THE

NATURALIST:

A

MONTHLY JOURNAL OF

Natural History for the North of England

EDITED BY

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AND

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Tolson Memorial Museum, Huddersfield;

WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF

JOHN W. TAYLOR, M.Sc. RILEY FORTUNE, F.Z.S.

1929.

LONDON

A. Brown & Sons, Ltd., 5 Farringdon Avenue, E.C.4

And at Hull and York.

PRINTED AT A. BROWN AND SONS, LTD.,
PERTH STREET WEST, HULL.

JAN. 1929.

No. 864
No. 638 of current Series

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A MONTHLY ILLUSTRATED JOURNAL

PRINCIPALLY FOR THE NORTH OF ENGLAND.

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THOMAS SHEPPARD, M.Sc., F.G.S.,
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The Museums, Hull;
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Contents :—

LONDON:

A. BROWN & SONS, LIMITED, 5 FARRINGDON AVENUE, E.C. 4.
And at HULL and YORK.

Printers and Publishers to the Y.N.U.

Price 1/6 net. Prepaid Subscription 15/- per annum.

THE NATURALIST

FOR 1929.

NOTES AND COMMENTS.

NEW NATURAL HISTORY BOOKS.

Our desk is again being loaded with books dealing with natural history from a popular point of view, and a large number of them are equally interesting to young and adult readers, though all have in view an attempt to make the study of nature interesting. Mr. E. Thompson Seton's three

volumes entitled 'Chink,' 'Foam Razorback,' and 'The Trail of the Sandhill Stag' respectively,* each contain about 130 pages, including charming pen-and-ink sketches, and also plates, and fascinating stories. To give one of them its full title, we have in Chink, 'A wooly-coated little dog and other stories from Lives of the Hunted and Wild Animals at Home, being the personal histories of Chink; the Development of a Pup; The Mother Teal and the Overland Route; The Kangaroo Rat; The Well-meaning Skunk; A Street Troubadour; being the Adventures of a Cock Sparrow.' The illustration is from 'Chink.'

THE BOOK OF GARDEN ANIMALS.†

The author endeavours to give an account of the natural history of garden animals, including mammals, birds, reptiles, amphibians, snails and slugs, spiders, millipedes, centipedes, insects, etc. The essays are well written and well illustrated, and the book will appeal to most naturalists, and as the animals referred to are of the 'common or garden' species, our readers who possess moderate sized gardens will be able to make observations of quite a number. The extraordinary size of the capital letters in the index forms an unusual feature.

* London: Hodder & Stoughton, 2s. 6d. net each.

† By E. Fitch Daglish. London: Chapman & Hall, xi.+213 pp., 7s. 6d. net.

RANDOM GLEANINGS FROM NATURE'S FIELDS.*

We know that quite a number of our readers have followed with interest the charming essays which have appeared in *The Illustrated London News*, by Mr. W. P. Pycraft, of the Natural History Museum, South Kensington. The author has the happy knack of writing in a way which can easily be understood and appreciated by the person known as 'the average reader.' In about forty articles he describes a variety of subjects, varying from ermine capes, jelly-fish, cocoons, barnacles, whales, oysters, pipe-fishes, crabs, to walrus. Mr. Pycraft's numerous disciples will be glad to have his essays in this cheap form.

GILBERT WHITE.†

We should not have thought that it was possible, but Mr. Johnson has demonstrated that there is still room for a new volume dealing with Gilbert White. This is dedicated to 'The Selborne Society, The Gilbert White Fellowship, and Selbornians Everywhere.' It commences by giving a list of leading dates in White's life, beginning with 1720 and ending with 1793, when he died; and the chapters refer to White: The Man; The Scope of White's Work; Zoological Anticipations; Ecology; Vertebrate Animals; Birds; Insects; Botany; Geology; Meteorology; Antiques—Folklore—Customs—Social Economy; Errors and the Refutation of Errors; White's Prose Style; White's Poems. Among the illustrations are some quaint sketches of Gilbert White, geological and other maps and sections, etc.

THE LURE OF BIRD WATCHING.‡

Our readers have long been familiar with the results of bird-watching, the camera of Riley Fortune notably having produced beautiful pictures which have adorned our pages during the past quarter of a century. From time to time books have been published as a result of records by the camera rather than by the gun, the Keartons and Knight, and a host of others taking a prominent part. In the present work, Mr. Hendy has reprinted a large number of articles which have appeared in numerous reviews, journals and newspapers, all well written, and all giving evidence of capable observations. In one respect we are a little disappointed, and that is in the fact that there are only eight illustrations from photographs, but they are all good.

* By W. P. Pycraft. London: Methuen & Co., xiv.+210 pp., 7s. 6d. net.

† Pioneer, Poet and Stylist, by Walter Johnson. London: John Murray, xvi.+340 pp., 15s. net.

‡ By E. W. Hendy. London: Jonathan Cape, 256 pp., 7s. 6d. net.

THE SEAS.*

We have previously drawn attention to the *Wayside and Woodland* Monographs issued by Messrs. Warne. Their latest addition to the series is termed briefly, 'The Seas,' and is by two especially qualified authors, namely the Assistant Naturalist to the Marine Biological Association, Plymouth, and the Leader of the Great Barrier Reef Expedition, 1928-9, respectively, both of whom have had tremendous experience in various aspects of marine biological

Laminarian Zone, uncovered at extreme low water of spring-tides. (*Laminaria digitata*).

studies. Though there are close upon 400 pages, and nearly 400 illustrations (nearly half of which are coloured), the book is quite handy for the pocket, and will be exceptionally useful to visitors to the seaside. Some of the coloured illustrations are quite works of art. In a series of sixteen chapters information is given, first, relating to the history of the oceans as judged from ancient maps ; then the fauna and flora of the shore and the sea bottom. There are chapters on Swimming Animals, Drifting Life, Boring Life, Coral Reefs, Colour and Phosphorescence ; Feeding of Marine Animals ; Sea Water ; Ocean Seasons ; Methods of Oceanographical Research ; The Sea Fisheries ; The Shellfish Industry ; Fishery Research ; Products from the Sea ; and a bibliography.

THE ROYAL NATURAL HISTORY.

Messrs. Warne & Co. are re-issuing this well-known work, edited by the late R. Lydekker, in an improved form. Section

* By F. S. Russell and C. M. Yonge. London : F. Warne & Co., xiii.+379 pp., 12s. 6d. net.

I. of the first volume is before us, and contains no fewer than 192 pages, with scores of illustrations in the text, as well as coloured and other plates. The first section naturally deals with man, monkeys and allied species. The text is readable, and in every way we can recommend the publication to our readers.

JOHN RAY.*

It is a great boon to the scientific world that the Ray Society exists, as unquestionably many important memoirs and documents are now available to students which otherwise would be locked up in more or less inaccessible places. John Ray, in whose honour the Society was founded, wrote an enormous number of valuable letters containing useful natural history information. So long ago as 1846, Dr. Edwin Lankester edited the ' Memorials of John Ray,' then published by the Society. Two years later the same editor issued ' The Correspondence of John Ray,' which included much additional material. The present editor, Dr. Gunther, whose researches in old time scientific matters are well known, points out that ' so many of Ray's original letters have been omitted by chance, and so many passages in his published letters have been eliminated by design, that there are more than sufficient materials to add yet a third volume, preparatory to that " Life " for which the world has waited for so many years.' It seems that a large number of Ray's letters have been re-discovered in the Bodleian Library, and several of them are now printed *in extenso* for the first time, and form an admirable supplementary volume to the ' Correspondence.' There are two Short Lives of Ray ; Chronological Tables of Ray's Letters ; and reproduction of portraits. The volume also contains his correspondence with Peter Courthorpe, Willughby, Martin Lister, Tancred Robinson, John Aubrey, Andrew Paschall and Edward Lywyd. There is a chapter on Ray and the Royal Society.

IRISH BOGS.†

This work is much more comprehensive than might be assumed from its title. It deals with the Irish Bogs certainly, but more particularly from the point of view of their fauna. The sub-title, ' Sport and Country Life in the Irish Free State,' more accurately describes its scope. Snipe, woodcock, duck, pheasant are referred to ; then we are introduced to Irish setters, pointers, water spaniels ; to fishing, and so on.

* Further Correspondence of John Ray, edited by R. W. T. Gunther. London : The Ray Society, xxiv.+332+6 pp.

† By J. W. Seigne. London : Longmans, Green & Co., xii.+249 pp., 15s. net.

The numerous illustrations are well chosen and particularly pleasing. There is no doubt this volume draws attention to the attractions of Ireland from a sporting point of view, and naturalists, as well as sportsmen, will be grateful to Mr. Seigne.

BARNACLES IN NATURE AND IN MYTH.*

This versatile author has written upon a tremendous variety of subjects, and now gives an extensive treatise on the barnacle, with illustrations from numerous sources of the traditions

'Ulysses Androvandus, 1603.'

relating to this familiar species. Originally, Mr.Heron-Allen dealt with this subject before the 'Sette of Odd Volumes,' and apparently his original intention was to issue his address in the familiar pamphlet form. However, as he consulted the works of 'early zoologists, botanists and thaumatogenists,' he found that the literature on the subject was such that his pamphlet eventually developed into a book. As the author points out, the word 'Barnacle' has been applied to strange philological uses. 'What d'ye lack, sir? What d'ye lack, Madam? Clocks, watches, barnacles?' cries Frank Tunstall in the opening pages of 'The Fortunes of Nigel,' when he is offering his spectacles for sale at the Fair; and the word has

* By E. Heron-Allen. London: Humphrey Milford, xv.+180 pp., 15s.

found itself applied to an instrument of torture and discipline for man and beast. In the sense implied by Mrs. Whitney, when she tells us that Blackmere ' barnacled himself on to Gershom Vorse,' the word has passed into history with the Dickensian clan of the Tite-Barnacles, and has recently achieved a renewed immortality in the same sense in a poem by the late ' Jester ' to the ' Sette of Odd Volumes ' in the lines :—

> Thousands of Barnacles, small and great,
> Stick to the jolly old Ship of State ;
> So we mustn't be cross if she seems to crawl—
> It's rather a marvel she goes at all."

To our readers the most fascinating part of the volume will be that devoted to representations of the barnacles in early literature, and even on Mycenæan and Cretian pottery. The author seems to have followed up his studies in his characteristically thorough manner, and has not omitted much.

PROBLEMS OF INSTINCT AND INTELLIGENCE.*

There are different ways of studying insects, and while one way is to kill them and place them in rows in a cabinet, probably the other extreme is the study of the different species and their methods of living, such as has been carried out in the present work. The author has had the great advantage of studying insect life in the tropics, and has brought together a wonderful series of observations bearing upon the intelligence of insect life, and the manner in which this is shown. By a series of experiments, some of which are illustrated, the fascinating life-stories of many species are dealt with, leaving the reader with little doubt in his mind as to whether the insect possesses intelligence or not. As an example we may quote one of his numerous illustrations :—

RED ANTS.

' A Red Ant is searching for prey. It finds, let us say, a large longicorn beetle, grips it by the leg, and tries to hold it down. Other ants near by see the struggle and enclose the capture in a ring. Now follows the extraordinary procedure. The ants proceed to stretch their victim, to lynch it until it is dead. They spread themselves round it, seize it by every projecting point, legs, antennæ, edge of the wings. They all lie with their bodies fully extended and radiate outwards in all directions. Then the lynchers begin to strain, and to haul on the victim with all their strength. The beetle is helpless. It can do nothing in this terrible machinery but lie still and allow itself to be stretched. The number employed in this stretching

* By Major R. W. G. Hingston. London : E. Arnold & Co. vii.+ 296 pp., 10/6 net.

process varies with the size of the victim to be stretched. Half a dozen will stretch a small weevil; twenty will operate on a ladybird beetle; I have seen many hundreds engaged at stretching a young bird. The result of the stretching is to kill the victim. It may be completed in four or five minutes, but a large capture will take half an hour. The ants, moreover, stick to it relentlessly. Whether the time be long or short, the ants persist till the victim is dead.'

THE HUMBER SHORE.

We have previously drawn attention to the interesting

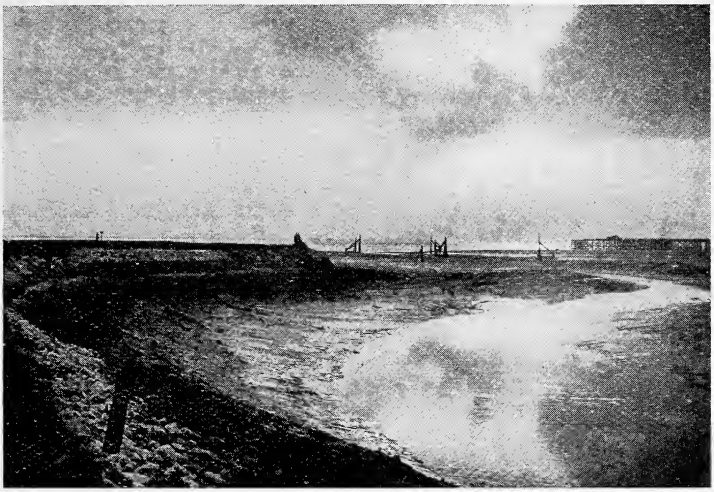

Photo **The Humber-side near Paull.** *P. Hunter.*

character of the house magazine of various firms. *Ours*, the magazine of Reckitt's, reaches us regularly, and in the issue for November is a reproduction of a photograph of the Humber end of the old Hedon Haven, showing the new oil stores and spirit refineries on the right, and Immingham in the distance on the opposite shore of the Humber. Before the changes which took place at the Humber mouth resulting in the formation of Sunk Island, Hedon Haven was an important artery, and Hedon was a port of greater magnitude than Hull, and to-day the town has a wonderful collection of silver plate, charters, and other evidence of its former prosperity. Geographical changes, however, reduced Hedon to the size of a comparatively small village. It ceased to send representatives to Parliament, and while to-day it still has a Mayor and Corporation, it is on a very small scale. The buildings seen on the photograph really represent one extremity of Hull's seven miles of river frontage.

1929 Jan. 1

THE PLACE-NAMES OF THE NORTH RIDING OF YORKSHIRE.*

Few counties have had such a wealth of literature relating to their place-names as the broad-acred shire, and in recent years works of exceedingly scholarly merit have appeared dealing with the question of place-names from a standpoint which is much above that of the old style, when the author's *ipse dixit* was considered to be sufficient. The magnificent map of the Riding issued with the new volume may be looked upon as the basis of this, the fifth in the series issued by the English Place-Name Society, and the author's introduction as a result of extraordinarily detailed study of the place-names is a masterpiece. We should like to quote just one paragraph as illustrating the conclusions which have been arrived at by a study of the place-names alone :—

DANES AND NORWEGIANS IN NORTH YORKSHIRE.

'The general conclusion as to the distribution of the Scandinavian element in the North Riding is that the Danes settled chiefly in the south of the Riding, in the level fertile valleys of the Derwent, Rye, Ouse, in the lower parts of the Ure Valley, and in Birdforth in the central Vale of York. The Norwegians settled chiefly in Ryedale, Whitby Strand, Cleveland and Teesdale, and in Richmondshire. Whereas the Danes and Norwegians indifferently occupied districts already settled by Angles, the distribution of place-names suggests that the Norwegian settlers tended to avoid the districts occupied by the Danes in the previous century. Most of the Danes undoubtedly moved out from the centre of their kingdom at York ; others entered the Riding independently. The Norwegians, as a whole, came over the Pennines from Cumberland, occasionally bringing with them Britons from that district, although the name Scarborough points to incursions of Norwegians from the North Sea, which probably explains the settlements in Pickering Lythe, Ryedale and Whitby Strand.'

MESOZOIC CYCADEAN FRONDS.

At a recent meeting of the Linnean Society, Dr. H. Hamshaw Thomas gave 'Further Observations on the Cuticle Structure of Mesozoic Cycadean Fronds.' In this he pointed out that 'the rare Yorkshire plant named by Prof. Seward *Dioonites nathorsti* and later *Pterophyllum nathorsti* is figured for the first time. Its cuticle structure shows that it should be regarded as the type of a new genus. Some of the numerous forms of *Pterophyllum* from the Lunz Beds (Upper Trias) of

* By A. H. Smith. London : Cambridge University Press. xlvi.+ 352 pp., 20/- net.

Austria have been re-examined, and the conclusion is reached that there is no justification for the separation of these well-graded forms into a number of species distinguishable by their dimensions ("breadth-index"), but that they should be regarded as different forms of the same species. This involves a change in the current nomenclature. Cuticle structure indicates that the Palæozoic fronds from the Coal Measures of Blanzy and Commentry in France, described some time ago by Zeiller as species of *Pterophyllum*, should be regarded as allied more closely to the Mesozoic genus *Nilssonia*, and cannot be classed as true Pterophyllums.'

HILLS AND HIGHWAYS.*

The author has spent a considerable time in travelling about from one part of the country to another, but has given

A City of the Pennines.

preference to open-air work, and especially to climbing in the Lake District and other parts. She has much to say of the Lake Country inns, the Cairngorms, the Pennines, and their well-known venues, and also describes her crossing of the Channel and life on the Continent. The essays are particularly pleasantly written and adorned by quaint woodcuts by Margaret Pilkington, one of which we are permitted to reproduce. Some of the essays appeared in *The Nineteenth Century and After*.

THE FERNS (FILICALES). †

The Past President of the Yorkshire Naturalists' Union has now completed his third volume of this work. The

* By Katharine C. Chorley. London: J. M. Dent & Sons, Ltd., 232 pp., 6/- net.

† By F. O. Bower. Cambridge University Press, viii.+306 pp., 30/- net.

present instalment deals with the Leptosporangiate Ferns. While it completes the author's prolonged study of the great class of the Filicales, he modestly states that the whole work only marks a stage in their detailed investigation. 'Historically there came first the period of discovery, diagnosis, and description, together with a provisional systematic grouping of the Class. The conclusion of this period may be held to have coincided with the publication of the Origin of Species. The state of knowledge of the Ferns at that time is fitly revealed in the First Edition of the Synopsis Filicum (1865), itself based upon the five volumes of Sir William Hooker's Species Filicum, of earlier date. Though the author of the Synopsis in his Preface makes no reference to Darwin's work, he does remark that "here as with other scientific systems those are the best characters which lead to a knowledge of the object sought for in the nearest and clearest way, keeping in view as much as possible its natural affinities." Nevertheless the goal of the Synopsis was primarily to form "a useful *vade mecum* for the travelling botanist and the cultivator of Ferns, and for ready consultation in the Herbarium." Thus was reflected in its pages the cataloguing aim of the earlier phases of Pteridology.' In this way the author reviews the History of the Study of the Ferns in which his own book on the Origin of a Land Flora played such an important part. Photographs, sketches and microscope sections assist in making this volume a magnificent conclusion to the series which the Professor has produced. The illustrations of photographs appearing on some of the plates are remarkably clear.

GEOLOGICAL PROGRESS.*

We should like to thank whatever powers may be for arranging the publication of this series of memoirs separately. A perusal of this section of the Summary of Progress reminds one very forcibly of the early days of *The Geological Magazine* when it was possible to read and understand the various articles then printed. Among the memoirs the following will particularly appeal to our readers : 'The Cockermouth Lavas, Cumberland—a Carboniferous Volcanic Episode,' by T. Eastwood ; 'The Origin of Cumberland Hæmatite,' by E. E. L. Dixon and B. Smith ; 'The Stratigraphical Position of the Manchester Coal Measures,' by L. H. Tonks ; 'The Rochdale Road Sewer Tunnel Section, Manchester,' by L. H. Tonks ; 'The Distribution of Sandstones in the Measures above the Barnsley or Top Hard Coal in the Northern Part

* Summary of Progress of the Geological Survey of Great Britain and the Museum of Practical Geology for the Year 1927. Part II. London : H.M. Stationery Office, viii.+110 pp., 2s. 6d. net.

of the Concealed Coalfield of Yorkshire and Nottinghamshire,' by G. V. Wilson ; 'Upton Colliery Sinking,' by G. V. Wilson and D. A. Wray ; 'Palæozoic Species of Vetacapsula and Palæoxyris,' by R. Crookall ; and there are as many again. Diagrams, tables, maps and photographs supplement the papers.

THE MUSEUM OF PRACTICAL GEOLOGY.

When we were in the Museum of Practical Geology last it seemed to be in a state of transition, and as one has read in the press recently (for about the thirtieth year!) of the desirability of transferring the Museum to a South Kensington site, one wonders whether this has been accomplished. However, we have carefully searched the publication from end to end, including the cover, and while we can find addresses from which the publication can be obtained in London, Edinburgh, Essex, Manchester, Cardiff, Belfast, Southampton and other places, there is not a single reference to the whereabouts of the Museum of Practical Geology, from which place presumably very largely the memoirs were published.

A COUNTESS IN A MUSEUM.

Catherine, Countess of Westmorland, has been induced to give her views on museums to *The Morning Post*.* She says : 'My only feeling with regard to the planning [of some of the London Museums] was that some of the rooms were too large and, therefore, inclined to be bewildering. One can give undivided attention to something of interest so much better if it is shown in a smaller space. Certainly if I were planning more rooms for small exhibits of any kind, I should keep them small. Others may not agree with me, but that is just my idea, and I mention it in passing. The chief thing that struck me was the lack of thought for the comfort of the thousands of people who throng these national collections year in and year out. In each Museum I inquired for a "rest room," and found that such a thing did not exist. I then went to look at the restaurants provided in these magnificent buildings for the benefit of the students and pleasure-seekers, and was astounded to find that such dreary, drab, uninteresting places even existed in these enlightened days.' We fear that Catherine, Countess of Westmorland, is not an authority on museums, and apparently her recent acquaintance with some of the larger ones—or some other reason—has induced her to 'rush into print.' Small rooms in a museum mean enormous expenses in the way of supervision, and, notwithstanding what is said in the *Evening Standard* at the time the Countess wrote (see below) museums were not built as refreshment-

* November 15th.

booths and rest houses. And we can quite believe the Countess was much more comfy in an ' attractive little tea-shop outside,' where doubtless the proprietor would much more welcome the sympathy of Catherine, Countess of Westmorland.

ROMANCE IN A MUSEUM.

There are still people who get a living by writing penny-a-line piffle, as shown from the following in a recent issue of *The Evening Standard*, under the above heading :—' The extreme value of the site of the Geological Museum in Jermyn Street —that gloomy building within a stone's-throw of Piccadilly Circus—must have made many people wonder why it was not removed to Kensington or some such more suitable spot years ago. The change is at last to be made, though it will take a long time. Some will regret the removal, and for reasons by no means geological. For the Jermyn Street Museum has long had romantic associations little suspected, possibly, by its directors. As a place for a quiet assignation it has few rivals, for the position is central and the atmosphere serene and undisturbed. Love-lorn couples by the score have exchanged vows behind a large and friendly lump of iron pyrites.'

PLECTAMBONITES.*

According to a Summary thoughtfully supplied by H.M. Stationery Office : ' This part of the palæontological memoirs issued by the Geological Survey contains 161 pages (4to) of letterpress, and is illustrated by five collotype plates. The work treats of certain British late Ordovician and Silurian brachiopod shells, many of which have previously been regarded as belonging to the genus *Plectambonites*, which was founded on early Ordovician species. The limitations of that genus are discussed, and it is shown that the forms of later age described in this work should be separated from it. Three new genera are established and numerous new species are described. Sections of the work are devoted to the classification, morphology and distribution of these fossils. A comparative table of the strata in Great Britain from the Llandeilo to the Ludlow Series is appended ; also a synoptic table of the species, showing their localities and geological horizons.' This publication completes the first volume of the new Palæontological Series published by the Survey, and is accompanied by a title page. Previous memoirs in this series have dealt with Carboniferous Crustacea, Ortholetinæ, Trepostomata and Producti. In the part now issued are excellent plates showing *Sowerbyella*, *Leptelloidea*, and *Chonetoidea*.

* *Mem. Geol. Survey*: Palæontology, Vol. I., Pt. IV, pp. 367-527, Plates XXI.-XXV. ' Plectambonites and Some Allied Genera,' by O. T. Jones, H.M.S.O., 6s. 6d.

NOMENCLATURE !

In describing 'The Herbal of Leonhard Fuchs' to the Linnean Society of London recently, the authors stated: 'The nomenclature adopted is at first sight extremely puzzling. It may be unitary, binary, ternary or rarely quaternary, and uninominal, binominal, trinominal or quadrinominal. But the nature of the nomenclature and its form do not necessarily correspond. Thus a trinominal designation, for example, may be either unitary, *e.g., Ephemerum non letale* (a monotypic genus), or binary, *e.g., Trifolium pratense purpureum* (a species of the genus *Trifolium pratense*), or ternary, *e.g., Bellis minor hortensis* (a subspecies or variety of the species *Bellis minor*). *Helleborus niger adulterinus sylvestris* is really a binary combination, the genus being *Helleborus niger adulterinus*.'

STRATIGRAPHICAL PALÆONTOLOGY.*

Dr. Neaverson is known to our readers for his successful work among Jurassic ammonites, and while these form an important section of the book before us, he has covered every aspect of palæontological science from the earliest to the latest times. As he points out, usually 'the preliminary teaching of palæontology is biological, and several text-books have already been written from this stand-point. There is, however, a further aspect of the subject, in which assemblages of fossils are considered as representing animal- or plant-population at definite periods of time. This "faunal" aspect (or "floral" aspect, as the case may be) is of prime importance in present day geology, for it concerns the units of comparison in the correlation of strata. Text-books of stratigraphy all contain some broad generalisations on the faunal aspect of stratal sub-divisions, but the student is often left with inadequate conceptions of the application of palæontological methods to stratigraphy.' In his work, however, he tries to remedy this defect by making extensive use of recent investigations and by endeavouring to utilise the fossils to best advantage. The twenty chapters are divided into General Considerations, and the remainder to Faunas of the Geological Systems in Britain. The author has had the advantage of modern methods of illustrating, made possible by the smoothness of the paper used in the volume, and while he has many 'line' drawings, the wealth of illustration from photographs certainly adds much to the value of the publication. The chapters are replete with references to special monographs on the subjects dealt with. There is a remarkably complete list of genera and species referred to, and altogether the book will be welcomed by those for whom it is intended.

* By E. Neaverson, London: Macmillan & Co., xiii.+525 pp., 18/- net.

BIRD WATCHING ON SCOLT HEAD.*

Miss Turner's wonderful patience, combined with her intimate knowledge of bird life, has resulted in her name being foremost among those who have done so much to perpetuate the charms of the avi-fauna of these Islands. The book is a picture gallery of rare species in their native haunts, and the obvious nearness of the birds to her camera indicates the successful way in which she has stalked her prey. Some of the notes have previously appeared in *The Times*, and the well-known *Transactions of the Norfolk and Norwich Naturalists' Society*, but the volume does not suffer on that account.

THE GREAT WINDING ROAD. †

The quantity of material from the pen of Oliver Pike is such that it requires no recommendation to our readers. The present volume is typical of those preceding it. Photographs of the gannet, carrion crow, robin, lapwing, red deer, etc., taken by the author, with the usual letterpress, appear. The type is large, the spaces between the lines larger, and the paper thick, making the volume appear to be worth the 7/6 asked for it. The secondary title to the volume is ' Being the Adventures of a Naturalist on the Roads of Britain ' and presumably the species dealt with relate to the more common animals found during the author's travels from one part of the country to another.

ANIMAL DRAWING AND ANATOMY.‡

We have often derived a certain amount of instruction, not to say amusement, in glancing round the various exhibits on the private view day at the Royal Academy, and judging them with the eye of a naturalist. The glaring incongruities make one wonder how the artists could possibly have made the errors. In the present work, Mr. Noble has taken such species as the sheep, horse, cow, dog, and birds and wild animals, and has treated them from the point of view of expressing them by pen and pencil. For example, in the horse, the skeleton, the attached muscles, the major muscles, and the surface muscles eventually to be covered by the skin, showing the hair tracts, are dealt with one after another. Artists interested in animals would do well to consult this work, and naturalists and others will find much in it of interest.

* By Miss E. L. Turner. London : Country Life, Ltd. 84 pp., 10/6 net.

† By Oliver G. Pike. London : H. Jenkins, Ltd., 234 pp., 7/6 net.

‡ By Edwin Noble. London : B. T. Batsford, Ltd. xi. + 105 pp., 10/6 net.

Prof. F. O. Bower, F.R.S.

President: Yorkshire Naturalists' Union, 1927-8.

THE EVOLUTIONARY RELATIONS OF THE BRITISH FERNS.

PROF. F. O. BOWER, D.Sc., F.R.S., F.L.S.

LONG years ago, in point of fact it was in 1888, Mr. Lee's well-known 'Flora of West Yorkshire' made its appearance, and I ordered a copy. It is well to confess that I never made full use of it, not then being resident continuously in my native county. My early botanising was done elsewhere. None the less, I soon became sensible of the breadth of its scope, and of the searching detail of observation in the field upon which it was based. This work has been continued by many willing hands to the present day, and expanded in its scope so as to cover the whole of our county. It has led to the result that the Natural History of Yorkshire is now as well known as that of any county in England—even the smallest of them. I little thought in the days so long ago of ever being called to preside over the Yorkshire Naturalists' Union, which has been so closely related with this notable work; nor did the particular trend of my own early efforts suggest such an event, for I was caught up in the stream of that revival in the study of plant anatomy and physiology that marked the seventies and eighties of the last century. The pendulum of interest and enquiry in the Universities, and particularly in my own University of Cambridge, then took a sudden swing away from observation in the field to work in the laboratory. Momentarily indeed it swung much too far, for there was amongst us then a tendency to neglect field work, and even to under-rate the importance of systematic recording at the very time when Britain stood pre-eminent in this among the nations. Hooker, Bentham, Oliver and Baker were then at the very height of their powers. In the search for details of structure and function we tended to belittle, or at least for our own purposes to avoid that systematic study of plants in which these masters excelled.

Time, with its natural consequences, increase in age and ripening of judgment in those enthusiastic students of the earlier decades, brought its own correction to them individually. But a much more potent influence appeared in that new aspect of botanical enquiry which will always be associated with the name of Warming, viz., *Ecology*. It consists in the study of plants, so to speak, in their home-life; the application of physiological analysis to the study of natural vegetation in the field. This has perforce led the laboratory botanist back

* The Presidential Address to the Yorkshire Naturalists' Union, delivered at York on 8th December, 1928. The address was illustrated by lantern slides, taken for the most part from the Plates in Sir William Hooker's 'British Ferns.'

to the country side, and to a critical knowledge of plants in the open. It is true that such study existed before Warming's day. It may be said that Sir Joseph Hooker, when on Ross's Antarctic Expedition he was laying the foundation for his Flora of Tasmania, was really pursuing ecology on the grand scale. Even earlier still, Darwin himself, when on the voyage of the *Beagle*, had studied plants and their distribution from this point of view. Mr. Lee's Flora of 1888, with its special chapters on Climatology and Lithology, bore its full share in the coming change of outlook. But Warming first gave not only its name, but also precision and method to Ecology. A proof of the hold which it has obtained upon botanical opinion at the present time is found in the fact that, only a week or two ago, the Darwin Medal was awarded by the President and Council of the Royal Society to Dr. L. Cockayne, 'for his contributions to Ecological Botany.' His field of work was in the Australasian region, which is peculiarly fitted for such study by reason of its large areas of intact vegetation. Here, at home, a whole section of some of our constituent Societies devotes special attention to such work in this county. The effect has been here, as indeed generally, to instate field botany in a new and vital lease of life, and thus to renew interest in its pursuit.

Meanwhile, Morphology, which had dealt in its earlier days too strictly with structure and with comparison of form, was also undergoing a change. Sachs in his lectures on the Physiology of Plants, had in 1882 introduced the term *Organography*. The rigid study of form was widened and relaxed, and its relation to function became an inherent part of Morphology. In the hands of Von Goebel that relation has been amply confirmed, so that morphology and physiology are rapidly adopting a common ground. Your President for this year has lived as a working botanist through the whole series of these changes. He has endeavoured in his own comparative studies, to take his share in spreading this more vital view of form, whereby evolutionary results are related as far as possible to conditions and causes.

A presidential address should not consist of a mere statement of generalities such as these ; nor even of history. It should be in some sense a personal deliverance, so that the speaker's individual work shall be made available in a condensed form. Having this year completed nearly half a century's research on 'Ferns,' and summed it up in three volumes in which the aim has been to reconstruct their chief evolutionary sequences upon a foundation of Organography, it seemed not inapt to use the present opportunity for placing our British Ferns in their probable relation to the Class at large. I believe this has never yet been done. In illustrating those species selected

for special notice here, the Plates of Sir William Hooker will be used. He was the greatest Pteridologist of his time, and he held the Chair of Botany in Glasgow University for twenty years, passing thence to the Directorship of Kew. After a long interval I had the honour of succeeding him in Glasgow, and pursued there the study of Ferns during twice his period of office. His work lay wholly in the pre-evolutionary period ; but one of its most notable results is that the groupings of that time have proved to be in the main natural groupings. He worked on the lines of certain continental writers, and as the common result there emerged such recognition of natural affinities as has stood the test of time under a drastic change of theoretical outlook.

Eight main Families of Ferns had already been distinguished by Mettenius before the ' Origin of Species ' was published, and they were generally adopted by writers of the last century. But their relation in descent was left undefined, for the simple reason that such questions were not yet canvassed. It was not till 1890 that Campbell enunciated the view, based on comparative grounds, that those Ferns which are the most massive in structure were the most primitive, and those more delicate, derivative. The distinction is indicated by their respective sporangia, the former had already been styled by Von Goebel, Eusporangiate, and the latter, Leptosporangiate. A comparison of the fossil evidence confirmed this conclusion, reference being made to what must always be the ultimate court of evolutionary appeal, viz., the testimony of the Rocks. The Palæozoic Ferns are relatively massive Eusporangiates : those typical of the present day are relatively delicate in their construction, and are Leptosporangiate. It is rarely that a numerical measure can be given, even roughly, which will indicate evolutionary progress. But in Ferns a general index of ancient types as against those that are modern is found in the number of spores in each spore-capsule. In the ancient types they may be numbered by hundreds or even thousands, in the modern types by tens, or even by units. (See table of spore-counts, ' Ferns,' Vol. I., p. 262).

With this general result before us the next step will naturally be to attempt some arrangement of the Families, so as to bring out their phyletic relations, not as a linear series which they certainly do not represent, but with a due recognition of their general affinites as confirmed by detailed study. The result may be pictured by a scheme in which relatively primitive types are at the base, and relatively advanced types above ; while those with a marginal position of the sori (which is held to be a primitive feature) lie to the left, and those with superficial sori (which is held to be derivative) are to the right. The result is a brush-like series of divergent lines.

(See ' Ferns,' Vol. II., p. 333). Our present task will then be to fit our living Ferns into this scheme. I say our *living* Ferns, for there is evidence that various families not now living in Britain were represented in its Fossil Flora ; but these must be left over for the present, and the living species will provide us with ample material for the present discussion.

The types of Palæozoic origin lie at the base of our scheme, and the first question will be, are any such still living in Britain ? The Ophioglossaceæ, which afford the young field botanist one of those surprises that both puzzle and delight him, for they appear so strange and unusual, may be held as essentially palæozoic. The Moon-wort (*Botrychium lunaria*) and the Adder's Tongue (*Ophioglossum vulgatum*), are our native examples. The former grows commonly among grass, and presents each year as a rule only one leaf that springs from the buried upright stock. Sometimes the leaf is sterile, showing forked venation of its pinnate lobes ; but where fertile the branched ' spike,' of pinna-nature, overtops the sterile blade, bearing its massive sporangia in serried marginal ranks, each containing a very large output of spores. In the Adder's Tongue, which is also found in grass land, both sterile and fertile parts are more compact, the former with a finely reticulate blade, the latter bearing on each margin of its simple ' spike ' a row of very large, laterally-fused sporangia ; each of these contains spores, estimated by thousands rather than by hundreds. These peculiar plants are not such as the lay mind would readily recognise as Ferns ; but detailed study, including that of the tropical genus *Helminthostachys*, suggests that the Family is really related to primitive Ferns, and in particular to the Botryopterideæ which flourished in the Coal Period. Unfortunately, direct palæontological evidence of affinity is unreliable, for early fossils referable to the Ophioglossaceæ are wanting. On the other hand, there are no known modern derivatives of the Ophioglossaceæ. Thus, they stand to-day isolated, as an imperfectly modernised relic of the Palæozoic Flora ; and this is what gives them their special interest among the living Ferns of Britain.

There is, however, another Palæozoic Fern-type still living in Britain ; it is more widely spread than *Botrychium* or *Ophioglossum*, and is far better known. The Royal Fern (*Osmunda regalis*), a denizen, though now rare, of swampy ground, is prized both for its beauty, and for its long-suffering toleration of domestic culture. Its thick upright stock, densely covered in by masses of roots, gives rise upwards to many highly divided leaves with open venation, while the adult plant bears distally on each a dense truss of sporangia. These again are marginal, of relatively large size, and each produces about 500 spores. It is a noble plant, and its leaves may attain

a height of six feet or more. Abroad to-day, as well as in the distant past, the trunk of members of this Family appears like that of a stunted Tree-Fern ; and it possesses in its stem and densely grouped leaf-bases a most characteristic vascular structure. It is this structure that finds it correlative in widely spread fossils of Permian Age. The work of Kidston and Gwynne-Vaughan on the Fossil Osmundaceæ has demonstrated that the type dates back to late Palæozoic time, while sundry sporangia and sporophylls, which have much in common with those of living genera, are frequently met with even in the Coal Measures. From such facts we may conclude that the type now represented in Britain by the Royal Fern is of Palæozoic date. The favourite of our gardens, and even of our homes, is one of the most venerable of living plants ; a member of a Palæozoic aristocracy.

There is one other Family represented in Britain, which has some claim to a Palæozoic origin ; but it is rather a slender claim, suggested rather than proved : it is the Family of the Filmy Ferns, or Hymenophyllaceæ, which is represented to-day by some 500 living species, of which three appear in Britain. None of the Family is large, and some very minute ; and they are characterised by their beauty and the pellucid texture of their leaves.

Among our British species, who does not know at least by name the Bristle Fern of Killarney (*Trichomanes radicans*), the largest of our three native species ? It is an occasional dweller on wet shaded rocks, in various localities besides the West of Ireland. Hooker states that it was once ' abundant at Bellbank, near " Binsley " '—surely Bingley, Yorkshire : ' but it is there no longer, and possibly it had been introduced. The hardly less notorious, but much more widely spread *Hymenophyllum tunbridgense*, is specially interesting for its very high spore-output (256-512). The third British species is *H. wilsoni*, common on wet rocks, particularly in Scotland. The Filmy Ferns possess one feature of definite advance on all the more antient Ferns, in the fact that their numerous sporangia are not formed simultaneously, as they are in all really primitive Ferns ; they arise in a regular basi-petal succession upon an elongated receptacle, which remains in *Trichomanes* as a persistent bristle, and gives its name to the genus. The feature in the Family which attracts most attention is the thin pellucid blade, as a rule only one layer of cells in thickness. Partly on this account, partly for other reasons, the Hymenophyllaceæ were long thought to represent the earliest Fern-types, being apparently most moss-like. But we now know that the filmy character is adaptive rather than fundamental, and similiar filmy texture appears in certain species of *Asplenium*, *Todea* and *Danæa*, which are exposed

to excessively moist conditions. The Hymenophyllaceæ may thus be recognised as extreme hygrophytes; and since no derivatives have been assigned to them they form a blind evolutionary branch.

