| Ludlow | 0 | 1 | 3 |
| Ross. | 15 | 0 | 0 |
| Moorhampton | 5 | 0 | 0 |

making a total of eighty-nine tons, threo hundred weight, and three quarters, actually sent off by invoice. But the Guards and Engine-drivers had the privilege of exporting Mistletoe on their own account, and did so by almost every train that left the County during the early part of December. An immense quantity went off in this way, and I am told that I greatly under-estimate it, when I put it down at 25 tons in addition-thus making a grand total of more than one hundred and fourteen tons.

The places to which it was chiefly sent were Manchester and Liverpool-for their supply, and that of Towns further north-London-and Birmingham.

The established price paid for it, when delivered at the stations, was from four to five shillings per cwt. according to its
condition; and the average rate of charge for the transit was about thirty shillings per ton; so that the whole expense of delivery may be said to be from five to six pounds ten shillings per ton. $\dagger$

I have purposely given you all these details; they are destinctive of the age in which we live. It is a practical, commercial, unpoetical period, when trains will wait for neither the peer nor the peasant; and when common-place railway trucks carry off romance-in the shape of Mistletoe-at so much per ton! Had good Sir Walter Scott lived in these days, it would never have occured to him to send his "merry men" to the "woods" for it-where, by the way, they would never have found it--but the Mistletoe none the less, would have reached him ; and if he had chanced to look over his greengrocer's bill, he would, doubtless, have found some such items as these :

To a bunch of Mistletoe fine \& full of berries $£ 100$
$\begin{array}{lllll}T o & \text { pieces of ditto ditto, for decoration } & 0 & 7 & 6\end{array}$

There only remains for me the pleasant duty of thanking those gentlemen who have so kindly answered my enquiries and given me so much information. To the Rev. F. T. Hatergal, I am indebted for the opportunity of consulting the books in our valuable Cathedral Library: Thomas Blasmill, jun. Esq., has been most useful to me in looking up authorities in the British Museum and in other ways: The Rev. Tromas Woodhouse has been a greater help to me than he would be willing to allow, for an example, see Appendix b. The Rev. Thomas Hutcminson, The Rev. W. H. Purcias, Dr. Wulis, of Monmouth; Elares
†"Many people would be greatly amazed," says Mr. Haywood, "were they to stand on Worcester bridge for a short time, any Market day a few weeks before Christmas, from about six to nine o'clock in the morning. They would see vehicles of every description, from the largest waggon, down to the donkey cart and wheel-barrow, loaded as high as can be piled with the "hallowed mirth-inspiring Mistletoe." All this is eagerly bought up by men called 'Badgers', who pack it in casks or crates, and send it off to decorate the houses of our neighbours, in Manchester, Lirerpool, \&c. I have made enquiry of the Badgers, and they say the price of Mistletoe is about $£ 4$ per ton; and that upwards of 100 tuns are aunually sent from Worcester."
Y. Steele, Esq., Abergavenny; and our Honorary Secretary, R. M. Lingwood, Esq., have kindly assisted me in various ways. Mr. Adars, of Marden, has taken much trouble in his enquiries for me, as has been acknowledged previously. Flavel Edarunds, Esq., has given me much information on divers subjects: and last, though not least, I am indebted to Mr. Cranston, of Kings-acre, for his opinion on many points; especially for giving me the thread that guided me through the difficult labyrinth of introduced Poplars.

In conclusion I must state to them and others, that no one can be more sensible than I am myself of the many deficiencies of this paper, and that it would be very satisfactory to me to add a supplement to some future number of the Transactions if sufficient additional information could be obtained with regard to the Mistletoe, and the trees upon which it grows.

PUSTSCRIPT.-Whilst this Paper has been in the Press, the following additional examples of tho occurrence of the Mistletoe in this County have been reported to me, viz:-on the Sycamore in the grounds of Barton Court, near Ledbury, (Captain Peyton,) the second instauce only of its growth here; on the willow, (Salix alba) on the banks of the Wye, below the Weir, (the Rev. E. Du Buisson;) on the Mountain-Ash at Tarrington School, (Mr. Fraser; ) on the Acacia at Downehill, (Mr. Musgrave;) on Maples and Thorns in St. Devcreux Park; aud, as a matter of course, I bave heard of another Oak said to bear it, too late to disprove the assertion.-I have also been assured that the Mistletoe grows on an Oak in the Bishop's Park at Farnham, Surrey, (Mr. Findlay,) but have not had time to make enquiries about it.
Errata : Page 68, the Mistletue is stated to be "very common" on the Black Poplar (Populus nigra;) it should be "not common :" and very remarkable it is, that it should be so rare in this tree, since it so closely resembles in its habit of growth the Black Italian Poplar, (P. monolifera) in which the parasite grows so very freely. Page 71, the Mistletoe is stated to grow on the Pink Horse chicstnut at Harewood,-it is the yellow variety on which it is found there, making the second example of its occurrence on the Esculus flava in this county. Page 78, the botanical name of the common Laurel is "Prunus lauro-cerasus," and not cerassus colchicum, as accidentally given in the text.

## APPENDIX 4.

## THE DEATH OF BALDER.

From the Tale of "The Young Norsbanan" by Mr. W. B. Rands, in the "Boys Own Volume" for 1863. (p. 143-4-5.) Beeton : Strand.

"Once upon a time, Balder the Beautiful, whom all gods loved, and all men, and all things that breathed, and that had not breath, was trcubled in his sleep with bad dreams, which made it seem to him that he must die. Then Freyga, who was exceeding fond of Balder, and was, indeed, said to be his mother, stood up in the peace-stead, and declared that she would take this matter in hand, and that Balder should not die, if Odin would give her leave to sit but once in Lidskialf, so that she might look out over all the heavens and the earth. For Lidskialf was the chair of Odin, in which none but he himself might sitsuch was the decree of the gods-and he often sat there, that he might see all that was being done in Jötunheim by the Giants, and what charms were being prepared by the swart little Lapps, and other sorcerers. However, the gods considered it thoroughly among themselves, and at last it was decreed that Freyga might sit in Lidskialf for once, only she was not to tell of it, and it was never to be permitted again.

So Freyga was very much pleased, and went up all alone to Odin's high seat, and looked out upon heaven and earth, and cried with a loud voice-
"Who loves Balder ?"
Then arose a sound like the voice of ten thousand thousand seas-a voice from all things, above and below, that they all loved Balder. Fire, and water, and iron, and wood, and stones, and beasts, and birds, and poisons, and serpents, and all things whatsoever, spake for Balder.