It thus appears that there lives in Britain a quite respectable representation of Ferns reputed as of Palæozoic type. Other antient Families still exist elsewhere, and especially in the tropics, which find no relics here. These, with the exception of the Hymenophyllaceæ, all produce their relatively large sporangia simultaneously, and they may, therefore, be styled the *Simplices*. But in the Mesozoic Period there was a fresh evolutionary outburst, and the Ferns took their share in it. Derivative forms arose, characterised generally by their smaller sporangia with lower individual spore-output; also by a '*gradate*' or '*mixed*' sequence of their production. The general constitution of the plants which bore these was more delicate, their conducting tracts more highly divided, and the venation more complex, while dermal scales were substituted for hairs. These and other features marked the progression from Palæozoic types towards those of the present day. Three intermediate evolutionary lines may be recognised, while from them sprang finally those six large groups into which the modern Ferns can be segregated (See Scheme, 'Ferns,' Vol. II., p. 333). Each of these groups centres round some well known genus, and they are accordingly named the Davallioids, Pteroids, Gymnogrammoids, Blechnoids, Dryopteroids, and the Dipteroids. Of these the first and last are not represented in the British Flora; consequently our interest lies in the remaining four.

The group of the Pteroid Ferns undoubtedly sprang from ancestors akin to the living genera *Dicksonia* and *Dennstædtia*, which have marginal two-lipped sori showing basipetal sequence of their sporangia, borne on a receptacle which was actually marginal. The distinctive feature of the Pteroids is that the sori have lost their individuality, and are fused into series which are still borne at or near to the margin of the leaf. Though the group includes over 150 species there is only one representative in the British Flora, viz., the Common Bracken. It is often designated *Pteris aquilina*, which was the name assigned to it by Linnaeus. But technically this is not correct, for it differs in essential points from that large and widely spread genus. The Bracken shares with the Dicksonioids the two-lipped sorus, the initially basipetal succession of sporangia, and the hairy covering without scales, which are all primitive features. The old generic name given it in 1760 by Gleditsch has therefore been revived, and the Bracken is now designated *Pteridium aquilinum* Gleditsch. It is the only species of its genus, but it is a plant of cosmopolitan spread. I have taken

it, in one or another of its various forms, in Jamaica, and in Ceylon ; the rhizomes of the form *esculenta* provided a staple food of the Maories of New Zealand. On our own islands it is almost everywhere. Its wide spread is probably due to its habit, with the buried rhizome well protected during its annual hibernation according to climate. Through the intermediate steps of *Pæsia* and *Lonchitis* this primitive genus is linked with the true *Pteris*, which is so remarkably successful in point of number of species, though not one of them is British. They are marked by a single-lipped sorus, which is actually superficial, and with the sporangia of divers ages intermixed, while scales appear as a dermal covering ; all these features mark advance from the state of the primitive Bracken.

It has been thought by some that the antient stock of the Osmundaceæ has no modern descendents. That may be true as regards the direct line, but there exists in the Gymnogrammoids a vast number of Ferns in which the sorus is essentially of the same type as that seen in the second genus of that Family, viz., *Todea*. The common feature is that the sporangia spring superficially from the veins without any indusium at all. It is true that the Gymnogrammoids are smaller, with a lower output of spores ; but there are suggestive links in the tropical genus *Plagiogyria*, and particularly in the Mexican genus *Llavea*, which has foliage strangely *Osmunda*-like. Thus, by comparison we may reach on to our native genus *Cryptogramme*, with its well known species, the Parsley Fern (*C. crispa*), which occurs so frequently, and in quantity, in stony places on mountain sides. Or again to that rare annual Fern, *Anogramme leptophylla* which, as a straggler from the south, is found on the Island of Jersey ; but this is not really a British Fern, except politically. Thus again we find in the large group of the Gymnogrammoids only one truly British species. Another well known Fern, the Maiden Hair (*Adiantum Capillus-Veneris* L.), is again the sole representative of a large and widely spread genus. It nestles among limestone rocks near to the sea, a northern straggler of the so-called Atlantic Flora. The really naked sori are borne upon the reflexed ends of its many leaf-lobes, following the veins in a truly Gymnogrammoid fashion. As in *Todea* there is no reason to believe that any of these Ferns ever had a true indusium ; their sori are, and probably always have been superficial and unprotected. A feature that suggests their derivation from some more massive source is the instability of the annulus, combined with a relatively thick stalk, and in *Jamesonia* with a spore-count occasionally beyond 64. The whole Gymnogrammoid series presents a complex problem. It is interesting to find that our native representatives touch that problem nearly.

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In certain primitive Ferns the transition of the sorus from the originally marginal position to the surface of the leaf happened early, and such a state is seen in the Gleicheniaceæ, from which source a great series with consistently superficial sori appears to have sprung. The Cyatheoid Ferns were among the earlier of these derivatives, while the modern Dryopteroids and Blechnoids include most of the later developments from this source. It will be seen that we have in the British Flora a considerable representation of these later superficial types ; but there is one genus which appears to be earlier in origin than they, viz., *Woodsia*. This genus, founded by the great British Botanist, Robert Brown, is represented in Britain by two small mountain species not readily distinguishable from one another, viz., *W. hyperborea* (=*W. alpina* (Bolton) Gray), and *W. ilvensis* (L.) R. Br. They have a short, ascending stem bearing a crown of leaves 3-6 inches high. Few would at first see in these small Ferns the northern representatives of the great Tree Ferns of the genera *Cyathea*, or *Alsophila* ; but this is what they appear actually to be, as shown by the fimbriated but cup-like indusium from the centre of which rises a receptacle bearing gradate sporangia.

The Common Bladder Fern (*Cystopteris fragilis* (L.) Bernh.), and its rarer fellow species, *C. montana* (Lam.) Bernh., both so similar to *Woodsia* in habit, provide one of the most puzzling enigmas of relationship among our British Ferns. The question is whether their ancestry was Pteroid with marginal, or Cyatheoid with superficial sori. Here we may be satisfied in knowing that the question exists : my own opinion is the latter, viz., that like *Woodsia*, the genus may be held as derived from some Cyatheoid source. Its spread is chiefly Northern and Alpine, but it extends also southwards through Asia, and is found in Africa and in North and South America. The Common Bladder Fern is one of our hardiest species ; it is found on rocks and walls in mountainous districts, and it grows freely if planted on rockeries.

Turning now to the Dryopteroid Ferns, with which *Cystopteris* is probably in close relation, these are very richly represented in the British Flora. The genera *Dryopteris*, *Polystichum*, *Athyrium*, *Asplenium*, and *Ceterach* all figure among our native Ferns, and indeed form the great bulk of them. In point of their general morphology and anatomy they differ only in minor features, and the distinction of the genera is chiefly according to the form of the sorus, and particularly of the indusium. The ancestral type was probably like that now seen in *Alsophila*, viz., with a naked gradate sorus, though a cup-like indusium appears in *Cyathea* and in *Woodsia*, while a laterally placed scale is characteristic of *Hemitelia*. But none of our northern types have like these

attained to the stature of Tree Ferns. Probably, however, the Cyatheoids formed the starting point for all the Dryopteroid Ferns. The rare eastern genus *Peranema* gives a suggestive clue, for in it the long-stalked sorus has its indusium attached on one side only, in the form of a *cap* rather than a *cup*, though the receptacle is still radial. But in *Dryopteris* the whole sorus is lopsided : this huge genus, with over 700 species, is a witness to its biological success. In the British Flora we have nine well authenticated species, of which the best known is the Common Shield Fern (*Dryopteris filix-mas* Rich.). It is characterised by a kidney-shaped indusium attached by a stalk where its margin is incurved : and this suggested the old name of *Nephrodium*. But of the nine British species two are without any indusium at all, and on that account they used to be included in the genus *Polypodium*. They are the familiar Oak Fern (*Dryopteris linnæana* C. Chr.), and the Beech Fern (*D. phegopteris* (L.) C. Chr.). Their creeping habit and leaf-characters are shared by other species of *Dryopteris*, and there is no doubt that they are merely species of that genus, in which, as in many others, the indusium is abortive.

In the evolution of the Ferns of this Dryopteroid affinity the sorus, and especially its indusium, have proved very plastic ; they appear as evolutionary playthings. We have seen that the receptacle may become lop-sided, and that the indusium may be reduced or even abortive. But these changes do not by any means mark the limit. One of the most interesting modifications is that which produces the sorus of *Polystichum*, a genus represented in Britain by the Prickly Shield Fern (*P. aculeatum* (L.) Schott.), and the Holly Fern (*P. lonchitis* (L.) Roth.). Here the indusium is shuttle-cock-shaped, and apparently distal on the receptacle, and is seemingly very different from the basal cup of *Cyathea*. But through the intermediate state of *Dryopteris* it is easy to see how this may have come about, first by lop-sidedness of the sorus, then by a continuation of the sporangial production all round the indusial stalk, instead of only on one side of it as in *Dryopteris* itself.

A further line of modification of the sorus is based upon an accentuation of the lop-sidedness already noted. It leads through *Athyrium* to the large genus *Asplenium*, and finally with abortion of the indusium to *Ceterach*, and to ' *Pseudo-athyrium*,' the so-called Alpine Polypody (*Polypodium alpestre* Hoppe). The genus *Athyrium* itself gives the key to the change, for commonly the basal sorus of a pinnule resembles the kidney-shaped sorus of *Dryopteris*, but unequally developed on its two sides. One side is continued further along the vein than the other, while in extreme cases the latter may be

absent altogether. Particularly instructive intermediate states may be obtained even from a single leaf of *Asplenium lanceum*, showing how the sorus of *Dryopteris* may pass into that typical of the genus *Asplenium*, or even of its tropical ally *Diplazium*. (See 'Ferns,' Vol. III., Chap. 42). The series thus briefly sketched is well represented in the British Flora. *Athyrium*, ranked by Hooker as a sub-genus of *Asplenium*, but now reinstated as the substantive genus *Athyrium* Roth. 1799, appears as our Lady Fern (*A. filix-fœmina* (L.) Roth.), while the Alpine Polypody with its abortive indusium, formerly styled *Pseudo-Athyrium* Newman, or *Polypodium alpestre* Hoppe, now appears in its natural relation as *Athyrium alpestre* (Hoppe) Rylands. This is a good example how the rigid observance of a mistaken systematic method may disguise true affinity, and lead to groupings that illustrate the ingenuity of the systematist rather than true relationship: for the 'Alpine Polypody' (*'Polypodium' alpestre*) appears in the *Synopsis Filicum* over 80 pages away from its natural relative, the Lady Fern.

The genus *Asplenium*, as taken in its more strict sense, is represented by eight species in Britain, and it is fitly typified by the Common Spleenwort (*A. trichomanes*), and the Black Spleenwort, *A. adiantum-nigrum*. Abroad it includes over 400 species. The large and closely allied genus *Diplazium*, with over 200 species, mostly tropical, has no British type. In the calcicolous Scaly Spleenwort (*Ceterach officinarum* D.C.) we have a single representative of a small allied genus, which differs from *Asplenium* in the venation, while the indusium shows varying degrees of abortion leading to its complete absence; these characters, together with the scaly covering of the leaves, have confirmed its separation as a substantive genus. It is thus seen that there is a rather meagre representation in Britain of the Asplenioid alliance, which is so rich elsewhere: but it serves to illustrate the natural progressions and evolutionary relations of that great body of Ferns, which are held as derivatives from a Dryopteioid, and ultimately from a Cyatheoid source.

Of the probable Cyatheoid derivatives included in the British Flora there still remain two very distinctive types, each represented by a single well-marked and well-known species, viz., the Hard Fern (*Blechnum spicant* (L.) Wither.) and the Hart's Tongue Fern (*Phyllitis scolopendrium* (L.) Newm.). It will be shown that the latter type is probably derived from the former. This view differs from that generally adopted: most writers have related the Hart's Tongue with the Spleenworts, a conclusion based on superficial rather than upon close comparison. The Hard Fern, though common with us in Britain and widely spread elsewhere, is the only species of *Blechnum* native in north Temperate Lands.

Of the Blechnoid Ferns as a whole many are tropical, and a great preponderance of their species grow in the Southern Hemisphere, particularly in Polynesia. Our species is thus a very isolated type, and far removed geographically from the bulk of the Family to which it belongs. The common feature of the Blechnoids is that two linear fusion-sori take a parallel course, one on either side of the midrib, and well within the margin ; while a vascular commissure, running below the common receptacle of each, supplies them in a manner not unlike that seen in the fusion-sori of the Bracken. But the Pteroids and Blechnoids are essentially different in origin, the former being types with marginal, and the latter with superficial sori. The probable origin of the Blechnoids was from types such as *Alsophila* or *Matteuccia*, with closely ranged, naked sori, forming linear series on the leaf-surface ; these were linked up laterally to form fusion-sori, and covered over by the original leaf-margin, which here serves as a protective indusium. That the type was successful is shown by the wide spread of the genus *Blechnum*, with its 140 species. They are mostly xerophytic Ferns, with tough leathery leaves, as shown in our own type, which well deserves its name of the Hard Fern.

If there were no intermediate links between *Blechnum* and *Phyllitis*, our Hart's Tongue would indeed appear to be a puzzle, with its broad leaves and paired fusion-sori facing one another, each with a vascular strand below its receptacle. But the key to the puzzle is found in certain varieties of *Blechnum punctulatum* found in South Africa, supported as this comparison is by certain related Ferns from the allied genus *Camptosorus* from North America and China. In all of these the fusion-sori do not run in straight longitudinal lines, but are thrown into sinuous curves on the widening leaf ; and these are liable to interruption at the points of sharpest curvature, with the result that the isolated parts face one another just as they do in *Phyllitis*.

The South African variety of *Blechnum* was actually described by Kunze in 1844 as *Scolopendrium krebsii*, in fact as a Hart's Tongue. If this be a true explanation of the origin of the characteristic soral structure seen in the Hart's Tongues, it is clear that the genus has no near relation to the Asplenioid Ferns, a conclusion which exact comparison will support ; for while the paired ' sori ' of the Hart's Tongue lie face to face, those of *Diplazium*, the Asplenioid genus with which it has been compared, lie back to back, as they naturally would if they represent the elongated sides of a single Dryopteroid sorus. Any similarity which they possess to those of the Hart's Tongue will then be homoplastic rather than phyletic.

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The penultimate type of British Ferns that calls for our attention this evening is one of the best known of all, the Common Polypody (*Polypodium vulgare* L.): it is found on walls and banks, and it even grows epiphytically on tree-trunks in moist districts. It is a Linnæan species that has kept its name, partly because it is so well marked a plant; but the fact that it is the only true species of *Polypodium* in Europe will also have contributed to this result. Field botanists may at once object that any British Flora includes several species of *Polypodium*: Hooker includes four under that genus. But since Hooker's day it has become clear that the old comprehensive use of the name *Polypodium* to cover all Ferns with superficial, globose, and naked sori results in grouping together Ferns of quite distinct affinity. The definition implies merely a state or condition that may have been arrived at along a plurality of lines of descent. In particular, some may have had naked sori throughout their evolutionary story; others may have sori that have become naked through abortion of the indusium. This is undoubtedly the history of the Oak and Beech Ferns, and of the Alpine Polypody, which find their natural places either with *Dryopteris* or with *Athyrium*. It is quite different with our remaining British species, the Common Polypody. There is no suggestion here of an abortive indusium: it has probably had a naked sorus always, and may, accordingly, be retained as a true *Polypodium*, of which genus it was, in point of fact, the type-species. It has hitherto been placed in the sub-genus *Eu-Polypodium*, which includes various smaller, southern and tropical groups: our object will then be to decide to what affinity our isolated, and sole European species really belongs.

It happens that this question, so long neglected, has quite recently been taken up by Dr. Carl Christensen, the distinguished author of the *Index Filicum*. The typical *P. vulgare* has a creeping rhizome bearing broad scales: the leaves arise alternately from it, and are simply pinnate with open venation, while each naked circular sorus is borne on the anadromic branch of a forked vein. The chief variant of this usually stable type is that styled var. *Cambricum*, where the segments may be themselves once or even twice pinnatifid, chiefly in the middle region. By comparison of allied species, both from America and from Asia, Christensen has found successive steps of linking of the veins into loops characteristic of the tropical sub-genus *Goniophlebium*, and he draws the conclusion that *P. vulgare* is a free-veined *Goniophlebium*, and not a member of the sub-genus *Eu-Polypodium*, as commonly accepted. Geographically, this suggestion appears probable, for *Goniophlebium* includes numerous species in tropical America and Asia, while African and Polynesian species are

few. It extends into sub-tropical and even temperate regions of Western North America and Eastern Asia, where species belonging to it meet the species *P. vulgare*, and others closely allied to it. The northern stragglers of *Goniophlebium* prove intermediate in character between the tropical species and *P. vulgare*. Accordingly we may recognise this isolated European species, our Common Polypody, as an extreme outlier of the tropical group.

Our last British Fern is the most peculiar type of them all. It is the Pill-wort, the only native representative of the aquatic Hydropterids, which are characterised by possessing distinct male and female sporangia; these bear in the one case numerous small male spores, and in the other a single large female spore. In this they stand alone among the families of living Ferns. They include two Sub-Orders, the Salviniaceæ and the Marsileaceæ; and the Pill-Wort belongs to the latter. It presents a very un-Fern-like appearance, and as it grows on boggy ground, or may be submerged or even afloat, it would readily be mistaken for some Sedge or Grass, since its green leaves, borne on a creeping rhizome, are subulate: but their tips, crozier-like while young, readily betray their real nature. The most marked feature is the spherical sporocarp, which in size and colour closely resembles a compound rhubarb pill; hence the name of Pill-Wort (*Pilularia globulifera* L.). This is again an isolated species, though it spreads throughout Europe; of the five other species only one is European, viz., *P. minuta*, found in the south of France.

About forty years ago I was struck by the name of Pillmoor Junction, the only railway station, I believe, in Great Britain to which there is no road-approach. It seemed possible that the Pill Moor might quite well have taken its name from this curious plant; but it was not recorded there in Lee's Flora, though he notes it at Skipwith Common. So I made an expedition there, and found *Pilularia* in quantity, associated with *Gentiana pneumonanthe*, *Hypericum elodes*, and other interesting plants characteristic of the swampy oases in the Vale of York. I do not, of course, put this forward as a new record, but only as noting the satisfaction of natural curiosity. I need not enter here into any description of this remarkable plant, for it is fully dealt with in current works on Botany. It may suffice here to note that it is another of those isolated types which so largely constitute the British Fern Flora. Its probable affinity is ultimately with the Schizæaceæ, a Family of Ferns which dates back certainly to early Mesozoic time, and was then represented in the area we now call Britain. But at the present day no representatives of the Family exist in Britain, except this rather remote derivative.

Those who have followed me through this examination

of the Fern-Flora of Great Britain as it exists to-day will have anticipated the general conclusion to which it naturally brings us: viz., that it is largely vestigial as regards the leading types. There is, in fact, an unusual proportion of species belonging to the more antient Families; for instance, Moonwort, Adder's Tongue, and the Royal, Killarney, and Parsley Ferns. Most of the eight main groups of living Ferns are represented, but not all of them; for instance, we have no native Marattiaceæ, Gleicheniaceæ, or Schizæaceæ as such, though most of our native species may be held as ultimate derivatives from the two last of these Families, all of which at the present day occupy stations nearer to the Equator. Further, the derivative Families of the Davallioid and Dipteroid Ferns are entirely absent, unless it be ultimately shown that *Polypodium vulgare* may be referred in origin to the latter through *Goniophlebium*. Thus, the representation of the Families of Ferns in Britain is patchy rather than complete.

Nevertheless, it is an unusually comprehensive presentment of the Filicales as a whole. The Fern-Flora of the world amounts to a total of about 6000 species, grouped in about 150 genera, and twelve Families. In Britain we have only about forty species; but these are representative of half of those Families, and about one-eighth of the genera, while the total of our species amounts to only about one-fiftieth of the known species of the world. We may reflect how much the interest of our Ferns is enhanced by being thus distributed over so many Families, and many of these the most antique. It is probably a consequence of the position of Britain on the extreme fringe of a great continental area. If our Islands had been isolated in the ocean like the Galapagos, and had perhaps been from time to time wholly devastated by showers of volcanic ash like the Island of Krakatoa, it is highly improbable that any such inheritance of antique living forms could have been ours; while such a Fern-Flora as might have succeeded those destroyed would probably have ranged within narrow limits; it might, nevertheless, have had special value in relation to the origin of Species, such as the Galapagos Islands afforded to Darwin. But instead of such speculations we may dwell with satisfaction upon our native Fern-Flora as it is.

There is, however, another aspect of our Fern-Flora that is specially interesting in its bearings on past history. It arises from the fact that so many of our species occur as isolated types of Families much more extensively represented in other regions. Many even of the largest genera are with us monotypic. For instance, the Moon Wort is our only *Botrychium*: the Adder's Tongue is the only truly British *Ophioglossum*; the Royal Fern is our only *Osmunda*; the Killarney Fern is our

only *Trichomanes,* and the Bracken our only Pteroid ; the Parsley Fern is our only truly British Gymnogrammoid, and the Maiden Hair our only *Adiantum* ; *Woodsia* is represented by two species, but they are closely allied and very local. The Hard Fern is our only *Blechnum,* the Common Polypody our only true *Polypodium,* and the Pill-Wort our only species of *Pilularia.* Thus, out of the eighteen genera of Ferns represented in Britain the majority are with us monotypic. So prominent a fact calls for some explanation, and two alternatives arise. We may ask ourselves whether our isolated species are geographically speaking feelers that have edged their way northwards, or laggards left behind when the rest of the allied species had retreated southwards, or had died out. In each case the alternative would need to be considered in the light of the facts of present day distribution, illuminated further by palæontological data. This is neither the time nor the place to discuss such questions fully ; but, speaking generally rather than for any one instance, it would seem probable that the latter alternative is correct, at least for the majority of the Ferns in question ; viz., that they represent vestiges of a richer Flora of the past, and that the species themselves have, by their more ready adaptation or by more hardy constitution, been able to subsist in surroundings from which their congeners have retired beaten. In fact that they symbolise the tenacious and adaptible race of men that inhabits these Islands.

ENTOMOLOGY.

Armadillidium nasatum Budde-Lund, at Marsden, near Huddersfield.—Several specimens of this woodlouse were found by Mr. Alfred Dean in a vinery at Hay Green in 1916, and Mr. F. Rhodes, to whom the specimens were submitted, remarked on the locality being a new one for this species.—CHARLES MOSLEY, Huddersfield.

Beetle Larva Attacking Earthworm.—On an afternoon in June, 1928, I saw a beetle larva gripping the fore part of an earthworm on the surface of the ground in the garden at Windmill. The worm was struggling violently and continually threw its foe from side to side, and also tried to break the hold by frequently rubbing its fore part on the ground. The struggle was first seen at 5-15. At 6 o'clock there was no abatement, but by 7 o'clock the worm was evidently weakening, and its movements were feeble. For two hours the larva seemed to keep its hold in one place. At 7-30 the struggle was over and the larva was eating the worm at the mouth end. The worm would be about 6 inches in length, but that of its enemy was only about $1\frac{1}{4}$ inches.—B. MORLEY, Skelmanthorpe.

1929 Jan. 1

FUNGI.

Pleurotus ulmarius Fr. in Notts.—While passing with a party on the 11th October last, through the centre of the ancient and rural town of Blyth, my daughter, Muriel, drew our attention to a conspicuous cluster numbering eleven specimens of this large agaric in the decaying hollow of a leafy elm.—JOHN HY. PAYNE, Newhill, Wath-on-Dearne.

CRUSTACEA.

Malformed Claws of the Edible Crab.—Mr. J. A. Stevenson's reference on another page to malformed claws

of the edible crab reminds us we have in our Folk-lore Museum in the Tithe Barn at Easington, a set of malformed claws of an edible crab which had been mounted in silver and used as a charm. A photograph is given herewith.—T. SHEPPARD.

MAMMAL.

Variety of the Mole.—Early in November Mr. A. Haigh Lumby sent to me a variety of the Common Mole, caught near Hesleden, in Littondale. The whole of the back was of a beautiful silver-grey, the under parts of the hairs being white. The muzzle and part of the neck were rufous or fawn, and the under parts a dirty white, with spots and blotches —one very large blotch being between the front legs. I sent it on to the Keighley Museum, where it has been mounted. —H. B. BOOTH, Ben Rhydding.

THE ALPINE HARE ON THE PENNINES.*

F. J. STUBBS.

The Alpine hare is to-day one of the most conspicuous forms of life on scores or perhaps hundreds of square miles of our moors. For its beauty, its charm of association, for the wonderful change of dress, it is one of the most interesting of British mammals. Of course it is an alien here ; but is now permanently a Yorkshire mammal, and as such one might have expected the animal to have a literature of its own. So far as I can find, all that has been written of this hare from a Yorkshire point of view could be put upon a single page.

Taking a wider field, the literature is still scanty. The late Major Barrett Hamilton, in his admirable ' Natural History of British Mammals,' dismisses the Alpine hare on the Pennines in a very few words, and these of little local importance. The total amount of our information about the species consists of a few valuable lines in an article in *The Zoologist* for 1895 entitled ' The Vertebrate Fauna of Cheshire,' by Messrs. T. A. Coward and C. Oldham. The details here given were repeated briefly, with additional notes, in Coward's subsequent work ' The Fauna of Cheshire ' (1910). And thus it happens that almost the whole of the recorded knowledge of the Alpine hare in Yorkshire lies in two Cheshire works, by Cheshire naturalists.

According to the published records, the first successful introduction to England of the Alpine hare was in (or about) 1881. In this year, Colonel Joseph Crompton Lees, of Oldham, brought fifty Perthshire Alpine hares to his moors at Greenfield, in Yorkshire (five miles east of Oldham). There had been an earlier introduction at the same place in the 'sixties, but this seems to have been a failure. However, since 1880, the animal has increased throughout a great area of the Pennine moors, and was reported in the outskirts of Sheffield a score of years ago.

With the exception of a few gaps, this vast Pennine moorland is one continuous waste, consisting of hundreds of square miles of uninhabited ground. From time to time much excellent field work has been done on this area, but without doubt it is still the least-known part of England to the naturalist, in spite of the fact that it lies roughly as the frontier between the most densely populated parts of Yorkshire and Lancashire. Of course there are local workers who are familiar with their own favourite areas, but there must be very few—naturalists or otherwise—who can possess an actual acquaint-

* Read at the Meeting of the Vertebrate Zoology Section of the Yorkshire Naturalists' Union at Leeds, on 20th October, 1928.

ance with every square mile from Buxton or Macclesfield to Keighley, from Bury or Bolton, round by Rochdale, *via* Woodhead and the Derwent to the neighbourhood of Sheffield. There are motor roads crossing this area, and there are many rough walking tracks. To penetrate the recesses of the separate moors, each one so different in type from the others, entails walking of the most arduous character.

One of the mysteries of the increase of the Alpine hare was the fact that, although the animal had spread so rapidly from Greenfield to the east and the south, there was no increase northwards. So far as one could tell, there was no difference either in the climate or the vegetation ; the moors inhabited by Alpine hares and the moors not inhabited had both the same peat soil, combinations of the usual moorland plants, and the usual moorland birds.* (Incidentally it is impossible to learn what governs the distribution on the Pennines of such birds as grouse, dunlin, golden plover, curlew, twite, or even merlin.)

To make the problem still more puzzling, during recent years the Alpine hare has changed its habits, and is now spreading northwards. The increase is but slow. The animal is still rare, as a very occasional visitor, to Blackstone Edge. Twenty years ago it was never seen on that series of moors, and, of course, in winter and spring, it is impossible to overlook the animal. What is the explanation for this 'lop-sided' increase since 1880?

The Greenfield introduction was not the first one. Mr. Coward now informs me that in 1918, hearing a rumour that Alpine hares had been introduced to the Derwent moors, he communicated with Mr. R. H. Rimington-Wilson, of Bolsterstone Hall, Penistone, who informed him that about 1870 he turned out a number of Perthshire hares on his moors. They seemed to disappear, but after a year or two the animals began to increase, until shortly they were shooting from 100 to 150 each season. Mr. Coward was unable to learn the precise moor where these hares were turned down, but apparently this was near Bolsterstone Hall ; and Mr. Rimington-Wilson would not say definitely that the present Alpine hares of his district were the progeny from his own experiment, or were invaders from the Greenfield colony.

Within a day or two of getting this information from Mr. Coward, I had a letter from Mr. Ammon Wrigley, a careful local historian who is not only deeply interested in hare hunting, but is a native and still an inhabitant of the parish of Saddleworth, which includes Greenfield. 'Years ago,' he writes, 'a gamekeeper told me that the Alpine hare was not

* See *The Naturalist*, 1928, p. 84.—Ed.

first turned out in Greenfield, for at an earlier date some were turned out on the Penistone moors by a member of the Stanhope family.'

Mr. Wrigley is unable to add any other details. Of course he was well acquainted with the Greenfield experiment, and like all of us knew that the published records accepted this as the only instance on the Pennines. Naturally, therefore, this gamekeeper's statement would interest him, and would be remembered. The point is this ; we know now that the Greenfield experiment was not the only one ; but have there been two other introductions? Possibly this "Stanhope' instance is the same as the 'Rimington-Wilson' one—a point that might be settled by the local historian.

There is thus no mystery about this irregular increase of area. Greenfield was not the 'radiant point' ; there were at least two radiant points, and the stronger (ten years earlier) was the Penistone one.

Barrett Hamilton, with the greatest brevity, mentions an abortive introduction in 'North Staffordshire.' Was this really abortive? The southern edge of the present unbroken area of the Alpine hare reaches the Staffordshire boundary. Moreover, Barrett Hamilton mentions a Yorkshire introduction of the Irish hare, an animal that might easily be mistaken for the Alpine. To my mind, there is no doubt that the whole subject has been sadly neglected by Pennine naturalists ; and here I include myself, for I have very few written notes, and dare not trust my memory so far as localities are concerned. And yet I must have seen Alpine hares on thousands of occasions on these moors !

All I can say now is that the Alpine hare is abundant generally (there may be lacunæ—but I have no records !) from Greenfield eastwards by Woodhead, Penistone and Hathersage, towards Sheffield. Southwards, its range reaches the moors between Buxton and Macclesfield. In 1927, Mr. Stewart, of Hathersage, informs me, Alpine hares appeared for the first time on Eyam Moor. But where exactly were these from? Had they crossed the Derwent from Hathersage, had they worked from the Peak (Kinder Scout) *via* Rushup, Bradwell Moor, and Abney Moor, or had they come in from the North Staffordshire direction? Alternatively, do they occur on the Froggatt Edge Moors across the Derwent? It is a district I have not seen in winter for many years. Although a Derbyshire locality, I mention Eyam Moor because of its isolation, and because of the interesting problems of route it suggests. On the other frontier I can add that five years ago an Alpine hare was shot on Wotherhead Hill, in Lancashire, and actually within the municipal borough of Oldham. I cannot get any definite information relating to the adjoining

High Moor and Wharmton Moor, although the latter spot is hardly a mile away from the original Greenfield locality, and less than a mile in a straight line across the valley from spots where I have often seen Alpines.

What is wanted is a long series of field observations for every part of the Pennines, and especially for areas on the outskirts of the present known range. Records relating to the Halifax, Hebden Bridge and Keighley districts, negative or positive, would be valuable. There is every reason to believe that as the moorlands stretch without a break into Lancashire; north and west of Rochdale, the Alpine will in time occupy these districts.

The Alpine hare is already changing colour, and in its white winter dress (which is often worn until May) the animal is extremely conspicuous, and no special skill is needed in identifying it. Gamekeepers and farmers often possess useful knowledge, which (in the case of the Alpine especially) is not always placed at the disposal of the enquirer. For instance, some people do not like the Alpine ; they think that it tends to drive out the much more desirable common hare ; and a keeper may say that he has no Alpines at all when really the species is well established.

I will say nothing here of the distinguishing characters between the various species of hares. These points are dealt with in praiseworthy detail in Barrett Hamilton's work. I am of opinion that some people are really hazy as to the difference between a brown hare and an alpine in summer dress. A skull, even a single bone, or a pinch of hair caught on a stone, can often be used as sound evidence of the presence of the Alpine hare. Such clues should be collected and passed on to the special student, with a note as to the exact locality.

In this changing world, the scientific names of our hares have not escaped, so I might add that modern writers call the common or brown hare *Lepus europeus*, using the name *Lepus timidus* for the Alpine hare, or, as it is variously called, ' Mountain Hare,' ' Scotch Hare,' ' Blue Hare,' ' Varying Hare,' or ' White Hare.' Albino brown hares should always be borne in mind, but these freaks are so rare that any white hare seen on the Pennines must be deemed to be an Alpine unless the contrary can be proved.

Part XVII. of C. Davies Sherborn's *Index Animalium* was issued in November, and takes this invaluable publication to page 4450.

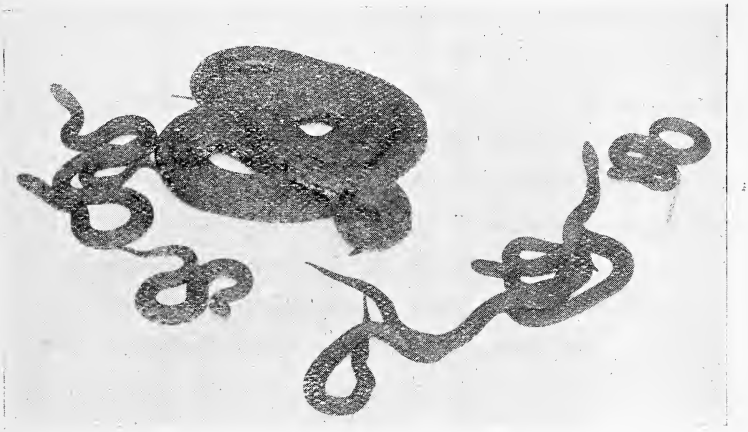
The well-known firm of S. Hirzel, in Leipzig, favours us with a copy of *Gruppentheorie und Quantenmechanik*, by Prof. H. Weyl. The work contains 300 pages, and is sold at R.M. 20.

At a recent meeting of the Linnean Society of London, Prof. W. M. Tattersall read a paper on ' *Asellus cavaticus* Schiodte, a blind Isopod new to the British Fauna, from a well in Hampshire.'

BIRTH OF ADDERS IN CAPTIVITY.

N. MORRISON, D.Sc., F.Z.S. (Scot.).

The adder has her young about the end of August or the first week in September. The gestation period is four and half months. It is, perhaps, a unique experience to have a captured snake giving birth to young immediately after being caught. Such has been my experience on two occasions, the first on 29th August, 1905, and the second on 1st October, 1928. The latter birth fell on a later date than normal. The adder in this case was a healthy specimen measuring 23 inches in



Female Adder with eight young Adders, born in Captivity 1st October, 1928.

Photo, Norman Morrison.

length. On being caught I noticed that it was a bit sluggish and lethargic in its movements, making very little effort to escape. There was nothing in its contour to suggest pregnancy beyond being slightly corpulent, and I was certainly very much surprised to find that on opening its cage one morning eight days after capture that there was a brood of eight young adders. They measured four and half inches in length, and six are females and two males. They were all normal specimens except one, which had malformation of the maxilla and palate. It was not so active as the others, which soon after birth developed a marked biting tendency. The viciousness of these creatures prompted me to test their toxicological properties, and I made them bite an ordinary microscope slide, when I found that no secretion was produced until the third day after birth. I mixed some of the venom with fresh pig's blood and a microscopic examination of the slide revealed

that the blood underwent a comparative rapid hæmolytice and agglutinative change, indicating that the poison in this short period had acquired its maximum potency.

This established the fact that the degree of virulence of adder's poison is not proportionately in keeping with the degree of the physical development of the creature.

Adders will not feed in captivity, but I thought that these youngsters might be induced to take food because they had no knowledge of the freedom of wild life, their world was circumscribed by the confines of their cage. I therefore assumed that they would respond to nature's call for sustenance, consequently I made special efforts to coax them to take suitable nourishment, but my efforts were fruitless. They stolidly refused to touch a morsel of food.

Mother and family are still alive and well. Adders live for a long time without taking any food. The hibernation period begins early in October, and on the 17th November these creatures showed no sign of becoming sleepy or torpid. Adders will not hibernate in captivity.

The female adder did not show any maternal instinct towards her offspring. This may have been due to the reptile being in captivity. Although not feeding, the young adders have stretched almost half an inch in length in 26 days.

Insects : an Introduction to Entomology, by **F. Balfour Browne.** London : Benn's Sixpenny Library, No. 45, 80 pp. This work contains in small space a remarkably interesting account of the structure, habits and instincts of insects, with special reference to their relation to the affairs. It might well form a succinct *Apologia pro sua vita* to any entomologist ; if one is required in these days of the spread of science.

The Story of the Birds, by **C. J. Patten.** Sheffield : Pawson & Brailsford, xxvii.+478 pp., 16/6 net. Professor Patten was asked by the British Broadcasting Corporation to give a series of talks to school children on the subject referred to in the title. These have been amplified and illustrated by views from photographs and reproductions of some excellent original pen-and-ink sketches, reproduction of plans, etc. Having been written for younger people, the work is devoid of technicalities, and will appeal to our readers whatever age they may be.

Plant Life and its Romance, by **F. E. Weiss.** London : Longmans, Green & Co., viii.+136 pp., 3/6 net. ' The contents of this little book formed the subject matter of twelve broadcast talks to school children.' Nine chapters are occupied with the general description of the various groups in the plant kingdom ; in one Professor Weiss deals with the evolution of plants ; in another with some of the problems of plant distribution throughout the world ; and in a third with the history of the British flora. The summarised account of the plant world is admirable, embodying a surprising amount of matter ; it is written in clear and straightforward style, and technicalities are reduced to a minimum. The book ought to rouse intelligent interest in the life and history of the world's vegetation. One might have liked to have had the history of the British flora treated a little more fully, especially so as to include critical reference to the theory of its re-establishment after the Ice Age by way of land connexions existing between the British Isles and the Continent of Europe.—M.A.J.

THE SOILS OF SPURN IN RELATION TO ITS VEGETATION.

JOHN GRAINGER, B.Sc., MARY HEWLETT, M.Sc., AND JENNIE GRAINGER.

THERE are three main types of soil on Spurn. Boulder Clay, which is very typical of the surrounding districts of Holderness, occupies the head of the isthmus, a small salt marsh lies half a mile to the north of the lighthouse, and the rest of the area is composed almost entirely of sand.

THE BOULDER CLAY is mostly confined to the ' mainland ' of the isthmus north of the Warren, but other patches have been deposited by human agency in various places along the neck and the head. These patches are not very large, and have been so rapidly covered over and buried by blown sand that they exercise no marked influence on the flora.