Then Freyga looked out once more all over the heavens and the earth, and said, also with a loud voice-
"Who loves not Balder ?"
And there was no answer. But a strange noise came up from the eastward of Valhalla, which Freyga could not clearly make out.
"I think," said she at last, "it is only Lok the mischiefmaker laughing. It is of no consequenee-he laughs at everything."

And as she spoke, she saw Lok laughing and mocking to himself, with his hair blown about in the wind, and his arms spread over his head, and she despised him in her heart. And she looked angrily and scornfully on him; and while she looked he scemed to change into a little shrub which the wind was at play with.
"It is only the mistletoe," thought Freyga; "it is very little, and no consequence."

Then Freyga looked out yet a third time over heaven and earth, and spake with a voice yet stronger than before-
" 0 fire and lightning, hurt not Balder !"
And a loud consenting voice made answer. So that Freyga was content. Then she said-
" 0 water, and wind, and hail, and snow, hurt not Balder!"
And there came a voice as before, and Freyga was content. And she spake yet again-
"0 iron, and stone, and earth, and wood, hurt not Balder!"
And there came a voice as before, and Freyga was content. And she spake yet again-
"O poisons, and plagues, and creeping things, hurt not Balder!"

And there came a voice as before, and Freyga was content. But she spake yet again-
" 0 beasts, and birds, and trees of the forest, hurt not Balder!"

And there came a voice as before, and Freyga was content. So that she spake no further from Lidskialf.
"I think," said she to herself, "that will do very well indeed."

But just as she was gathering her garments around her to step down from Lidskialf, which has nine hundred and ninetynine golden steps to it, she heard once more what seemed to be the sound of distant laughter.
"It is only Lok again," said Freyga; "he is always laughing." And looking forth upon the east of Asgard, where she had seen the little mistletoe, she saw Lok, whose sides were shaking with mirth. "I thought it was a mistletoe-bush," said she, " but it seems to be Lok."

So she came back to the Asir, and told them Balder's dream would come to nothing, for she had made all things in heaven and earth make oath not to hurt him.

After this the gods used to make much sport with Balder of an afternoon, for he was very good-natured. It was their manner to make a target of him, some throwing darts, some slinging stones, and some hewing at him with their swords and battle-axes ; but there was nothing that hurt him. Nanna, his wife, was very pleased with this, and it was great amusement for the other gods, all except Lok, who was not only on tip-toe, as he always was, for mischief, but was very jealous that less regard was paid now than formerly to his antics, because the Asir found so much entertainment in throwing things at Balder. Now Lok had his suspicions about the mistletoe, and, putting on the shape and attire of a woman, he went to Freyga's house, which was on the sea shore, and said-
"I have noticed of late that the Asir are in the habit of
standing in a circle around Balder and trying to hurt him, and yet none of the things they use scem to do him any harm. How is that?"

Now Freyga was proud of what she had done when she had ascended Lidskialf, and she said to Lok, taking him for the woman he seemed to be-
"You must be very ignorant not to know that nothing can harm Balder, for all things in heaven and earth have sworn never to do him ill."
"What!" said Lok, "all things?"
"Why, yes," said Freyga, " you may well say all things, for who would call the mistletoe a thing? I did not think it worth while to ask so insignificant an affair for an oath."

This was just what Lok wanted to hear, and what he expected to hear. So the next time the gods were having sport with Balder, he took with him a sprig of the mistletoe, and went up with it to Hoder, who, being blind, was standing sadly apart from the rest.
"Why do not you also fling somerwhat at Balder?" said Lok.
"First," answered Hoder, "because I cannot see where he stands, and secondly because I have nothing to throw."
"Well," says Lok, " bold out your hand slyly"-bebind you-and I will put into it something to throw at Balder, and will, moreover, direct your hand, so that you shall take good aim."

Now, when the Asir saw Hoder making ready to throw this small branch at Balder, they all laughed heartily, and Balder among the rest.
"Put up your weapon, Hoder, for it seems to me too dangerous a thing to throw."

Those were the words of Balder. But Lok, at the same moment, directed the aim of Hoder, and the mistletoe-bough went straight to the temples of the White Sun-god, who fell down dead."

## APPENDIX B.

## HISTORIC DOUBTS.

Exception has been taken so ably to the quotations from Dr. Henry and Mr. Davies which open the last section of this paper, that the subject must not be left altogether unnoticed. It is asked, what proof have we that the Britons were descended from Gomer ? There is an interval of some 2000 years between the age in which Gomer lived and the earliest period at which we find mention of the Britons. It is a mere unsupported hypothesis. We do not even know that Gomer was, as he is here asserted to be, the eldest son of Japheth.

Still greater objections are urged against the supposed "connection between the Druidical and Patriarchal religions." The little we do know of what the Patriarchal religion really was shows a most material difference between them. The Patriarchal religion was certainly a worship of the one true God: the Druidical religion was, as certainly, an idolatrous system, consisting, as all accounts agree, in the worship of the heavenly bodies, and of gods whom the Romans call Hesus and Teutates.

Some objectors have even gone further than this, and doubted the existence of Druids at all. This seems a most unreasonable piece of scepticism, in the face of the evidence of such contemporary writers as Strabo, Tacitus, Suetontus, Pliny, and above all, Cexsar, the earliest, and by far the best of all our authorities on the subject.

With very much higher interest and originality, the Rev. Mr. Woodhouse points out the very striking resemblance that exists on some points between Druidism and Brahminism. We know that the maintenance and honour of a sacerdotal casto
was the leading feature of the religion of the ancient Britons; just as it is, at this day, of that of the Indians; the caste of the Druids strongly resembling in position and privileges the caste of the Brahmins. Infact, the very existence of a sacerdotal caste invested with such powers, and regarded with such reverence as the Druids were, betrays the oriental origin of the system. Nothing like it existed in any other western nation; not even among the Germans, the close neighbours of the Gauls and Britons, was there anything of the kind. Such a connection is by no means improbable, when we recollect that there is also an undoubted connection between the languages of Britain and India, the Celtic and the Sanscrit: when, moreover, it is remembered, that ethnologists are agreed in the belief that extensive migrations took place in pre-historic times from central Asia, the great seat of the Aryan races, into western Europe.