The junction of the boulder clay with the sand of the Warren gives a sharply-marked floristic difference. The clay supports agricultural grasses such as *Cynosurus cristatus* and *Dactylis glomerata,* while the sand on the Warren grows *Festuca arundinacea* and the typical plants mentioned in an earlier paper (1). The clay dips gradually under the sand, but at no depth does it seem to contribute to the nutrition of the sand flora. A local erosion of the eastern border of the Warren showed that the clay was overlain by 9 feet of sand at that particular place. Rhizomes of *Psamma arenaria* and *Elymus arenarius* penetrated the sand in all directions, but did not enter the clay.

The clay has the following physical and chemical composition :—

Fine gravel	4%
Coarse sand	21%
Fine sand	17%
Coarse silt	5%
Fine silt	31%
Clay	12%
Organic matter (loss on ignition)	12%
Pore space of dried sample	46%
Lime requirement	2·46 tons per acre
Acidity pH	7·3

No red colour is given by Comber's reagent (0·5 per cent aqueous potassium salicylate). The high percentage of sand is probably due to its transfer by wind from the isthmus.

THE SAND provides nutrient material for a large variety of plants which are listed at greater length in other papers (1 and 2). The narrow neck and the wider head of the peninsula are just heaps of sand the surface of which is constantly moving. A strong wind blows the sand like dust, beating against the face of any person unlucky enough to be present,

and collecting among the tufts of Psamma and other plants. Sheppard (4) has collected data which show that the movement of this sand has been of such magnitude as to cause the isthmus and head bodily to move to the west from 1786 to 1869, and then eastwards subsequently. Sand freshly deposited is neutral in reaction, has about 1·5 per cent. of organic matter (loss on ignition) and has a pore space of about 21 per cent.

Deposition is most rapid on the neck and head, and on the borders of the Warren. The sand-binding plants (*Psamma arenaria, Triticum junceum* and *Hippophæ rhamnoides*) grow through the newly-deposited sand and form a harbourage for more sand and vegetation. The reaction of sand buried at a depth of four feet is still neutral, and the organic matter content is about the same (viz., 1·5 per cent) as sand freshly deposited at the surface. Rhizomes of *Psamma* ramify freely and send out abundant lateral roots at various depths in the sand down to four feet, which was the limit of sampling. The soil flora of such a sand is scanty, the total population varying between 100,000 and 300,000 organisms per gram.

The Warren is much wider than any other part of the isthmus, and areas where sand is being deposited are only found in a belt about 10 metres wide round the edges, next to the beaches. The flora of these consists almost entirely of *Psamma arenaria* and *Triticum junceum* with such pioneers as *Arenaria peploides* on the west border and *Elymus arenarius* on the east. The soil of the Warren within this band supports a characteristic maritime heath flora (1). All the soil particles come within the arbitrary ' coarse sand ' fraction, but there is a marked difference of organic matter content, pH value and micro flora in layers at various depths. The following table will serve to illustrate this :—

Depth of sample.	*Org. matter cont. per cent.*	*pH.*	*Micro-flora. Millions per gram.*
1 inch	7·5-8·5	6·8-7·0	10
2 inches	6·0	6·8-7·0	6
3 inches	4·0	7·0	15
3 in.-9 in.	3.0-4.0	7.0-7.2	22

The change in reaction from slightly acid to slightly alkaline, as one passes from the surface to a depth of 9 inches, suggests some leaching of the soil bases and may account for the rise in numbers of the micro-flora. This evidence of leaching, together with the high organic matter content shows that the sand of this part of the Warren is relatively stable.

The *Psamma* encroaches on the maritime heath in several patches, but does not seem to find a suitable habitat. The plants of the heath are those which can grow in sand with a relatively high content of organic matter, and this state may

be unfavourable for the optimum development of *Psamma*. The sand of the lower layers under the heath plants has apparently the same chemical and physical composition as the sand of the borders which supports *Psamma*, and it would seem that the inability of this plant to establish itself in vigorous growth on the maritime heath is due to its failing to compete against the mat of shallow-rooted plants which dominates this area.

No significant change in reaction, texture or organic matter content could be found between the bare sand of the beach and that supporting the growth of *Psamma*.

The Neck. The pioneer plants which grow nearest the sea on the east side of the isthmus are either *Salsola kali* L. or *Cakile maritima* Scop. The season seems to decide which one of these plants shall be dominant, for in 1925 there was abundant *Salsola* and no *Cakile*, whilst in 1926 and 1928 there was much *Cakile* and very little *Salsola*. *Cakile* is often found in the centre of the isthmus, but is always growing on blown sand which has the characters previously mentioned. *Salsola* has never been found outside its pioneer habitat.

The flora along the extreme western border is of a different character. The beach is of shingle, backed by a considerable bank for a good part of its length, and the following plants are typical :—

*Carduus repens.**
*Sonchus arvensis.**
*S. oleraceus.**
*Senecio vulgaris.**
Helianthus annuus.
*Taraxacum officinale.**
*Anthemis cotula.**
Solanum dulcamara.
Conium maculatum.
Potentilla anserina.
*Rumex crispus.**
*Triticum repens.**
*T. junceum.**
Arenaria peploides.
Atriplex babingtonii.

Those marked * have wind-borne seeds, and it will be seen that this type is well represented in the flora. Many of the plants are agricultural weeds, and it seems possible that seeds may have been carried from the Lincolnshire side of the Humber by the prevailing south-westerly winds. These species root among the blown sand and shingle where wind erosion is not too vigorous.

The semi-stable sand of the centre of the neck seems to be a habitat very favourable to the extensive growth of *Hippophæ rhamnoides*, for this species has extended visibly during the three years 1925-1928. Two belts of *Hippophæ* on the neck were measured in August of the former year, the more northerly one being 60·5 metres long from north to south, and the more southerly patch being 120·5 metres in a similar direction. Both plots were measured again in May, 1928, and both had extended in about the same ratio, the former to a length of 76 metres and the latter to 157 metres.

This represents an increase of about 8 per cent. per year in area covered by *Hippophæ*.

The Salt Marsh is a very limited area on the west side of the isthmus, about half a mile north of the lighthouse. It consists of a low-lying area divided into two by a chalk embankment running north and south. The western part has been gradually silted up by a process of natural warping. The soil is roughly a mixture of equal parts of sand and silt, and is black and friable. Its reaction is round about pH 7·4, and its organic matter content is about 16 per cent. A micro-flora of 150,000 organisms per gram finds sustenance therein. The flora consists of *Atriplex portulacoides* and *Glyceria maritima* with patches of *Salicornia herbacea*. There is a sharp transition to a *Festuca-Psamma-Arenaria* association on the west border and a corresponding sharp transition in the soil. The latter association is supported by accumulated sand with the characteristics already described.

The eastern side of the chalk bank has also been silted gradually, but it was originally shallower than the west, and is at present rarely flooded with sea water. Its soil characters are intermediate between those described for the silt of the western portion and those of pure sand. It has a reaction (pH 7·2) nearer to neutral than the silt, and has less organic matter and more sand particles. A very open association of *Glaux maritima* and *Salicornia herbacea* grows thereon.

A depression to the north of this salt marsh is found to have a flora which is almost completely dominated by *Festuca arundinacea*. It is apparently a silted-up marsh topped by sand. Its reaction is about pH 7·4.

Iron as a soil base seems to be quite absent from all strata of the area under survey. All soil extracts failed to produce a red colour when tested with Comber's reagent (0·5 per cent aqueous solution of Potassium salicylate).

The results agree in general with those published by Salisbury (3) for Blakeney Point in Norfolk. He found *Festuca* and *Psamma* growing in sands of pH 6·8-7·1. with low organic matter contents of 0·5-1·8 per cent whilst *Atriplex* and *Suaeda* grew on marshes with soil pH 7·3-7·8.

Samples of soil were taken to include a depth of 6 inches from the surface except where stated otherwise. The pH was determined by the colorimetric method, using a B.D.H. colorimeter and chemicals. Bromo-thymol blue was found to be the most suitable indicator. No difference in pH was found between samples tested in the field and those dried and tested later. The loss on ignition, pore-space, and lime requirement were determined by the standard methods of the soil chemist, and the method of Dr. Robinson of Bangor,

was used in mechanical analysis. The micro-flora was estimated from platings on Thornton's medium.

References.

(1) Grainger, J. ... 'Notes on the Vegetation of Spurn' (*Nat.*, August, 1926, pp. 237-241).

(2) Mason, F. A., and Pearsall, W. H. 'Yorkshire Naturalists at Easington and Spurn' (*Nat.*, September, 1928, pp. 273-278, and October, 1928, pp. 315-318).

(3) Salisbury, E. J. 'The Soils of Blakeney Point' (*Annals of Botany*,' Vol. 36, pp. 391-431, 1922).

(4) Sheppard, T. ... 'Lost Towns of the Yorkshire Coast.' A. Brown and Sons, Hull.

SOME YORKSHIRE TICKS.

G. B. WALSH.

The following are records of Ticks (Ixodidæ) which have occurred during the last few years. Most of them have been identified by Professor G. H. Nuttall and Dr. Cecil Warburton, of the Molteno Institute of Parasitology, Cambridge.

Argasinæ.

Argas reflexus Fabr. A female of this species was sent to me from a Rock Dove taken at Flamborough.

A. vespertilionis Latr. Seven larvæ of this species were taken on a very large Pipistrelle Bat by Mr. W. J. Clarke, of Scarborough. Prof. Nuttall informs me that they 'are very often found attached to different species of bats in different parts of the world, including Britain. The maturer stages (nymphs, adults) infest the sleeping places of bats and feed quickly so that they are but rarely found *on* bats.'

Ixodinæ.

Ixodes ricinus Latr. I have taken this common species under a stone at Littlebeck, near Whitby, and others have been sent me by Mr. A. Gordon, of Helmsley, where they occurred on horses and fallow deer in Duncombe Park.

I. hexagonus Leach. Specimens have occurred on hedgehogs from Ruston, near Scarborough (G.B.W.) and Duncombe Park (A. Gordon), and on a stoat in Duncombe Park (A.G.).

I. caledonicus Nuttall. Several years ago a jackdaw in the grounds of the Boys' High School, Scarborough, was seen to be in difficulties, and shortly afterwards it died. The upper part of its head was covered with a mass of these ticks in all stages of development. I counted upwards of 300 specimens, which had doubtless caused the death of their host.

Hyalomma syriacum Koch. This is an introduced species found on imported tortoises (*Testudo graeca* L.). I have specimens from Scarborough, York and Hull, but the species has no faunal significance, and doubtless dies soon after its introduction into this country.

1929 Jan. 1

REVIEWS AND BOOK NOTICES.

British Birds and Their Eggs, by **J. Maclair Boraston.** London: W. & R. Chambers, Ltd., viii.+303 pp., 7/6 net. We referred to this volume when it first appeared (see *The Naturalist*, March, 1909, page 92), and the remarks then made still hold. That it has answered its purpose and proved particularly popular is shown by the fact that it has been reprinted on three subsequent occasions, namely in 1916, 1921, and 1928. The price has been increased to 7/6, but as things now are, this is not unreasonable.

Mishi: the Man-eater, by **E. C. Stuart Baker.** London: H. F. & G. Witherby, 222 pp., 10/6 net. This book is evidently written from the point of view of the tiger, and describes various achievements in his very eventful life, some of which are illustrated by drawings. The incidents in the life of a man-eating tiger are reviewed, and in addition references are made to buffalo, pigs, the gaur, rhinoceros and bears. Mr. Baker is evidently familiar with Indian jungle life, and the stories will appeal to naturalists, sportsmen and general public alike.

Naturalism and Religion, by **Dr. Rudolf Otto.** London: Williams & Norgate, xi.+374 pp., 6/- net. The present time seems opportune for the translation of Dr. Otto's well-known work, and this has been ably carried out by Professor J. Arthur Thomson and Margaret R. Thomson. It deals with The Religious Interpretation of the World; Naturalism; Fundamental Principles; Darwinism in General; Religion and the Theory of Descent; Darwinism in the Strict Sense; Critics of Darwinism; The Mechanical Theory of Life; Criticism of Mechanical Theories; Automony of Spirit; Freedom of Spirit; The World and God.

Great Storms, by **Carr Laughton** and **V. Heddon.** London: P. Allan & Co., viii.+251 pp., 10/6 net. The authors have gathered together a series of fascinating stories of famous storms, particularly those on the sea, and their effects. In addition to the following heads to the first six chapters, namely: Of Storms in General; Storms in History; The Armada Gales; The Great Storm of 1703; West Indian Hurricanes; The Last Voyage of the *Elizabeth*, 1764; other subjects dealt with are Typhoons, Superstitions, Windy Corners, Storms of Fire, and so on, and there is a good crop of illustrations.

General Science, by **E. J. Holmyard.** London: J. M. Dent & Sons, Ltd., xiii.+236 pp., 4/-. The author is Head of the Science Department, Clifton College, and has written a large number of essays, principally dealing with chemistry and biological subjects, such as gunpowder, sulphur, saltpetre, sugar, combustion, how plants live, anæsthetics, bacteria and coinage metals. The essays are well written and up to date, but the eight sketches from portraits of well-known scientific men are not always successful, and we think the description 'supposed portrait,' added to Roger Bacon, might be added to some of the others, certainly to that of Sir Ernest Rutherford.

Sport and Nature in Sussex Downs, by **Frederick F. Wood.** London: Duckworth, 172 pp., 6/- net. Mr. Wood endeavours to show that even a poor man can take a keen interest in sport, and take part in the pleasures of the Sussex Downs, provided he be sound in wind and limb. By the aid of several illustrations (which, however, with regard to the photographs, are mostly poor) the author deals with rabbiting, coursing, otter hunting, the hare, fox, old oak, beetles, old Sussex folk, tracking, poaching and birds. The articles are ably written by an enthusiast who, like most other sportsmen, began his experience with terriers and ferrets. The volume will add to the literature on the charms of Sussex.

THE STALK-EYED CRUSTACEA OF THE YORKSHIRE COAST.

J. A. STEVENSON.

STALK-EYED Crustacea are well represented off the Yorkshire coast, but most of the species are either rare, or difficult to secure. The majority live beyond tide marks, and consequently the only way to get at them is with the trawl, or, to a less degree, the crab-pots.

The most common of all the crabs here is the Shore Crab (*Carcinus mænas*), which is found all over the littoral zone. Next in abundance is the Edible Crab (*Cancer pagurus*), which is the same in its habits here as elsewhere. Sometimes specimens possess malformed claws, with three or more fingers ; the additional fingers generally projecting side by side from one of the others. But in one specimen that I have seen, there are three *movable* fingers and one immovable. The former can all work independently of each other.

Of the *Portunidæ*, or Swimming Crabs, there are five species found in this district. By far the most common is *Portunus marmoreus*, the Marbled Swimmer. I think that this species is meant in the report on Crustacea in the ' Victoria History of Yorkshire,' Vol. I., when referred to as *Portunus depurator*. The latter is far from common here, and is only found well out from the coast. The report does not mention *P. marmoreus*, which, as the shrimpers well know, *is* found on the littoral here.

The Marbled Swimming crab, more than any other, is often found with that curious degenerate barnacle, *Sacculina carcini*, clinging to its underparts. The barnacle is a parasite, and by absorbing nutriment from around the crab's gut, prevents the crab from moulting. It is so degenerate that it is hardly more than a bag of eggs.

The Velvet Crab (*Portunus puber*) is extremely rare here, and is caught in crab-pots off Hayburn Wyke and in Robin Hood's Bay. We have had but two large males.

The Dwarf Swimmer (*P. pusillus*) is quite common, but an inhabitant of deep water. At present it forms the chief food of the wolf-fish, the queen-scallop being scarce here now.

One more Swimming Crab is a pear-shaped crab that inhabits the bays of Filey and Redcar, *Portumnus variegatus*. I believe that it is quite abundant, but all we see of it is numbers of dead specimens on the sands after a particularly severe storm.

Cast up with it may be seen, in greater numbers, the Masked Crab (*Corystes cassivelaunus*). The male in this species has arms as much as four times the length of those in the female. This crab is a sand-burrower.

Allied to this species, and found in little communities in deep water off the coast, is the Circular Crab (*Atelecyclus heterodon*). Sometimes a trawl-net may bring up a dozen : at others, none. It is also fond of burrowing, as I observed in a specimen that I had alive in a dish for a day or two. It would sit for hours in the sand, with its eyes, antennæ, and the tops of its claws showing. Unfortunately it did not live long. I find it difficult to keep this species alive.

Found in the same place as the Circular Crab, though perhaps more commonly, are the little Rough Nut-Crabs (*Ebalia tuberosa*), sluggish in habits, and fond of climbing about in the corallines. Their colour is very varied, and sometimes exceedingly beautiful. As I write I have seven before me, all alive, sitting in sand on the bottom of a dish full of sea-water.

Another Nut-Crab, *Ebalia tumefacta*, is found here ; but it is very rare, as is a third, *Ebalia cranchii*.[1] They are inhabitants of deep water.

We have quite a few different Spider Crabs here. The commonest is the Scorpion Spider Crab (*Inachus dorsettensis*), which swarms in the deep water. A relative, *Inachus dorynchus*, is found occasionally in the rock pools.

The long-legged *Macropodia rostrata* is very common in deep water, in the same places as the Scorpion Spider Crab. Another kind, *Macropodia phalangium*, is also said to be found here. I have not yet seen it. Two Spider Crabs, *Hyas araneus* and *H. coarctatus* are very common. The former are called the ' Ghost-crabs ' by the fishermen, and enter their crab-pots in dozens. *H. coarctatus* is more an inhabitant of deep water, though I have found it between tide-marks.

There is some doubt thrown on the occurrence here of the Thornback Crab (*Mamaia squinado*), in the ' Victoria History of Yorkshire.' Personally, I have never seen one : but from reports I hear occasionally from the ' crabbers,' I believe that it might be found here. There is no fear of their confusing it with another similar species (*Lithodes maia*), because they all know the latter very well.

A crab distantly related to the Spider-Crabs, of small size and rare occurrence, is *Eurynome aspera*,[2] sometimes called the Strawberry Crab. It is found in the same places as the Nut-Crab. We have only had three specimens, and two of these, a large female and a small male, are alive before me as I write. They are charming little creatures, though very sluggish. They display most activity during night time.

There is another small crab, though found very rarely,

[1] *Nat.*, Jan., 1928, p. 24 ; also Aug., 1928, p. 237.

[2] *Nat.*, Aug., 1928, p. 238.

Pirimela denticulata. We have had only two specimens, both being from the rock pools in South Bay, Scarborough. It is something like a Shore Crab, but much smaller, and plumper. It is very fond of climbing about in the sea-oak weed, which is abundant.

Three more Brachyurans are found in this district. *Achæus cranchii*, once on Filey Brig. *Pilumnus hirtellus* is not uncommon, both there and in South Bay, Scarborough ; but only at the lowest of low spring tides may it be taken. Lastly, we have so far had two specimens of the little Pea Crab, both from the Horse Mussel (*Modiola modiolus*). It is decidedly uncommon in this district.

Passing on to the Anomoura, or Queer-tailed Crustaceans, there are several species in this area. Five Hermit Crabs occur in the trawling grounds :—*Eupagurus bernhardus*, *E. lævis*[1] *E. kroyeri*,[2] *E. hyndmanni*, and *E. ulidianus*. The names of these (excepting the second one) are from Bell's ' British Stalk-eyed Crustacea,' 1853. *E. kroyeri* is generally found inhabiting a sponge (*Suberites domuncula*), which has covered the turret shell in which the crab lived when young.

That grotesque monster, the Northern Stone Crab (*Lithodes maia*), is not uncommon off the coast. It is occasionally found stranded, too, on the rocks.[3] Sometimes females loaded with purple eggs are caught, but not often.

The little Porcelain Crabs (*Porcellana longicornis*) are extremely abundant from low-tide mark downwards, while their larger relative, *Porcellana platycheles*, is extremely rare, having been taken but once, and that on Filey Brig.

All three British Squat Lobsters are found here in abundance :—*Galathea squamifera* in the rock pools, *G. strigosa*[4] in crab-pots, and *G. nexa* from low-tide mark outwards. Their relative, *Munida rugosa*, is locally abundant in about[5] thirty fathoms of water between Scarborough and Whitby. Some of the specimens we have had have been very fine ones.

The Macroura, or Large-tailed Crustaceans, are represented by a few forms. The Spiny or Rock Lobster (*Palinurus vulgaris*[6]) was once taken in the trawl off Flamborough.

The Common Lobster is abundant from low-tide mark down to thirty fathoms. The Norway Lobster or Dublin Prawn (*Nephrops norvegicus*) is only found in the mud off Sunderland and Shields. It is not often brought into Scar-

[1] *Nat.*, April, 1928, p. 115.
[2] *Nat.*, Jan., 1928, p. 25.
[3] *Nat.*, Aug., 1928, p. 237.
[4] T. Sheppard, *Nat.*, Jan., 1926.
[5] *Nat.*, Jan., 1928, p. 23.
[6] ' Victoria Hist. of Yorks.", Vol. I., Chapter on ' Crustacea.'

borough. The Freshwater Crayfish (*Astacus pallipes*) is very sparsely distributed in our rivers and streams. The Ure and Derwent are said to contain them.

A curious little lobster, *Upogebia stellata*, turned up here quite recently. It was trawled about 7 miles off Whitby. This animal, I always understood, was strictly a form found on our south and western coasts.

Six kinds of prawns occur. The 'Common' Prawn is extremely rare. *Pandalus montagui* is abundant in deep water, and has the peculiar habit of clinging on to the outside of a trawl-net right up to the time when the cod-end is emptied on to the deck. Sometimes the net comes up red with them! *Hippolyte varians*, *H. cranchii*, *H. thompsoni*[1] and *H. spinus* are all found in deep water. The first three are common, the last very rare. The first two may be taken at any time in the rock pools. No doubt some of these prawns have received, since Bell's time, new names. The names of these prawns now given are those used in Bell's book.[2]

Two kinds of shrimps, *Crangon vulgaris* and *C. trispinosus*,[3] complete the list of Macrura. They are both common in the sandy bays of Filey, Redcar, etc., and form an important addition to the means of livelihood of the fishermen in summer time.

The remaining order, Stomatopoda, includes the Opossum Shrimps. I believe that there are a large number of species found here. But I have done no tow-netting for them as yet, and have no idea as to their abundance. All I know at present is that *Mysis chameleon* is very abundant in the rock pools.

Prof. C. H. Desch gives 'A Study of Sheffield' in the autumn issue of *Geography*.

E. A. Cockayne illustrates and describes variations in *Callimorpha dominula* in *The Entomologist's Record* for November.

Volume XXVI. of *The Annals of the South African Museum* is entirely devoted to an account of the Myriopoda of South Africa, by C. Attems. It is a substantial work of over 400 pages, with 36 plates and 84 text figures.

The Journal of the Marine Biological Association for November contains a wonderful record of the scientific work which has been accomplished at the Plymouth Biological Station. There is a well-written and well-illustrated account of the Laboratory itself, and then an extremely formidable list of publications recording results of researches at Plymouth. These are followed by two papers on '*Patella vulgata*,' by Dr. J. H. Orton; and 'Observations on the Vertical Distribution of Marine Macroplankton,' by F. S. Russell.

1 *Nat.*, Aug., 1928, p. 237.

2 'British Stalk-eyed Crustacea,' 1853. John van Voorst & Co.

3 *Nat.*, August, 1928, p. 239.

A PLEA FOR THE HERON.

E. W. WADE, M.B.O.U.

The Heron must formerly have been an abundant and familiar bird in the marshes and woods of Holderness, which would be peculiarly well suited to its habits. We read in the Earl of Northumberland's ' Household Book ' (*temp.* Henry VIII.) that ' " Hearonsewys " were bought at 12d. each for the table, being valued at the same price as Bitters (Bitterns), Fesaunts, and Kyrlewes, as against 2d. each for Mallards and 7d. for Schollards.' The bird was evidently held to be one of the best for the table, as well as quarry for the falconer, and even now there are those who say that the breast of a young Heron is not to be despised as an article of diet. In those days we find it nesting in only one sanctuary, at Hornsea. The present mere is only a small portion of the lake which once stretched far into the North Sea, and like so many more, has disappeared in the waves. That it now contains Herons is due to the devotion of a keeper. When the Herons, formerly no doubt abundant at Hornsea, ceased to breed there we cannot say, no record being available. Our modern Heronry commenced in 1881, when the late John Taylor, Wassand keeper, told me that a pair of the birds nested in the woods at the west end of the mere. He was immensely proud of them, and guarded them most jealously. When I first visited the Heronry in mid-March, 1887, five pairs were already incubating eggs, though we had heavy snowstorms during the month. By the first week of April the number had doubled. From that date they increased steadily until, in 1921, the year of John Taylor's death, thirty-seven nests were occupied. Since then they have steadily decreased until in 1928 there were only twenty-three nests. At the present day, though the birds' usefulness for table and falconry has passed, its appearance always excites admiration. In the morning's train journey into Hull we used for many years to look out for a Heron, to which the name of ' Charlie ' came to be attached, on the Humber mudflats. Out of the breeding season the Heron may be found scattered all over the Riding. A small pond at Flamborough often used to contain one, and the shallow ditches at Kilnsea may always be relied upon to hold a Heron watching with indomitable patience for its prey. The Humber mudflats are a well-known resort of considerable numbers, and every pond or land drain at some time is visited in quest of food. The ' British Birds ' Ringing Scheme shows that in winter they even stray as far south as Portugal. During the day they stand motionless in the water with their bills drooping on their breasts or preen their feathers, using a substance obtained from two patches of feathers called the ' powder down '

feathers, and situated on the breast, possibly for the purpose of waterproofing their plumage. In the evening the serious business of feeding begins in earnest, as the Heron is a bird of the twilight.

Early in the year, sometimes in the middle of February, nesting commences, and goes on with increased intensity till mid-March when, in a normal year all but a few stragglers have returned to the heronry. A visit to the nesting ground in the dusk of a March evening is a weird experience. A series of harsh squawks resounds from the nests, an unearthly call which the twilight gloom impresses upon the imagination. A pity that one cannot see what antics the birds are indulging in. The love call of the Bittern as he rises from the nesting ground in the evening is very similar, indeed the habits of the two birds have a great resemblance. In the daytime comparative silence reigns in the colony.

The earliest nest I have seen was on 28th February, when a solitary bird was sitting on four eggs, the usual number, though five is occasionally seen—the latest, 9th June, when this year three birds were incubating eggs, probably second broods, as the first young were all on the wing. Once before I have seen eggs in June, and even if a bird had returned from the south of Europe or the first eggs had been taken, which is hardly likely in our protected heronry, the date of the first nest or another laying could not have been so late as June. The nest when new is so transparent that the eggs can almost be seen from below, but when tenanted for many years it becomes a mass of sticks two or even three feet thick, whitewashed by the droppings of the birds.

In my young days a firmly rooted belief existed in the country that the Heron sat on the nest with its legs protruding through the bottom. By the end of March the young may be heard twittering in the nests, malodorous and happy. Then the parents roam far afield in search of food. Of the spring assembly of frogs for breeding purposes full advantage is taken, and in the Lambwath marsh, some thousands must fall victims. I have seen Perch and Roach disgorged by the young when disturbed at the nests. Every available marsh, stream and pond, from the Driffield trout streams to the Humber, is drawn upon for food for the hungry broods, and many victims fall to the gun of the river watcher protecting the trout, as he supposes, from the birds' attentions.

The parents may be seen flighting in mornings and evenings to the nests. The Heron is omnivorous. Eels are a favourite food, and eels are the worst enemy of the trout. All kinds of small fish are taken, waterhens, voles, mice, small crabs from the Humber foreshore. Nothing comes amiss. Early in May the young leave the nest and perch on the

adjacent branches. When strong on the wing early in June they still hang about the Heronry, before going forth from the sanctuary to wander over the countryside and face the dangers of civilisation.

Many attempts have been made at nesting in other sites. In 1925, there was a nest in Burton Constable woods, but the eggs were sucked by Carrion Crows, and the birds driven away. At Enholmes, about twenty years ago, there were two nests, but the eggs were taken and the birds driven away. In Houghton Woods, in 1887, there were two nests, but the eggs were taken by schoolboys, and the birds left the place. Other instances are given in ' Birds of Yorkshire,' but the above are from my own observation. A few nesting pairs find protection on Mr. St. Quintin's estate. There is no doubt that with the necessary protection, other heronries could be established. Only in the quiet sanctuary buried in the Wassand woods the Holderness birds have managed to escape the greed of the collector. It has been said that Rooks drive them away, but at Wassand both birds have always nested side by side.

To the nature lover, the Heron standing motionless in the silent pool or winging his majestic flight overhead, is a sight not to be dispensed with, and the country would be the poorer if they were banished. It is a pity that the increase of fishing enthusiasts, gamekeeping, not to mention collectors, is leading to their diminution. Surely there is room for so fine a bird in these people's scheme of creation. Their spirit of intolerance is to be deplored. The Heron is not above suspicion, even in the matter of young game birds. I have seen one shot *flagrante delicto* beside a young pheasant which he had just killed, but there are rogues in every walk in life, and it is as unjust to condemn the race of Herons for the fault of one as it would be in the human or any other species. Our birds are undoubtedly diminishing, and it behoves every bird lover to rally to their protection.

VERTEBRATE ZOOLOGY.

Bird Notes for the Darlington District, 1928.—Migrants: The summer migrants arrived early in the Darlington district. Our Yorkshire records only are appended: Wheatear, Cronkley Scar, March 31st; Willow Warbler, Croft Spa, April 13th; Sandpiper, Croft Spa, April 21st; Cuckoo, Romaldkirk, April 24th; Redstart, Cowton, April 25th and Romaldkirk, April 28th. Nesting: An excellent nesting season on the whole; but Grouse broods suffered from heavy rain in June. Swallows reared three broods at Stapleton. General: Well-defined increase in the Corncrake this year. Other species which have increased of recent years:

Magpie, Jay, Lapwing, Swift, House Martin and Long-tailed Tit.—Per J. B. NICHOLSON, *Secretary*.

Little Auk at Marsden.—A plump and well-nourished Little Auk was picked up dead in a field in the outskirts of Marsden on Nov. 28th. To every appearance the bird had flown against a wire.—CHARLES MOSLEY, The Museum, Huddersfield.

Sparrow pursuing Rook.—This morning I saw a display of what looked very like cowardice on the part of a rook. Hearing an oft-repeated ' cau ' in an obvious tone of fear, I looked up and saw a rook flying swiftly over the house tops, in and out among the chimney-stacks, in effort to evade a common house sparrow which was pursuing it with persistent determination. The sparrow was not uttering any note, and was only eventually shaken off by reason of the stronger wing-power of the rook.—CHARLES MOSLEY, The Museum, Huddersfield, Nov. 8th, 1928.

Wren's Curious Nesting Place.—About mid-July in 1928 the writer discovered a Wren's nest on the top of an old Swallow's nest. The latter was intact, but almost concealed, when the second nest was completed, by the large quantity of material added by the Wren. The cup of the Swallow's nest was utilised by the Wren without any building up, though moss and feathers were added round about to form the sides and dome. Six eggs were laid, and the young successfully reared. The site of the nest was in a small cart shed at Ballig, St. John's, Isle of Man, quite open to view and of easy access. A similar nest appeared in the same shed in 1926, so possibly the same pair of birds was responsible for both nests. With little difficulty these nests were removed after the breeding season and are now in the Manx Museum.—RALPH HOWARTH, Peel, Isle of Man.

BOTANY.

Viola arenicola Chab. in Lincolnshire.—I am glad to be able to report that my old friend, the Rev. W. Wright Mason, of Salmonby Rectory in N. Lincolnshire, who has recently given me his extensive herbarium, last spring sent me a violet of the *silvestris* section which seemed to be different, and on submitting it to Mrs. Gregory, she without hesitation referred it to this critical species, which, in her 'British Violets,' she predicted might be found in Britain. In appearance it recalls *V. arenaria*. 'Semblable á eux par ses feuilles et son facies on l'en distingue facilement par sa souche allongée, et cailleuse, par ses sépales lancéoles-lineaires et non pas oblongs-lancéoles ou ovales-lancéoles,' etc. It is very pleasing to be able to add this interesting violet to the British list.—G. CLARIDGE DRUCE, D.Sc., F.R.S.

A YORKSHIRE INVASION OF BEWICK'S SWANS.

F. J. STUBBS.

On the suggestion of Mr. H. B. Booth I am now recording the unusual circumstances of an invasion of Bewick's Swans to the Pennine reservoirs of the Yorkshire boundary. On the 4th March, 1922, a gamekeeper shot what he took to be a wild goose flying over Bill's-o-Jack's Inn, Greenfield. The same day it was recognised by Mr. F. W. Chadderton as a swan, probably Bewick's ; he secured the bird for the Oldham Museum and sent it to me at once. It was certainly a Bewick's, apparently in its first year. The length was 3 ft. 11 in., span of wings 6 ft. 5 in., and weight 10 lbs.

The following morning (5th March) two Bewick's Swans were found lying dead side by side at the foot of the rocks in the secluded Seal Bark, in the same valley. Apparently the birds had collided in mid air, during the thick mist. One had a badly broken neck and a damaged head. I did not see this bird, and understand that it was sent to someone in Glossop. The other was sent to me. It was not quite white, but older than the shot specimen. The length was 4 ft., span 6 ft. 9 in., and weight 16 lbs. Death had been caused by a terrific blow under the left wing by some object about the size of a swan's beak ; the coracoid and the adjacent sternum were badly smashed, the splinters of bone forced into the thorax. A tiny wound on the head, perhaps due to the fall, was the only other mark on the bird.

When the two dead swans were found, a third bird was seen swimming on the adjacent Bill's-o-Jack's Reservoir ; it remained until the next day. As it happened, the previous week I had been told of a large flock of ' wild grey geese ' on this reservoir on or about the 24th February. On the 1st March, Mr. C. Laing, of Strinesdale, saw what he described as sixteen white geese on Strinesdale Reservoir, Oldham, (the Yorkshire-Lancashire boundary passes through this reservoir). On the 9th he saw six ; these were seen also by Mr. C. J. Batley, the Waterworks Engineer, who on the same day saw eight, and another lot of five, on the Piethorne Reservoir (Lancs.), three miles north of Strinesdale. Both Mr. Laing and Mr. Batley saw the two Greenfield specimens, and assured me that their ' geese ' were exactly like the birds I showed them. The totally white wings and the black feet had been noticed.

During the next few days I received reports, some of them vague, others precise, of parties of ' white geese ' or ' grey geese ' seen on several of the moorland reservoirs within a few miles of Greenfield. On the 8th March, Mr. A. W. Boyd saw a herd of Bewick's Swans at Alderley (Cheshire), and

on the 13th a single bird on Audenshaw Reservoir (Lancs.) I saw this individual, and had it under observation for some time. Its resemblance to a goose, both when swimming and when flying, was surprising ; I did not think it was at all like the mute swans or the whoopers I had seen. While in flight I counted the bird's wing strokes as about 130 to the minute, which is about the rate of the heron's wing strokes. When commencing to fly, the large black feet were conspicuous. It is nearly a century since the last recorded visit of Bewick's Swans in numbers to the Oldham district, and John Blackwall's interesting account of this invasion will be familiar to most bird students—it is quoted in Mitchell's ' Birds of Lancashire.' Yet I feel sure that the species must be of more frequent occurrence, and very possibly some of the ' wild geese ' so frequently and vaguely reported for Pennine reservoirs were Bewick's swans. With the exception of Mr. Boyd, not a single one of these 1922 observers thought that the birds seen were swans, although several were puzzled by the black feet (remembering that no ' grey goose ' has black feet), and by the totally white wings. The two Bewick's Swans are now in the Oldham Corporation Museum.

Darwinism and what it Implies, by **Sir Arthur Keith.** London : Watts & Co., vii.+56 pp., 1/- net. This is a sequel to the author's treatise on ' Concerning Man's Origin,' which included his Presidential Address to the British Association. It includes the Ludwig Mond Lecture in the University of Manchester, and as there are over fifty pages well bound, we must congratulate Messrs. Watts & Co. on the facilities they have given to the reading public for getting good material.

Maps : Their History, Characteristics and Uses, by **Sir Herbert George Fordham.** London : Cambridge University Press, xii.+83 pp., 6/- net. Sir George Fordham's knowledge of early maps, and the numerous monographs which have been produced from his pen, are well known to our readers. The Cambridge University Press has produced a handy little volume dealing with early methods of map production, art in cartography, classification of special maps, and so on. Many illustrations from early examples accompany the volume.

The New Universities : An External Examination, by **A. G. G. Herklots** (Ernest Benn, Ltd., 144 pp., 6/- net). The value of a university lies in its social life as much as in its courses of studies. ' Visit almost any modern university at night, and, unless a dance and debate is going on inside, you will find it empty. It is locked up.' An undergraduate must be able to use his university not only as a lecture room, but as the centre of his activities. Modern universities often fail to give opportunity for conversation and general reading. Libraries are shut up, and undergraduates return home to pass their leisure outside. The Union should be a club, not a cloak-room. ' Halls of residence are becoming more numerous in the modern universities, and, indeed it is upon the adequate provision of such hotel accommodation that the cultural future of the university very largely depends.' Mr. Herklots discusses with understanding the fundamental problems of a few universities, and his suggestions are valuable. He has also opinions of much sense on slighter topics, such as university bookshops and ' rags.'

DERWENT.

HAROLD J. BURKILL, M.A., F.R.G.S.

A. H. SMITH recently* states that the name of the River Derwent is derived ' from Romano-British *Deruentio*, the name of a Roman station on the Derwent in the East Riding.' Is not this a reversal of the origin, and was not the name of the Roman settlement taken from the river on which it was located? If the Romans gave the name to the river, what is the explanation of the other Derwents? Were they named from other settlements? It certainly seems as if the deduction here was against the obvious evidence. The Yorkshire Derwent is one of at least four English rivers bearing the same name. We have another Derwent in Derbyshire; a third in Durham, and a fourth in Cumberland. Also we get the same root sound in Derwen in Denbighshire, Derwen-las in Montgomery, Derwen-y-pandy in Shropshire, and Derwydd in Carmarthen.

Professor Ekwall† discusses the four rivers together, and the origin of the name, stating, ' The early forms of the Derwents vary very little. The common OE base seems to be *Deorwente*, in which *eo* is probably a substitution for British *e*. Bede's *Deruuentio* is the latinised form without the substitution.'

And again, ' The name is derived from British *derua* " Oak." ' ' I see no reason to suppose that *Derventio* meant anything else than " Oak river," river where oaks grow abundantly.' ' This is corroborated by the fact that Oak is abundant in the valleys of the Derbyshire, Yorkshire and Cumberland Derwents.' . . . ' Quite possibly the name really refers to oak forests rather than isolated oaks. The Yorkshire and Derbyshire Derwents run through old forest districts, and the same was very likely the case with other Derwents.' ' The name Derwent is not found with certainty outside England. A similar name is the place-name Drevant in France, formerly Derventum.'

These quotations from Professor Ekwall seem to be of considerable interest to anyone who has been able to study the Yorkshire Derwent and its tributaries. There may not be at the present day any oak woods of a large size, but there are oaks in the various valleys below the moorland area, and one sometimes finds a small collection of oak trees in the heart of the moor, as for example in Bloody Beck or Raven Gill, a tributary of the Jugger Howe Beck, near the head waters

* " The Place-Names of the North Riding of Yorkshire," by A. H. Smith (Cambridge University Press, 1928).

† " English River-Names," by Eilert Ekwall, Professor of the English Language in the University of Lund (Oxford, Clarendon Press, 1928).

of the Derwent. And still further back in time oaks were to be found where now none exist, a fact demonstrated by the presence of oak pollen in the peat.

If the origin of the name *Derwent* were due to the Romans, would not it have been found in other places colonised by them ? These English rivers must have been well known to the early inhabitants of the land before the Romans came. Would they have had no names for them in those days, and this name must have meant something to them, otherwise how could four different rivers receive the same name if they did not signify a similar thing to those tribes that inhabited these regions ?

In his introduction, Professor Ekwall states, ' There has been in the past a curious prejudice against assuming English origin for river-names in England, and some scholars seem to prefer leaving them unexplained rather than except a simple and straightforward explanation from a Germanic source. The result of my examination is that English names are a good deal more common than has been generally assumed, but that names of more important rivers are predominantly pre-English.'

' Scandinavian names are common in districts where Scandinavians settled, especially in Yorkshire, Lancashire, Cumberland, Westmorland, but they mostly denote streams of small or medium size.'

The evidence as given above certainly seems to show that the name *Derwent* belongs to a period before the Roman settlement on the banks of the river.

In *Discovery* for December, Dr. R. Gurney discusses the geological significance of the occurrence of *Limnocalanus macrurus* in Ennerdale Water ; Prof. C. J. Patten refers to the Chaffinch as an Architect ; and A. R. Warnes refers to the preservation of Chichester Cross. All are illustrated.

The December number of *British Birds* contains photographic illustrations of the eggs of the Fulmar on the Northumberland Cliffs ; a Cormorant strangled and drowned by an Eel ; and a Nest of a Swallow in a Bowl, in the Isle of Man. R. H. Brown contributes Field Notes from Lakeland.

Under ' Research Items,' *Nature*, No. 3080 deals with the Sound Produced by Book-lice ; The Blood Vascular System of the Spiny Dogfish ; a New British Freshwater Pearl Mussel (*Margaritifera durrovensis*, in Ireland) ; The Yield of Conifers in Great Britain, and Seed Mixtures for Hay and Grazing Land.

By the aid of numerous illustrations from photographs and photomicrographs and sketches in the text, four contributions to Phytology are given in the November issue of *The New Phytologist*. These are ' Illustrations of Carpel Polymorphism,' by Edith R. Saunders ; ' Observations on *Rhynchosporium secalis* (Oud.) Davis, Leaf Blotch of Barley and Rye,' by F. T. Brooks ; ' A Modified Form of Auto-Irrigator,' by G. Redington ; and ' The Inter-Relationships of the *Archimycetes*,' by W. R. Ivimey Cook.

YORKSHIRE NATURALISTS AT YORK.

F. A. MASON, F.R.M.S., AND W. H. PEARSALL, D.Sc., F.L.S.

A LARGE and representative gathering of Yorkshire naturalists visited York on Saturday, December 8th, in connection with the Sixty-seventh Annual Meeting of the Yorkshire Naturalists' Union. Through the kindness of Mr. H. J. Wilkinson, the Union was able to enjoy very commodious and comfortable headquarters in the De Grey Rooms. Here, interesting exhibits were on view, arranged by members of the York and District Field Naturalists' Society, and also a fine collection of geological photographs by Mr. C. E. N. Bromehead, of H.M. Geological Survey. Members also had an opportunity of examining the valuable collections in the Yorkshire Museum which had been made especially available by the keeper, Dr. W. E. Collinge, while arrangements had also been made for parties to visit the more recent Roman excavations and the Merchant Adventurers' Hall.

The official proceedings started with the General Committee Meeting in the afternoon, Professor F. O. Bower being in the chair. The business of approving the Annual and Treasurer's Reports was quickly dispatched. It was announced that the Presidency for 1929 had been accepted by Mr. H. E. Wroot, of Leeds. A number of changes in the sections and committees were effected, some of them brought about by the departure of Professor E. Percival for New Zealand. Mr. W. J. Clarke succeeded him as Chairman and Convener of the Marine Biology Committee, Mr. W. J. Fordham as Chairman of the Hymenoptera and Diptera Committee, and Mr. H. Fox as Convener for Fresh Water Biology. In the latter case, Mr. A. Malins Smith becomes Representative on Executive in succession to Mr. Geo. Howard, who, it is regretted, has had to resign this office. In the Presidency of the Zoological Section, Mr. E. W. Wade is succeeded by Mr. R. Chislett. The Botany Section has undergone notable changes. The Plant Galls Committee has been transferred to the Entomological Section, while the Botanical Survey Committee which was becoming too cumbrous, has been split into two committees, (*a*) *Records*: Chairman, Mr. R. D'O. Good; Convener, Dr. W. A. Sledge. (*b*) *Ecology*: Chairman, Mr. A. Malins Smith; Convener, Miss D. Hilary.

Few changes have ensued in Geology, except that Mr. A. Raistrick succeeds Mr. G. Melmore as Secretary. The election of officers being completed, a reference was made to the necessity which has arisen of preserving terns in Durham and the steps being taken to bring this about. Finally a Sub-Committee was appointed, with Mr. T. Sheppard as Convener, to consider the possibility of making Spurn Point

a Nature Reserve. Members then adjourned for an excellent tea, provided at headquarters by the generosity of Mr. H. J. Wilkinson.

Delegates from twenty-two affiliated societies and a large number of associates and members were present at the subsequent evening meeting to hear the President, Professor F. O. Bower, F.R.S., deliver his Presidential Address on 'The Evolutionary Relations of British Ferns,' which appears on pages 15-29 in this issue. On the motion of Professor J. H. Priestley, seconded by Dr. T. W. Woodhead, the thanks of the Union were offered to Professor Bower for his address and for his services as President during 1928. On the motion of Mr. W. P. Winter, seconded by Mr. W. E. L. Wattam, a hearty vote of thanks was accorded to the York and District Field Naturalists' Society, its President, Mr. C. R. Featherstone and Secretary, Mr. A. Wentworth Ping, who had energetically fostered the local arrangements. The meeting finally showed its real appreciation in a vote of thanks to Mr. H. J. Wilkinson, who had generously thrown open the De Grey Rooms to the Union and also provided refreshments. This motion was moved by Mr. F. A. Mason and Dr. W. H. Pearsall. At the conclusion of this meeting members were entertained at a Conversazione by the President (Mr. C. R. Featherstone) and Council of the York and District Field Naturalists' Society. Exhibits and lecturettes, illustrated by lantern slides, were provided and these concluded an enjoyable and memorable meeting. Addresses were given by Mr. H. J. Wilkinson on 'Notable York Botanists,' Mr. S. H. Smith on 'Some Local Fishes,' and Mr. J. A. Dell on 'The Development of the Frog.'

Owing to shortage of time, Mr. H. Sowden's address on 'Some Life Histories' was not given. The exhibits shown during the evening were arranged by Messrs. H. Britten, J. A. Dell, G. H. Dobson, W. Fabian, G. Machin, Tyler Orme, A. Smith, H. Sowden and V. G. F. Zimmerman.

At a recent meeting of the Geological Society of London, Mr. K. S. Sandford read a paper on 'The Erratic Blocks and the Age of the Southern Limit of Glaciation in the Oxford District.' The Plateau Drift around Oxford contains rocks brought from long distances :—from Scandinavia, Scotland, East Anglia, the Midlands, and, most surprising of all, from Devon and Cornwall. Excepting smaller pebbles, much of the material is subangular and some of it glacially striated.

The familiar Almanack issued by the British Museum (Natural History), for 1929, has a coloured portrait of Robert Brown, the distinguished botanist. It also contains information likely to be of interest to visitors and students, and on the back are paritculars of recent important acquisitions, including particulars of 140,000 coleoptera, etc.; 96,000 lepidoptera ; 6000 moths, etc. ; 3000 minerals, and many larger specimens. There is a list of the staff, from which we are glad to see that Mr. P. Goode still holds the position of lavatory attendant !

The Naturalist

GONIATITES SPIRALIS IN A SECTION NEAR THE NORTH CRAVEN FAULT, SETTLE DISTRICT.

R. G. S. HUDSON, M.Sc., AND J. WILFRID JACKSON, M.Sc., F.G.S.

DURING visits to the Settle district the authors have independently discovered a section of Lower Carboniferous rocks containing *Goniatites spiralis* (J. Phill.). This is of importance, since it is an addition to the very few exposures of the Yoredales, which contain the goniatite zone fossils of the Bowland Shales.

It is in the left bank of Daw Haw Beck, a small tributary to Cowside Beck, and is about half a mile east of Cowside Farm, and one mile west of Black Hill, and only about 260 yards south of the North Craven Fault, which is also exposed in the same beck. The section consists of black shales containing sparse fossils in the upper part, and a richly fossiliferous band in the lower part near the water level. The lower band contains the following fauna :—

Zaphrentis sp.
Athyris royssii.
A. subtilita?
Camarophoria crumera?
Orbiculoidea nitida
Productus tissingtonensis.
P. sp. (*semireticulatus* group).
Pustula sp. (*punctata* group).
Retzia radialis?
Posidonomya aff. *membranacea.*
Pterinopecten cf. *persimilis.*
Goniatites spiralis (s. lat.), rare.
G. (s. str.) sp., common.
Phillipsia sp.

Owing to the fragmentary nature of some of the fossils, it is not possible to be sure of their identification, but the margin of error in the above list is small. The *Posidonomya* aff. *membranacea* is a curious, small transverse form unlike the large Upper Bowland Shale type. The same form occurs in great abundance in hard calcareous black shales exposed in the beck to the east at the western foot of the grit-capped Black Hill. In the same beck, other hard calcareous shales contain fragments of goniatites showing a type of ornament not unlike that of ' *Homoceras* ' *malhamense* Bisat, but the specific determination of these is not possible at present.

The stratigraphy of the area is difficult to interpret, since it is both broken by the cross faults between the North and Middle Craven Faults, and also covered with thick drift. Exposures in Daw Haw Beck show that the *spiralis* shales are above an unfossiliferous limestone exposed close to the North Craven Fault. In the same exposure as the *spiralis* shales, but separated from them by a fault, there is a 15 feet limestone, followed by a shale. Neighbouring becks expose shales with thin limestones, which are evidently part of the same series.

The general structure of the area, and the section of equivalent beds on Fountains Fell show that the series containing

the *spiralis* shales is part of the Yoredale sequence, and occurs between the top of the Great Scar Limestone—here containing the Lower *Lonsdaleia* beds and of lower D_2 age—and the cherty *Lonsdaleia* beds of upper D_2 age, that is, they are part of the Bryozoa series described by Professor Garwood and Miss Goodyear (*Q. J. G. S.*, LXXX., 1924, pp. 222-224). This correlation is supported by the occurrence in the *spiralis* shales of *Productus tissingtonensis*, a form characteristic of the Hardraw Shales of Wensleydale (Hudson, *Geol. Mag.*, 1925, p. 183).

VERTEBRATE ZOOLOGY IN YORKSHIRE.

A Meeting of the Vertebrate Section of the Yorkshire Naturalists' Union was held in the Library of the Leeds Philosophical Society on Saturday, October 20th, Mr. E. W. Wade presiding.

At the sectional meeting the minutes of the previous meeting were read and approved, as were also the annual reports by the Divisional officers of the North, East and West Ridings, and of the York District. The divisional officers were Messrs. W. J. Clarke, E. W. Wade, H. B. Booth, and S. H. Smith. The general and financial reports of the Yorkshire Wild Birds and Eggs Protection Acts Committee and the report of the Yorkshire Mammals, Amphibians, Reptiles and Fishes Committee were also approved.

Mr. R. Chislett was unanimously elected President of the Section for 1929.

An illustrated paper was contributed by Mr. F. Stubbs on ' The Increase of the Alpine Hare on the Pennines '; and a full report will be found elsewhere in *The Naturalist*. A discussion followed and brought out the following points: The Yorkshire Alpine Hares do not interbreed with the native hares; they still assume the white winter pelts; and they are naturally indolent and unpopular for hunting because of the lack of scent, and because they take to earth.

Birds of the Norfolk Broads.

A beautifully illustrated paper, ' Notes on Some Birds of the Norfolk Broads,' was given by Mr. Ian M. Thomson, who travelled from London for this purpose. The Broads are stretches of water surrounded by dense reed beds and connected by navigable canal-like rivers. The country is very flat, and numerous windmill pumps preserve the levels and prevent flooding.

Three rare breeding birds which owe their present status entirely to the protection afforded by certain land-owners are the Bittern, Bearded Tit, and Montagu's Harrier. Photographs of the Bittern depicted the bird approaching the nest and incubating the eggs, also the curious attitude assumed when alarmed, when the neck and beak are stretched up vertically and harmonise remarkably with the parallel vertical stems of the reeds. The species was re-established in 1911 and is increasing in numbers ; the period of incubation is 24 days and the young are fed by regurgitation.

Photographs of the Bearded Titmouse showed the unusual structure of the nest and the curious markings inside the beaks of the young. Both birds brought food to the nest and appeared to feed the young on spiders.

The nesting habits of Montagu's Harrier were well shown, and the various stages of development of the young in the same nest explained. The eggs are laid at intervals of two days, and as incubation commences

when the first egg is laid, the eldest chick may have a seniority of six days over the youngest. The young are aggressive, and on approach throw themselves on their backs to give free play to their talons. At first they are very tenderly fed with soft pieces of intestine brought by the female bird, the latter receiving the quarry from the talons of the male bird while in flight.

Members of the Duck family are numerous, particularly the Mallard and Shoveler. The Tufted Duck was first recorded as a breeding species last year, and the lecturer saw his first Pochard's nest this year. The Common and Garganey Teal are also present as breeding species.

It is customary to cut some of the reed beds with a scythe, and to stack the reeds into heaps which afford cover and resting places; in a short period the lecturer saw three pairs of Garganey Teal, many Common Teal, Shoveler and Mallard together with Redshank, Lapwings and Black-headed Gulls using these resting places.

The Great Crested Grebe is not uncommon, and the lecturer had once seen the Black Necked Grebe, but had not observed the Little Grebe.

Among the diurnal birds of prey the lecturer had seen both Montagu's and the Marsh Harrier, while the Sparrow Hawk and Kestrel were not uncommon, the latter sometimes nesting on the ground. The Hobby was seen on one occasion and the Osprey had been observed.

Both the Long and Short-eared Owls are found, and the Barn Owl frequents the reed-beds at night—happily the Little Owl is absent. Several photographs were shown of the Short-eared Owl, and it was stated that the nest invariably opens to the north-east.

The Corncrake appears to be absent, but the Water Rail is well distributed, and a series of photographs of this species was shown.

Sedge and Reed Warblers are plentiful, and the Grasshopper Warbler, though frequently heard, is very difficult to locate. In the drier areas the Yellow Wagtails outnumber the Pied, and both the Reed and Yellow Buntings are common.

In the autumn immense flights of Starlings visit the reed beds, and the noise of their wings is like a rushing torrent as they pass overhead, darkening the sky. These flights roost in the reed beds and cause damage to the extent of hundreds of pounds by breaking down the reeds and rendering them useless for thatching. The reeds are forced down forming a complicated mesh sufficiently impenetrable to trap partridges and pheasants. Owls have been found trapped in the criss-cross maze so formed —no doubt attracted by other birds so caught.—E. Wilfred Taylor.

The Royal Natural History (Messrs. Warne & Co., 2/6 net) is keeping up its promised fortnightly issue, and three sections are already printed, forming Volume I., contain 600 pages, with the familiar illustrations and numerous coloured plates.

The Flowering Plants of Whitby and District, by **Robert Fisher, M.A.** Whitby: Horne & Son, price 1/6. The Whitby Naturalists' Field Club has done a useful work in bringing together a list, extending to over 43 pages, of the flowering plants and vascular cryptogams of its district. Canon Fisher has undertaken the task of compiling the list, which follows the 11th edition of the London Catalogue of British Plants. The common names are added, and the ones used are taken from Rayner's 'Standard Catalogue of English Names of Wild Flowers.' Mr. Flintoff has rendered valuable service, not only in supplying many records, but along with the author, has verified most of the plants in the list. It is hoped that any species not included will be reported to the secretary, Miss Ingham, Esk House, Whitby. The list includes 721 flowering plants and 27 vascular cryptogams; there is a further list of 144 species which have been recorded but require confirmation, also an index of botanical names and one of English names.

In Memoriam.

WILLIAM HORNE, F.G.S.

(1836-1928).

THERE are probably few who have toured the district around Leyburn and Wensleydale during the past half-century who have not made the acquaintance, if not friendship, of William Horne, watchmaker, jeweller, antiquary, geologist and hail-

fellow-well-met, whose premises have long been a meeting place for collectors and connoisseurs.

His schooldays were spent near Aysgarth, at 16 years of age he was an apprentice in Manchester, from there he went Askrigg, then to Oldham as a watchmaker, and in 1866 he went to Leyburn where he remained for the rest of his life, a period of 62 years.

From boyhood he was a keen collector of fossils, particularly from the Carboniferous Limestone so well developed in his area. Several fossils from the Yoredale rocks, notably fish-teeth, were extracted by him with great skill. Some of these are in the National Collection at South Kensington, and bear his name as the donor. He was successful in finding some new species which were figured and described in the *Quarterly*

Journal of the Geological Society. As a result of his work he was elected a Fellow of the Geological Society of London in 1887.

His first paper was read to the British Association in 1873, 'On the Occurrence in the Yoredale Rocks of Wensleydale of Fish and Amphibian remains.' In 1887 he described the 'Prehistoric Remains recently discovered in Wensleydale' to the Yorkshire Geological Society. Ten years later he described 'Early Races in Yorkshire' to the Leeds and Hull Geological Societies, and, in 1906, with Mr. Hartshorn, wrote a guide to Wensleydale for the British Association excursion there, and gave a list of the Fossil Fish Remains. About the 'eighties he frequently conducted excursions and gave reports thereon to different societies.

He took a keen interest in early man and lectured on the subject to different societies, including the British Association for the Advancement of Science. He was looked upon as the authority on all such matters for the Wensleydale area, and his knowledge was of much value in connexion with the excavations made on Leyburn Shawl.

He had a museum at his place of business, and besides local geological and archæological specimens, he had a wonderful show of all kinds. A veritable 'Curiosity Shop,' and for each specimen he had a story.

He was an Honorary Life Member of the Yorkshire Naturalists' Union.

Always ready for a 'yarn' with any 'kidney,' he was full of amusing anecdotes in reference to the days of the British Association when Huxley, Tindall and others were, with Horne, regular attenders.

Fond of the open air, he took up golf with enthusiasm, and after he was 70 years of age he gave the present writer a very hot game on the Leyburn links. Latterly he was a keen follower of 'bowls.'

The Darlington and Stockton Times for Nov. 3rd gave a good account of W. Horne's life's work, and to this, and to our mutual old friend, J. A. Hartshorn, the present writer is indebted for material for this notice. To Mr. Horne's two sons we tender our sympathy in their great loss.—T. S.

ROBERT WILSON, J.P.

(1855-1927).

Those who were privileged to meet and know Robert Wilson, of Hellifield, will agree that he was a man with a wonderful amount of energy and determination. He was born at Austwick, and then lived some time at Feizor. His early working life was spent in Settle, before he commenced business

as a wheelwright at Hellifield, where he spent the last 38 years of his life. He had an extensive knowledge of the local flora, and one fact he told the writer will show that his love of plants was life-long. He stated that a certain plant of the Parsley Fern had been known to him for fifty years ; this was on Dry Rigg, on Helwith Moss. To many of our readers the question of how and why some become naturalists is a very interesting subject. Settle is far from large cities, with their naturalists' societies and continuation classes in various subjects ; true, at Giggleswick, there was at that time Dr. Watts, whose flora is so well known, but between the working men of Settle and the staff of the Grammar School there was in those days a great gulf.

Settle seems always to have had men who sought the ferns of the district, generally with the intention of collecting them for sale, but Wilson had been helped very early as a lad, when he lived with his grandparents at Feizor. At the time R. Clapham lived at Feizor (he is often cited in Lee's ' West Yorkshire '), and old Buck, Wilson's grandfather, knew him, and, it is said, could always get the Rusty-back Fern for him from Moughton, but would never reveal the place. When Wilson started work at Settle, he continued to search for ferns and knew their botanical names, but it was not until he had left Settle that his interest turned to flowering plants. Here, another Settle botanist comes into the story, Herbert Hastings Sturdy, well known to most botanists who call at Settle ; he owed his training to his father who was a gardener and had worked in nursery gardens near Manchester, and afterwards at Thornton-in-Craven and Bowerley, and Hanlith, Settle. When Wilson realized the flowering plants had bi-nominal names like his ferns, through meeting with Sturdy, a new interest came which continued till the end of his life, and the two tramped the wild fells of their native countryside and acquired a deep knowledge of the flora, becoming men whose help was constantly sought, and never sought in vain.—C.A.C.

PARASITES.

Urosalpinx cinerea Say in England.—In *The Nautilus* (Boston) for October, 1928, p. 68, I find the following : ' In *Nature* for August 18th, 1928, there is an interesting account of the injury to young oysters by this species. It was introduced into England on American oysters in the same way and probably about the same time as *Crepidula fornicata*. " In 1824, 50 per cent. of an experimental spat fall was destroyed by what we now know as *Urosalpinx*. During the last twenty or thirty years, or probably less, *Urosalpinx* has become an

effective addition to the enemies of the oyster cultivators.'' ' *Urosalpinx cinereus* Say lived in the Pliocene of England (Waltonian in Red Crag) and also in the Pliocene of Iceland ; then became extinct on the European coast of the Atlantic during the glacial period. It survived, however, on the North American coast of the Atlantic ; also, on the west coast of North America was introduced with oysters, and occurs there now-a-days from the Gulf of San Francisco to San Pedro. I think *Urosalpinx cinereus* Say, may have been introduced at the same time as *Petricola pholadiformis* Lam., which now inhabits the coasts of the North Sea from the Channel to Yorkshire, and the Skaw (Skagen) in North Jutland.—Hans Schlesch.

ENTOMOLOGY.

Insects in the Darlington District, 1926.—Hymenoptera : *Bombus lapidarius* again very scarce. Bee-keepers reported a great lack of honey from the heather, ? due to lack of bloom or to low night-temperatures of August and September. Lepidoptera ; Meadow Brown again very late (not recorded until July 7th), but subsequently abundant. Painted Lady, Darlington, July 28th.—Per J. B. Nicholson, *Secretary*.

BOTANY.

Vegetation in the Darlington District in 1928.—Flowering : The outstanding influence on flowering was the mild weather of February, which abruptly converted a rather backward season into a markedly early one. This earliness was gradually lost during April and May, and during June flowering was definitely late. Farm Crops : Seed time generally unfavourable, the soil, at first sodden, rapidly becoming too dry. Early sown Barley was the most successful cereal. Hay not abundant owing to lack of ' growing weather ' during April and May, but of excellent quality owing to ideal harvest weather. Fruit Crops ; Apples, pears, plums, black and red currants and gooseberries were all good crops. Strawberries were a failure owing partly to late frosts, partly to hot dry weather during fruiting season. Wild Fruits : Good crops : wild strawberries (contrast cultivated crop), mountain ash, blackberries, elderberries, crab apples, hips, guelder-rose. Poor : haws (little may blossom), sloes, beechmast. Fungi : Another bad year, especially for the larger terrestrial species ; some improvement noticeable, however, sa the autumn advanced.—Per J. B. Nicholson, *Secretary*.

We have received a circular from the director of a firm of valuers, who informs us that ' the director is a gentleman of outstanding ability.'

NEWS FROM THE PRESS.

A newspaper correspondent suggests that the Blackpool Corporation by catching thousands of cuckoos and training them to turn ' ackoo ' into ' Blackpool,' and then releasing them, the town would obtain a ' wonderful advertisement.'

The Sunday Dispatch records that ' in the topmost branches of a leafless tree in Driffield Cemetery is to be seen the remarkable spectacle of a woodcock sedately sitting on two eggs, an unusual occurrence so late in the autumn ' (*i.e.* late November).

From a reader at York :—' *Nature* for November 10th informs us that Thomas Bewick was " celebrated for his woodcut illustrations of animals and birds " (p. 741). As drawings of plants are mentioned a few lines below, we conclude that birds belong to the mineral kingdom.'

In *The Hull Daily Mail* for December 5th is the following record :—' Mr. H. Fisher, of Aldborough, E. Yorks., was surprised to see a strange animal in one of his traps during last week-end. On getting close to it, he found it to be a splendid specimen of an otter, which measured 38 in. and weighed 8½ lb.'

In *The Yorkshire Post* of November 22nd, we read ' Huge Reptile. Prehistoric Fossil discovered in Sussex.' Most fossils are prehistoric, or should be ! We are also informed that the first discovery of iguanodon remains was made by ' Sir Mantell O. Lewes,' later referred to as Dr. Martell. We believe Dr. Mantell, of Lewes, was responsible.

We learn from the *Hull Daily Mail* that ' An enormous " bird's " beak, about three feet long, found attached to a decomposing carcase was recently brought to the Museum at Hull. It certainly looked like a bird's beak, and apparently the eye socket, etc., was intact, but the object proved to be portion of a skull of a whale, the Lesser Rorqual (*Balaenoptera acutorostrata*).'

We are not surprised to read the following in a recent number of *Nature* :—' In *The Daily Mail* for November 14th there appears under headlines of the usual startling character a description of an invention which, it is alleged, will revolutionise all our present ideas about electricity. . . . . We do not think that any useful purpose is served by a paper publishing preposterous claims under heavy type, especially when it takes no responsibility for them and states nothing to justify them. Sudden outbursts like this—sensational in presentation and unscientific in substance—can only do harm and are much to be deprecated.'

By means of eight large-type double-column headings, *The Eastern Morning News* (Hull), of November 22nd, informs us that a skeleton 25 feet long is the ' largest known to science,' and gives other information similarly unreliable. *The Eastern Morning News* may care to know that in the musuem not very far from its office is a skeleton twice as long as this ' largest known to science,' and portions of others which would be quite four times as long. The following is the narrative, which innocently ends with ' American Explorer's Story ' :—' Amazing Finds in Mongolia—Largest Skeletons known to Science—Animals 25 Feet Long—Implements of People Who Lived 25,000 Years Ago. An amazing story of the discovery of skeletons of extinct animals, the largest known to science and of terrifying aspect, was given yesterday by Mr. Roy Chapman Andrews, the famous American explorer attached to the American Museum of Natural History, who has just returned from Mongolia. He has discovered, he says, the skeleton of a beast 25 feet long from head to tail, 14 feet in height at the shoulders, and carrying a head that goes up on a twelve foot neck. It is estimated that this animal existed some six million years ago. Fifteen thousand stone implements, from which can be gathered the history of the people who populated Mongolia about 25,000 years ago, have also been collected. American Explorer's Story.'

The Naturalist

Printed by A. BROWN & SONS, Ltd., 40 George Street, Hull, and published by A. BROWN & SONS, Ltd., at 5 Farringdon Avenue, in the City of London.
Jan., 1929.

FEB. 1929.

No. 865
No. 639 of current Series.

THE NATURALIST.

A MONTHLY ILLUSTRATED JOURNAL

PRINCIPALLY FOR THE NORTH OF ENGLAND.

EDITED BY

THOMAS SHEPPARD, M.Sc., F.G.S.,
F.S.A.(Scot.), F.R.A.I., M.B.O.U.,
The Museums, Hull;

and T. W. WOODHEAD, Ph.D., M.Sc., F.L.S.,
Tolson Memorial Museum, Huddersfield,

WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF
JOHN W. TAYLOR, M.Sc. RILEY FORTUNE, F.Z.S.

Contents :—

LONDON:
A. BROWN & SONS, LIMITED, 5 FARRINGDON AVENUE, E.C. 4.
And at HULL and YORK.

Printers and Publishers to the Y.N.U.

Price 1/6 net. Prepaid Subscription 15/- per annum.

YORKSHIRE NATURALISTS' UNION.

VERTEBRATE SECTION.

President of the Section : R. CHISLETT, Rotherham.

Two Meetings will be held in the Library of the Leeds Philosophical Society, Park Row, Leeds, on Saturday, February 16th, 1929, at 3-15 p.m. and 6-30 p.m.

Papers will be given as follows :—

' Prehistoric Mammals of Ireland,' by H. E. Forrest.

' Some Manx Bird Notes,' by Ralph Howarth.

* ' Classification and Field Work,' by Ralph Chislett, F.R.P.S., M.B.O.U.

' British Domestic Sheep,' by H. B. Booth, F.Z.S., M.B.O.U.

Members are particularly invited to bring notes, specimens and lantern slides.

Will Officials of Affiliated Societies kindly notify their members.

E. WILFRED TAYLOR, *Hon. Secretary*,
10 Telford Terrace, York.

* Illustrated Presidential Address.

SUBSCRIPTIONS

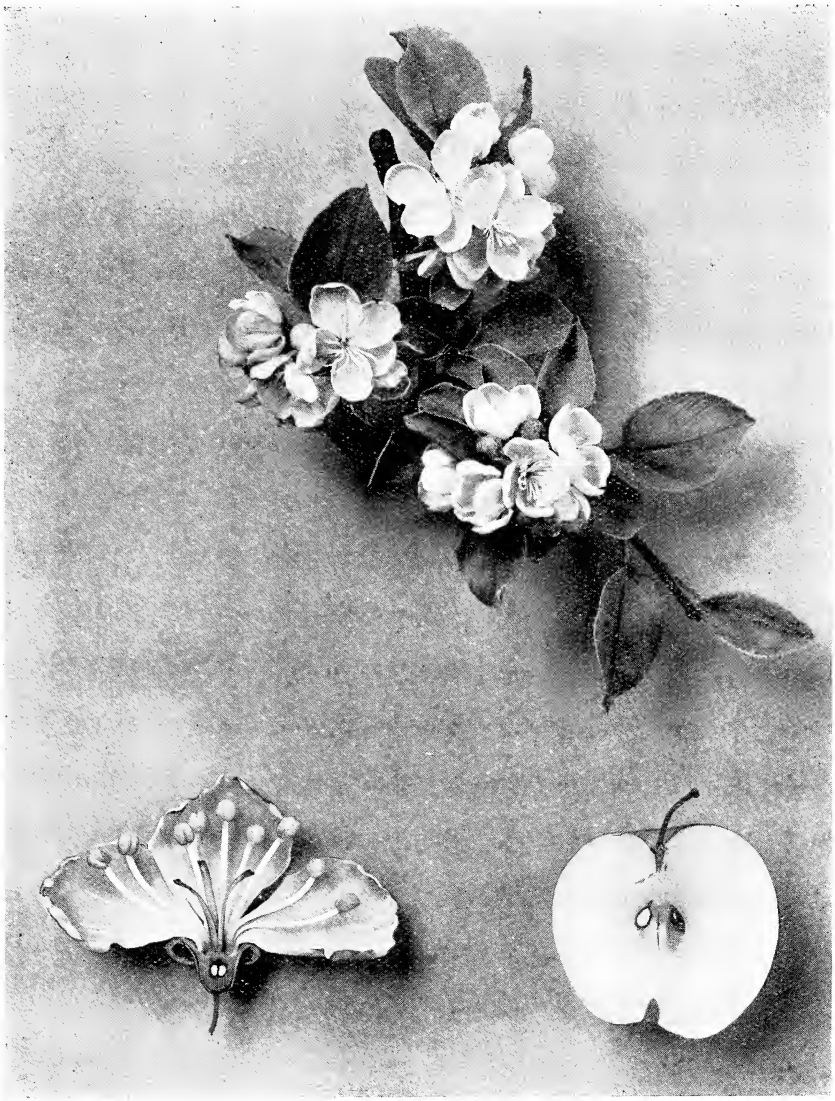
TO THE

YORKSHIRE NATURALISTS' UNION.

Members are reminded that subscriptions are due on the 1st January in each year. Prompt payment will save the time of an honorary official and expense to the Union.

Remittances should be sent to the Hon. Treasurer, S. D. Persy Fisher, Sackville Street, Leeds.

Members desirous of having their subscriptions paid direct through their Bank each year can obtain Banker's order form by applying to the Treasurer at the address given above.



Apple Blossom and Fruit, showing Cross-Pollination.

Model *made and exhibited at the Museums' Association Conference by* W. E. Mayes.

NOTES AND COMMENTS.

THE APPLE AND POLLINATION.*

The illustration (Plate II.) represents one of a series of models which have been made for the botanical section of the Leicester Museum by Mr. W. E. Mayes, the Sub-Curator, to show various forms of floral mechanism relating to that most important function—the fertilisation of seed. When pollen-grains from the stamens of one flower fall upon the pistil (or seed chamber) of the same flower, the flower is said to be self-pollinated ; but when the pollen grains from another flower are carried by the wind, by insects, or by some other agency, to fall on that same stigma, the flower is said to be cross-pollinated.

CROSS-POLLINATION.

Experiments show that the advantage of cross-pollination over self-pollination lies in a tendency to the production of more fertile seeds and stronger plants. Hence we find in many flowers contrivances and adaptations of structure which help to ensure cross-pollination. In the case of the apple, the flowers are borne in clusters, usually on short lateral shoots produced the previous year. They are bisexual ; that is to say the male and female structures are combined in one flower.

BOTANICAL MODELS.

The stigmas are receptive—or ready to receive pollen before the pollen bearing anthers, which surround, are open. Thus cross-pollination is favoured by this circumstance, as well as by the elevated position of the stigmas. Cross-pollination is chiefly brought about by bees and flies, and probably by night-flying moths attracted by the conspicuous flowers which are usually more strongly scented at night. The model here illustrated was exhibited at the Museums' Association Conference, held at Exeter, when Mr. Mayes read a paper describing the production of ' Botanical Models for Museum Purposes.'

ROCHDALE LITERARY AND SCIENTIFIC SOCIETY.

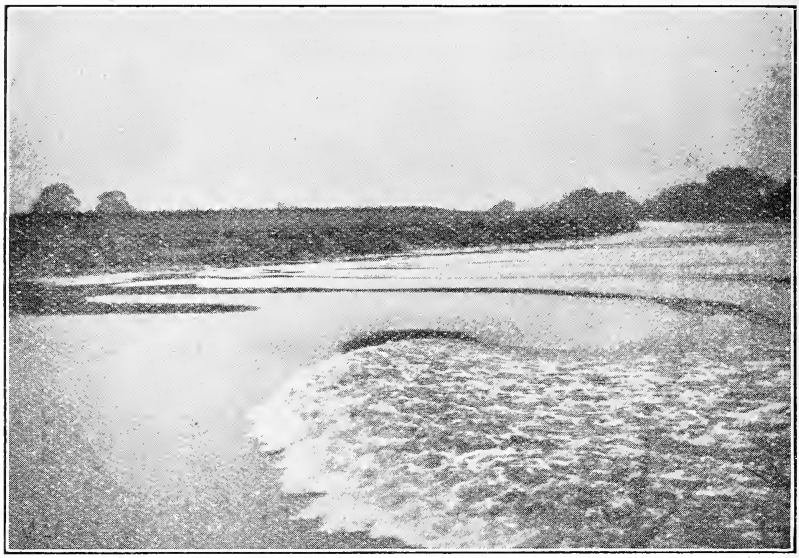
We learn from *Nature* that ' the Rochdale Literary and Scientific Society celebrated its jubilee on Friday, November 9th. The Society was founded on Nov. 9th, 1878, and has grown to be an important local institution for the promotion of scientific investigation. It was among the first to investigate, if not discover, the flint implements used by prehistoric man on the Pennines, and has contributed several fossils new to science to the British Museum. It first issued Herr Stolpe's English translation of " Ornamental Art by Savage People,"

* *Museums Journal,* Vol. XXV., pp. 127-134.

which has just been re-issued by the Swedish Academy Aktiebolagen Familijeboken. The Society has also made an exhaustive investigation of the Roman Road on Blackstone Edge, which the authorities have recently decided to schedule as a National Monument. Prior to the jubilee celebrations, the Society presented to Dr. J. R. Ashworth his portrait in oils, painted by the Hon. John Collier, in recognition of his forty three years' honorary secretaryship of the Society.'

TIDAL BORE OF THE TRENT.

Dr. Vaughan Cornish has the following note in an account



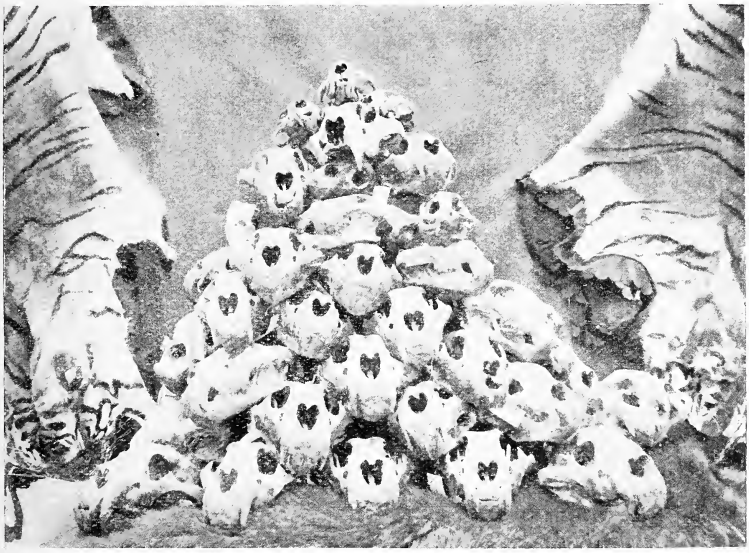
Tidal Bore in the River Trent at Knaith.

of ' The Tidal Bore in the Trent,' in *Nature*, for December 1st. ' On the occasion of my latest visit to the Trent I arrived at Gainsborough on August 16th, the day after new moon, and saw the eagre on this and three following days. Morning and evening I met the eagre some miles below Gainsborough, and as soon as it had passed I motored to a point higher up the river and met it again, and so on as far as Torksey, ten miles above Gainsborough. The near view is splendid, from the fury of the waves lashing the bank, and the foaming " whelps " which rear their crests above the shallows. The distant view, less easy to obtain in this flat country, is almost equally striking in a different way, the whole disturbance merging in one broad bright band extending from bank to

bank which sweeps majestically up the river. The length of course run by the eagre is fully five-and-thirty miles from its beginning near the outfall into the Humber estuary, and all the way the coming of the tide is heralded by the warning cry "ware eagre."

SPORT AND WILD LIFE IN THE DECCAN.*

Brigadier-General Burton's articles on Big Game are well known to readers of some of our leading reviews. He has now brought many of these, as well as new information, together,



A Golgotha of Tiger Skulls.

and produced a volume fascinating alike to the antiquary, sportsman, artist and naturalist. Wild boar, deer, horse, leopard, python, tiger and monkeys seem to be among his chief items, and evidently he has 'investigated' the subject in a particularly thorough manner. His photograph of a heap of tiger skulls is a silent witness of the deadly effect of his gun.