Such remarks are as interesting as they are suggestive, but seeing that the subject of this paper is "Mistletoe" and not "Druidism," with all due deference, the text has been allowed to remain. If it has been shown, successfully, that Mistletoe has been held in honour from the times of the Britons to our own; that it has always been connected with the celebration of the New Year, and supposed to have certain mysterious virtues; that even among races of other name and blood-such as the hardy conquerors of Roman Britain and their Scandinavian kinsmenit held an honoured place; -a history has been traced for it, more ancient and more romantic, than almost any other native plant can boast. Its other rivals of Christmas-tide, the holly and the ivy, scarcely vie with it in ancient fame and wide-spread honour: only the oak, on which it grows, has associations more venerable and historic: only the yow carries back the thoughts to a more remote antiquity, or into more poetic scenes: and none of these has the same homely charm, or is so exclusively connected with Christmas and the New Year, with England and with Herefordshire.

## THE EARTHQUAKE OF OCTOBER 6TH, 1863.

On the morning of Tuesday, the 6th of October, 1863, at about 20 minutes past 3 o'clock, Greenwich time, the sky being then free from clouds, and the air cold, calm, and clear, a very extraordinary sound was suddenly heard approaching with astonishing rapidity from the Westward.

This sound, which appeared to consist of a rapid succession of detonations, was accompanied by a tremor of the ground which made the windows rattle in their frames as in a gale of wind.

Then came a very considerable lift of the ground-the true earthquake wave-and, with the shock, a crash of subterranean thunder, resembling the firing of a battery of heavy guns underfoot. Immediately afterwards the sound was heard dying away in the distance.

According to Daubeny, all earthquake movements, when they are anything more than mere tremors, may be divided into three kinds ;-"the undulatory, the succussive, and the vorticose."
"Of these three kinds of earthquake shocks, the first is the most common and the most harmless. From the second, that of succussion, more is to be apprehended; but the vorticose movement is the one which has been felt in the most violent and disastrous catastrophies on record." (Daubeny on volcanoes, c. 32.)

The earthquake of 1863 was one of the first kind ; the undulation "proceeded onward in a uniform direction;" "and thus, although the shock, in this neighbourhood, at least, was very considerable, no serious mischief followed the movement.

[^21]The exact direction of this shock is still a matter of dispute. Indeed it is no casy thing to determine the course of an earthquake; for the best constructed seismometers have a serious difficulty to contond with, which is this,-there is no fixed point to start from ; everything in an earthquake being alike in motion.

We must be satisfied, I think, with a rough approximation to the truth, trusting almost entirely to our own feelings and those of others.

My house faces E. S. E., the back, therefore, is turned to the W. N.W. Now, according to the feelings of the members of my family, the shock struck the back of the house first and passed away by the front.

Two policemen, standing at the moment of the shock at the junction of Blue School and Widemarsh Streets, felt satisfied that the sound rolled towards them "down Wall Street," that is from W. by S. Others, again, are confident that the shock came from the N. W.

It is now of course impossible to determine this point, and therefore I prefer to use the term Westward, leaving the exact point of the compass an open question.

The duration of an earthquake, like the direction, is a point difficult to determine. Probably the sound and movement which caused so much dismay only lasted four or five seconds; but from the report of county policemen, gamekeepers, and others, I am inclined to think that slight tremors of the earth took place at intervals during the whole of that night. The game in preserves was said to be disturbed in a remarkable manner when there was apparently no movement whatever; at other times a slight motion appears to have been perceptible to man.

Few visible effects were left by the earthquake: some glass and china articles were thrown down and broken, ceilings were cracked, and so was a strong garden-wall at Holmer. The arched roof in the corridor of the City Prison, on the female side, was cracked to some extent; and in the County Gaol the arched roof of the corridor on the female side was so shaken
that a fissure which had been closed was re-opened and carried to the length of twentr-seven yards. One of the chimney-pots belonging to the matron's apartments was thrown down, with some bricks, and the iron braces which tie the sides of the corridor together were so moved, that it seems probable the whole corridor would have fallen if it had not been recently repaired and braced with iron.

Few clocks appear to have been stopped by the shock: I have only been able to satisfy myself respecting two pendulum timepieces; and it is curious that the pendulums of these clocks swong in different directions.

The barometer was not, I believe, affected by the shock, but it was very unsteady immediately before and after the 6th of October, as the following evening readings will show :-

| Sept. 29th-29.85 |  | Sept. 30th-29.10 |  |
| :---: | :---: | :---: | :---: |
| Oct. | 1st-29.39 | Oct. | 2nd-29.69 |
| " | 3rd-29.66 | " | 4th-29.89 |
| " | 5th-29.78 | " | 6th-29.71 |
| " | 7th-29.55 | " | 8th-29.41 |
| " | 9th-29.32 | " | 10th-29.45 |
| " | 11th-29.42 | " | 12th -29.12 |

The reading of the exposed minimum thermometer on the night of the earthquake was (at Hereford) $34.75^{\circ}$.

For some days before the 6th the wind had been W. and S. W. On the 6th it changed to E., and the weather became exceedingly wet and unsettled. Early on the morning of the 8th a heary thunderstorm took place near Hereford; the lightning being very vivid and the rain heavy.

This earthquake appears to have been felt chiefly in the midland counties, and its greatest force was probably experienced in the Golden Valley and in this neighbourhood. The shock was certainly a very severe one; and the underground sound was loud and appalling. Those who were awake at the time, and especially those who were out of doors, were far more powerfully affected by the sound and movement than those who were roused
from their sleep by the commotion. A very intelligent policeman told me, about ten minutes after the event, that he heard the sound approaching before the shock reached the place where he stood, and felt a strange kind of terror come over himself. "It was," -to use his own words-"more dreadful to hear it coming than to feel it when it came."

When the wave passed, the rocking of the earth was so violent that this policeman and a companion found a difficulty in keeping their footing, and were obliged to hold each other to prevent themselves from falling. Immediately afterwards they heard the sound passing away in an easterly direction.

Was this movement the effect or shock of some distant earthquake, or was it central with us; caused by an explosion in the earth's crust directly under this island?

Two men highly distinguished by their scientific attainments are now engaged in investigations which may throw much light on this subject. The question will be, doubtless, fully discussed at the next meeting of the British Association



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| 8 | LI | 6 | I | I | 0 | 0 | 0 | $88 L \cdot 0$ | 99.87 | 9．79 | 88．68 | 60.87 | 96．67 |  |
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| $\zeta$ | 8 | 6 | Z | 9 | $G$ | 6 | 0 | 16．\％ | 96．78 | 88．89 | 0.97 | 71．99 | 89.67 |  |
| $\varepsilon$ | 6 | 8I | 7 | $\boldsymbol{Z}$ | 0 | 0 | 0 | 96．I | 9.88 | －99 | 69．95 | 78．69 | $89 \cdot 67$ |  |
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HEREFORD RAINFALL DURING 14 YEARS; REGIStered by The late henry Lawson, Esq.

| 1826 | . 23.378 inches. |  |
| :---: | :---: | :---: |
| 1827. | 21-930 | " |
| 1828. | . $31 \cdot 230$ | " |
| 1829 | . $25 \cdot 498$ | " |
| 1830. | . $29 \cdot 319$ | " |
| 1831 | . $31 \cdot 033$ | " |
| 1832. | . $25 \cdot 234$ | " |
| 1833 | .25-338 | " |
| 1834. | . (lost) |  |
| 1835. | .29.276 | che |
| 1836. | 28-168 | " |
| 1837. | .26.207 | " |
| 1838. | .27.643 | " |
| 1839. | . $34 \cdot 404$ | " |
| 1840. | . $21 \cdot 381$ | " |
|  | 380.039 |  |

Mean of 14 years, \& average for Hereford $27 \cdot 145$ inches.

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## TRANSACTIONS

OF THE

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No. 6.

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## THE ADDRESS

Of the retiring President, Elmes Y. Stexer, Esq., read at the Annual Heeting of the Woolhope Naturalists' Field Club, held at Hereford, February 22nd, 1866.

## Gentiearen of tiee Wooliope civb,

I return you my sincere thanks for the honor you have done me in appointing me your President fur the past year, and for the courtesy and kindness you have shown me, as well as for the indulgence you have so freely extended to my very inefficient performance of the duties of that office. Seeing thaíI cannot lay claim to more than a very superficial acquaintance with the sciences we cultivate, I feel that your considerate and very flattering treatment is solely attributable to your linuly fecling towards a fellow-student, who was thought to take a sincere interest in the welfare of the Club, and to be disposed to promote the success of its operations to the best of his ability.

On revierving the past season, I think I may, upon the whole, congratulate you on the success of our field days. We had the benefit of a Sunmer remarkahle for its almost unprecedented number of fine days, and, although on two occasions our perambulations were somewhat impeded by heary showers of rain, we had not one absolutely bad day, and our energies proved equal to every occasion.

Our First Meeting on the 18th May, at Builth, was a remarkably successful one, and was graced by a considerable phalanx of members and friends. The District into which we travelled opened up new ground, and that circumstance of itself would account for much of the interest we derived from it; but we were highly favored in all other respects. The Rev. Jones Thomas kindly met us at the Three Cocks Junction, and throughout the day exerted himself in doing honor to the Club,
in a manner so courtcous and genial, as to deserve a grateful recognition of his kind services. He undertook the duty of leader, on the march, and nothing could exceed the care he bestowed in pninting out the many scenes and objects of interest to be met with, in the well selected line shosen by him for our excursion. In the name of the Club I had the pleasure to present to him the cordial thanks due to his kind and hospitalle exertions. We were also favored with the company of several local Geologists, who have done excellent work in the surrounding district; under their guidance some interesting fossils were obtained, amongst them the following: -

At Gwernyfydd.
Ampyx nudus. Ogygia Buchii.
Ogygia Portlockii.
At IV ellfield.
Ogygia Buchii.
At Pencerig.
Ogygia Buchii.
Ampyx nudus

Pentamerus oblongus,
(Llandeilo flag.)
Calymene duplicata.
Trinucleus fimbriatus.
Trinucleus concentricus.
(Llandeilo flag.)
Siphonotreta micula.

## (Llandeilo flag.)

Siphonotreta micula.
Diplograpsus pristis.

## ( Upper Llandovery.)

Orthis radians and a Petraia.
(Wenlock Shale.)

Graptolites Ludensis. Sedgwickii and an Orthoceras.
Some interesting plants were found, amongst them conspicuously and abundantly Trollius Europeus, Allium Schœenoprasum. Also a few specimens of Botrychium lunare, and several choice species not sufficiently rare to require special mention. Every member who had the good fortune to attend that meeting, must have been impressed with the beauty and variety of the striking scenery which had been spread out before him on all sides; and must have brought away with him a delightful impression of
a day most agreeably and profitably spent. In company with some friends I remained behind, to make further acquaintance with the locality, and this afforded me the opportunity of seeing a very fine collection of Silurian fossils, obtained in the district, by Messrs. Powell and Griffiths, of Builth, who have kindly furnished me with a List, a copy of which I now present to you. I cannot leave the subject of the Builth meeting, without congratulating you on the opening out of so fine a field for your future operations.

Our Second Meeting took place on the 22nd of June. It was well attended and passed off satisfactorily. The members assembled at Abergavenny, and travelled by omnibus up the lovely Vale of Usk, to Crickhowell; there we took to our legs and made excellent use of them in ascending by the Darren, to the Pencerig Calch, or Table mountain; returning by the Crughwel, which gives its name (conspicuous heap) to the Village at its foot-at the Darren we had in view a very bold escarpment of the uppermost beds of the Old Red, with its pale yellow Sandstone and purple shaley beds, in both of which we searched, but in vain, for the celebrated Holoptychius scales; higher up we crossed the Carboniferous Limestone, and at the highest point stood on a platform of Millstone Grit, which remains a relic of ancient beds of the Carboniferous series, long since washed away from the mountainous district which stretches towards the North, the East, and the West, for a considerable distance. Immediately facing us, in a southerly direction and across the lovely Valley of the Usk, rose up the fine bold escarpment of Carboniferous Limestone which forms the northern edge of the Monmouthshire Coal and Iron basin. All the points of interest I have mentioned were displayed from the summit of the Pencerig Calch, and if we were not rewarded for our exertions by the discovery of any rare fossils or plants, those who stood on that famous outlier for the first time must, I think, have felt themselves repaid for the toil of the ascent.

On the 18th and 19th July, we met at Ludlow, and at the Craven Arms several members of the Dudley aud Carodoc Clubs.

The first day's operations were somewhat impaired by the weather. However, under the guidance of our excellent and scientific associate Mr. Lightbody, who appears to know intimately every rock and every fossil of the district, we traversed a very beautiful and interesting line of country, and found many objects worthy of our hammers, over which we had the advantage of all the scientific assistance we could require from our learned associates of Ludlow.