BRITISH MYCOLOGISTS.†

Besides the Reports of the Marlborough and Aviemore Forays, with their accompanying monographs, this substantial

* By R. G. Burton. London : Seeley, Service & Co., 282 pp., 21/- net.

† *Trans. Brit. Mycol. Soc.*, Vol. XIII., Pts. III. and IV. Cambridge University Press, 15s.

journal includes descriptions of new and rare Forest fungi, brown-rot fungi, tropical root disease fungi, new or rare British Discomycetæ, an old fungus of the Douglas fir, etc., and the *Physalospora* disease of the Basket Willow. Other papers refer to the Genera *Vermicularia* and *Colletotrichum* ; *Ceratostomella paradoxa* the perfect stage of *Thielaviopsis paradoxa* ; Life-history of *Olpidium radicicolum* and the 'hybridisation nodules' of Swedes ; and The identity of *Phoma pitya, P. abietina* and their relation to *Phomopsis pseudotsugae*. The part contains over 200 pages and 20 plates.

THE DAGLISH BOOKS.

There seems to be a good crop of volumes in the market just now which are either written or illustrated, or both, by E. Fitch Daglish. The wood engravings of this author have become a feature in illustrating natural history objects in recent years, and the public is not slow in realizing their value. 'Game Birds,' by Douglas Dewar (Chapman & Hall, x.+256 pp., £2 2s. net) has no fewer than twenty-three admirable woodcuts, and the letterpress likewise is the work of an expert ; in fact it is difficult to know which to admire most, the accuracy of the descriptions or the fidelity of the illustrations. (See Plate III.) The author deals with : Characteristics and Classification of Game Birds ; Coloration ; The Moult ; and Game Bird Hybrids, and then describes the various British Game Birds. Messrs. J. M. Dent & Sons have issued four volumes of Animals in Black and White at 2/6 each, in which both text and woodcuts are by E. Fitch Daglish. They deal with 'The Larger Beasts,' 'The Smaller Beasts,' 'The Larger Birds' and 'The Smaller Birds' respectively. By apparently very little effort wonderful effects have been obtained in the representation of such animals as the Zebra, Elk, Giraffe, Hippopotamus among the larger beasts ; Skunk, Panda, Hyaena among the smaller beasts ; Condor, Magpie, Macaw, Puffin among the larger birds ; and Wagtail, Stonechat, Goldcrest and Kingfisher among the smaller birds, to mention only those which appeal to one's eye the most.

THE BIOLOGY OF SPIDERS.*

Within the memory of many of our readers, the students of insects were almost entirely confined to those interested in Lepidoptera. Even the 'micros' found a very small proportion of followers. Spiders and other similar creatures

* By Theodore H. Savory. London : Sidgwick & Jackson, xx.+376 pp., 16/- net.

Pheasants in Winter Plumage.

From 'Game Birds,'
by Douglas Dewar.
Published by Chapman & Hall.

Illustrated by E. Fitch Daglish.

were rarely studied, possibly on account of the lack of literature readily available. Recently, however, the pendulum has swung in the other direction, and we now find zoologists hard at work among the 'neglected orders,' and certainly in these directions many great strides have been made in scientific investigation. Under the general editorship of Professor J. Arthur Thomson, a series of Biological Handbooks is being issued, about half a dozen of which are already well known to our readers. The present is equal in interest and

Photo *H. Main*

Trap-door Spider (*Nemesia congener*) in Nest. × 1.

value to its predecessors, and by the aid of numerous photographs, sketches and diagrams, sixteen chapters have been prepared. After describing the spider's structure, the book refers to its methods of self-protection, feeding, and reproduction, as illustrating the behaviour of a creature of the small-brained, instinctive type. The spider's relation to its environment is discussed in detail. Finally, the evolution of the families of spiders is considered, and it is shown how the spider can contribute to our understanding of organic evolution. There are over 120 illustrations, one of which, considerably reduced, we are kindly permitted to reproduce.

WATER DIVINING IN LINCOLNSHIRE.

At the recent annual meeting of the Lincolnshire Naturalists' Union, Mr. H. Preston mentioned that during the year two interesting borings for water had been made—one on the east side of the River Ancholme, near Brigg, and the other at Miningsby, in the south, but both failed to find water, although in each case water diviners who had been employed indicated an abundance of water at shallow depths. Without expressing any definite opinion on 'divining,' he said, one would expect that if running water did act on the twig when held in the hands of certain persons, it would do so without fail if present, but it would certainly not act if not present. The principle of water divining was supposed to be an infallible mystery, but the failure of these two borings, coupled with the many others they heard about, should at least cause a suspicious doubt to rest upon the methods.

WILD ANIMAL INTERVIEWS.*

The author endeavours to speak from the point of view of the animals described. He evidently attempts to explain to younger readers the characteristics of certain American and other wild animals, about forty of which are referred to, and most of which are illustrated. A typical illustration shows an elephant evidently jumping from the ground as all its feet are well in the air, and this is described as 'a lesson to American girls and boys in contentment.' Some of the illustrations are marred by the bearded and trousered biped who appears in many of them, but we must not say too much unless it should so happen it represents the author! who was formerly Director of the New York Zoological Park, so should be an authority on his subject.

Lords of the Wild, by **Samuel Scoville, Junr.** Chapman & Hall, 246 pp., 7/6 net. In an exceedingly popular manner and with really good illustrations by C. L. Bull, describes animals not often to be met with in popular books on natural history. Among them are leopards, foxes, cobras, bears, baboons, black cats, wolves and other denizens of the very wild.

Typical Flies: A Photographic Atlas of Diptera, by **E. K. Pearce.** London: Cambridge University Press, xiv.+64 pp., 10/- net. In this, the third series, the author gives 162 photographic illustrations of various species of diptera together with their haunts, etc., which will be of considerable service to the ever-increasing number of students interested in this difficult branch of animal life. Since the first series was issued so long ago as 1915 the author has photographed hundreds of specimens and, as he rightly says, only those who have handled them for this purpose can understand the difficulties. The sequence of the species follows that in Verrall's List of British Diptera, and Brauer's Classification has also been given.

* By William T. Hornaday. London: Charles Scribner's Sons, xiv.+310 pp., 7/6 net.

A TRAWLER TRIP OFF THE YORKSHIRE COAST.

J. A. STEVENSON.

Desirous of knowing exactly what the trawlers brought up in their nets, I secured permission from the owners of the trawler *Tyndrum* (aptly named !) to join it for a trip of two or three days. Thus it was that, with a bag of necessities, at half past five in the afternoon of July 4th I presented myself on board the old boat, which was due to sail at six o'clock.

The crew were quite pleased to take me, and I must express my thanks to them for being so kind and helpful throughout the trip.

The *Tyndrum* is too much of a tin drum to do any trawling far off shore, and this is just what I wanted, for animal life is more abundant close in.

After an hour's steaming we arrived at our destination.

The first thing was to set the dan buoy, round which the trawler was to drag its great net. This buoy was anchored to the bottom (30 fathoms), and a lantern was affixed, as it was already dusk.

After steaming away awhile, the right trawl was shot. It quickly sank, and the immensely strong trawl warps soon stopped running out. The ship resumed a regular speed of $2\frac{1}{2}$ knots, and I settled down to wait until the trawl was to be hauled up, two and a quarter hours later.

It was nearly eleven oclock before it was hauled up again. All the hard work on a trawler is done by the incredibly powerful steam winch.

Finally, the trawl was up, and the cod-end, or purse, was hanging over the fore-deck. Bob Jenkinson, the third hand, undid the rope that fastened it, and out slid an avalanche of animal life. The men spent the next hour repairing the netting, as it had been badly torn, when it was shot overboard again. The fish had then to be sorted and cleaned. All kinds were flapping or writhing all over the place, Mixed with them were heaps of Sea Urchins (*Echinus esculentus*), hated by the fishermen on account of their spines, which render sorting a most uncomfortable job.

Heaped with the Sea Urchins was a great pile of muddy 'rubbish,' and it is in this 'rubbish' that most of the rarities are to be found.

So while the crew were cleaning and stowing away the fish, I was running through this 'muck' as the fishermen call it.

The first thing that struck me was the enormous quantity of single valves of the Queen Scallop (*Pecten opercularis*). In fact, apart from Sea Urchins, most of the stuff consisted

of them—all overgrown with serpulæ and hydroids, and covered with mud. Before the war this bivalve was exceedingly abundant here: since, however, it has become quite rare. I presume that all these old single shells were, therefore, the remains of the scallops that were alive here in the past.

Attached to many of these shells were beautiful, transparent tunicates (*Ascidiella opalina* and *Ciona intestinalis*), and deep water anemones (*Botocera eques* and *Dianthus plumosa*).

Every time I stirred the mass of life it gave off beautiful green flashes of phosphorescence, which I could well see as it was dark.

The hydroids and polyzoa were in profusion. The most common of the former was *Hydrallmania falcata*, but other kinds were everywhere.

The Sea Mats (*Flustra foliacea* and *F. truncata*) were plentiful, attached to small stones and shells.

There were one or two Common Squids (*Loligo forbesii*), though it was too early in the year for cephalopods.

Tube worms, especially the serpulæ, were fixed on to everything hard that there was; while of the paddle worms I saw two or three, chiefly *Phyllodoce lamelligera*. There were also many scale-worms (*Polynoe imbricata*),

Crustacea, I was surprised to see, were not abundant. The most common kind was undoubtedly the Scarlet-lined Prawn (*Pandalus montagui*) which came up in dozens at every haul, clinging hard to the outside of the net until too late to save themselves.

The Scorpion Spider Crab (*Inachus dorsettensis*) was common, as was the slender Spider Crab (*Macropodia rostrata*). In subsequent hauls I collected the following:—

Common Lobster (quite abundant).
Edible Crab (exceedingly large specimens).
Circular Crab (*Atelecyclus heterodon*).
Marbled Swimming Crab (*Portunus marmoreus*).
Eurynome aspera.
Ebalia tuberosa.
Hyas araneus and *H. coarctatus*.
Eupagurus bernhardus.
E. kroyeri, and several other common species.

Towards the end of the trip, the trawl brought up a fine colony of the tube worm, *Hydroides norvegica*.

Of shells I procured several varieties, the best being a fine *Venus casina*, *Lyonsia norvegica*, *Psammobia tellinella*, *Leda caudata*, and *Stylifer*. The last I procured from the spines of a Purple Heart Urchin (*Spatangus purpureus*).

The large Nudibranch *Tritonia* was very abundant, as was another, *Dendronotus frondosus*.

Echindoerms were well represented in the motley mass that came up every $2\frac{1}{4}$ hours. The commonest, as I have said, was the Egg Urchin (*Echinus esculentus*). Another species, *Echinus miliaris*, was also abundant, as was the little green Pea Urchin (*Echinocyamus pusillus*). *Spatangus purpureus* and *Echinocardium cordatum* came up sparingly.

The most common Starfish was, as it everywhere is, the five-fingers (*Asterias rubens*). But a close second was the Sunstar (*Crossaster papposus*), A relative of the latter, *Crossaster endeca*, was also abundant, as was the extremely fragile *Louidia fragilissima* and the Butthorn, *Astropecten.*

Several pieces of that remarkable sponge *Polymastia robusta* were obtained.

The fishes were chiefly food fishes, consisting of Haddock, Whiting, Lemon Soles, Plaice, Turbot, a few Cod and Ling. Wolf-fish, one or two Skate, and heaps of young, unmarketable food fish of all kinds, which, I regretted to see, were all thrown overboard when they were *dead*. Fulmars, Herring Gulls and Kittiwakes followed in flocks, and ate them up as soon as they fell into the water.

On the night before we came in we got a very large Common Topknot (*Zeugopterus punctatus*) ; it was $10\frac{1}{4}$ inches long.

I soon realized how carefully the fishermen of the *Tyndrum* have searched for specimens for us in the past, because little escaped their eyes as they sorted the fish.

At one time we struck a wreck, and spent an hour or two in hauling the net off it. When at last they did haul the net up on deck, they had a full day's work in mending it. It was ripped from end to end, and all the fish that had been inside were lost.

Finally we came to port again in the early morning of July 7th. To me the trip had been immensely interesting. and I learnt a great deal from it.

A memoir and portrait of Professor W. G. Fearnsides appears in *The Colliery Guardian* for January 4th under the ' Men of Note in the British Coal Industry ' series.

In *The Geological Magazine* for January, K. A. Davies writes on ' The Graptolite Faunas of the Upper Ordovician and Lower Silurian,' and refers to Yorkshire and Lake District sections.

J. D. Dean writes on ' The Identity of *Clausilia cravenensis* Taylor with *C. suttonis* Westerlund,' and W. Polinski on ' *Pirostoma dubia cravenensis* Tayl., its affinities and its geographical origin,' in *The Journal of Conchology* for December.

British Birds for January contains records of the Long-tailed Duck in the Isle of Man, said to be its first occurrence in the Island ; and Red-breasted Flycatcher in Northumberland. The recorder of the latter specimen could not satisfy himself as to what the species was, so shot it and found out. The same publication contains many interesting records of the Recovery of Marked Birds.

THE DISTRIBUTION OF ERRATICS AND DRIFTS.

A PAPER and contoured map by the late F. W. Harmer, M.A., F.R.Met.S., with a short introduction by Prof. Kendall, F.R.S., have just been issued by the Yorkshire Geological Society as a part of its *Proceedings* (Vol. XXI., Part 2, 10/6). The paper, about 70 pages in length, is accompanied by a very beautiful contoured map of England, on the scale of 16 miles to the inch, specially prepared to show the distribution of erratic boulders—one of the sources of information as to the derivation and extension of the glaciers during the Ice Age.

The recording of erratics in Yorkshire was undertaken 35 or 40 years ago by the Boulder Committee of the Yorkshire Naturalists' Union, and was continued for many years with great enthusiasm under the direction of Prof. Kendall and other well-known glacialists. In 1908 a detailed report and map were prepared by the Secretary, the late J. H. Howarth, of Halifax, and published in *The Naturalist*, summarising and tabulating the results. With that, and subsequent work, our knowledge of Yorkshire erratics and drifts probably goes far beyond anything the Harmer map can tell us. But it is nevertheless an invaluable contribution to the study of the glaciation in the large areas south of Yorkshire, down as far as the apparent limit of glaciation in the region of the Thames valley.

Harmer was a pioneer in such methods of study, and will ever be regarded as a first-rate authority for East Anglia. In the preparation of the present map and paper, this region is well covered with notes, but he has pushed his investigations far and wide, through the Midlands, and, indeed, through the whole glaciated area. It is quite likely that his deductions as to the course of the glacial streams will be subject to some criticism in detail, but the map affords a basis of sound facts upon which other workers may find it convenient to build up more detailed investigations and draw conclusions for themselves.

Harmer died in 1923, and this publication constitutes a personal memorial of the highest order.—J. W. S.

The first civil pension granted by the Government of Northern Ireland for meritorious public service has been awarded to Mr. R. J. Welch, who has also received the Commemorative Medal of the Belfast Naturalists' Field Club.

It is a compliment that the *Imperial Fisheries Institute of Japan* publishes its Journal in English. No. 1 of Vol. XXIV., recently received, contains twelve important monographs dealing with such variety of subjects as the Temperature of Water on the Development of Fish-eggs; Population Growth of the Water-flea; and the Preparation of Asakusanori, a form of paper prepared from Porphyra.

FIELD NOTES.

ORNITHOLOGY.

Long-tailed Tits at West Bretton.—On the 26th December, 1928, I saw a flock of seven of these birds working in the mixed belt of woodland near to Bretton Bar. It is not a common species in our district.—W. E. L. WATTAM, Newsome.

Hedge-sparrow's Nesting Site.—In the latter part of July, 1928, a pair of Hedge-sparrows made its nest among the haulms of a potato crop in a garden in Leeds Road, Huddersfield. The four eggs were successfully hatched, but the fledglings fell prey to some animal, probably a cat.—W. E. L. WATTAM, Newsome.

Manx Terns win.—A commercial undertaking has recently come into being on the site of a long established Ternery in the North of the Island. In spite of the clang of machinery and bustle of workmen, the Terns, Arctic and Common, successfully maintained with persistent vigour their rights, and this year (1928) again reared a good average number of young. The consistent attacks made by these delicate and fragile birds on the men working near their nests shows how vigorously Terns will protect their incubated eggs, young, and rights of occupation. So vicious and daring were the attacks, that frequently in their zeal they would knock the hat off the head of a workman, some of whom become quite nervous and apprehensive, as the stooping birds demanded considerably more attention than the work they had in hand. Eventually one of their number conceived the idea of placing several medium-sized pebbles in his hat as a protection against the birds. This experiment proved so successful that the idea was almost generally adopted, with the result that the workmen followed their various occupations with a sense of added security.—RALPH HOWARTH, Peel, I.O.M., 22nd January, 1929.

Wild Birds and the Fruit of the Wild Rose.—For many years I have been making observations on the fruit of the wild rose, *Rosa canina* Linn., usually called ' hips,' in order to ascertain the wild birds that feed on these berries. At mid-day on November 28th, 1928, I saw a Blackbird fluttering about a part of my garden-hedge where ' hips ' abounded. On obtaining the glasses and watching most carefully I saw, to my surprise, the bird take a ' hip ' lengthwise in its bill, give the berry several tugs and shakes, and finally pull it off the bush. The blackbird held the ' hip ' between its mandibles for a few seconds and then in one gulp swallowed the

berry whole. At once this incident reminded me of the Waxwing, a bird generally understood to swallow ' hips ' whole. The incident astonished me, because it was so unexpected. Since the first observation I have seen the Blackbird behave in this way very many times ; indeed, after a week or so I ceased to report such incidents in my notebook. In all I have seen Blackbirds swallow scores of ' hips ' whole, and in one instance I noted distinctly a bird swallow four—one after the other—with rapidity. Further, four independent witnesses at different times and without knowing what to expect, have described an incident similar to the one recorded above on my drawing their attention to a bird in the fence. I mentioned this feeding habit of the Blackbird to my friend, Mr. A. S. Frank, of Egton Bridge, to whom it was then unknown. Mr. Frank is a careful observer and a good ornithologist. Some time after my discussing this matter with him he wrote : ' By a strange coincidence I have to-day (January 8th, 1929) seen a Blackbird swallow a ' hip ' whole, so that I am now in a position to confirm your own observations. It is curious that until to-day I have never seen them swallowed whole.' I am writing an account of my observations, and I shall feel greatly obliged if anyone, having noted facts of interest in relation to birds feeding on ' hips ' will kindly communicate with me. I have searched the books and I have been unable to find any reference to the Blackbird's habit of swallowing ' hips ' whole. I can only conclude, therefore, that I am the first observer to note the Blackbird swallowing ' hips ' whole, and to record the incident in print. —R. J. Flintoff, Goathland, North Yorks.

FLOWERING PLANTS.

Asplenium adiantum-nigrum Linn. near Goathland, North Yorks.—On the 17th November, 1928, Dr. W. Arthur Sledge, of Leeds, found *Asplenium adiantum-nigrum* growing on masonry near Goathland. A specimen of this fern has been submitted to Dr. G. Claridge Druce, F.R.S., and he refers to it as ' an obtuse form ' of the Black Spleenwort. It is not included in Canon Fisher's ' List of the Whitby Flowering Plants ' among the cryptogams given therein, and to the best of my knowledge and belief it has not been recorded in the Whitby district. Baker includes it in all areas. Now the Esk area covers a tract of country from Marske to south of Robin Hood's Bay along the coast, and to Rosedale inland. Canon Fisher's Whitby district is therefore a large portion of this area. I consequently conclude that *Asplenium adiantum-nigrum* is a rare plant in Baker's Esk area, No. 4.—R. T. Flintoff.

THE YORKSHIRE NATURALISTS' UNION'S ANNUAL REPORT

FOR 1928.

(Presented at York, December 8th, 1928).

The Sixty-sixth Annual Meeting was held at Harrogate on Saturday, December 3rd, 1927, and a short account of this meeting appeared in *The Naturalist* for February. The Annual Report was published in the same journal, commencing on p. 55 of the February number.

The Presidential Address, entitled ' The Evolution and Survival of the Spider,' was delivered by Mr. Wm. Falconer, and has also appeared in *The Naturalist* for January and February.

Field Meetings have been held during 1928 as follows :—Stokesley (April 7th-9th), Spurn and Kilnsea (May 26th-28th), Austwick (June 16th), Cawthorne (July 17th), and Richmond (August 4th-6th). The Holmbridge excursion had again to be cancelled owing to difficulties in obtaining access to the required areas. A Fungus Foray was held at Sledmere from August 25th-30th, and sectional meetings were held by the Entomology Section, which again visited Buttercrambe Woods on June 23rd, along with the Arachnida and Plant Galls Committees; the Conchology Section visited the River Foss on June 9th, and went to Little Smeaton on July 14th ; the Bryological Committee visited Upper Raikes, March 24th, and Pateley Bridge, September 25th. Reports on these meetings have appeared or will appear in *The Naturalist.*

The Excursions for 1929 will be as follows :—

Mid. W. Hellifield, March 31st-April 2nd.
N.E. Pickering, May 18th-20th.
N.W. Hawes, June 8th.
S.W. Doncaster for Marr, July 8th.
S.E. Driffield, August Bank Holiday.
Fungus Foray.—Masham, September 16th.
Annual Meeting.—December 7th.

Membership.—The following new members have been elected during the year.

Caruth, Miss F. E., B.Sc., Royds Hall Secondary School, Huddersfield.
Crowther, John, Water Street, Roman Road, Grassington.
Douglas, J. C., 6 West Avenue, Horbury, near Wakefield.
Dufty, Miss E., Cleveland Street, Doncaster.
Ellis, John C. S., ' Burway,' Huddersfield Road, Brighouse.
Fisher, Rev. Canon Robert, M.A., 12 Esk Terrace, Whitby.
Lax, F. Bernard, Bracken Cottage, King Lane, Leeds.
*Morehouse, Miss Kathleen, 23 Queen's Road, Doncaster.
Morris, T. O., B.Sc., Indo-Burma Petroleum Co., Ltd., P.O. Box 132, Rangoon, Burma.
Nelson, Rev. E., Allendale, Manor Drive, Harrogate.
*Nelson, K. E., Allendale, Manor Drive, Harrogate.
Pilling, Miss M., B.Sc., The University, Leeds.
Prince, A. D., B.Sc., 3 Brudenall Mount, Leeds.
Raistrick, Dr. A., M.Sc., F.G.S., Brackenhurst, Shipley Glen, Yorks.
Schlesch, Hans, Gustav Adolfstrasse 14, Copenhagen.
Wray, Dr. D. A., 6 Chestnut Avenue, York.
Wood, Asquith, 99 Royal Park Avenue, Hyde Park, Leeds.

Affiliated Societies.—The number of societies affiliated to the Union is 38, and it is with regret that we received the resignation of the Ovenden Naturalist Society, tendered on financial grounds.

The Presidency for 1929 has been offered to and accepted by Mr.

H. E. Wroot, of Leeds. Mr. Wroot is joint author with Prof. P. F. Kendall of 'The Geology of Yorkshire,' and during many years of office on the Executive of the Union has done much to advance the interests of geology and natural history generally in Yorkshire.

Obituary.—We regret to record the decease of the following: Edward Cockshaw, Wm. Horne, W. Harrison Hutton, H. R. Moiser, Johnson Wilkinson.

Secretariate.—The honorary secretarial duties have been carried out by Dr. W. H. Pearsall and Mr. F. A. Mason, F.R.M.S., and all the excursions have been attended by one or both of these officers. They desire to acknowledge the assistance of the Local Secretaries and the hearty co-operation of officers of the Affiliated Societies in the areas visited during the year.

The Honorary Treasurer, Mr. S. D. Persy Fisher, has carried through the duties of this responsible office during the year with enthusiasm and success.

The University of Leeds.—At the invitation of the Court of the University of Leeds, on the occasion of laying the Foundation Stone of the new buildings of the University, on October 2nd, by Her Grace the Duchess of Devonshire, the Union was represented by one of its Hon. Secretaries, Dr. W. H. Pearsall.

General Committee.—The following members have been elected Permanent Members of the General Committee:—Prof. A. C. Hardy, R. D'Oley Good, J. Grainger, Miss L. Scott, A. Malin Smith.

VERTEBRATE ZOOLOGY COMMITTEE.

North Riding (W. J. Clarke):—During the spring of 1928, most summer migrants seemed to reach the area under observation somewhat later than usual, notable exceptions being a Swallow seen at Scarborough on April 10th, and a Woodwren at Whitby on April 27th.

Sedge Warblers were more than usually numerous throughout the district. Whinchats were also more abundant in the Scarborough area, but very scarce about Whitby. Sand Martins, Landrails, Bullfinches Linnets and Greenfinches were present in greater numbers about Scarborough, while Herring Gulls and Kittiwakes have increased very largely. Chaffinches and Bramblings are reported to have been scarce during the winter about Whitby. The Woodcock is increasing as a breeding species, and was especially numerous about Whitby, where 40 were shot in one day—said to be a record for the district.

A Black Redstart was seen at Scarborough on November 21st, 1927.

A Grasshopper Warbler was heard at Scarborough on May 12th.

A Marsh Warbler was seen about the Mere by Messrs. A. T. Wallis and T. N. Roberts, on June 10th, and it stayed for some days. It was observed at close quarters, and both the bird and its song were identified by Mr. Wallis, who has had experience of the species on the continent.

The pair of Yellow Wagtails which usually have nested at the Mere did not appear this spring.

A male Blue-headed Yellow Wagtail was seen by Mr. F. Snowdon near Whitby High Light on May 5th, 1928. It was examined at close quarters with glasses, and identified with certainty.

Waxwings were reported in small numbers during December, 1927, at Scarborough, and a single one at Whitby during the same month.

Pied Flycatchers were observed during the spring migration at Scarborough and Whitby, and a pair nested in the latter district.

Goldfinches continue to flourish in the Whitby area, but have been less abundant about Scarborough, where a certain amount of illegal snaring still takes place.

A Siskin was seen by Mr. A. T. Wallis on December 18th, 1927, feeding on the roadway in Westborough.

A late Swift was flying over the Mere at Scarborough on September 8th, 1928.

Three Brent Geese were shot at Scalby Ness on December 27th, 1927.

Wild Fowl were very numerous about the Mere during the whole of the winter. Mallard and Wild Ducks were there in large numbers, 84 Pochards were counted in one lot, and many times between 60 and 70 individuals could be seen. All, however, departed as soon as the boats were placed on the water in the spring. Other species seen there from time to time included Golden Eye, Tufted Duck, Scaup, Wigeon and Teal, some being in considerable numbers.

Common Scoters reappeared off the coast, where they were practically absent during the winter of 1926. Flocks have been frequently seen near Whitby, and a few at Scarborough.

An adult Velvet Scoter frequented the Scarborough harbour from November 24th to 29th, 1927. A young female was obtained near Whitby on November 20th, 1927.

On July 27th, 1928, a Quail was heard calling, at Stainton Dale.

Curlews were on the moors during the breeding season in about their usual numbers, but Golden Plovers appeared to be somewhat less abundant.

An adult Little Gull frequented the Whitby harbour from early in August to the time of writing (October 16th).

An immature Iceland Gull in the first year's plumage lived in Scarborough harbour from 1st December to the 10th.

Single examples of the Little Auk were seen during December, 1927, on the North Sands, and in the Harbour at Scarborough.

An adult Great Northern Diver stayed about the harbour from January 21st, 1928 to February 9th.

An adult Fork-tailed Petrel was picked up alive in an exhausted condition at Appleton-le-moor on December 29th, 1927.

Many Fulmars frequented the Castle Hill during the whole of the nesting season, but no young birds could be seen. At Whitby, the species has also been present, and in at least one instance has bred, the young bird being still in the nesting place on August 16th.

The Scarborough coast has been fairly free from the floating oil nuisance during the last twelve months ; but at Whitby many birds have died from this cause, including Gannets, Cormorants, Puffins, Guillemots, Razorbills, and Great Black-backed Gulls.

The recorder is greatly indebted to Messrs. T. N. Roberts, of Scarborough, and F. Snowdon, of Whitby, for ornithological notes, and also to Messrs. J. A. and D. G. Stevenson, of Scarborough, for notes on fishes.

East Riding (E. W. Wade) :—An open winter with slight frosts, heavy gales, snow, and much rain, culminated in a heavy snowstorm, 9th to 12th March, with drifts up to 4 feet deep. April commenced with sunny weather up to the 11th, after which heavy gales, with frost and snow and rain continued until the 24th, the best of the month being fine and sunny. May and June were cold, dull months, with cutting N.E. winds, which even blighted the Hawthorn hedges along our east coasts. In July, gloriously sunny weather set in, and continued with scarcely an interval till autumn, the summer being a record for sunshine and absence of rain.

A year of such violent contrasts could not fail to affect our breeding birds. A Thrush under observation was sitting on four eggs on March 9th. Driven off by the snow, she built another nest five feet from the first, reared two broods in it, and a third in an adjacent trellis. Late summer, the Thrushes and Blackbirds were tame with hunger.

Rooks were a week behind the average date and laying smaller clutches

than usual. The first young were observed on 7th April, when many in the same rookery had not even laid eggs. The other Corvidæ were up to the average.

Owls had a moderate season, the scarcity of mice producing small broods of young.

Peewits were scarce, and are still slowly diminishing. Laying commenced in March, and eggs were found in May. Wading birds were below the average, excepting the Redshank, which is increasing in the district.

The first migrants were seen on the average date, but many appear ot have been delayed on passage, and put in a late appearance. The Spotted Flycatcher in particular was irregular in coming. A few came as usual, but the bulk were about a fortnight behind time. The cold spring ad versely affected all the smaller migrants, with the exception of the Willow Warbler. Nothing ever appears to diminish its numbers or quench the exuberance of its delightful song. Garden Warbler, Blackcap, Tree Pipit and Sand Martin were noticeably scarce. One district in whcih four pairs of Lesser Whitethroat reared young in 1927 held only one pair this year. The Blackcap Warbler was almost non-existent. Tree Pipits had nearly entirely deserted their usual haunts. A nest of Tree Pipits, destroyed in cutting and burning grass on a railway bank, showed exactly the same type of egg as in 1915, no nest having been observed in the interval. Generally, the Warblers were late in nesting, and laid small clutches.

The curious nesting habits of the Teal were under observation. In one large wood, three nests were found, all on dry ground among heather and bracken, 100 to 150 yards from water. It would appear that these nesting sites were not favourable to the birds, as two out of three nests were deserted after about ten days' incubating. On the other hand, unexpected cases of second broods were reported, probably owing to the stimulating influence of the sunny weather. Whinchats, which show a slight increase in number, in two instances reared second broods. Lesser Tern were double brooded. A pair of Great Tits in a garden nesting box, after rearing a first brood, commenced laying again on 23rd June, lad eight eggs, and reared five young. A cat having destroyed the hen bird, the young were fed and brought up by the cock. A second brood of Shelduck hatched at Spurn on 12th July, the first brood having hatched on 14th June. The Goldfinch maintains its usual numbers. The Woodcock again nested at Welton. In other parts of East Yorks. there is a decided increase, one keeper having seen five nests this year. When it is considered how much ground must have been missed in a large wooded area, which ten years ago held only one or two pairs, the increase is seen to be great.

The Stockdove, driven by increasing numbers to change its habits, has resorted more and more to nesting in plantations, building a nest like the Ringdove, and in one case well identified the bird was sitting in a Hawthorn hedge, close to a Waterhen which had adopted a similar nesting site.

A Red Bunting's nest was found in a grass field, five yards from water. Evidently this bird, which now nests on the sandhills at Spurn, shows a great adaptability in its choice of nesting sites.

Swallows and House Martins were generally double brooded, a few cases of a third brood being reported. Except in the Beverley district, their return and migration was not interrupted by frost or storm, and they disappeared peacefully from late July till October 6th. The Swifts were unusually late in leaving—on 19th August many of them had not left the villages where they nested.

The Corncrake is still diminishing, only five birds being heard. In the Beverley district, which up to now has always held a pair, none was observed.

The Partridge on our lower lands is generally scarce. By some it is thought that the cold weather drove the birds from their eggs or destroyed the young ; others say that the increase of the Pheasant, where their range overlaps, is driving the Partridge away. On the Wolds fairly good coveys are found.

Our Hornsea heronry contained twenty-three nests this year, and unfortunately the numbers appear to be gradually decreasing.

The Pink-footed Goose arrived on 22nd September. A Lesser Redpoll laid six eggs on 6th July, and reared its young.

At Bempton, the Guillemot is still decreasing, and one of the three remaining climbing gangs say it is hardly worth while continuing to climb, as the Kittiwakes are pushing all their Guillemots out. On the other hand, there is an increase of Guillemots at the western end of the cliffs, which suggests that the birds dispossessed on other ground were going there, as Kittiwakes are not increasing on that ground. Floating oil seems particularly fatal to Guillemots and Razorbills. At Spurn, any month in the year but August to October, the remains of dead birds may be seen, while occasionally up to 100 have been counted in the Flamborough district. In *Bird Notes* for July, it was reported that 266 Guillemots and Razorbills were counted last June, killed by oil, on the Norfolk coast. Meanwhile the Kittiwake increases by leaps and bounds, also the Herring Gull, the special foe to the Guillemot.

The Bempton pair of Gannets again tried to nest on Black Shelf, commencing two nests, but the nesting materials were carried away by Kittiwakes, as before, and the effort frustrated.

York District (Sydney H. Smith) :—Castle Howard lake, a favourite haunt of bird life, was occupied by big flocks of Mallards, Teal and Coots during January and February, and on the 5th of the latter month three Whooper Swans were seen, and a Garganey Teal. On February 25th, a pair of Goosanders was seen on the lake. Great Crested Grebes are still in evidence, but do not appear to have nested successfully this year. A pair of Goosanders occurred at East Cottingwith on February 25th ; as a rule, this species, when reported in the York district, are usually females, the opposite sex seldom being in company, are often reported at the same time from the Washburn Reservoir. An old brick yard at Dringhouses, York, is now the home of a pair of Great Crested Grebes, which commenced building a nest on April 1st, and on the 8th it contained five eggs. On the 24th, the water commenced to rise very rapidly, and the Grebes made desperate attempts to build the nest higher, but helped by the N.E. wind, the water flowed over the eggs and spoiled them. The Grebes nested again when the weather improved, and reared one young bird. A pair of Pochards was on this pond on April 8th, but did not stay and make a nest.

Owls have increased to an extraordinary extent in this district, and three species, Barn Owl, Tawny Owl and Long-eared Owl, are constantly observed at various places in the City. At 3 a.m. in the morning of March 7th, both Barn and Tawny Owls were hooting in the Exhibition Square, Deanery Gardens, around the Kings Manor School, and in Bootham Park. Others are known to have nested in the turrets of the Theatre Royal and in Bootham Bar. Little Owls also have continued to increase and extend their range. On May 2nd, one was seen at Tollerton, and a pair was shot at Fulford. They are further reported as being observed at Sandburn Woods, Four Alls, Skelton, Escrick and Skipwith.

A pair of Great Spotted Woodpeckers reared its brood in Suet Carr Wood, and a pair of Tree Creepers was also successful at the same place.

At Escrick, two pairs of Hawfinches reared young, and Goldfinches also reared their families at Acomb, Sandhutton, Escrick and Welburn.

Curlews again nested in this district, and reared young broods successfully at Allerthorpe Common, Sandburn and Strensall. A new site was Alne, where two pairs nested on a fallow field, where several young ones

were seen at the end of June. All these nesting sites are only 80 to 100 feet above sea level, and much lower than the usual moorland haunts of this species.

Kingfishers, Dippers and Sandpipers have all been fairly common this season on the Rivers Ouse, Rye and Nidd; and the Turtle Dove, although a summer visitor only, appears to increase, and has been observed at many different places during the summer months, notably Sandburn, Healaugh, Marston Moor, Stamford Bridge, Millington Springs, Gilling, Ampleforth and Byland Abbey.

A pair of Kestrels frequented the towers of York Minster, but this year did not make a nest as in previous years.

Nightjars have gradually decreased in number of late years, and old haunts like Skipwith Common only held one pair in 1928, and odd pairs were also observed at Sandburn, Scoreby and Helmsley.

A pair of Little Grebes successfully hatched young on a pond near Wigginton, and this species was noticed on several ponds in the neighbourhood of York, where it maintains its status.

Common species of birds—Thrush, Blackbird, Chaffinch, Hedge Sparrow, Spotted Flycatcher, Moorhen, Great and Blue Tits, Robin, Wren, Meadow and Tree Pipit, Whitethroat, Yellow and Reed Buntings, etc.—appear to have been in usual numbers.

The Marsh Tit nested at Skipwith, and here Linnets were few as compared with previous years, and only one pair of Whinchats was seen, whereas Willow Warblers were very common, and many more than appear to be normal numbers.

The nest of a Song Thrush was found at Skipwith, built directly upon the ground in a plantation. Mr. Vear states this is the second occasion he has found this to be done by the Song Thrush.

About twelve hundred Black-headed Gulls occupied the ponds on Skipwith Common; the pond nearest the road was most attractive, perhaps because the water and mud is deeper, and consequently safer from the point of view of the Gulls. Every year egg collectors take some toll of the nests, but protection is extended by the estate to the fullest extent possible. The season was normal so far as the arrival of the gull contingents was concerned, and in respect of nesting and laying of eggs, and it is thought more young birds were successfully reared than has been the case for several years. During the third week of May, large numbers of young Gulls in various stages of plumage, were observed on the two main ponds.

Mr. F. H. Edmondson informs me of the late nesting of Partridges at Scoreby, where the sitting hen was taken off the nest by a Fox during the night of September 19th.

I have to express my thanks for valuable assistance with local bird reports to Mr. Fred Vear (Skipwith), Mr. V. G. F. Zimmerman (York and Castle Howard), Mr. F. Shorney (Dringhouses), and Dr. J. S. Gaynor (Earswick).

Arrival of Migrants: York District, 1928.

Wheatear	York, March 15th; Askham Richard, Apl. 29th.
Chiff Chaff	Askham Bogs, April 1st.
Swallow	Linton-on-Ouse, April 8th; York, April 27th.
Sand Martin ...	Linton-on-Ouse, April 8th; Dunnington, April 30th.
Cuckoo	Dringhouses, April 15th; Rufforth, May 2nd.
Willow Warbler ...	Dringhouses, April 15th.
Yellow Wagtail ...	Acomb, April 26th.
Sedge Warbler ...	Askham Bogs, April 29th; York, May 12th.
Landrail	Boston Spa, April 27th; Marston Moor, May 13th.
Whitethroat ...	York, April 27th; Askham Bogs, April 29th.

Sandpiper	...	Hawnby, April 29th.
House Martin	...	Rufforth, May 2nd.
Pied Flycatcher	...	Hawnby, May 6th.
Swift ...	...	York, May 12th and May 13th.
Blackcap Warbler		Marston Moor, May 13th.