On the second day we started from the Craven Arms up the Onibrook, we lingered for a considerable time at the well-known Caradoc Shale Bank, where innumerable specimens, none however quite perfect, of Trinucleus Concentricus were obtained, besides other intercsting Fossils. We then walked on to Horderly, and were well rewarded for our search in the interesting strata met with on the linc of march. After this we all re-assembled at Stokesay Castle, where we found ample and much needed refreshment, and where Mr. Latouche exhibited a beautiful model constructed by himself of the Gcological features presented by the surrounding country

On the 26 th July, at the kind invitation of the Malvern Club, I had the pleasure of a delightful field day in the Malvern Hill District. The points of Geological interest were : to receive from Dr. Holl, a demonstration of the Laurentian or Pre-Cambrian Rocks, discovered by his most able and extensive researches; and to visit some very interesting excavations in the Drift Beds near Clencher's Mill, made by the Malvern Club, under the supervision of their learned and indefatigable President, Mr. Symonds. On that occasion the Cottswold Club was represented by its President, Sir William Guise, and your Society was represented by Mr. Lightbody, by our excellent and painstaking Secretary, Mr. Thompson, and by your President. We had a delightful day; Dr. Holl most efficiently and satisfactorily explained the very interesting and conclusive views he had been able to take of the Geology of the Malvern District, and exhibited the unmistakable evidences of the existence of the Laurentian Rocks, near the Wind's Point, and at Midsummer Hill. I shall not dwell upon these discoveries,
as Dr. Holl has been so kind as to send me a copy of his admirable paper on the subject, published by the Geological Society. That pamphlet I have now the pleasure of offering to the perusal of any member of the Woolhope Club who may feel interested in it. Our party, wrich was numerous, and graced with the presence of many ladies, met to dinner at the Eastnor Arms. I returned thanks in your name for the toast of "Prosperity to the Woolhope Club." After Dinner we proceeded to inspect the excaration in the Drift Bed, near Clencher's Mill. Many Fossil remains of an interesting character, principally bones of the Elephas primo genius and Rhinoceros Tichorrhinus were there exhibited. Mrr. Symonds favored us, in his usual kind manner, with observations on the history of the Drift, and its evidences of early life. We then adjourned to Bromesberrow Rectory, where we concluded the operations of a most agreeable day in doing justice to the refreshing hospitality of Mr. Hill, the Secretary of the Malvern Club.

Our last Mecting was fixed for the 28th Augrast, at Usk, and as generally happens to us in that locality, our operations were seriously interfered with by rain. We found much to interest us in the railway cutting, at the mouth of the tunnel; thence we procceded to view the raluable collection of Fossils, from the district, kindly offered to our inspection by Mr William Nicholl. We saw a great variety of specimens, including many capital Trilobites, some rare Brachiopods and Corals, and many of the Pteraspis and Cephalaspis, fishes of the Old Red Sandstone. Amongst the Trilobites, conspicuous was Homalonotus, at first supposed to be Delphinocephalus, but recently defined as a new species, which, as far as I know, is peculiar to the Wenlock shale, forming the Bed of the Usk, near Graig-y-Garcoed. This Fossil has been named by Salter, Homalonotus Johannis, after the christian name of Mr. John Lea, of the Priory, Caerleon, one of our Woolhopian Geologists, who, with Mr. William Nicholl, first discovered this interesting crustacean. Dr. Grindrod, of Malvern, attended our Field-day, and brought with him from his own unrivalled collection, a splendid and perfect specimen of the
H. Delphinocephalus, which we were thus enabled to compare with the new species. After inspection of Mr. Nicholl's Silurian and Devonian Fossils, we proceeded, despite of the falling rain, to a small quarry at Llanbaddock, where innumerable Ludlow Fossils were found, amongst them many specimens of Phacops Caudatus and Longicaudatus; thence, along the railway, through a cutting in the Wenlock-shale, where Atrypa Reticularis is most abundant, we made our way to the Garcoed. In the river bed, although the water was too deep, from recent rains, for a good search, we were able to find Homalonotus Johannis, and in the bank higher up the stream, many other fossils of the Wenlock series. On our return to Usk, we dined together at the Three Salmons. Dr. Grindrod's beautiful specimen of the Homalonotus Delphinocephalus was passed round the table, and I had the pleasure to thank that gentleman in the name of the Club, for his kindness in joining our party and giving us the opportunity of seeing so fine a Fossil. Mr. Lea, of Caerleon, was our guide on the excursion, and his knowledge of the locality and of its points of scientific interest, was of the greatest service to us.

There is a point which I desire to press upon your notice in connexion with our ,Field-days, and I do so because I am quite convinced by my own experience, that much of the comfort, and more still of the bencfit to be derived from these meetings, greatly depends upon a careful attention to it. I suggest that it will be advisable in future to make it an invariable rule of the Club that, the Itinerary for each day, shall be arranged beforehand, printed in the programme, and rigidly adhered to on all occasions. Gentlemen arriving from a distance, being strangers to the district, will naturally place themselves under the guidance of their local associates whose help they look for. All who may happen to stray will, by reference to the printed route, be enabled to strike the line of march without difficulty. Alternative routes are, I think, very objectionable, as tending to separate the party and dislocate the arrangements made for the pleasure and enjoy-
ment of all. I think it very important, also, that whoever may be good enough to set out an Itinerary, should limit the proposed operations within moderate bounds; for it is far more satisfactory and profitable in the end to examine one or two localities thoroughly, than to hurry over interesting objects for want of time to devote to them.

There is one more suggestion I would offer for your consideration, in the hope that it may lead to the better accomplishment of one of our main objects, which I take to be to improve the general stock of information on all matters of scientific interest belonging to our district. I would urge the Club to impress upon every member the propriety of communicating any discovery that may fall in his way in Geology, Botany, or Zoology, to some central authority, to whom the charge would be entrusted to report thereupon to the Club. The best mode of carrying this into effect would, of course, be matter for your discussion.

Last summer, Dr. Bull was kind enough to transmit to me a specimen of a very singular plant found by him near Hereford, the Xanthium Spinosum, in return I sent him a curious plant found by myself near Abergavenny, the Blitum Virgatum. I shall not now describe these interesting plants, because I hope Dr. Bull will kindly favor the Club with an account of them at his convenience.

It now only remains for me, Gentlemen, to perform the sad task of reminding you of the loss we have sustained by the death of one of our oldest members, who for many years evinced a deep interest in our prosperity, and seldom failed, so long as health and strength permitted, to join our Field Meetings, at which his cordial manners and polished conversation contributed materially to the enjoyment of all who had the pleasure of his company; I allude to our old friend Mr. Bodenham, of Rotherwas. We shall see him no more amongst us, Gentlemen, but I am sure we shall long remember him, and regret that death should have deprived us of so valued an associate.

Mr. Lingrrood, and Mr. Chandos Wren Hoskyns, who have been long prominent and useful members of the Woolhope Club, have retired to the Continent. In their case we may hope that the separation is but a temporary one-I earnestly wish, as you all do, that they may speedily return with a renewed zest for our interesting pursuits.-Mr. Lingwood's services deserve a special acknowledgement from us, for he was at all times most cheerfully willing to assist any of us, from the stores of his extensive information, on all subjects of Natural Science.

With warmest wishes for the success and prosperity of the Club through many future years, I now retire from a post of honor, which I owe to your kind indulgence, and from which I have derived unmixed pleasure and enjoyment.

$$
\begin{gathered}
\text { LIST OF FOSSILS FOUND IN THE } \\
\text { BUILTH DISTRICT, by Messrs. Powell and Grifiths. }
\end{gathered}
$$

## Llandeino Flag.

Ogrgia Buchii.
" Portlockii.
Asaphus tyrannus. Trinucleus fimbriatus.
O " concentricus.
Calymene duplicata.
Euomphalus perturbatus.
Lingula Davisii, in addition to the above
Trinucleus Lloydii.
Theca triangularis.
Siphonotreta micula.
Lingula attenuata.
Ampyx nudus.
Diplograpsus pristis.
Agnostus Mc ${ }^{\text {CO Coyii. }}$
Didymograpsus Murchisonii.
Ogygia Corndensis (A. Powisii.) ?

Guernyfydd.

Wellfield.
Wellfield Lodge.

Pencerig.
\} Gilwern Hills, near Llandrindod.

Vorcanic Grit overifing Ltandeifo.
Asaphus Tyrannus.
Orthis flabellulum.
) Western flank of the Caerneddau Bills.
Upper Lilandovery.
Pentamerus oblongus.
Petraia subduplicata.
Orthis radians.
Wenlock Shale.
Cyathophyllum.
Acidaspis Jamesii. Graptolites Ludensis.
" Sedgwickii
Pencerig.
Cardiola interrupta.
Pterinea Sowerbyi.
Lingula Plumbea
Rhynchonella
Orbicula
Builth Bridge.

Phacops caudatus.
Calymene Davisii
Orthoceras bullatum
Theca Forbesii (rare)
Lituites cornu-arietis (rare)


Cardioläfibrosa (rare). River-bem, near LZerdihonow. Orthoceras (new')
" Canaliculatum.
" Angulatum.
Phragmoceras intermedium.
Lituites Ibex.
Calymene Blumenbachii
Barkes of Irvon near Builth.

## Upper Ludiow.

Orthoceras distans dimidiatum. Ludense.
Ecculiomphalus Bucklandi.
Orthonota (several sp.)
Rhynconella
Orbicula rugata.
Lingula Lewisii
Homalonotus Knightii (rare)
Encrinurus punctatus. (rare)
Serpulites longissimus
Holopella conica
Tentaculites annulatus.
Lowest Beds of Old red Gaitdstone.
Orthoceras tracheale.
" semipartitum
filosum
Modiolopsis Lœeris
Holopella obsoleta
Trochus helicites.
Leptoena lata.
Cypricardia cymboformis.
Bellerophon striatus carinatus
Turbo" Williamsii ?
Ilœœnus Davisii ?

Aberedro and Erwood.

## METEOROLOGICAL OBSERVATIONS for the Year 1864.

The year 1864 was remarkable for its dry atmosphere and the number of its fine bright days. The dryness, indeed, during the Months of April, May, June, July, and August, was so excessive as to be commonly spoken of as "the drought." During this period, the difference of reading between the $d r y$ and wot bulb thermometers was commonly 10 or 12 degrees, sometimes 14 , and, occasionally 16 ; a very extraordinary difference for this climate.

During the year 238 days were registered as fine or $d r y$.
The heat from May to August was at times very great. On the 18th of May the thermometer in the shade rose to $81 \cdot 75$ degrees, and on the 5 th of August to 81 degrees; but the highest reading for the year ( 83 degrees) was registered on the 19th of July.

Only one thunder-storm of any importance occurred at Hereford during the whole year: this storm took place on the 3rd of September, and lasted only three-quarters of an hour, in which space of time 0.785 of an inch of rain fell, the greater portion in the first twenty minutes.

The coldest weather occurred in January and February. In January the frost was severe, day and night, from the 2nd to the 9th. In February the frosts were severe at night from the 5th to the 11th. The lowest reading of the thermometer (17.75 degrees) was registered during the January frost, and again in February.

The mean reading of the barometer for 1864, is high. The mercury rose 30 inches, or higher, on 111 days, and fell below 29 inches on 12 days only. The greatest range of the barometer took place in November : on the 6th of that month the mercurial column was 30.503 inches in height, and on the 14th the reading at 9 am . was 28.497 inches.

These readings, it must be obsorved, are not reduced to sealevel, but they are corrected for tomperature, index-error, and capillarity.

Assuming the late Mr. Lawson's estimate of the mean rainfall for Hereford to be correct ( $27 \cdot 145$ inches) we are this year about 7 inches short of our average supply; the amount measured being only $20 \cdot 146$ inches.

Observations with the dry and wet bulb thermometers were not commenced until February, and this registration being necessarily imperfect, the results are not included in the table for the year; but I have made up a table shewing the degree of humidity for each day of the month from April to August, together with the rain-fall.

Ozone registration was commenced much later in the year, and several places were tried before a satisfactory spot could be found. Scarcely a trace of ozone could be discovered in the Hereford almosphere, but at last the Ozonometer was placed on Eign Hill, with very satisfactory results. In commencing this class of observations, I have had the advantage of Dr. Kemp's ačvice and assistance. The Doctor found the Bartonsham a better station for ozone oberservations than the City, but Eign Hillalready mentioned-has proved infinitely superior to either.

Correct records of the velocity and pressure of the wind are very desirable, and in a practicable point of riew, second to nono in importance. We have at present no wind-gauge in Hereford which can be depended upon; a fact much to be regretted; I therefore strongly recommend the setting up of a Robinson's Anemometer, and feel assured that the Governors of the Infirmary would readily admit such an apparatus to be placed on the roof of that building. $\Delta$ better situation could not be desired.