West Riding (H. B. Booth) :—During January and February, 1928, the district around Long Preston was startled by the report of a Golden Eagle on the surrounding fells, and more particularly around Crake Moor. I was not lucky enough to see the bird myself, but combining all the descriptions of those who had seen it I am practically certain that it was a Common Buzzard, and probably of the darker variety. The reports that it had attacked dogs in the neighbourhood were pure fabrications.

Swans.—Each spring we hear of Swans appearing in almost any kind of water, and usually they are immature birds, and have been driven away from their home waters by the fierceness of the older birds (particularly by the older males), which, when they commence love-making, show their fury towards outsiders. In 1928 we have had many more stray Swans than usual. But I will only deal with two reports, where they were definitely stated to be Wild Swans. Early in March five Swans settled on some flooded land on the farm of Mr. Harry Clarkson at Crosshills, where they were driven into a shed and fed. Although they were stated to be Wild Swans, and their differences from Mute Swans commented upon by the press, it was evident from the photographs produced in the same papers that they were immature Mute Swans and birds hatched in 1927. These were later turned out on Winterburn Reservoir, where your recorder saw them, each with one wing clipped. Afterwards, I understand, four of them were caught (the fifth could not be caught) and were sent to Malham Tarn.

The other case was that six Wild Swans descended on Larkfield Dam, Rawdon, in November, 1927. Out of these only two remained in March, when they were described in the local press as Whoopers, or Whistling Swans, and the description must have been taken from some natural history text-book, and not from the birds themselves. My surprise may be imagined when I visited Larkfield Dam on March 17th and found a pair of adult Mute Swans sail up to the side of the dam to me, expecting to be fed ! I understand that later they nested there.

Since the introduction of the Swans (nine in all) on Malham Tarn, the Great Crested Grebes have left, seeming to have resented the intrusion of the Swans (Mr. A. Ward).

Herons and Heronries.—As the magazine *British Birds* is endeavouring to take a census in England and Wales this season, special attention has been bestowed upon them in the West Riding. The results show that about 50 pairs of Herons have nested, or have attempted to nest, in the West Riding this season. These consist of four well-established heronries, one attempt to form a new heronry, and one isolated attempt to nest.

Black-headed Gulls.—I am obliged to Mr. J. A. Yelland, of Bradford, who has been making notes on the comparatively new nesting station (of some half-dozen years or so) at Summer Lodge Tarn, in Swaledale. These gulls nest in the rushes at one end of the Tarn. Close to the edge of the Tarn, where it is possible to walk on the rushes without sinking into the water, the nests are very slight constructions, but further out they are built on the water, and are very large.

On May 24th, 1926, there were nearly 100 nests, mostly containing two or three eggs, but not any young ones.

On June 4th, 1927, there were over 100 nests, some containing eggs, and others with young birds ; also several nests were empty, where the young had evidently hatched and left. May 7th, 1928 : A large number of Gulls, but not a sign of a nest. May 28th, 1928 : There were 189

nests; but nesting was very backward. There were not any young birds, and some of the nests held no eggs, some one egg only, but the majority had two eggs, and a few with three eggs. One nest contained four bluish eggs, evidently laid by the same bird. There was also a very large pale Gull, without a black head, present, which Mr. Yelland took to be a Herring Gull.

Other Nesting Notes.—For about ten years the Greater Spotted Woodpecker has frequented Saltaire throughout the winter, and for the past three or four years it has remained throughout the summer, and has been suspected of breeding near there, but its actual nesting could not be located. In the second week in June this year Mr. Sam Longbottom discovered the nesting hole in a living Birch tree, well within a mile of Saltaire. The parents were feeding young at the time, and on June 17th the latter were almost ready to leave the nesting hole.

Mr. Rosse Butterfield reported an extremely late nest of the Grey Wagtail. He had seen it on August 4th with young in the nest at Grassington, and considered that the male bird had an abnormal call note—more like that of the Yellow Wagtail. I visited the spot on August 11th, when the young had just left the nest and the female was feeding two of them close by. I was not able to see or hear the male; probably he was looking after some of his young that had got further away. Red Grouse have been rather 'spotty' in their breeding. While they have done very well on Ilkley Moor, yet on the Bolton Abbey Moors, only a few miles away, they have done very badly. There a number of dead birds were picked up both before and during the nesting season, and the majority of these were hens. But generally Red Grouse have done badly.

Migratory Notes.—Single birds, or a few of a species, arrived early, in spite of the cold north-east winds and frosty nights; but the bulk of the immigrants came about their usual dates. Among early arrivals the following may be noted. On April 8th Mr. Robinson reported a Swallow on the Ilkley Golf Links, and on the same day Mr. A. Malins Smith saw one at Clapham. Probably both birds perished. On April 10th Mr. J. Astin saw a Tree Pipit, in song, and on April 9th a single Willow Warbler. It was April 21st before many of the latter species had arrived, and then they were so starved that not one I saw on that day was in song. On April 28th five or six Wood Warblers were singing in Bolton Woods. I never remember seeing or hearing this species before early May here. Mr. E. R. Firth reported the Nightjar near his house just outside Ilkley on May 13th, which is early for this district. Contrary to my expectations (see last year's report) Swifts arrived in about their usual numbers. One was seen high in the air on April 29th, several on May 3rd and on May 8th; but it was May 10th before our Ben Rhydding contingent arrived at their old haunts.

On May 5th of this year, and two subsequent days, four Black Terns were reported on the Harlington Meadows, quite close to Mexborough, by Mr. J. W. Wall (*North West Nat.* for June).

A Dotterel was reported as seen by two good field ornithologists (the brothers Wilson) on May 6th, near to Roggan Hall, on the Hazlewood Moors, Bolton Abbey. The Rev. C. F. Tomlinson and your recorder made a careful search for it on May 12th, but without success.

Rooks.—Mr. W. G. Bramley, from the Bolton Percy district, writes: 'The dry weather in July considerably affected Rooks. It was impossible to keep them away from potatoes unless you were there continually. Many young Rooks were unable to obtain sufficient food, and could easily be run down. During the middle of the day they were often noted gasping for breath.'

Variation in Plumage.—I have had the usual reports of several Pied Blackbirds. Mr. Rosse Butterfield reports that on August 2nd he

saw a fine buff-coloured Swallow, near Griff Mill, between Oldfield and Stanburn.

In 1927 a light cream-coloured Carrion Crow haunted the neighbourhood of Malham Tarn, and probably it was a bird of the year. This year it (or another) is almost pure white. It is evidently a male, as it paired with a black female, which latter was unfortunately shot (Mr. A. Ward).

MAMMALS, AMPHIBIANS, REPTILES AND FISHES COMMITTEE.

Mammals (W. G. Bramley) :—According to reports received from Messrs. S. H. Smith, H. B. Booth and F. H. Edmondson, Otters are evidently on the increase in most parts of the county, especially in Airedale, Wharfedale and the Ribble Valley. Mr. Booth records five as having been obtained in the first two areas.

Badgers still hold their own, and are to be found in their usual haunts, chiefly in the North Riding, but do not seem to have increased during the past few years to the extent that Otters have.

The Grey Squirrel is on the increase in the York area, while the native species is apparently disappearing. The Red Squirrel has, Mr. W. J. Clarke informs me, almost gone from many of its usual haunts in the North Riding.

Hares and Rabbits have had a good season, although in some districts the rains of early June drowned many. A brown and white 'Dutch marked' Rabbit was seen by the recorder about half-way between Kettlewell and Kilnsey Crag at the beginning of August.

A White-beaked Dolphin is recorded by Mr. F. Snowden near Whitby in August, 1928, but details are lacking.

A young Common Seal was captured in Filey Bay on November 25th, 1927, and has been exhibited there during the past summer.

An account of a young Killer Whale washed ashore at Scarborough on November 12th, 1927, has already appeared in *The Naturalist* (1928, pp. 15-16).

A Pipistrelle Bat taken at Scarborough on July 20th measured 30·5 mm. along the forearm, being the largest yet examined at the Natural History Museum, South Kensington.

Reptiles.—Mr. W. J. Clarke writes :—Vipers still continue to abound in suitable localities (in the North Riding) in spite of continual persecution. Specimens were seen in an active condition so late as October 25th, 1927, and October 27th, 1927. They reappeared from their winter's hibernation on February 27th. Six adults and one young one were seen on March 3rd.

Fishes.—I am indebted to Messrs. W. Carter Platts, S. H. Smith and H. B. Booth for the following information :—

On February 25th, Mr. J. H. R. Bazley, fishing in Hornsea Mere was successful in landing the largest Pike that has been taken from this famous Pike fishery. It weighed 30 lb.

From the Ribble at Long Preston, Mr. H. Hyde, a one-armed angler of Skipton, took a Pike of 12 lb. about the beginning of March. This fish was taken on a bait of White Herring, 12 oz. in weight, a bait which has proved successful in taking several notable Pike in the Craven district.

The River Hull yielded a Pike of 16 lb. about the same time, and one of 6 lb. 2 oz., measuring 2½ feet in length, was taken from the Aire at Cononley Ings in early October.

Trout and fresh-water fishing has been patchy, but taken all round may be considered as being about up to the average.

The Hawes length of the Ure has yielded one of the largest Trout

within memory, a splendid specimen of 8¼ lb. Another large Trout was taken on fly in the Derwent at Forge Valley on July 10th. It weighed 3¼ lb. and measured 20 inches in length. An examination of its scales shewed that the fish was 5½ years old.

A Roach of 2 lb. 2 oz. was taken from the Ouse at York, and another of 1 lb. 14 oz. at Bishopthorpe.

The floods in the early part of the Salmon season were responsible for the large numbers of fish which reached the higher water of the Ouse and its tributaries. On the Ure good catches were made, but during the later periods of low water large numbers of fish were found dead.

On the Esk the Salmon season was well up to last year's average. The season was a little later but not so sporadic, only the last week being blank, except for Sea Trout. The number of fish taken were 6,131, and had a value of over £4,073. The average weight was 12·34 lb. Mr. Carter Platts says the increase in weight is attributed to the occurrence of Norwegian fish, which, he states, are coarser in the flesh, rougher in the scale and duller in colour. Their presence in the Esk is not to be deprecated as they are stronger and more ' game ' than our native fish.

Marine Fishes (W. J. Clarke) :—Close observations have been made upon the marine fishes of the Scarborough area, the result being several additions to the local list, and one or two possibly new to County waters.

A short-spined Sea Bullhead 9 inches long, was taken near Robin Hoods Bay on February 8th ; another 11 inches long from the pier at Scarborough on September 15th. Although considered a common species it is certainly not abundant in the Scarborough area.

A large Long-spined Sea Bullhead was taken at Scarborough on December 4th, 1927, measuring 12 inches in length.

Several Red Gurnards have been trawled near Scarborough, specimens being seen on December 9th and December 10th, 1927, on February 6th, 1928, and on other dates.

A single Streaked Gurnard was taken near Robin Hood's Bay on February 21st, 1928.

During the last three months of 1927 an important invasion of Ray's Sea Bream took place along the eastern coasts of Great Britain. Fifteen were noted at Scarborough, four at Filey, one at Flamborough, and four at Whitby. There is no doubt that many more occurred but did not come under observation.

A John Dory was captured alive in the harbour at Scarborough on June 30th, an unusual place to find this deep water species.

Several Jeffrey's Goby were taken during the summer in Shrimp nets at Filey.

A cod weighing 3½ stones was landed on Scarborough Fish Market on January 23rd, 1928.

Two Lesser Fork-beards were observed, one from Robin Hood's Bay on January 7th, 1928, and another trawled near Scarborough on February 6th, 1928.

A small Four-bearded Rockling was trawled near Whitby on September 28th, 1928, measuring 2¼ inches in length.

Five Norwegian Topknots were trawled near Robin Hood's Bay, three miles from the shore, on January 21st, 1928. Evidently this little flat fish, only recently recognised as occurring in Yorkshire waters, is not very uncommon.

A Muller's Topknot was taken near Whitby on April 2nd, 1928, and another of unusual size, measuring 10¼ inches in length, near Scarborough on July 7th, 1928.

The Worm Pipe Fish, the smallest British species, has again appeared

in the South Bay at Scarborough, one measuring 6 inches in length being found in a rock pool on August 6th, 1928, another 7 inches long on September 1st, 1928.

A Pearlside was picked up stranded on the South Sands on March 20th, 1928, after a south-easterly breeze. It measured $2\frac{5}{8}$ inches in length.

An Argentine (*A. silus*) was trawled 44 miles E.N.E. of Scarborough on August 25th, 1928. It measured 13 inches long, and is a rare species in the North Sea.

Porbeagle Sharks occurred as usual in some numbers, several being seen very close inshore at various points along the coast.

A Thresher Shark, measuring 12 feet in length, was caught in the Salmon nets at Filey on July 28th, 1928.

During January, 1928, there was an unusual visitation of Lesser Spotted Dogfish in the Scarborough and Whitby area. Fifty-four were captured on January 4th, 14 on the 5th, 65 on the 6th, 2 on the 7th, 12 on the 9th, 2 on the 13th, and 1 on the 17th. All these were landed at Scarborough. This is not as a rule a common Yorkshire species.

Starry Rays continue an abundant species in Yorkshire waters. A female, $17\frac{1}{2}$ inches long, found on the Scarborough fish market on January 24th contained a perfectly developed egg, the first to be placed in the National Collection at South Kensington.

A fine Sting Ray, measuring 33 inches in length, was captured in Filey Bay on July 5th, 1928.

On the following day a small Sea Lamprey, about 15 inches in length, was taken near Scarborough.

WILD BIRDS AND EGGS PROTECTION COMMITTEE.

Wild Birds and Eggs Protection Committee (F. H. Edmondson):—The breeding season for 1928 has been a fair one. The cold weather between Easter and Whitsuntide caused some second broods, and on the whole I think young birds bred in the county have come off fairly well.

The Peregrine Falcon in North West Yorkshire.—Again they have been unsuccessful in the north, only one pair managed to rear their young, and that not the pair we specially try to protect.

Stone Curlew in the North Riding.—Four or five pairs arrived at the old station, and about three pairs at the adjoining station, and I think all have successfully reared their young.

Hornsea Mere.—There has been a good breeding season, all the usual birds have been there in increased numbers.

Fulmar Petrel.—Not quite as many have been this year, although they have bred successfully in isolated pairs all along the cliffs.

Merlin in the West Riding.—I think a few more than usual have reared their young, but many nests were destroyed by the game-keepers.

Kilnsea and Spurn.—The first eggs of the Ring Plover were marked on May 13th. The first Little Tern arrived about May 16th, and commenced to lay on May 20th. The first young Ring Plovers were seen on May 19th.

On May 28th five youths were seen hunting for eggs, they refused to give their names but left on interrogation.

The usual high tides between June 18th and 19th did a good deal of damage, although the nests on the higher parts were hatching off satisfactorily. The last eggs hatched off about July 20th.

We have had a fairly successful season; several of the members of the Yorkshire Naturalists' Union who visited Kilnsea, Spurn, and Hornsea gave satisfactory reports.

1929 Feb. 1

BALANCE SHEET.

Receipts.	£	s.	d.
Mr. A. Hirst	5	0	0
Mr. W. H. St. Quintin	5	0	0
Major Dent	2	0	0
Mr. J. Atkinson ...	1	1	0
Mr. S. H. Smith ...	1	1	0
Mr. J. Wilkinson ...	1	1	0
Mr. H. B. Booth ...	1	0	0
Mr. F. H. Edmondson	1	0	0
Mr. R. H. Edmondson	1	0	0
Miss Waterhouse ...	1	0	0
Mr. W. G. Bramley ...	0	15	0
Mr. H. J. Behrens ...	0	10	6
Mr. E. B. Gibson ...	0	10	6
Mr. J. Y. Granger ...	0	10	6
Mr. J. F. Musham ...	0	10	6
Mr. C. H. Procter ...	0	10	6
Mr. E. W. Wade ...	0	10	6
Mrs. J. S. Binns ...	0	10	0
Mr. R. Chislett ...	0	10	0
Miss Edmondson ...	0	10	0
Mr. W. J. Forrest ...	0	10	0
Mr. A. Haigh Lumby	0	10	0
Mr. A. Jordan ...	0	10	0
Mr. B. Linney ...	0	10	0
Mrs. Yellowlees ...	0	10	0
Mr. E. W. Taylor ...	0	7	6
Mrs. E. Cox	0	5	0
Mr. G. Fysher ...	0	5	0
Mr. R. Howarth ...	0	5	0
Mr. R. Howarth ...	0	5	0
Mr. Jackson Smith ...	0	5	0
Mrs. J. Wood	0	2	6
Mr. W. Waterhouse ...	0	2	6
Masters F. and P. Wood	0	1	0
Total Subscriptions ...	28	17	0
Bank Interest for Year	0	6	3
Balance from Season 1927	23	5	5
	£52	8	8

Payments.	£	s.	d.
Cheque Book	0	8	0
Mr. J. W. Medcalfe ...	14	0	0
Mr. J. B. Clubley ...	7	5	0
Mr. M. Hodgson ...	5	0	0
Mr. J. Green	3	0	0
Mr. N. Pateman ...	0	10	0
Mr. S. East	0	10	0
Stationers	1	13	0
Commission	0	1	0
Total Cost	32	7	0
Balance in Hand ...	20	1	8
	£52	8	8

Audited and found correct,
22nd October, 1928.
W. E. L. Wattam.

Freda Edmondson,
Hon. Treasurer.

ENTOMOLOGICAL SECTION.

Coleoptera Committee (M. L. Thompson) :—Members of the Coleoptera Committee attended the meetings of the Union at Ayton and Broughton, Easington and Spurn, Austwick and Richmond, when a few of the more interesting beetles characteristic of these localities were taken. The special meeting of the Entomological Section was very well attended at Buttercrambe Woods in June, when *Mantusa obtusata* Gyll. and *Anthribus variegatus* Fourc. were the most interesting species met with. Some interesting species have been taken by individual members of the Committee. Mr. E. G. Bayford, working among the older specimens in his collection, has discovered examples of *Micralymma marinum* Stroem. (*brevipenne* Gen.) taken so long ago as 1886 at Scarborough, and *Phyllotreta nodicornis* Marsh from Barnsley in 1899 ; also *Lyctus brunneus* Steph., taken at Barnsley, these two last being new to the county. Mr. G. B. Walsh has met with *Atheta excellens* Fk., *A. flavipes* Thoms., *Malthodes flavoguttatus* Kies., *Ptenidium nitidum* Hur. and *Scaphidema metallicum* F. in the Scarborough district. Mr. C. E. Stott, visiting the same district, has taken *Hydræna testacea* Curt., *Cercyon terminatus* Marsh., *Atheta lutipes* Er., *A. monticola* Th., *A. palustris* Kies., *A. arenicola* Thoms., *Ptenidium fuscicorne* Er., and *Sitones cylindricollis* Fahrs. *Hydnobius punctatissimus* Steph., a very local insect, was met with on the coast at Eston-in-Cleveland. Another interesting insect is *Batrisodes venustus* Reich., which was taken at Spurn by Mr. J. M. Brown.

Hymenoptera (R. Butterfield) :—The past summer has been the sunniest since 1921, though the average day temperature has not been high, and the nights were cold until near midsummer. As a result of a number of unfavourable summers the Hymenoptera seem to have been reduced in numbers ; but an increase should be apparent next year. There seems to have been more second broods than usual. I saw *Andrena trimmerona* ♀ working in my garden as late as September 24th ; and also the bronzy species of *Halictus*. The early *Andrena cineraria* had a second brood on the moors in August.

Mr. Wm. J. Fordham found a female *Methoca ichneumonides* Latr. at Allerthorpe Common. It was in a rut in a sandy cart-track near some Cicindela burrows. He has previously found the male. The female is wingless. Nothing was known as to the habits of *Methoca* at the time of the publication of Saunder's Monograph in 1896. At Allerthorpe he took a male *Mellinus sabulosus* Fab. At the same place Mr. J. Wood also took this species.

Mr. Wood and I twice visited the Ribble Valley in Bolton-by-Bolland district. *Andrena rosæ* v. *eximia* was the only form which was new. We also visited Allerthorpe on two or three occasions. Our first visit was in April 28th. Mr. Wood found a nest of *Bombus jonellus* about the size of a cricket ball with opening in side. The nest was under a covering of dead leaves and herbage, but not actually under ground. I noticed a newly-made burrow in a raised sandy patch covered with a thin layer of peat. On excavating the burrow a female *Andrena rufitrus* was found. Two or three males were afterwards found on sloe blossom, and also an example of *Andrena angustior*. In July I paid a visit to Kilnsea and found one or two interesting Aculeates.

Diptera (Chris. A. Cheetham).—The excursions were favoured with good weather and interesting collections were made at Spurn, Cawthorne and Buttercrambe, which included many additions to our lists. Mr. Fordham, who is now living at Barmby Moor, has found some good species on Allerthorpe Common, perhaps the most interesting being *Nemotelus uliginosus* L. from the old ponds near Frog Hall. This is a small fly belonging to Stratiomyidæ, a family poorly represented in Yorkshire. Another very interesting addition, *Chemopogon apicalis* Mg., we owe to Mr. H. Maxwell Stuart. Fortunately Mr. Stuart has been able to throw light on the life history of this species, which has hitherto been little known or perhaps it would be better to say that previous statements have been quite wrong.

The summer was on the whole a fair one for collecting, but not so good as the fine summer of 1921 ; possibly your recorder's collecting days came at inopportune times, and others may have been more fortunate. Looking back over the year the impression is a succession of promises of good things which never materialised.

I cannot recall one day that yielded anything approaching what it seemed to promise. Diptera of all sorts—even the troublesome pests—have been scarce, and it must be due in part to the weather of the last two or three years. To look at a particular genus, the Tipulids, many species have not been noted, those living in the dampest situations being nearest to normal numbers, and *T. paludosa* Mg. has perhaps been more frequent than in recent years, but the early species, *T. vernalis* Mg., was much less in evidence than normally. Reports of the work done will be found in the pages of *The Naturalist*, where the more interesting finds are mentioned, but some others remain for later study. One very fine fly, *Helophilus trivittatus* F. was caught on Austwick Moss, 28/7/1928. I have only heard of two previous Yorkshire examples. At Crag Wood, Rawdon, 5/9/1928, I found *Rhamphomyia hirsutipes* Coll., a species recently described in *The Entomologist's Monthly Magazine*, and on Newby Moor, 14/7/1928. I caught *Carpotricha gutiularis* Mg., a species previously only in our list as a gall record.

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It is evident that interest in the group of two winged flies is still increasing, and there is promise of still more workers in the future.

Lepidoptera.—The Recorder, Mr. B. Morley, reports that he has done little collecting during the present year, and he has received no records from other workers in this group. He will be glad at all times to receive particulars of captures of interest.

Hemiptera (J. M. Brown):—Though the early part of the season was not very promising, and the Hemiptera were late in making their appearance, the present year has proved to be a very good one, and although at present I can report only two additions to the county list, a number of interesting species have been taken in different parts of Yorkshire. Most of the field meetings have been attended and accounts of the insects collected have appeared in *The Naturalist*. Among the Hemiptera obtained are *Asopus punctatus*, one of the less common shield-bugs first recorded for the county by Mr. Walsh from Skipwith, and now taken at Buttercrambe by Mr. Walsh and myself, and at Allerthorpe by Mr. Fordham; *Elasmostethus interstinctus* taken plentifully at Buttercrambe; *Notochilus contractus* obtained again at Spurn; *Cyllocoris flavomaculatus* at Buttercrambe and Greta; *Dichrooscytus rufipennis* in Deffer Wood; *Microphysa elegantula* near Sheffield; and the Homoptera, *Stiroma bicarinata* taken at Grassington, and *S. nigrolineata* at Spurn, both new to the county.

Neuroptera (J. M. Brown):—Among the powdery-winged Neuroptera I have this year obtained *Coniopteryx tineiformis* at Wharncliffe, Ecclesall Woods, Grass Woods and Whitcliffe Woods, *Semidalis aleurodiformis* at Ecclesall Woods, *S. curtisiana* at Ecclesall Woods. These delicate insects do not appear to have been noted before.

Orthoptera (J. M. Brown):—The Lesser Earwig, *Labia minor*, which has been reported from only one or two stations in the county, I obtained at Aske.

Psocoptera (J. M. Brown):—Attention is now being given to this group of insects, and several additions to the county list have been made, including two or three apparently rather rare forms. I have now taken about twenty species in Yorkshire.

Arachnida (Wm. Falconer):—During the year four small gatherings have passed through my hands, one from Halifax (Mr. Harris), another from Hebden Bridge (Mr. D. Sutcliffe), and two others made during the meeting of the Union at Austwick (Mr. W. P. Winter and Dr. Lovett), and of the Entomological Section at Buttercrambe Woods (Mr. W. P. Winter), both in June. Most of the spiders were common and widely distributed species, but in the last-named locality Mr. Winter discovered a spider new to the county, and another for which there is only one previous record of an immature male. Two falsescorpions, *Chthonius tetrachelatus* Preys. and *C. rayi* L. Koch, are mentioned in *The Naturalist* for September, p. 276, as occurring at Spurn, but both had previously been found there. Last year I revised the whole of the large collection made by the late Mr. Linnæus Greening, now in the Warrington Muncicipal Museum. Included in it are a few Yorkshire examples of interest collected in September, 1899, which, together with those accruing from the activities of the Union—the former distinguished by the initials W.M.M. and the latter, where necessary, by W.P.W. and Dr. L.—which claim recognition for distributional reasons or because of the paucity of published notices, are listed below.

SPIDERS.

Dictyna arundinacea Linn. Harrogate, both sexes, W.M.M.
Amaurobius ferox Walck. Lister Lane, Halifax, ♂, Mr. Harris.
Zelotes apricorum L. Koch. Oxenber, females, W.P.W., Dr. L. Four previous county records.

Scotophæus blackwallii Thor. Great Ormesby, ♀, ♂, W.M.M. This predates Mr. Stainforth's Rye Hill specimen of 1908.
Episinus angulatus Bl. Buttercrambe Woods, two males. The only other Yorkshire record, Linton Common, immature male.
Theridion denticulatum Walck. Buttercrambe Woods, several females.
Enidia cornuta Bl. As above, ♂.
Leptorhoptrum huthwaitii Cb. Upper Shibden, ♂, Mr. Harris.
Oreonetides abnormis Bl. Oxenber, ♂, W.P.W.
Microneta viaria Bl. Buttercrambe Woods, ♂.
Bathyphantes concolor Wid. Oxenber, ♂, W.P.W.
B. dorsalis Wid. Buttercrambe Woods, ♂.
Leptyphantes tenebricola Wid. As above, ♀.
L. flavipes Bl. As above, ♂.
Tetragnatha solandrii Scop. As above, both sexes.
Epeira cucurbitina Clerck. As above, ♀.
E. quadrata Clerck. Harrogate, both sexes, W.M.M.
Xysticus lanio C. L. Koch. Buttercrambe Woods, an adult female. A very fine, valuable and unexpected addition to the Yorkshire arachnidal fauna, the first to be made since 1919 (*Nat.*, December, 1922, p. 389). Mostly of southern occurrence, but reported from Cheviot Hills and Staffordshire.
Chiracanthium carnifex Fabr. Harrogate, several females, W.M.M. This predates the writer's Scarborough record of 1906 (*Nat.*, June, p. 180). Four previous county notices.
Clubiona brevipes Bl. Buttercrambe Woods, ♀.
Textrix denticulata Oliv. Oxenber, ♀, Dr. L.
Lycosa palustris Linn. Warley Town, Halifax, ♂, Mr. Harris; Oxenber, ♀, W.P.W.
L. nigriceps Thor. Harrogate, W.M.M. This predates the writer's 1903 record (*Nat.*, May, 1922, p. 174).
Heliophanus cupreus Walck. Oxenber, ♂, Dr. L. Four previous county records, one each in Vice-Counties 61 to 64.
Evarcha falcata Bl. Buttercrambe Wood, ♀.

Harvestman.

Megabunus diadema Fabr. Oxenber, Dr. L.

Mites.

Sericothrombium holosericeum Linn. Oxenber, two examples, Dr. L.
Ixodes hexagonus Leach. Hebden Bridge. One example taken from a ferret, Mr. D. Sutcliffe. Previous record, Selby, from a cat.

Plant Galls Committee (W. Falconer) :—The reports of the work of the members of this Committee have already appeared in *The Naturalist* in connexion with the excursions of the Yorkshire Naturalists' Union, etc.

A. A. Dallman reports :—The remarkable cecidia developed from the pistillate catkins of *Salix fragilis* L. (Houard S.l.) which I first observed in Yorkshire in 1920 (*Journal of Botany*, 1925, pp. 103-4) are becoming quite common in the Don and Dearne Valleys, and appear to be extending their range. I have seen this type of galling in many places about Doncaster, Conisborough, and Mexborough. First observed in Essex in 1906, it has gradually extended its range, and it would be well to keep it under observation in Yorkshire. It is quite possible that it may have been in the West Riding as far back as 1906 or earlier, but been overlooked. In such event it may not have reached here from Essex or the south of England.

BOTANICAL SECTION.

(Chris. A. Cheetham) : The past year will probably be officially recorded as exceptionally sunny, but for the purpose of noting its effect

on the vegetation, a more detailed consideration is necessary. To hark back to December, 1927, will bring us to keen frosty weather, with heavy snowfalls in some districts; following this, January and February were mild and damp, and we had some days at the commencement of March with abnormally high temperature, keen frosts returned on March 11th and 12th, retarding the growth started by the mild weather, the latter part of March was wet. April opened with a warmth giving a delightful Easter, but again a cold spell with keen frosts set in until about the 23rd, when the fine warm weather returned in time for Whitsuntide. June started fine, but was cool and unsettled, with some gales later. July and August were fine, much more so in the south than in the north. We had a spell of hot weather, July 11th to 16th, and a fine August Bank Holiday. September was sunny, but had some cold nights with frosts.

It will be seen that the chief feature is the quick changes, with sharp rises and falls of temperature during the growing period. These occasional frosts doubtless caused the variable fruit crops.

The outstanding crop this year is that of the Mountain Ash; where this occurs in plenty, as in the limestone scrubwoods of Craven, the trees are bent down under the load of berries, a display of colour that will be remembered when the rest of the vagaries of 1928 are forgotten. No other tree is reported with more than an average crop. The Oaks are good at lower altitudes, but poor in the uplands. The Ash is below normal, but not like the complete failure of 1926, which preceded the heavy crop of 1927. Mr. Burnley, however, says that in the Scarborough district there is a complete absence of Ash fruits. Brambles yielded fairly good crops in most districts, and Rasps have had a long fruiting season, though not so abundant as last year. Roses are full of hips, and Elder and Guelder Rose have good crops. Hazel Nuts are not nearly so plentiful as last year in Craven, but are reported as good in the Huddersfield area. The fruit trees vary in different districts, on the whole there is an average crop of Apples, Pears and Plums, the Wild Crab is generally speaking good, but Sloes are again poor; like last year a few odd trees make a good show, and it is not the complete failure of 1926. Beech and Horse Chestnut are variable, but on the whole they have a medium crop, and are much better than last year. Among the smaller plants, the Wild Strawberry and Woody Nightshade have had good crops, whilst the Bilberry, Crowberry and Cloudberry crops are poor. In many cases the amount of blossom and promise, and the final result in fruit do not agree, the blossom on the Apples, Pears and many others was very fine, whereas the fruit crops are only moderate.

Mr. Wattam remarks on the poor colouration and general weakness of the bloom spikes of the Wild Hyacinth in the Huddersfield area, and he thinks it due to the lack of sunshine and excessive wetness of the past winter and spring. Regarding seedlings, he states :—The most abundant have been those of the Sycamore, Ash and Beech, but even these were below the average. He met with a few Oak, Holly and Hawthorn, and in the moorland cloughs seedlings of *Salix caprea* were fairly abundant.

Mr. R. J. Flintoff reports that in the Goathland district he found *Gentiana pneumonanthe* growing in its old station—he had missed it for several seasons, and thought it had been 'dug up.' It is not so plentiful as it used to be. *Cornus suecica* flowered well, and he states that it is, in his opinion, increasing. *Trollius europæus* flowered well and plentifully, and *Carduus heterophyllus* is increasing. *Salvia nemorosa, Brassica elongata* and *Claytonia perfoliata* have gone. *Chrysosplenum alternifolium* he finds in four or five stations. He thinks *Calluna vulgaris* did not flower so well as usual: other observers state it was late and soon over. *Cynoglossum officinalis* and *Atropa belladonna* fruited extremely well. *Habenaria albida, Primula farinosa* and *Tulipa sylvestris* he saw for the first time, and also saw many fine specimens of *Ophrys muscifera* and one

or two of *O. apifera*. *Osmunda* flourishes and increases in its old station, thanks to the protection given to it by the owner of the land. This fern was once common hereabouts, now it is very rare.

Mr. Norman Frankland, writing from Horton-in-Craven, states that it has been a poor year for Orchids, and in some fields where normally dozens of Butterfly Orchids were to be had, only one or two were to be seen. He also mentions that it has been a very poor year for Mushrooms—this I have noticed in the Austwick district, the few seen being on the hills rather than in the lower cultivated fields.

Mr. Sturdy reported the Flowering Rush, in flower, near Settle, in a place where he had first found it in 1876, but where he had not seen it for thirty years, though he had regularly sought it there. He said the Purple Saxifrage was in full flower on Pennyghent on March 31st; it was past its best at that date on Moughton. He also reports the Holly-fern from another locality, several good plants. The Crosshills naturalists saw the Sweet Flag in various places in the canal between Skipton and Silsden.

Mr. Haley, writing from Ravensthorpe, in response to a query as to the aliens in the district, says they are conspicuous by their absence. Before the war, he could pick up thirty or forty specimens in places where now there are none. It appears that the maltsters keep all their refuse, or sortings from the barley, for chicken food, and consequently all the waste ground where they used to throw this is now covered by *Epilobium angustifolium*. *Coronella varia* is spreading, and *Claytonia alsinoides* is in many places in the woods. *Senecio sarracenicus* and *Euphorbia pseudocyparissias* are getting squeezed out by *Impatiens glandulifera*, and *I. parviflora* has disappeared from the same cause. There is still a good show of *Saponaria officinalis*, and a few plants of *Sisymbrium pannonicum* and *S. austriacum* are still left.

With regard to the 'secondary growth' that was so much in evidence in 1927, Mr. Wattam states that the extra woody growth of last year was quite sound, and in consequence the leafage of the trees which produced this extraordinary growth has been beyond the average. Mr. Beanland writes: secondary growth wants watching for another year along with the sort of weather!! We have had a good time since July, dry, sunny and warm, *but very little secondary growth has taken place*, hardly normal in any I have seen, yet it was wet weather up to the end of June. May we infer, on the contrast with last year's growth, that abnormal wet has a lot to do with it if *continuously* so; the change after June would indicate this, though it is too short an observation, four or five years at least are required definitely to say that wet or dry summer months are the cause.

Most observers state that little secondary growth was seen. Mr. Frankland, however, thinks that in his district there was more than last year, but this was in early August. At this time I saw a few Oak trees at Austwick, and a row of Lime trees which showed it markedly for a short time, but it did not develop much further. The pages of *The Naturalist* show that Botanical interest is still a lively force in the county. On the excursions the swing of the pendulum was definitely to the Botanical side, and other sections must look to their laurels! In the excursion reports, it is well to the fore, and also in individual papers in various branches:—Prof. Priestley, on 'Secondary Foliage'; A. S. Foster, on 'Precociously Opening Buds'; J. M. Brown, 'A New Locality for Schœnus,' etc.; J. H. Payne, 'Yorkshire Moss Records'; F. E. Milsom, 'Mosses and Hepatics of S. Pennines'; R. T. Flintoff on 'Andromeda near Goathland'; and F. A. Mason, on 'Yorkshire Basidiomycetes.'

To look back over the year's work, and realise what has been done, will cheer the hearts of our older botanists who are sometimes inclined to deplore the fancied lack of interest at the present time. If the

enthusiasm of 1928 can be maintained the future for Yorkshire Botany is assured.

Botanical Survey Committee (W. H. Burrell) :—The year which has passed has been notable in several respects for the work accompished by our members. Mr. A. Malins Smith reported last year on the Bog Algæ he has been studying, and it is good to know that these studies are being continued, and fresh problems tackled. Retirement from academic duties has endowed Dr. T. W. Woodhead with new opportunities and enthusiasm. He is continuing his researches on Yorkshire peat, and he gave an exhaustive summary of his results at the recent British Association meeting at Glasgow, This is a fitting occasion to congratulate Dr. Woodhead on his recent notable contributions to the study of post-glacial vegetation and climate.

The joint secretaries of the Union have, as usual, contributed to the success of the excursions by their field notes.

Mention may be made here of a list of the Flowering Plants of Whitby, edited by the Rev. Canon Fisher, to which our friend, Mr. Flintoff, contributed.

Messrs. Stiles and Bellamy have written on the Diatom Flora of the River Went, and Mr. Milsom has described the Typical Moss Flora of the Southern Pennines.

The field meetings of the Union have been well attended, and reports on botanical survey at these meetings have appeared in *The Naturalist*. Particularly valuable have been the full reports on Lichens, contributed by Mr. W. E. L. Wattam, especially those for areas such as Spurn, which previously had been little investigated. The plants of a similar uninvestigated area were described by Miss M. Hewlett during the Richmond excursion.

Bryology (F. E. Milsom) :—During the year, bryological sectional meetings have been held at Holme Moss, near Holmfirth (V.C. 63), and Pateley Bridge (V.C. 64). Reports of these meetings will be found in *The Naturalist*, and attention is also directed to the sectional reports of the general meetings of the Union.

Among plants noted during the year, records of which have been hitherto scanty, may be cited :—

Mosses.—*Fontinalis antipyretica* L. This is in the Census Catalogue for V.C. 61, but is not in the East Riding Flora. A definite station for it is Eastburn Beck, Driffield. It is doubtless common, and has been omitted by the county workers from their reports.

Tetraplodon mnioides B. and S. Noted for Holme Moss. This is the first official record for V.C. 63, although it had been previously noticed for the hills on the Yorkshire-Derbyshire boundary.

Hepatics.—*Aplozia sphærocarpa* (Hook) Dum. Noted for Holme Moss (V.C. 63) and Ravensgill, Pateley Bridge (V.C. 64).

Eucalyx paroicus (Schiffn.) Macv. Noted for Ravensgill. This is the first record for V.C. 64.

Hygrobiella laxifolia (Hook) Spruce. Noted for Ravensgill (V.C. 64).

The work referred to in last year's report in connection with the association of hepatics and sphagna is being carried on. It may be stated broadly that no close association of different species has been noticed, species of both classes of plants following generally the moisture-content of the ground.

In conclusion, it seems not inappropriate to pass on an appeal made by the Secretary of the British Bryological Society at its recent annual meeting. More workers are wanted on the systematic side of bryology, especially in the hepatic section.