The Barometer readings are corrected for temperature, capiltarity, and index error, but not reduced to sea-lpvel. Herefort, according to Mr. Curley is 158 feet above the fevel of the sea; the cistern of the barometer is, therelure, about 180 feet above sea-level, and the correction is $\times 0 \cdot 170$ nearly. EDWIN J. ISBELI..
Barometer, mean reading for the Year, $20^{\circ} \%$ inches. Thermometar, mean realing for the Xear, 48.76 Degrees

## THE DROUGHT.

Amount of rainfall measured at 9 a.m. and mean degree of bumidity for each day.


Explanation, D.day, R. rainfall, H. mean degree of humidity, complete saturation being 100,45 extraordinary dryness.

EDWIN J. ISBELL.

For Ozone Table see next leaf.

OZONTE TABIE.


In this table the amount of Ozone in the Atmosphere is expressed by the figures $\quad 0$ to 10 , according to a given scale.

## ILETEOROLOGICAL OBSERVATIONS

for the Year 1865.

The most remarkable Meteorological fact in 1865, was the almost entirc absence of rain during the month of September; twenty-eight days were registered fine, and on the other two days 04 of an inch of rain fell, or in plainer figures only ${ }^{1} \frac{1}{5}$ th of an inch; the months of April and June were also very dry, there being twenty-four fine days in the former, and twentyfive in the latter month. The rainfall in April was very much below the arerage, but not so much in June, as on the two last days of the month there fell 1.07 inches. The month of August was remarkable for its being the wettest, owing principally to the Thunderstorms which were so frequent; October was the next wettest month; these two months form a striking contrast with September. January and February are noticeable for heavy fails of Snow. The most remarkable fall we have had for some years commenced on the night of the 25th January and continued more or less until noon on 27 th, when the average depth was taken and found to be $10 \frac{1}{2}$ inchos; in places where it had drifted it was from 8 to 10 feet deep, it had not disappeared when there was another heavy fall on 16th February, when it areraged 5 inches deep, and continued on the ground till the end of the month.

There were several Thunderstorms worth mentioning, the first occurred on May 9th, when 82 of an inch fell in two showers between the hours of 5 and 11 a.m. There was another storm on the 6th July, 71 of an inch falling at intervals during the morning; the next was a hail storm on the 9th of July, on this occasion $\frac{1}{3}$ of an inch fell in 12 minutes; there were also two heavy storms on 12 th and 23rd of August, both falls amounting to $\frac{3}{4}$ of an inch each.

The Thermometer was unusually high in April, on the 26 th and 27 th it rose to 729 and 72.6 respectively, the mean temperature was 5 degrees above the average. June was the hottest month in the year, on the 22nd the Thermometer rose to $87^{\circ} 6$, it was above $80^{\circ}$ on six days and above $70^{\circ}$ on twenty days. September was almost as remarkable for the height of the temperature as for the extreme dryness; the Thermometer was above $70^{\circ}$ on nineteen consecutive days; on one occasion it rose to $78 \cdot 0$, and once to $77 \cdot 0$, the mean temperature was considerably above the average.

January was the coldest month, frost on seventeen nights; on the 29th the Thermometer fell to $3 \cdot 6$, the lowest reading since December 1860. February and March were also two very cold months, there were fourteen frosts in the former and thirteen in the latter month, the mean temperature in both was several degrees below the average.

There were 193 days registered as fine, the rainfall 25.005 inches is, according to Mr. Lawson, 2 inches below the average.

The Barometer was a very fair height, nearly as high as in 1864; the greatest range took place in January, it rose to $30 \cdot 143$ and fell to $28 \cdot 295$ within ten days; the highest reading occurred on 15th December, 30.577 , and the lowest on 14th January, 28-295.

Ozone observations have been carried on at Hampton Park, there was less in September than any other month, and it was most abundant in January and February.

WILLIAM COOKE.

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[^0]:    - The thickness of any stratum in relation to a horizontal line drawn through it , is = that line multiplied by the natural sine of the angle of inclination of stratum ; and in reference to a vertical line, is $=$ the vertical line multiplied by the natural cossine of the same angle of inclination.

[^1]:    * Published Mar, 1854, of which a new edition is now preparing. The reader will do well to consult the reviews of this work, in the North British Review, and Quarterly Review, October, 1854.
    \# My friend, the late Dr. Thomas Iloyd, of Ludlow, in 1832 first noticed the existence of fossils in the old red sandstone of Herefordshire, about the Wyld, near Leominster, and soon alterwards near Downton Hall, and other places in the neighbourhood of Ladlow Onchus Murchisoni was discovered by myself in themudstones of the upper Ludlow, near Batchcots 1833, and Pterggotus poblimaticus in the exact equivalent, near Croft Castle, in $1: 35$. The Ladlowbone bed was laid open 1834 , hy workmen engage: in a quarrynow filled up-on the site of the house at the entrance to Ladford churchyard from the bridge. Its position is near the bottom of the yellow sandstone, known as Downton Castle building stone; a repetition of the bed, verkicalle,

[^2]:    separated several feet, was obserred by the late Messrs. Scobie and Strickland, at Hagley. Small spines had been previously noticed in corresponding beds at the Tin Mill Coppice, near Bringwood. Traces of the fish bed have now been satisfactorily observed near Kington, Lucton, Richard's Castle, Ludford, Downton Castle Bridge, round the Ludlow promontory ; at Hagley and Gamage Ford, round Woolhope ; and at Longhope, Blaisdon Edge cutting and Flaxley, in the prolongation of the upheaval towards the Severn. I have found fragments of it in the gravel between Leintwardine and Clungunford.

[^3]:    * See a paper on the protruded mass of the upper Ludlow rocks at Hagley Park, Herefordshire, by Hugh E. Strickland, Esq., F.R.S., \&c., in the Quarterly Journal of the Geological Society of London, November, 1859.

[^4]:    Bridstow Vicarage,
    30th Nov. 1855.

[^5]:    * Edinburgh Philosophical Journal, April, 1859.

[^6]:    * Huxley on Cephalaspis and Pteraspis. Quarterly Journal, Geological Society, vol. 14, p. 281.