Mycological Committee (A. E. Peck) :—The Annual Foray was admittedly held at too early a date, but my own experience is that the pine woods in particular have failed to produce any crop of agarics to interest me at any time of the year (I write in mid-November). In

early October I had repeated good gatherings of the common mushroom (*Psalliota campestris*) from pastures laying many miles apart, yet never saw a specimen of the Horse Mushroom (*Psalliota arvensis*). My local (Scarborough) work and notes have been meagre, in fact specimen hunting seemed hopeless. I have retained good health, so that it is no state of melancholy which causes this sorry report! I am pleased that Mr. Mason appears to have struck better ground, 'where crops of agarics were certainly up to the average.' and, although coming on later in the year than usual, good gatherings have been made in Mid-W. Yorks. through October and November.

Committee of Suggestions (Chris. A. Cheetham):—The Sub-Committee dealing with the Rivers Investigation has completed its programme of monthly visits to stations on the River Wharfe which have extended over the last two years. Mr. Percival and his colleagues hope to present their report on this subject before the former leaves us to take up an appointment in New Zealand. After the report has been considered, it will be necessary to review the scheme, and see what can be done to continue or extend the work in other directions. Freshwater biology in connection with running water has come to the fore during the last year or two in other parts of the country, and on the continent, and those who have been privileged to see or hear of the work done in Yorkshire know how interesting the subject can be when dealt with systematically.

With regard to the other branch of the Committee's activities, Peat Investigation, seems to have languished through lack of workers, and the suggestion put forward in this report last year for a series of sections across the Roman Roads crossing peat areas in various localities has found no response as yet.

Glacial Committee:—Quarrying for gravel in connexion with various housing schemes and other work reveals constantly changing aspects in the inland glacial sections, as does the coast erosion on the cliffs. The bone of a seal has been identified from material found in the Burstwick Gravel Pit of Central Holderness, and the Hull Museum has also recently secured a mammoth tooth weighing 6½ lb., which was obtained from a gravel pit at Seaton, near Hornsea, many years ago. In the press for November 3rd, a mammoth tooth is said recently to have been found in the boulder clay at Atwick. Atmospheric changes have already begun to interfere with the Corporation 'railway embankment appearance of the glacial sections north of Bridlington.

Coast Erosion.—The Committee has nothing of an unusual nature to report.

British Association.—Your delegate attended the two Conference of Delegates of the British Meeting, meeting at Glasgow, a report of which appeared in *The Naturalist* for October, and, at the request of the Editor, an extended report by the same writer appears in *The Museums Journal* for November.

The Naturalist.—During the past year the work of the Sections and Committees of the Yorkshire Naturalists' Union has taken premier place in the Union's official journal, and this has been supplemented by a wealth of records and observations relating to the fauna and flora of the county in their various branches. In addition, the journal is being more and more recognised as a medium for the publication of important monographs dealing with a greater variety of subjects, and covering a greater area. Officials in our national museums and on H.M. Geological Survey, professors at the universities, and, particularly in the north of England, our leading scientific workers contribute to our pages. We are also glad to find evidence of a revival in matters geological. We are also glad to get so much of appreciation of our efforts to keep our readers acquainted with current events, by means of the Notes and Comments, Northern News, and other items.

1929 Feb. 1

INCOME AND EXPENDITURE ACCOUNT to October 31, 1928.

INCOME.

	£ s. d.	£ s. d.
Members' Annual Subscriptions, arrears	11 16 3	
,, 1928	82 13 6	
,, 1929	2 18 0	
		97 7 9
Levies from Associated Societies, arrears	2 14 7	
,, 1928	10 2 0	
		12 16 7
'Booth' Fund for printing		3 10 0
Bank Interest		4 7 6
Special Donation		1 0 0
Interest from 4% Consols		3 4 0
,, ,, 4½% Conversion Loan...		3 16 10
'NATURALIST':—	£ s. d.	
Subscriptions, arrears	12 6 6	
,, 1928	103 5 6	
,, 1929	3 8 0	
		119 0 0
'Cheesman' Fund for illustrations ...		5 0 0
Subscriptions for Life Membership ...		23 2 0
Balance being excess of Expenditure over Income		184 11 1
Actual Income for year 1928 - £216 19 4		
,, Expenditure for year 1928 275 12 3		
		£457 15 9

EXPENDITURE.

	£ s. d.	£ s. d.
Expenses of Meetings—		
General Expenses ...	7 13 8	
Hon. Secretaries Expenses, 1927	10 10 0	
,, ,, 1928	10 10 0	
		28 13 8
Printing and Stationery (General A/c)		42 19 7
,, ,, (Treasurer's A/c)		5 4 9
Postages, Addressing (General A/c)...		11 11 2
,, ,, (Treasurer's A/c)		1 2 11
Cost of Wreath		1 0 0
Investment in 4% Consols (£200 @ £85 11 3)	171 2 6	
Brokerage	1 1 0	
		172 3 6
	£ s. d.	
'NATURALIST':—		
Members' Copies ...	169 16 9	
Exchanges	5 12 6	
Hon. Editor's Postages...	7 11 11	
,, Stationery	1 11 0	
Extra Illustrations ...	10 8 0	
		195 0 2
		£457 15 9

S. D. PERSY FISHER,
Hon. Treasurer.

BALANCE SHEET, October 31, 1928.

LIABILITIES.

	£ s. d.
Amounts owing by Union—	
'Naturalist,' etc.	109 15 3
Subscriptions paid in advance ...	6 6 0
Hon. Treasurer	4 8 4
'Hey' Legacy	20 0 0
30 Life Members' A/c	346 10 0
Balance, being excess of Assets over Liabilities	68 2 3
	£555 1 10

Audited and found correct,
Nov. 22nd, 1928,

CHRIS. A. CHEETHAM,
W. H. BURRELL, } *Hon. Auditors.*

ASSETS.

	£ s. d.	£ s. d.
Cash in Bank		162 13 3
Cash in hands of Hon. Secretaries ...		0 1 2
,, ,, Hon. Editor... ...		0 18 2
£200 4% Consols (value at 31 Oct.)...		173 12 6
£170 16 9 Conversion Loan... ...		170 16 9
Subscriptions in arrears, £83 13 4		
Written off as unrealisable 36 13 4		
		47 0 0
Investments:— 'Cheesman Fund,' £100 5% War Loan. 'Booth Fund.' £100 3½% Conversion Loan.		
		£555 1 10

NORTH WESTERN NATURALIST

A Scientific and Educational Journal (Published Quarterly), especially for Cheshire, Cumberland, Derbyshire, Isle of Man, Lancashire, North Wales, Shropshire, Staffordshire and Westmorland.

Edited by A. A. DALLMAN, F.C.S., in collaboration with

H. Britten, F.E.S., Rev. G. H. Carpenter, D.Sc.,
W. E. Collinge, D.Sc., F.S.A., H. E. Forrest, F.L.S.,
C. L. Walton, M.Sc., Ph.D., F. E. Weiss, D.Sc., F.R.S.,
A. Wilson, F.L.S., F.R.Met.S

Communications to :—

Editorial.—A. A. Dallman, F.C.S., 17 Mount Rd., Hr. Tranmere, Birkenhead.
Business.—F. H. Green, 86 Old Chester Rd., Woodhey, Rock Ferry.

Annual Subscription, 7/6. Single copies, 2/- net.

Printed by A. Brown & Sons, Ltd., 40 George Street, Hull, and published by A. Brown & Sons, Ltd., at 5 Farringdon Avenue, in the City of London.
Feb., 1929.

MARCH 1929.

No. 866
No. 640 of current Series.

THE NATURALIST.

A MONTHLY ILLUSTRATED JOURNAL

PRINCIPALLY FOR THE NORTH OF ENGLAND.

EDITED BY

THOMAS SHEPPARD, M.Sc., F.G.S.,

F.S.A.(Scot.), F.R.A.I., M.B.O.U.,

The Museums, Hull;

and T. W. WOODHEAD, Ph.D., M.Sc., F.L.S.,

Tolson Memorial Museum, Huddersfield,

WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF

JOHN W. TAYLOR, M.Sc. RILEY FORTUNE, F.Z.S.

Contents :—

LONDON:

A. BROWN & SONS, LIMITED, 5 FARRINGDON AVENUE, E.C. 4.

And at HULL and YORK.

Printers and Publishers to the Y.N.U.

Price 1/6 net. Prepaid Subscription 15/- per annum.

YORKSHIRE NATURALISTS' UNION.

BRYOLOGICAL SECTION.

Excursion on March 16th to Hebden Bridge for the investigation of Crimsworth Dean, Lumb Falls, etc.

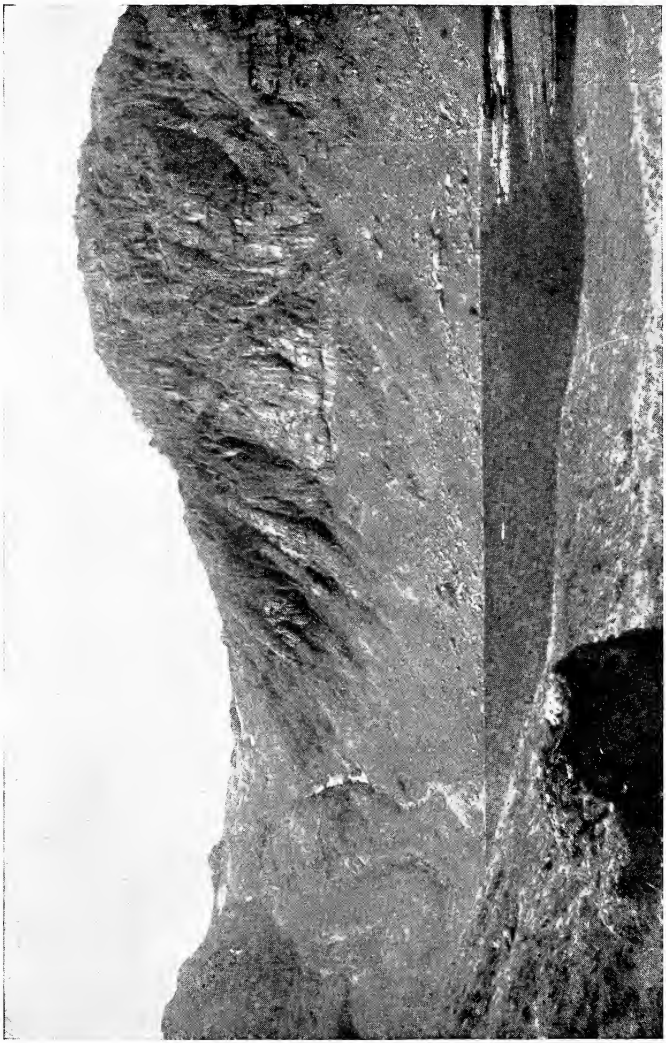
Trains :—Huddersfield, 9-12 a.m. ; Hebden Bridge, 9-56 a.m. Members from Leeds and Bradford proceed by train or bus to Halifax, thence by train departing Halifax, 10-10 a.m. ; Hebden Bridge, 10-33 a.m. The party will assemble on the arrival of this train.

Return Train :—Hebden Bridge, 6-50 p.m. ; Bradford, 7-43 p.m. ; Leeds, 8 p.m. ; Huddersfield, 8 p.m.

The route is *via* Pecket Wood, Hardcastle Crags Gates, Lumb Falls and Pecket Well, then by bus to Hebden Bridge.

Tea at Webster's Caldene Café, Market Street, Hebden Bridge.

F. E. MILSOM, *Convenor.*



The haunt of the Raven, Buzzard, and Peregrine Falcon.

From 'A Bird-Lover's Diary,'
by Arthur Astley.
London : The Sheldon Press.

NOTES AND COMMENTS.

BIRDS.*

Apparently the author has been contributing a series of articles to the *Parents' Review*, at the request of the late Miss C. M. Mason, the founder of the 'P.N.E.U.' They were contributed between 1915 and 1926, and so far as bird-watching is concerned the observations are the results of personal experience, but in such matters as song and flight the author has brought his notes up to date by referring to the latest theories. He appeals to his readers to follow up the interesting hobby of bird-watching, in which case he promises a life-long interest that will never pall. There are eight illustrations, one of which we are kindly permitted to reproduce (see Plate IV.). After dealing with 'Birds of a Northern Lake,' 'A Northern Woodland' and 'A Northern Mountain,' a bird of each month of the year is referred to in detail, followed by chapters on flight, migration, song, and nesting habits.

COAL MEASURE FOSSILS.

At a recent meeting of the Geological Society of London, S. J. Clift and A. E. Trueman read a paper on 'The Sequence of non-Marine Lamellibranchs in the Coal Measures of Nottinghamshire and Derbyshire. The succession of the genera *Carbonicola*, *Anthracomya* and *Naiadites* was discussed. In general features, the sequence is similar to that of the South Wales coalfield. The lowest horizons are rich in large specimens of *Carbonicola*. Above them, but below the horizon of the Barnsley Seam, occur species of *Anthracomya* and *Carbonicola* characteristic of the zone of *Anthracomya modiolaris*. The zone of *Carbonicola similis* is not separately recognised in the area. The sequence of faunas, and particularly the range of *Carbonicola* and *Naiadites* within the '*Similis-Pulchra*' zone, appear to be of value in determining horizons above the Barnsley Seam.'

BIG GAME.†

Popular books on big game are well in demand, and neither the authors nor the publishers seem to spare pains nor expense in producing really handsome volumes. One of exceptional merit is before us, and is the result of the observations, aided by pen and camera, of a practical zoologist and naturalist in many lands. In addition to views of the scenery and occupants of Norway, Sardinia, Suakim, India, Burma, Siam, Siberia, Newfoundland, Turkestan, New Zealand and other

* From 'A Bird-Lover's Diary,' by Arthur Astley. London: The Sheldon Press, ix.+306 pp., 7/6 net.

† 'Twenty-five Years Big Game Hunting,' by Brigadier-General R. Pigot. London: Chatto & Windus, xi.+307 pp., 21/- net.

far-away places, the author gives practical hints on methods of transport, equipment, and other advice for those about to take an interest in big game shooting. His illustrations are altogether away from the usual type, and are quite refreshing in their general excellence.

THE ZOO.*

Dealing with another aspect of animal life, where the species such as the previous volume describes can be seen without the expense and risk of travel, is the present work, which will be a handy guide to visitors, or, better still, will be useful to those about to visit this famous Zoo, especially if they are younger people, for whom apparently the notes are written. Monkeys, Lions, Wolves, Reptiles, Elephants, Birds, etc., are the items likely to be selected, and there are several interesting photographs.

CONVERGENT AND DIVERGENT EVOLUTION.

At a recent meeting of the Linnean Society of London, Dr. S. L. Hora read a paper on convergent and divergent evolution as exemplified by various animals: 'Since Darwin's time our conception regarding the relative importance of the principles of divergence and convergence has undergone considerable change. Variations in organisms are the result of divergence. Convergence implies resemblances, 'which result from independent functional adaption to similar ends.' Animals living under different conditions sometimes exhibit similar modifications; but on analysis these modifications are found to be responses to similar factors in the environments. This basic idea of convergence was illustrated by several instances of similar structures found in the inhabitants of torrential streams and in the fauna of sluggish waters. Attention was also directed to the 'Communal Convergence'' with special reference to the body-form of insects inhabiting torrents. By referring to the differences in the nature of the ostia of certain sponges now living in muddy water and to the divergent modifications of the rays in the paired fins of the Homalopterid fishes, it was indicated how organisms living in the same environment and in response to the same element in the habitat are sometimes differently modified. It was concluded that environment is the supreme master of most of the changes in animal organization and that organic evolution is an index of the varied conditions under which life exists. Structures become moulded time and again, progressively or retrogressively, due to changes in the habits and habitats of organisms.'

* 'Round London's Zoo,' by Helen M. Sidebotham. London: Herbert Jenkins, Ltd. 200 pp., 3/6 net.

WILD AUSTRALIA.*

Sir Baldwin Spencer's work in Australia is well known, but until these volumes appeared the scientific world had not the opportunity of judging the value and magnitude of his researches. Fortunately he was early on the scene in Australia, and as a trained scientific man was able to make the most of ethnographical material, noting details which ordinary observers might easily have overlooked. His travels on the great continent have resulted in most valuable material being preserved, material which in the future no one can possibly gather together. Sir Baldwin made a special study of the series of ceremonies performed by different tribes, some of which can never be performed again ; hence his sketches, photographs and descriptions are invaluable. The late J. R. Mortimer, in his work among the prehistoric graves on the Yorkshire Wolds frequently made note of what might at first be considered trivial details, but, as he truly said, one never knows what value these facts may have to future workers. Sir Baldwin's account of the ceremony with regard to the burial and breaking of the arm bone from a skeleton of a dead individual, of the elaborate way in which this was buried in a specially prepared trench or mound, is an indication of something of this character. Few people finding two fragments of a human bone in a grave would realize the significance of the discovery were it not for the record made by Sir Baldwin.

A FOUR MONTHS' CEREMONY.

In another instance, the Engwara Ceremony, the performance lasted exactly four months, during the whole of which, fortunately, Sir Baldwin was able to be a witness. Several pages would be required to give even a summary of this record, but we might quote the following concluding words from Sir Baldwin's account : ' Very shortly after sunrise the ceremonial ground was deserted, save for two or three old men who took down the Kauaua and rubbed off all the traces of blood. The young men were sent out into the bush, and, before the ban of silence between each of them and the old man who had charge of him could be removed, the former had to present his old Abmoara man with a present of food called Chaurilia—usually a wallaby or small kangaroo—after which the old man touched the young man's mouth with a sacred object, such as a Churinga, or even a piece of down used during the ceremony, and he was free to speak. The visitors from distant parts returned to their own hunting grounds, and thus ended the Engwara.'

* ' Wanderings in Wild Australia,' by Sir Baldwin Spencer. London : Macmillan & Co., 2 Volumes, xxviii.+930 pp., 42/- net.

A DISAPPEARANCE.

'For months afterwards the ceremonial ground was what the natives call ekeirinja, that is tabu or forbidden, to women and children. The Kauaua was carried away to the top of a hill, where it was eaten by white ants and rotted away. The Parra mound was left untouched, but the little gumtree branches, exposed to the heat of the summer sun, soon disappeared and the wind carried away the sand of which the mound was made, until not a trace of it was left. It is more than thirty years ago since we watched from start to finish this great Engwara ceremony. From that day to this no other has been held, and now the old men are gone and the young men no longer take any interest in such things. There can never be another Engwara.' The descriptions are improved tremendously in value by the wealth of illustration, and those interested in savage races, and particularly those of Australia, which are of an exceptional primitive type, will find the book of value, while curators of museums and others, and collectors generally, will be assisted in their work by the scores of figures of objects of Australian workmanship. The illustrated methods of making stone implements, etc., for example, are exceptionally helpful in this connexion.

SHAP GRANITE.

Following up the excellent work of Harker and Marr (*Q. J. G. S.*, 1891), Dr. D. R. Grantham has an important contribution on 'The Petrology of the Shap Granite' in the *Proceedings of the Geologists' Association* recently issued (Vol. XXXIX., Part 3). In this he states: The Shap granite is a composite intrusion made up of a suite of porphyritic biotite-granites allied to adamellite. Its content of primary accessory minerals is high; but they present little variety, and comprise mainly biotite, sphene, iron-ores, apatite and orthite, with subordinate amounts of zircon, pyrite, tourmaline, monazite, and possibly also (in part) rutile. One variety is rich in hornblende. The usual secondary minerals occur, together with sphene, muscovite, anatase and rutile. Epigenetic minerals comprise molybdenite, bismuthinite, chalcopyrite, zinc-blende, pyrites (in part), fluor, and barytes. The oldest solid product of the original magma appears to have been a chilled, peripheral, fine-grained facies (the 'early basic granite') with high specific gravity, a relatively low content of porphyritic felspars, and a relatively high content of accessory biotite, sphene, etc. It is a decidedly basic type and probably hybrid in origin. Its textural varieties range between porphyritic microgranite and granite-porphyry. This early product ('early basic granite') was disrupted by the

forces which promoted the emission of the main intrusions and contributed to their inclusions in large number. These inclusions have hitherto been regarded as ' basic segregations.' This term can be applied only in the sense of cognate inclusions of a basic character. The granites forming the main flows show successive increase in the content of porphyritic felspars, and decrease in accessory minerals. These are chemically less basic and have lower specific gravities than the earlier type.

INDEX ANIMALIUM.

This publication, by the Trustees of the British Museum, has been compiled and edited by Charles Davies Sherborn, Bibliographer to the British Museum (Natural History). Vol. I. was issued in 1902 by the University Press, Cambridge, and contains particulars of every scientific name given to animal life between 1758, practically the beginning of scientific naming of species, to 1800. The later volumes bring the work down to 1850. The name of the species is given, together with the author, title of publication in which it appeared, the volume number, page, date, etc. The object of the work is to enable future students giving a name to a species to ascertain quickly whether that name has already been applied. The second part of the work gives the species under generic names. Take for example Anas (Vol. I., p. 1076). This is the scientific name for the duck, and following it is every name hitherto given to species of duck between 1758 and 1800, the reference to these names being given in the previous alphabetical list. This means that a worker among the ducks can see at a glance whether a name he proposes to give to a new species has already been given by someone else, and in this way confusion should be prevented. The great period of naming new species, however, occurred between 1801 and 1850, and the search through the literature of various countries for new names given during this period has occupied the greater part of Sherborn's very busy life. Wisely he commenced a fresh volume for this period, the first part for which was issued in 1922 and contains cxxxi. (Bibliographic notes of great value to Librarians) +128 pp. Up to the present time (November, 1928), XVII. Parts have been issued recording the whole of the species described during the period included up to ' nyx.' The sections of this second volume are being printed with commendable rapidity, consistent with careful proof-reading, and naturalists, and the scientific world generally, await with anxiety the completion of this indispensible and monumental work.

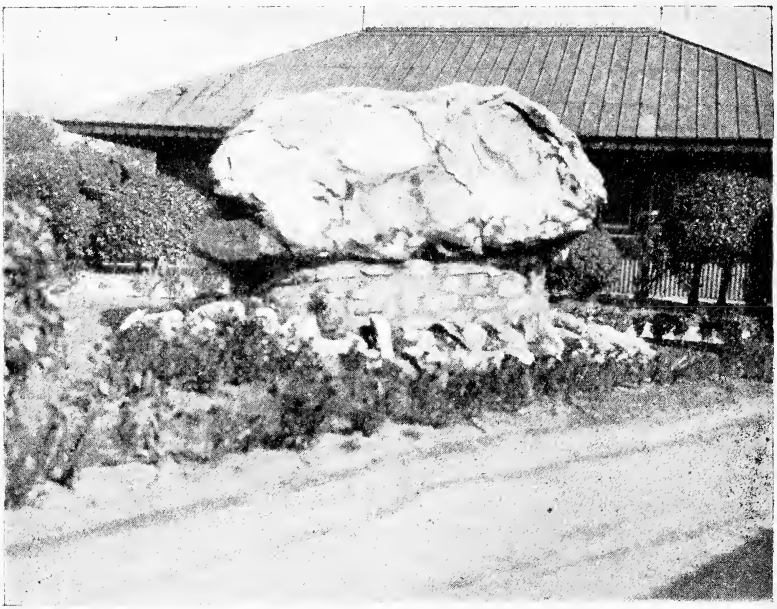
STONE DECAY A BIOLOGICAL PROBLEM.

In a paper on ' The Decay of Stone in Buildings and Monuments,' by Dr. R. M. Buchanan, appearing in *The*

Quarry for January, the writer concludes ' that observation and bacterioscopic analysis appeared to support the view that stone decay is essentially a biological process in harmony with the reducing processes in nature, and that its end products result from microbic action dependent on chemical pabulum absorbed from a polluted atmosphere.'

THE CROSBY BOULDER.

Older geologists will remember the sensation caused some



The Great Crosby Boulder.

years ago by the discovery of an enormous boulder of Gypsum at Crosby, near Liverpool, and the discussions it caused between the ' submergers ' and ' land ice ' geologists, the former headed by the late Mellard Reade, opining that it had been transported by drift ice, the latter championed by Professor Kendall and others, maintaining that it was an ordinary erratic moved by land ice. Many illustrations, photographs and caricatures appeared at the time, and eventually the erratic was mounted on a pedestal and preserved. Recently it appears that the exigencies of traffic have necessitated its removal, and although it weighs 18 tons, it has now been re-mounted in the Coronation Recreation Ground, Great Crosby.

The Naturalist

AN ERRATIC.

It may safely be looked upon as an ordinary ice transported erratic, and the old time controversy as to whether ice-borne or water-borne seems to have been settled by the elimination, by time, of the submergers. The accompanying illustration is taken from the *Proceedings of the Liverpool Geological Society* recently issued, an interesting volume which also includes a number of papers, among them being ' Modern Views of the Earth's Surface History,' by T. A. Jones ; ' The Geology of the Southern End of the Clwydian Range,' by R. C. Blackie ; ' Some Recent Work on the Submerged Forest in Anglesey,' by E. Greenly ; ' The Petrology of Triassic Boulders from the Boulder Clay of Anglesey,' by I. S. Double ; ' The Cleavage Fan in the Silurian Rocks of the Denbighshire Moors and Clwydian Range,' by P. G. H. Boswell ; and ' The Pre-Glacial History of the River Kent, Westmorland,' by G. H. Mitchell.

AMMONITES, CRUSTACEA AND GRAPTOLITES.

Volume LXXX. of the *Monographs of the Palæontographical Society* for 1926 has recently been published. Dr. L. F. Spath gives the sixth instalment of his admirable work on ' Gault Ammonites.' The smooth paper used enables many of the illustrations to appear in the text where they are described—a great advantage. H. Woods gives the fifth section of his ' Macrurous Crustacea,' figuring and describing specimens from Speeton and Scarborough in Yorkshire, and Tealby and Donnington, Claxby and Nettleton Hill, Lincs. O. M. B. Bulman submits Part II. of his ' Dendroid Graptolites.' The society could issue more monographs and plates if better supported.

SQUIDS IN YORKSHIRE.

In the *Natural History Magazine* for January,* Mr. G. C. Robson illustrates and describes ' A Giant Squid from the North Sea.' In this he says ' The occurrence of these monsters in British waters is being studied, and until all the records have been carefully examined it would be unwise to discuss the cause of their intermittent appearance on these shores. There does, however, in the case of the genus *Sthenoteuthis* appear to be a focal area of occurrence on the coast of Yorkshire, between Spurn Head and the mouth of the Tees, the majority of the specimens having in recent years been stranded in the neighbourhood of Scarborough. It seems likely, therefore, that the animals come in from the Atlantic through the Pentland Firth or the Orkney-Shetland Channel, are carried southwards through the North Sea, and, getting into difficulties, possibly

* British Museum, price 1/-.

owing to the lack of proper food or the lower salinity of the southern part of the North Sea, are cast ashore in an enfeebled condition at the point where, as is known from hydrographical observations, the movement of the southward-flowing Atlantic water finally spends itself.' Records near Withernsea are then given. In the same journal Dr. A. B. Rendle writes on the ' Preservation of our Native Flora,' and L. R. Cox refers to ' A Spiral Puzzle,' an enormous gastropod-like object, seven feet in height.

As becomes the premier Natural History Museum of the world, the British Museum (Natural History), South Kensington, is issuing monographs dealing with the objects under its charge, which at once fall in with the excellent traditions of that institution. We have before us two such monographs. The first deals with Rhodesian Man and Associated Remains (xiii.+76 pp., 12/6 net) and is printed on pages of unusually large size with the object of better illustrating the remains referred to. Rhodesian Man has taken his place in the literature relating to Prehistoric times, and different reports have appeared, confusing in their variation. In the present monograph we feel that the last word, so to speak, has been said with regard to these important discoveries, which are now on exhibition in the museum ; and the skull, bones and associated mammalian and other remains have been dealt with by various experts. The letterpress is the work of W. P. Pycraft, G. Elliot Smith, M. Yearsley, J. Thornton Carter, Reginald A. Smith, A. Tindell Hopwood, Dorothea M. A. Bate and W. E. Swinton, Mr. Pycraft taking the greater responsibility in describing the skull.

Similar in character to the preceding is the ' Catalogue of the Pontian Bovidæ of Europe,' by G. E. Pilgrim and A. T. Hopwood (vii.+106 pp., 12/6 net), and here, as with the other monograph, Dr. F. A. Bather writes a preface. The sub-families dealt with are Gazellinæ, Ovicaprinæ, Pseudotraginæ, Bubalidinæ, Hippotraginæ, Cervicaprinæ, Tragelaphinæ. The publication will certainly assist zoologists and Museum directors at home and abroad in their work upon this difficult group.

Men, Books and Birds : Letters to a Friend, by **W. H. Hudson.** London : Jonathan Cape, 320 pp. The volume reviewed in this journal for August, 1925, has now been re-issued in the Travellers' Library at the price of 3/6, which is much more reasonable than was that of the original edition, and in the present form is much more handy.

Gentlemen Unafraid, by **Barrett Willoughby.** London : G. P. Putnam's Sons, xiii.+285 pp., 15/- net. Deals with an area rarely touched by books of geography and travel to-day. It describes a series of adventures in Alaska and refers to ethnography, geography, zoology and other topics, all well illustrated. The narrative is more in the form of an interesting novel, but is very informative and readable. The frontispiece is a photograph of the author standing beside the totem of the Fog Woman's Children at Sitka. He is the one wearing trousers.

Life in Rural England, by **William Coles Finch.** London : The C. W. Daniel Co., 248 pp., 10/6 net. Now that it is almost too late to do so, it is astonishing what a large number of people are interested and concerned with disappearing rural England. The author refers to occupations and pastimes in field and village, farm and home, watermill and windmill, and illustrates his notes in an admirable manner. Various types of early cottages and buildings, graveyards and gravestones, cornmills and watermills, tithe barns, and so on are described with great charm and admirably illustrated.

REMAINS OF LEMMINGS IN DERBYSHIRE CAVES.

J. WILFRID JACKSON, M.Sc., F.G.S.,
Senior Assistant Keeper, Manchester Museum.

WHILE sorting a small amount of material obtained from the Harborough Cave, near Brassington, Derbyshire, I had the good fortune to find an imperfect lower jaw of the Norwegian Lemming (*Lemmus lemmus* L.). Two teeth only are present in the jaw, but are quite characteristic of the species. The material was obtained from the lower level (Layer I. of Armstrong's paper),[1] and the species forms an interesting addition to the other animal remains found in this layer in 1922, when the cave was excavated by members of the Derbyshire Cave Exploration Committee. On that occasion I was able to identify some bones and jaws belonging to wild-boar, roebuck, and reindeer, all obtained from the lower stratum. The lemming jaw is very dark in colour and highly mineralised, as in the case of the remains of the reindeer and others. During our work in 1922 we discovered in the same layer a rude quartzite implement and flake, like those from the Creswell caves, and these objects, taken in conjunction with the finds by Mr. Storrs Fox in 1907 of a quartzite hammer stone and a perforated hyæna tooth, suggest that the cave was used for habitation or as a temporary shelter at a very remote period.

Lemming remains have not been of frequent occurrence in the Derbyshire caves. The Norwegian Lemming is recorded from the Langwith cave (in Magnesian Limestone) near the eastern boundary of Derbyshire.[2] It occurred along with the remains of many other small rodents, including the banded lemmings (*Dicrostonyx gulielmi* Sanford and *D. henseli* Hinton)—fossil relatives of the Arctic Lemming (*D. torquatus*). The remains of one of the banded lemmings (*D. gulielmi*) have also been found in the Pin Hole Cave, Creswell,[3] where Mr. A. Leslie Armstrong is carrying out successful excavating. Other rodents found here include include the Continental Field Vole (*Microtus arvalis* Pallas), now extinct in Britain; *M. anglicus* Hinton, extinct; *M. agrestis* L., *Evotomys glareolus* Schr., *Apodemus sylvaticus* L., *Muscardinus avellanarius* L., and *Lepus anglicus*

[1] A. L. Armstrong, 'Exploration of Harborough Cave, Brassington.' *Journ. Roy. Anthrop. Inst.*, Vol. LIII., 1923, pp. 402-416 (with a report on the Animal Remains, by J. Wilfrid Jackson).

[2] Rev. E. H. Mullins, 'The Ossiferous Cave at Langwith.' *Journ. Derby. Archæol. and Nat. Hist. Soc.*, Vol. XXXV., 1913, pp. 137-158.

[3] J. W. Jackson, 'Recent Cave Exploration in Derbyshire.' *North Western Naturalist*, December, 1926, p. 190.

Hinton, extinct ; also the remains of Ptarmigan (*Lagopus mutus*).

The occurrence of the remains of lemmings in the Derbyshire caves indicates a Late Pleistocene date for the deposits containing them. Similar remains have been found in the Ightham Fissures, Kent, in many caves in the West of England, and so far to the west as Co. Cork, Ireland. Some years ago I found a number of jaws of *Lemmus lemmus*, *Dicrostonyx henseli* and *D. gulielmi*, among the large series of other species in material obtained while digging the Dog Holes Cave, Warton Crag, Lancashire.[1]

Other caves in the north of England will no doubt yield equally good results if special attention is devoted to the remains of these small mammals. Quite recently Dr. L. S. Palmer and I, while investigating a cave in Langcliffe Scar, near Settle, not far from the famous Victoria Cave, came across the remains of the Northern Vole (*Microtus ratticeps* K. and B.), Field Vole (*M. agrestis* L.), Bank Vole (*Evotomys glareolus* Schr.), Long-tailed Field Mouse (*Apodemus sylvaticus* L.), and Common Shrew (*Sorex araneus* L.), in cave earth resting on a bed of glacial drift. The first named species is now extinct in Britain, but occurs throughout Northern Europe and a large part of Siberia.

Much has been written concerning the climatic conditions which prevailed in Britain and the Continent (where similar remains have been found in abundance) when the lemmings and other northern creatures were in occupation. Their presence here is not fortuitous, but seems to be intimately linked with the major glaciation of the country and the period immediately succeeding that event, so that they may be termed glacial and post-glacial mammals. In Britain, lemmings first begin to appear in the later Middle Terrace of the Thames at Crayford, along with many other newcomers of a northern or alpine character. At this stage Mousterian man occupied the valley of the Thames and certain other areas. Most of the northern animals, and especially the lemmings, maintained their existence through Aurignacian to Magdalenian times, becoming extinct in Western Europe at the close of the Late Palæolithic period.

The lemmings, together with the arctic fox, arctic hare, barren-ground reindeer, musk-ox, wolverine (or glutton), and some others, belong to what is known as the tundra fauna. These animals inhabit the lands of the far north bordering

[1] J. W. Jackson, ' On the Discovery of the Remains of Lemmings in Dog Holes, Warton Crag.' *Lancs. Naturalist*, Vol. II., 1909, pp. 227-229 (the *Dicrostonyx* of this paper was then referred to the recent Arctic species).

the Arctic Ocean, regions characterised by frozen subsoil and the general absence of shrubs or trees.

It is believed by many authorities that, as the glaciers of the Great Ice Age retreated, barren areas were left in their wake. These ice-free areas became tundras covered in some places with dwarf willows and stunted firs, and in others with reindeer moss and lichens or with birch-scrub, thus providing a suitable environment for the lemmings and other animals.

After the period of most intense cold in Mousterian times there appears to have been an amelioration of climate during Aurignacian and Solutrean times, followed by a recurrence of a colder climate during Magdalenian times. In the final Azilian-Tardenoisian stage of Upper Palæolithic times there was a decided amelioration of climate sufficiently humid for the growth of forests and the spread and multiplication of the forest fauna. The northward migration of the tundra fauna is believed to have taken place during this final stage.

In many places where objects of human manufacture have been found in definite association with the remains of lemmings, etc., and more especially in caves of the West of England, as Aveline's Hole, Burrington Combe, the culture represented is of a developed or late Aurignacian character leading on to early Tardenoisian.

COLEOPTERA.

Coleoptera near Wigton.—There is very little woodland in the district so that Phytophagous Coleoptera are less plentiful than in some areas. *Lema lichenis* is common. *Chrysomela staphylea* common. *C. varians* and *C. hyperici* are rare about Kelsick. *Phytodecta olivacea* local on broom at Aikshaw and Bromfield. *Phædon tumidulum* locally common on *Heracleum*. *Phyllodecta vitellinæ* common on sallow. *Hydrothassa marginella* common. *Luperus rufipes*, Oulton Moss, on birch. *Lochmæa suturalis* common where heather grows. *L. cratægi*, Kelsick, on hawthorn, not common. *Galerucella tenella* frequently taken by sweeping rushes on Oulton Moss. *Sermyla halensis* common attached to white bedstraw. I took an unusual form on Oulton Moss with the antennæ, legs, head and thorax black, base of elytra greenish blue, and the rest purple. *Longitarsus melanocephalus* and *L. jacobææ* both common at Kelsick, the latter also at Brayton. *Phyllotreta undulata* common at Kelsick, it sometimes riddled the leaves of my turnips. *Apthona nigriceps* Dundraw (*Nat.*, 1927, p. 111). *Sphæroderma testacea* and *S. cardui* common. *Apteropeda orbiculata*, Kelsick, rare. *Plectrocelis concinna* not particularly common, Blencogo. *Crepidodera transversa* and *C. ferruginea* common about Kelsick. *C. smaragdina*

locally common on sallows about Kelsick and Dundraw. *Cassida flaveola* and *C. viridis* are both fairly common.—JAS. MURRAY, Burnside Road, Gretna.

INSECTS.

Distribution of Scodiona belgiaria in Yorkshire.—For many years the headquarters of this insect in the country was understood to be the West Yorkshire moors. Having been more or less acquainted with the insect in its more easterly range, for many years, I am now in a position to name its more definite ' camps ' on that side of the county. Until 1928 I had only taken it spasmodically, but in early July of last year I had the pleasure of taking a nice series on the Goole side of Thorne Moors (about a mile to the east of the colliery), the most south-easterly part of the shire. Coming northwards 12 to 15 miles, I have found it again at Skipwith Common. Taking another similar leap, I have unearthed it at Strensall Common. Six or seven miles to the north-east I have heard of a specimen being taken near Castle Howard. I have seen a record of its occurrence on Goathland Moor, and my friend, Mr. H. Sowden, took one four or five years ago in the heart of Cleveland. The insect occurs, therefore, in suitable stations from the Trent to the Tees. The last season was the first occasion on which I could personally examine a series, and I find that its variation at Thorne Moors appears to be along a well defined course. In the males, the paler the ground colour the more pronounced the dark outer line. From the grayish mealy ground colour of the paler specimens there is a gradual darkening of the scales till both the inner and outer lines are nearly lost in the deepening colour. In the female what seems to take place is compression of the darker pigment. The smallest ones are black-brown, the medium-sized ones paler, and the odd, fairly large ones nearly as light-coloured as the normal males, the lines being more or less pronounced in the same way in proportion to depth of colour. When at rest in the earlier part of the day it seems absolutely quiescent, but later on becomes skittish.—GEORGE MACHIN, 42 Vyner Street, York.

Referring to some remarks appearing in *The Irish Naturalists' Journal* respecting alleged misleading statements concerning *The North Western Naturalist*, the editor of the latter journal states, ' We are glad to learn that the wrong impression which the remarks in question convey will be removed by a subsequent note which we are assured will appear at an early date. Under the circumstances we will only express our surprise and regret at even the semblance of anything which might be allowed to detract in any way from the very friendly relations which have existed, and we trust may always continue, between the two journals and naturalists in both countries.'