[^7]:    * Mr. Page informs me that the grey fissile flagstones and tilestones of Forfar, "our lowest Old Red," contain among other fossils, Lepidodendroid stems, Fucoids and Zooterites, fern-like fragments (Sphenopterys ?), Pterygoti of several species, from 1 ft . to 6 ft . long ; Eurypteri, two species; Acanthodes Diplacanthus, two species; Climatius (several) ; Plectrodus, Icthyolites undetermined, Cephalaspis, \&c.
    * "Synoptical View of Old Red Sandstone," Quarterly Journal, Geological Society, vol. 15, p. 436.
    $\ddagger$ This statement was made on the information of a friend. I have since read Mr. Mitchell's paper (Quarterly Journal, Geological Society, vol. 17, p. 145), Dipterus is not there mentioned ; but fossils belonging to the genera Acanthodes, Diplacanthus, and Ctenacanthus are mentioned as occurring in these beds.

[^8]:    * Symonds' "Old Red Sandstones of Herefordshire," ubi supra.
    + Morris and Roberts "on the Yellow Sandstone and Mountain Limestone of Oreton and Farlow." Quarterly Journal, Geological Society, vol. 18, p. 94.

[^9]:    *"In Herefordshire and in Italy much birdlime was formerly made from the berries of the Mistletoe." (London Encyclopadia.)

[^10]:    * In many a Herefordshire Orchard, may be seen an old cankered tree or two, past bearing fruit, or nearly so; with most of its main branches dead, and what little remains of the tree, overpowered with Mistletoe, A stranger passing by might take such trees as the groundwork for some slash. ing remarks on the sloveuliness of Herefordshire farmers in general, If his good fortune should afterwards bring him within reach of the hospitality of the house, he will very probably, as he walks round the homestead after luncheon, be shown these very dilapidated remains of trees, as the "pets" of the orchard. "That cider you thought so strong and good, grew on these trees 15 years ago"; or they are some old favourite lind that grew the strongest cider in days gone by; or made some wonderful quantity in some particular year: or they were "my Father's farourite trees, and will bide my time, I hope." Anyway, he will discover, that Herefordshire Farmers can lave amiable reasons for preserving old worn-out apple trees, and will be more cautious in criticism for the future.

[^11]:    "When the Velts fly from North to South, it will be a hard winter," they say in Worcestershire, "but if they fly in the reverse direction it will be a mild one." The same thing is also said in reference to wild Geese and Ducks. (Mr. J. S. Haywood, Worcester.)

[^12]:    - I have since learnt that there is but little Mistletoe in the neighbourhood of the tree. The nearest Mistletoe-bearing tree is a Pear tree, about 100 yards from the Oak; and this in itself, as we have seen, is an example of rare occurrence.

[^13]:    * This poem Mr. Davies thinks from internal evidence, dates "long before the sixth century, in an age when the Britons were acquainted with the Romans, but whilst Rome itself as yet was Pagan. Not a single Christian idea is introduced; on the contrary, we find an upen profession of worshipping the Moon in a general concourse of men, and the lore of the Druids, is declared to be meet for Sovereign princes." (p. 280)

[^14]:    * Mr. Davies in his Celtic researches says that "the Apple was the next most sacred tree to the Oak, and that orcharls were planted in the vicinity of the sacred groves." (Mr. Lees in Phytologist 1851 p. 357.) But in his "Botanical Looker Out" it is said, that Mistletoe from the Hazel was preferred by the Druids, next to that from the Oak, but on what authority I linow not.

[^15]:    + The Mistletoe, Trefoil, Oak, and Wheat, form the Bardic emblems of the four seasons, and, as such, the Mistletoe was figured on the jewelled National Token, given by the Ladies of South Wales, to the Princess of Wales. (Illustrated London News, March 5th, 1863.)

[^16]:    * What is the Mistletoe good for? I asked of a man learned in country customs, and great in faith-"That do depend on what tree it comes from" he answered. "It be a very fine thing for fits. My father had the Leptic fits for many years afore he died. He tried amost all the Doctors in Hereford, and the Infirmary too, but nothing never did him so much good as Mistletoe from the Haw, mixed with Woodlaurel, and he took nothing elseSometimes he took it in powder, with honey, and sometimes made a tea of it. Then my daughter took Mistletoe for the Sterricks but it didu't cure her; so may be, it was not the right sort.-They do tell me that Mistletoe from the Maiden Ash be a fine thing for Convulsives, but I never had much to do with giving it to people. I know when you get it from the Mawpell it's good for animals. It's capital for sheep when they don't go on well at lambing time, and for cows too. That as comes from the Apple tree, and Poplins, is the best to hang up in the house on New year's day for good luck through the year, but a many people use any that comes first."

[^17]:    + The remains of the Oak still exist, and the Mistletoe was there in 1803, but it has long since disappeared.

[^18]:    * "Pictures of Nature," around Malvern Hills and the Vale of Severna book that every lover of nature, who has seen or known the hills, must rejoice in possessing.-It deserves to be much more freely illustrated when it could not fail to be still more generally attractive.

[^19]:    * Hone, in his "Every Day Book," relates a discussion which took place at a Christmas party, as to which might be the grat and crowning glory of Christmas festivity. One said "mince pie"; another said "beef and plum pudding"; sume said "wassail-bowl"; but a fair maiden blushingly suggested "the Mistletoe." (Notes and Queries Vol. vi.).
    "Butwhen Mistletoe is not to be obtained" says Halliwell "the kissing. bunch," a garland of evergreens, ornamented witin ribbuns and oranges, may be substituted for it at Chtistmas." (IDid)

[^20]:    * For giring to Cows, the popular belief is that it should be gathered from the Hawthorn or Maple-It was from a woodman near ledbury that I first heard of the continued existence of this use for Mistletoe; "Mistletoe aint of much use now Sir, as I knows on," said he, "except for one thing and then it do beat everything. A piece of Mistletoe from the Haw,-from the Haw Sir," he repeated, "chopped in pieces and given to a Cow alter calving, will do her more good nor any drench you can give her," and this has been confirmed from other parts of the County. Sir Thomas Browne ("Vulgar Errors," Book ii. c. 6.) also states that it is a common country practise to give Nistletoe to Cows at this particular time.
    "A Worcestershire Farmer" says Cuthbert Bede, "was accustomed te take down his bough of Mistletoe, and give it to the Cow that calved first aiter New-year's day, which was supposed tc ensure luck throughout the jear to tho whole dairy." (N. \& Q. Vol. iii. p. 313.)

[^21]:    * Daubeny.