TYLONAUTILUS NODIFERUS (ARMSTRONG) IN THE UPPER CARBONIFEROUS LIMESTONE.

JAMES WRIGHT, F.G.S.

At page 375 of the interesting paper by Messrs. J. Pringle and J. W. Jackson on the zonal Nautiloid, *Tylonautilus nodiferus* (Armstrong), published in *The Naturalist* for December, 1928, there is the remark that the species under discussion does not appear to have been recorded from East Lothian or Fifeshire. On reading this I was reminded of a specimen which I had collected over twenty years ago from the shale overlying the Levenseat Limestone on the shore to the east of Ravenscraig Castle, between Kirkcaldy and Dysart. This is the top limestone of the Upper Limestone Series, and occupies a position just under the Millstone Grit. On looking at the specimen again and comparing it with Armstrong's figures,* and with the plate accompanying Messrs. Pringle and Jackson's paper, I was fairly certain that I had here an example of the same species. The only doubt in my mind was that the specimen being somewhat crushed, the sulcus round the periphery was scarcely decernible, although otherwise the nodose and characteristic markings were very distinct. Mr. Pringle has kindly examined the specimen and confirms the determination. Thus all doubts are dispelled, and I have accordingly much pleasure in recording this occurrence of the species in Fife.

Apart from this record, however, there is mention of the species in the Geological Survey Memoir on 'Central and Western Fife and Kinross,' 1900, where at p. 236, *Discites* (*Nautilus*) *nodiferus* Armstrong is recorded from locality 73, which is Kennoway Den, probably from one of the Upper Limestones which crops out there. On p. 135 of the same work, Sir A. Geikie has some interesting remarks about the section, but states that there is some doubt about the exact position of the limestone in the series, although it may be the Gair or perhaps the Index seam. At p. 250 of the Memoir, however, in the complete list of fossils from the Levenseat Limestone in Fife, *Nautilus* (*Discites*) *nodiferus* is recorded.

Now as regards the specimen, or specimens, here referred to in the Fife Memoir, Mr. Pringle informs me there is no record in the Scottish Survey Collections. I think it probable therefore that this occurrence of the species in Fife may have been given on the authority of the late J. W. Kirkby, who added considerably to the fossil lists embodied in the Appendix to the Memoir.

* *Trans. Geol. Soc. Glasgow*, Vol. II., Pl. I., Figs 6 and 7.

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The Levenseat, Gair and Index Limestones of Fife being the equivalents of the Castlecary, Arden, etc., Limestones of the West of Scotland, we thus have in these records now given an extension of the known horizontal range of the species in an easterly direction and probably it is only a matter of time till its occurrence in East Lothian is also noted.

BOTANY.

Yorkshire Bryophytes.—*Catascopium nigritum* Brid. is rare as a Yorkshire plant. It is mentioned in Baker's ' Flora of North Yorkshire ' as having been found in 1901 on Cronkley Pasture, Upper Teesdale, by Messrs. D. A. Jones and Horrell. The writer found it again in May, 1928, on damp peaty soil at the foot of one of the cliffs on Cronkley Scar, in good fruit. This confirms the old record for V.C. 65. Apparently the only other recorded station in Yorkshire is on Goredale Scar at Malham (V.C. 64), where it was found by Mr. W. H. Burrell. *Orthotrichum diaphanum* Schrad. was found in 1928 on an old wall at Awkley, near Doncaster (V.C. 63). *Tortula cernua* Lindb. continues to be well established in its original station near Sprotborough (V.C. 63).—S. P Rowlands, Doncaster.

Early Seedling Plants.—During a walk in the neighbourhood of West Bretton on the 26th December, 1928, a noticeable feature of the wayside flora was the abundance of seedling plants at the hedgerow bases. In countless numbers were those of *Galium aperine,* from the cotyledenous stage to others showing two whorls of the bracteate foliage. In the vicinity of old plants of *Cerastium arvense* and *Arenaria trinerva,* seedlings showing the first true leaves were likewise abundant in thick clusters. Others, not so prolific, were the seedlings of *Viola hirta, Geranium robertianum* and *Lapsana communis.* On the following day I visited Rusby Common, Ingbirchworth. A large extent of the Common had been fired, apparently in the late Spring. One of the outstanding features of the new growths appearing were the seedlings of *Ulex gallii,* those showing merely the two thick, dark green, cotyledons being most abundant, the seedlings of older growth, variable to one inch in height, showing well the three-foliate leafage, and first spinous formation. Apparently the mild weather of the autumn was the cause of this early prolific display.—W. E. L. Wattam, Newsome.

The Report of the Manchester Museum for 1927-8 shows that considerable changes have been made in the arrangement of the collections. Among the donations is ' Water-worn perforated Cement Block simulating a perforated stone axe-hammer, found on the beach at Scarborough.'

FRESHWATER COLLEMBOLA.

JAMES M. BROWN, B.Sc., F.L.S., F.E.S.

Collembola or Springtails abound in most situations, always providing there is sufficient moisture ; these small insects being particularly sensitive to drought, a very short stay in a dry receptacle resulting in their death. One might expect, therefore, that a considerable number of species would be aquatic, thereby making certain for themselves a sufficiently damp habitat. As a matter of fact, however, only about seven British species are truly aquatic, five freshwater and two marine, a few others finding their home either on the sea coast or near the margins of freshwaters, but not actually living in or on the water itself, while a number of others may occasionally be seen on puddles in cart tracks, and similar places into which they may have fallen.

All the aquatic species form part of the ' neuston ' or rather the ' supraneuston,' that is, that congeries of organisms living above and depending for support upon the surface film of water. Individuals of Collembola are notoriously difficult to wet and submerge, owing to the surface characters of their cuticle, and the presence of hairs or scales, and this probably accounts, in part at any rate, for their absence from the under-water world of life. Their very simple method of respiration, due in most species to a complete absence of tracheæ, would not appear to be a sufficient obstacle to aquatic life, as respiration through their delicate cuticle seems to be the rule among them, and could be carried on equally well under water. The difficulty of movement through the water might prove a more serious drawback.

The following species may be regarded as our aquatic representatives in fresh waters :—

Isotomurus palustris (Mull.), *Agrenia bidenticulata* (Tullb.), *Podura aquatica* L., *Sminthurides malmgreni* var. *elegantula* (Reut.), and *S. aquaticus* (Bourl.), all of which occur in Yorkshire.

Of these species the ubiquitous *Isotomurus palustris* is amphibiotic, being equally at home on the water surface and among damp vegetation, on damp soil under stones and elsewhere, and it is one of our most plentiful Springtails. Apparently it possesses no structures which may be regarded as adaptations to aquatic life, and it may perhaps be considered as a comparatively recent migrant to the water.

Agrenia bidenticulata is a dark purple species occurring in upland streams, especially in the north. It may be found hiding under stones at the margins of rapid streams, or more commonly living an active life on the surface of the water near the banks. The backwaters and eddies of moorland

streams and rivers seem to suit it well, and it contrives very successfully to resist being swept away by the current. It is provided with a well-developed spring, having elongate dentes, the upper surface of which is thickly beset with tubercles, and each dens carries on the inner side near the apex a long stiff bristle which projects considerably beyond the end of the mucro or last segment of the spring. The mucro itself bears three strong tooth-like projections dorsally. When flexed beneath the body, the spring is so placed that it will be the ' dorsal surface ' that strikes the support in making the jump. In what way this type of spring may assist movement on the water-surface is not quite obvious, the elongate bristle may give additional support, but in any case the apparatus is highly efficient.

Podura aquatica is probably the best known of the aquatic forms. The insects are deep blue-black or purplish, rather squat little creatures measuring about 1 mm. in length, sometimes occurring in enormous numbers on small pools. They delight in cattle ponds where there is a good supply of organic matter. The body surface is strongly tuberculate, and the insects are provided with very long springs, the dentes having a bow-shaped form and being provided with rows of bristles. The terminal segment of the spring, which provides the fulcrum for ' taking off ' while leaping, is specially suitable for resting on the surface-film, having lost the dorsal teeth which would seem to be useless on the liquid surface and having the whole broadened out laterally by the provision of lamella-like expansions, which give greater area for resistance and support.

But perhaps the most perfectly adapted and efficient springs are found in those species belonging to the most highly evolved section of the order—the Symphypleona—namely the two species of *Sminthurides* mentioned above. These small insects (and *S. elegantula* reaches in the female sex, .6 mm. and *S. aquaticus* 1 mm.), have compact, more or less rounded bodies, with little trace of segmentation, yellowish with dark lines in the former, and greenish with dark patches in the latter. The springs of these insects show a remarkable degree of modification from the more normal form. The whole instrument is particularly long, and when flexed beneath the body reaches forward to the level of the front of the head. The mucros have entirely lost the original teeth, and by the extraordinary development of the lateral lamellæ, which are broad and transversely ribbed, have produced almost spoon-shaped apical segments to the spring, half as broad as long in *S. aquaticus*, which has the more efficient organ. When leaping, the concave face of these ' spoons ' strikes the water surface, and with the leverage

due to the long dentes, gives considerable force to the leap. It is quite remarkable what distances these minute insects can leap on the water film, *S. elegantula* being able to clear 55 mm., or nearly one hundred times its own length.

The last two species are also interesting in the sexual dimorphism displayed by them. The males are considerably smaller than the females, being approximately about half their size, and bear at the elbow joint of their antennae a curious arrangement of hooks, spines and hairs. These are made use of during courtship, to grasp the antennae of the female, in which embrace the diminutive male is lifted up and carried about by its more robust spouse, the two insects being face to face.

From a study of these aquatic forms, it appears that the only conspicuous adaptations that have arisen have been in the direction of efficient locomotion on the surface film, the insects all having well developed springs (which many land species have entirely lost), the adaptations resulting in modification in form of the mucrones to become fulcra suitable for the water surface. All the aquatic species are, as might be expected, very active insects, running and leaping on the surface with equal facility, and many of them, curiously enough, appear to spend no small amount of their time apparently jumping at, and rebounding from, stones and plant surfaces among which they live, and when kept in aquaria, at the glass surface forming the boundary to their watery habitats.

It may be noted that among the nearly related Thysanura or Bristle-tails no species have adapted themselves to aquatic life.

ARCHÆOLOGY.

Bos longifrons on the Pennines.—Three well-preserved horn-cores of this species have been given to the Huddersfield Museum. They were found in November last on a portion of the Standedge Moors known as Black Moss. Two of them had been washed along the catch-water drain which runs from Little Black Moss Reservoir to Brunclough Reservoir, and were found by Mr. James W. Corden, of Marsden. Later he found another one in a gully, and a fourth which was ' too tattered to send.' This is the second such find on the Pennines, for we already have horn-cores of *Bos longifrons* from Hare Hill, near Greenfield, found in 1924.—CHARLES MOSLEY, The Museum, Huddersfield.

Section VI. of Lydekker's *Royal Natural History*, issued by F. Warne & Co., deals with deer, camels, pigs, hippopotami, 'rhinoceroses', horses, elephants, dugongs, etc. It concludes Volume II. of this popular publication.

REVIEWS AND BOOK NOTICES.

Every One's Book of British Natural History, by **W. Percival Westell.** London : The Religious Tract Society, xvi.+280 pp., 6/- net. This is a new edition of a book we reviewed some time ago. It is written in the writer's familiar style, illustrated by some excellent photographs by somebody else, in this case the Rev. S. N. Sedgwick, and has an introduction by the late Lord Avebury.

Wells and Springs of Sussex, by **F. H. Edmunds.** Geological Survey Memoir. London : H.M. Stationery Office, viii.+263 pp., 5/- net. Under this new title the former memoir on ' The Water Supply of Sussex,' which has been out of print for some time, makes its appearance. The new volume contains all the valuable matter included in its predecessor as well as much additional information. By the aid of plans and sections a general account is given of the geological features of the county in their relation to the water supply, and there are details of several hundred wells which have been put down in various parts. The memoir has a substantial binding.

The American Whaleman : A Study of Life and Labor in the Whaling Industry, by **Elmo P. Hohman.** London : Longmans, Green & Co., xiv.+355 pp., 25/- net. The author has gathered together a tremendous fund of folklore, history and general knowledge relating to the old whaling industry, and by extracts from log books, reproductions of old prints, photographs of objects made by the whalers, and in other ways, has produced an excellent and very human narrative of the hardships and traditions of the time when the whales had to be caught by hand-harpoons, their blubber removed and the whalebone scraped and prepared for the numerous purposes for which it was then used. Details are given of the various forms of harpoons and other objects used in connection with whaling, and altogether it is an admirable addition to our literature on the subject.

Chemistry of Plant Products, by **P. Haas** and **T. G. Hill.** London: Longmans, Green & Co., Ltd., 4th Edition, xvi.+530 pp., 18/- net. In the preface of this edition the authors of this very successful text-book suggest that perhaps, with the increase in the number of chairs of Biochemistry in the Universities, less need may be felt for this book, which they regard as directed mainly to the students in centres where such facilities are not yet available. This is an unduly modest appraisement of the value of their work. Primarily, the work appeals to the students of plants, and, with the exception perhaps of one or two of the institutions associated with the University of London (as for instance, University College, with which the authors are associated) the students in the Departments of Botany are still most unlikely to come in contact with biochemical instruction, which is as authoritative, and as sound and well-balanced as the account of plant biochemistry in the pages of this book. It is true that in many Universities it is now possible to turn to a separate Department of Biochemistry, possibly with a Professor at its head, but in any such case the amount of time given to the biochemistry of the plant is likely to be very meagre. As a result, for years to come in this country, it seems likely that it is to the pages of this and similar monographs that the student of botany must turn if he would acquaint himself more fully with the chemical knowledge that is fundamental to the understanding of the plant. This being the case, we can only congratulate ourselves that such a difficult subject has found such skilful and clear expositors, who are willing to take the necessary trouble to keep a valued and much used book up to date by a revision which bears on every page clear evidence of the care and knowledge that has been expended in keeping it abreast of progress in a borderland of science, where the outlook is often cloudy with speculation and hazy through a sense of rapidly shifting values.—J.H.P.

GEOLOGICAL SECTIONS NEAR HALIFAX, YORKS.

C. J. SPENCER.

THE Halifax Corporation is constructing two new reservoirs in Gorple Clough, which descends from the north end of Black Hambledon to a point near Blake Dean Bridge on the Hebden Bridge to Widdop Road.

The Halifax Scientific Society paid a visit to the lower trench of the new waterworks (about half a mile above the junction of Gorple Water with that from Widdop) which is sunk, according to the 1-in. Geological Survey Map, in the Kinderscout Grit.

On the south side of the stream the bottom of the trench was about 10 or 12 feet below the stream bed, but sloped upwards as it went into the hill. It would be about 60 or 80 feet deep near the south end, but the sides were largely hidden by supporting timber. Still, from what could be seen of the section and the better view of the shallower round pit, which was not obscured by supports, and which will contain the outlet valves, etc., it is fairly safe to say that the southern part of the trench is wholly through massive sandstone, at least 80 ft. thick. The outlet tunnel, from within the reservoir to some distance beyond the embankment, and passing into and out of the base of the circular well, also displayed this rock when the lining masonry was not complete. Passing to the north side of the stream the trench appeared wetter, and little could be seen at any point for the supports. Judging, however, from the sides of the shallow trench, which when complete will form the overflow channel and is roughly parallel to the trench at its upper end, it would appear that on the north side of the valley the massive rock is overlaid by a blue grey clay in which is a thin seam of coal. This dips slightly into the hill, roughly towards the north. Taking a sight along the coal band as it was displayed along the sides of the shallow cutting, it was seen that if it occurs on the south side of the valley it should be higher up the hill side than the end of the trench, which accounts for it not being seen on that side. Higher up the channel was another band of brownish clay showing some well marked bands of irregular stratification.

The following details of the strata passed through in the course of a boring for water at Clark Bridge Mills, Halifax, may be of interest as extending records published in *The Halifax Naturalist* in December, 1899, and June, 1903 (Vol. IV., pp. 81-84, and Vol. VIII., pp. 21-27). The bore hole is within a few yards of the Hebble Brook on its west side, and is at the foot of Beacon Hill and near Halifax Station. It is thus near the point where the Rough Rock, on the long

dip slope of which Halifax stands, disappears beneath the Lower Coal Measures that form Beacon Hill, which rises steeply on the east. Just how far into the Rough Rock the stream was eaten at this point is not easy to determine as the adjacent ground is almost entirely built over. Height of surface above sea-level about 350 feet :—

	ft.	in.	ft.	in.
Made ground	7	6	7	6
Brown discoloured sandstone	1	6	9	0
Light grey sandstone stained reddish brown by iron in parts, and in layers 3 feet to 4½ feet thick	84	0	93	0
A marked band of softish black shale		8	93	8
An alternating series of stone and shale—dark grey argillaceous sandstones in layers varying from 2 in. up to 12 in. thick separated by very dark grey shales 1 in. to 4 in. thick	91	4	185	0
Black shale with vegetable remains (small branches of plants) in the lower parts and at the base a layer of dark friable clay	128	0	313	0
Light grey sandstone, fine at the top, shaly toward the bottom	20	0	333	0
Shales with arenaceous layers of darkish grey sandstones	94	0	427	0
Light grey sandstone	73	0	500	0
Shale and sandstone	42	0	542	0
Coal		4	542	4
Shale and sandstone	74	8	617	0

Stopped here during the war, but re-commenced in 1927.

	ft.	in.	ft.	in.
Black shale (unfossiliferous)	46	0	663	0
Layers of sandstone and shale	32	0	695	0
Black shale	26	0	721	0
Millstone Grit	68	0	789	0
Shale	15	0	804	0
Shale and sandstone	100	0	904	0
Black shale	37	0	941	0
Coarse grits	53	0	994	0
Shale and Fireclay	24	0	1018	0
Coarse grits	52	0	1070	0
Fireclay and shale	10	0	1080	0

May 21st, 1928.—Depth reported as 1110 feet still in Fireclay and Shale, and waiting new cutters from London. Since then I have no reports.*

At a recent meeting of the Royal Society, A. E. Boycott, C. Diver, S. Hardy and F. M. Turner read a paper on ' The Inheritance of Dinistrality in *Limnea peregra*.'

The ' Classified Analysis of Books,' published during 1928, in *The Publishers' Circular* for December 29th, shows that out of the 10,612 new books and pamphlets issued during 1928, 515 relate to science, the latter figures being a slight decrease on those for 1927.

* We understand there is practically nothing further to report.—Ed.

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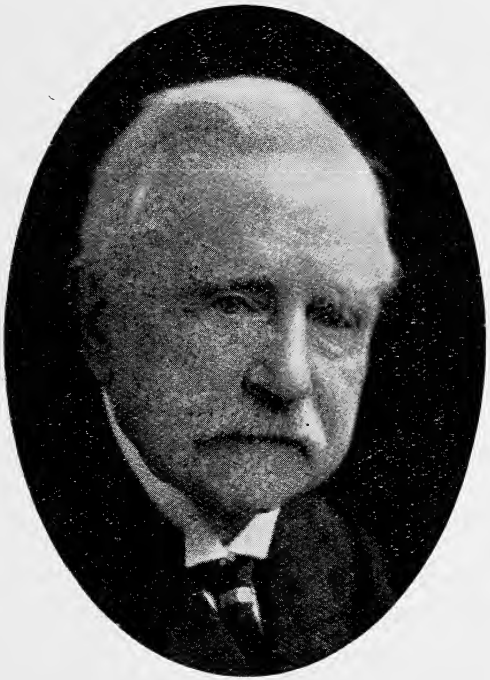
(To be continued).

In Memoriam.

SIR WILLIAM BOYD DAWKINS, M.A., D.Sc., F.R.S., F.S.A., F.G.S., M.I.M.E.

(1837-1929).

Years ago the present writer made the first acquaintance of 'Boyd Dawkins,' as he then, and always was known by his friends. It was on the occasion of his Presidential



Address on 'Yorkshire Caves' to the Yorkshire Naturalists' Union at Darlington in 1897. Since then he has had the privilege of being a regular correspondent with Sir William, and in recent years has accompanied him on many occasions in connexion with archæological, and more recently, with museum matters. In his early years, Boyd Dawkins had the advantage of winning the Burdett-Coutts Scholarship, one result of which was the publication of his marvellous 'Cave Hunting,' a charmingly written and well illustrated volume which appeared so long ago as 1874, and for many years has been out of print, now commanding a good price. Fortunately for Sir William, he came early under the influence of John Phillips, who was then Professor of Geology at Oxford, and in this way he took

an interest in the natural sciences. As Sir William was always proud of reminding us, he was associated in his early days with John Richard Green, and there is reason to believe that the two well-known works on ' Early Man in Britain,' by Dawkins, and a ' Short History of the English People,' by Green, were the results of their joint studies.

His connexion with the Geological Survey led him to study more recent geological deposits, and he specialised in the mammalian remains therefrom. In the early 'seventies the famous Victoria Cave, near Settle, was excavated, and Dawkins, with Tiddeman, did much excellent work in connexion with that Hyæna Den with its remains of early extinct mammalia.

According to an excellent obituary notice appearing in *The Yorkshire Post* : ' In 1869 Dawkins was appointed on the recommendation of Huxley " to reduce to order the chaos of the old Manchester Museum," which belonged to two local societies. The collections were ultimately handed over to Owens College and formed the foundation of the splendid museum eventually established. A little later the distinguished Yorkshireman, Dr. Williamson, who had been Professor of Biology as well as Geology at Owens College, decided to reduce his responsibilities, and Dawkins was appointed to a newly constituted Chair of Geology. With the University and the Museum Dawkins's active life was spent. He retired in 1908, having presented to the College a valuable collection of books relating to Geology.

As a geological adviser on engineering problems he was at one time in great demand, and he had to deal with the scheme for the Channel Tunnel, the Humber Tunnel, the water supplies of London, Croydon, Cardiff, Bristol, Birmingham, Leeds, and Liverpool, the Nantwich salt supply, the Manchester Ship Canal, and the Dover coalfield.

He had to do with the foundation in 1883 of the Lancashire and Cheshire Antiquarian Society, and his reputation and services as President helped very largely in its success. He also took a keen and practical interest in the archæology of Wales and of the Isle of Man.'

He probably held the record for the number of Presidential Chairs he occupied at one time and another in connexion with natural history, archæological, geological, historical, literary and engineering societies and institutions.

In 1919 he had conferred upon him the honour of a knighthood. He was a Fellow of the Royal Society (elected in 1867 !), Antiquarian Society and many others, and an honorary member of quite a large number.

In recent years he spent considerable time and money in connexion with the Manchester Museum at the University, in

which he was particularly interested, and quite recently handed over large and valuable collections thereto. It is with regard to museum matters that Sir William and the undersigned have been in frequent conference in recent years, especially in reference to the steps which should be taken to ensure better recognition of the provincial museums by the national institutions. Sir William was also exceptionally helpful with the negotiations between the Hull Corporation and the executors of the late J. R. Mortimer, which resulted in the purchase of the collection for Hull, and one of the last public services Sir William rendered was the opening of the new museum at Buxton a few weeks ago.

We regret we have not space to give a complete list of even the important memoirs and books from the pen of Sir William. An idea of their number and value, so far as the county of Yorkshire is concerned, can be obtained by reference to the index in the Bibliography of Yorkshire Geology, published in 1915. From this we learn that his first contribution bearing upon our county was in 1865, when he wrote to *The Quarterly Journal of the Geological Society* on the mammalian remains found near Richmond, Yorkshire.

He married first, in 1866, Miss Frances Evans, who died in 1921, leaving a daughter, and secondly, in 1922, Mrs. Mary Congreve, widow of Mr. Hubert Congreve.—T.S.

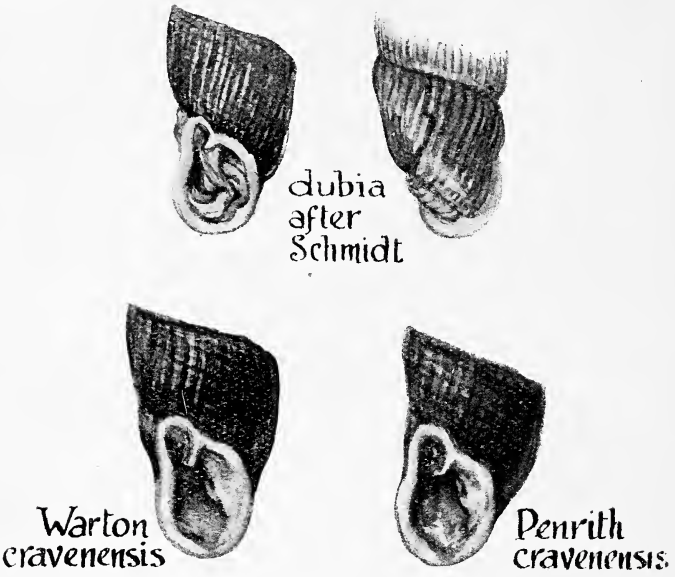
MARINE ZOOLOGY.

Yorkshire Marine Mollusca.—As Hull Museum Publication No. 91, the late F. H. Woods gave an account of the ' Marine Mollusca of the Yorkshire Coast ' (*Trans. Sci. and Field Nat. Club.*, Vol. IV., Part V., pp. 231-250). At the end of this he gave a list of species likely to be found off the Yorkshire Coast not represented in the collection. Mr. J. A. Stevenson, of Scarborough, who has done excellent zoological work in that district, has now made the following welcome additions to Mr. Woods' list. One of the specimens he sends, namely *Eulima intermedia*, is apparently the first record for the Yorkshire Coast : *Glycimeris glycimeris, Astarte sulcata, Venus casina, Gari tellinella, Xylophaga dorsalis, Aporrhais pes-pelicani, Eulima intermedia.*—T. Sheppard.

CONCHOLOGY.

On the identity of Clausilia dubia var. suttoni Westerlund, 1881, with a well-known north of England species.—Many years ago a Dr. Sutton, of Newcastle-on-Tyne, announced the discovery of a new British variety of *Clausilia* which, according to Dr. Gwyn Jeffreys, was the var. *schlechti* Zel. of *dubia* Drap. Carl Westerlund, in 1881,

however, took exception to this identification and described the shell as var. *suttoni*, after its discoverer. Quite recently, examination of Westerlund's type has been possible, which goes to show that *suttoni* and *cravenensis* Taylor are synonyms and that *suttoni*, as the earlier name, must therefore be used. Examination of the radula suggests that *suttoni* should be separated from *Clausilia dubia* Drap., and this is further emphasised by the isolated position of *suttoni*, with its centre of distribution in the North of England, and on conchological grounds. The type locality of *Clausilia suttoni* is Marsden,



in the county of Durham, where there would seem to occur a shorter and smoother-shelled race than those of the Yorkshire, Lancashire and Westmorland Fells, so characteristic of the Craven Highlands. It would be a very good piece of field work to secure living specimens of *suttoni* from the Durham locality if conditions there make this still possible. A fuller account is given in *Journal of Conchology*, Vol. XVIII., page 251, to which journal we are indebted for the accompanying illustration.—J. Davy Dean, February 1st, 1929.

The Proceedings and Reports of the Belfast Natural History and Philosophical Society for the Session 1926-7 have recently been received, and are for sale at 2/-. The publication contains summaries of various lectures, including 'The Races of Europe,' by E. J. Elliott; 'The Cult of the Dead in Ancient Italy,' by Professor Henry; and 'Dr. Wm. Drennan,' by Miss R. Duffin, as well as reports of the various sections of the Society's work.

YORKSHIRE ENTOMOLOGY, 1928.

W. D. HINCKS.

At the Annual Meeting of the Entomological Section of the Yorkshire Naturalists' Union, Mr. J. M. Brown, B.Sc., presided over the meeting held in the Leeds Museum on October 27th.

Northern COLEOPTERA were exhibited by Messrs. Bayford, Thompson and Dibb, and the President showed others from Cambridge, Spurn and Buttercrambe Woods.

Some fine photographs of the life history of *Geotrupes typhæus* were shown by Mr. A. E. Winter, who explained his method of obtaining photographs of earth-dwelling larvæ, and gave details of his own observations and those of Fabre.

Mr. Hincks: over a hundred species of the Curculionid group *Pachyrrhynchini* and other fine exotic weevils.

HYMENOPTERA were shown by Messrs. Butterfield, Dibb and Bayford; the last passed round two fine Chalcids bred from the cells of Mason bees found on the stalks of bananas.

The President: the life histories of several well-known HEMIPTERA and also specimens of several less common species.

Mr. Thompson: some fine Yorkshire species captured during the season.

DIPTERA.—*Hæmatopota italica* from the New Forest, was shown by Mr. Dibb; and also a few undetermined Tyrolean species shown by Mr. W. P. Winter.

ORTHOPTERA were shown by the President and Mr. Thompson; the former also exhibited four species of the mealy-winged NEUROPTERA.

Mr. Hincks: three species of ODONATA from Sarawak, the Corduline —*Epophihalma vitiigera* and two species of *Gomphinæ* belonging to the genera *Ictinus* and *Macrogomphus*.

In the PSOCOPTERA Mr. Brown showed a number of species. The present neglected state of this group offers a good field for research. Mr. Brown discussed certain structural and biological details in connection with his exhibit.

The Plecopteron, *Perla cephalotes*, was also shown by the President.

Dr. Croft recounted his experience of *Colias edusa* during the past season.

He had found the butterfly commonly in the south, and exhibited several specimens.

Dr. Croft drew attention to the prevalence of the Poplar Hawk Moth in Leeds during the past season, some specimens of which he passed round, together with a collection of moths made in his garden and house during the year.

Mr. W. P. Winter showed a box of insects from the Tyrol, and with reference to one of the species exhibited Dr. Croft made some remarks on seasonal dimorphism, and gave a brief resumé of Weismann's experiments.

The President contributed some remarks on seasonal dimorphism in the HEMIPTERA.

The evening meeting was devoted to the reading of recorders' reports, and to the nomination of officers.

The Two Solar Families, by **T. C. Chamberlin.** University of Chicago Press, xxii.+311 pp., $2.50 net. The Professor of Geology and Palæontology in the University of Chicago is well known for his geological researches, which have been a source of pleasure to American and English geologists for many years. With his geological knowledge he is peculiarly fitted to write the present well-illustrated volume, which will appeal to geologist and astronomer alike.

FRESHWATER CRAYFISH.

In *The Naturalist*, January 29th, p. 46, Mr. Stevenson writes, ' The freshwater Crayfish—sparsely distributed—The Ure and Derwent are *said* to contain them.' As to the Ure I am pretty sure I have caught one or two up Wensleydale, and *quite* sure as to numbers in Semmerwater, Bainbridge. Indeed, on one occasion, with a rough wind on, there were numbers driven into the shallows at the pebbly lower end, near where the Bain flows out. Probably about 1895. My son, R. K. Clark, remembers catching them, when a boy, in the Bain below the lake.*

P. 27.—We used to get Pilularia in the pond at the entrance to Strensall Common, about $\frac{1}{4}$ mile from Strensall Station, *c.f.* H. Ibbetson and B. B. Le Tall's ' Ferns of York.'—J. Edmund Clark.

BEWICK'S SWANS IN YORKSHIRE.

Dear Sir,—I should like to supplement the notes on Bewick's Swans by Mr. Stubbs in your January issue. On March 3rd, 1922, the waterman's wife sent me word that she had seen a great number of geese on the reservoir below Bill's-o-Jack's Inn. The day following, having heard of the swan being shot, I went to see the lady, and on asking her the colour of the birds she had seen, her answer was—white, of course—and then added that they were very noisy and did not sound like tame geese. I am fully convinced that the birds she saw were swans ; I continued to receive reports of these birds for about a week, but never had the good fortune to see one. From then until January 11th, 1925, I never saw or heard of any more in our district, but on that date I saw a herd of 27 on Chew Reservoir ; on disturbing them they rose in the air making a great noise, but, although the noise was more or less a yelp, I should never have mistaken it for puppies as some writers state. I have several other records of Bewick's Swans being shot in our district previous to 1922, but none of them was in a herd.—Fred Allen.

DERIVATION OF THE WORD DERWENT.

Dear Sir,—Referring to Mr. Burkill's article in the January number of *The Naturalist*. As Mr. Burkill points out, the name must date long prior to the Roman occupation of Britain. But I wonder if Mr. Burkill, Mr. Smith and Professor Ekwall, whom Mr. Burkill also quotes, are acquainted with ' Words and Places,' by the Rev. Isaac Taylor. This book was published by Macmillan in the middle of the last century and ran through several editions ; therein we read as follows :—

' Another word diffused nearly as widely as *afon* is the Welsh *dwr*, water. Forty-four ancient river-names contain this root. On the modern map we find the Dour in Fife, Aberdeen and Kent, the Dore in Hereford, the Duir in Lanark, the Thur in Norfolk, the Daro in Queens County and Dublin, the Durra in Cornwall, the Dairan in Carnarvonshire, the Durrarwater and Deargan in Argyle, the Daver or *Dur*beck in Nottinghamshire ; the Glar*dur*, or grey water, in Elgin ; the Ro*ther*, or red water (Rhuddwr), in Sussex ; the Cal*der*, or winding water, in Lancashire (twice), Yorkshire, Cumberland, Lanark (three times), Edinburgh, Nairn, Inverness and Renfrew ; the Ad*der* in Wiltshire and Berwick, the A*dur* in Sussex, the A*dar* in Mayo, the No*der* in Wiltshire, the Ched*dar* in Somerset, the cascade of Lo*dore*, the lakes of Win*der*mere and *Der*wentwater. The name *Der*went is probably from *dwr-gwyn*, the clear water.'

Surely this sounds more convincing then Mr. Smith's suggested derivation or Professor Ekwall's laborious attempt to derive the word from the British *derua*, oak !—Yours faithfully, G. T. Lyle.

* These crayfish were introduced into Semmerwater by Sir Christopher Medcalfe before 1730, see ' Yorkshire Natural History 200 Years Ago,' *The Naturalist*, November, 1914, p. 347.—Ed.

NEWS FROM THE MAGAZINES.

S. J. Tomkeieff describes 'The Volcanic Complex of Colton Hill (Derbyshire) in No. 336 of *The Quarterly Journal of the Geological Society of London*.

With the aid of thirteen illustrations, T. C. Futers describes the modernising of Seghill Colliery, Northumberland, in *The Colliery Guardian* for January 11th.

In the *China Journal* for January is figured a large eel, caught in a Hong Kong reservoir. It weighed 18 lbs., was 57 inches long, and 13½ inches in girth.

An appreciation notice and portrait of the late Lord Lambourne appears in *The Animal World* for February. The same journal contains photographs of 240 traps entered in the Society's Humane Rabbit Trap Competition.

In *The Naturalist* for January, 1929, our contributor, Mr. E. W. Wade, was described as M.B.O.U. This was added by us, but we now find that Mr. Wade resigned his membership of the British Ornithological Union some time ago.

'Tar-Distallate Winter Washes,' and 'Apple Capsid Bug,' by S. G. Jory, and 'The Economic Possibilities of Rice Grass (*Spartina townsendii*),' by F. Knowles, appear in *The Journal of the Ministry of Agriculture* for January.

No. 336 of its *Quarterly Journal* was published by the Geological Society of London on December 31st, but did not reach the Society's library until January 22nd. It is said to have been posted and mistaken for a Christmas present by the Post Office.

Among the many contents of *The North Western Naturalist* for December are 'Notes on Birds of Lakeland and Solway Firth, 1926,' by Ritson Graham; and 'Algæ of North East Lancashire,' by H. Ellis. A strong feature is the number of notes and records.

The Journal of the Commons and Footpaths Preservation Society for November deals with a variety of subjects, including Recent Legal Decisions, Cliff Footpaths, London Squares, Petrol Filling Stations and Highway Disfigurement, A Cornish Right of Way, Open Space Schemes.

The Vasculum for February describes the Vegetation of Hell Kettles; and a Beheaded Burn. There are also references to the Triple-spotted Pig, and the Coxcomb Prominent, the Yellow-lined Quaker and the Marbled Carpet. Mr. Sticks showed the Small Phoenix, and an Abnormal Bugle (not for the 'last trump') is described.

We have received from Mr. Hans Schlesch a reprint from *Archiv für Molluskenkunde* dealing with 'Ueber das rezente Vorkommen von *Pomatias elegans* Müll in Ungarn usf.' It is accompanied by a map showing the distribution of the species. Also from the same journal, 'Vorläufige Mitteilung über ein interessantes Vorkommen von Lössmollusken in der Umgebung von Szeged (Südungarn).' In this are illustrated some of the molluscan monstrosities recently presented to the Museum at Hull.

La Prensa, of Buenos Aires, publishes information in regard to Ecuadorian petrol, based on articles written by the State Geologist of Ecuador, Dr. George Sheppard, with reference to the question of Ecuadorian petrol, and speaking principally of the Peninsula of Santa Elena. Dr. Sheppard's observations have been confirmed by Lord Forres, Chairman of the Board of the Anglo-Ecuadorian Oilfields, Ltd., in his speech made at the Annual Meeting, which took place in London recently at the Company's offices. The Chairman said that the development of the undertaking had surprised him, that the various borings had justified themselves, and that special tools had been ordered from the United States which had given good results in the hard formations in different parts.

NORTHERN NEWS.

The *Yorkshire Herald* for January 26th records the felling of an oak tree at Pickering supposed to be 400 years old. The tree is said to be 34 feet in circumference.

At a recent meeting of the Linnean Society of London, a paper by Professor F. E. Lloyd on ' The Resistance of the Door of the *Utricularia* Trap to Water Pressure,' was read.

From a publisher's announcement we gather that for a guinea it is now possible to obtain ' The Cytoarchitectonics of the Human Cerebral Cortex,' by Constantin von Economo.

We have received from the Geological Survey Office, Jermyn Street, two colour printed maps showing the drifts and other geological features of the Ipswich and Felixstowe districts. The former takes in the area from Aldeburgh to Bawdsey Manor, and the latter the district immediately around Felixstowe. Each is sold at 2/-. As they cover the area where man was invented, according to some authorities, there should be a brisk demand for the maps.

A poetic correspondent sends the following :—

A Blackbird sat high on a Goathland rose bush,
Tit-willow, Tit-willow, Tit-willow ;
And it said why should I not get fed with a rush,
Tit-willow, Tit-willow, Tit-willow.
Here's haws and here's hips, and I'm wanting the haws,
And I've not said ' hip hip ' nor ' hurrah ' just because
I find I can swallow at one gulp the haws,
Tit-willow, Tit-willow, Tit-willow.

The Ministry of Agriculture and Fisheries has added to its valuable collection of publications in issuing as Miscellaneous Publications, No. 62, ' Insect Pests of Crops,' 1925-7 (London : H.M. Stationery Office, 48 pp., 2/-). The pamphlet deals with Development in Methods of Control ; Foreign Introductions ; Cereal, Potato, Root Crop, Pulse, Pasture and Forage, Vegetable, Fruit, and Special Crop Pests, and there are valuable appendices showing the fluctuations of the severity of the pests in different years ; lists of the more Important Plant Pests, etc.

It was a happy idea to select Professor J. Graham Kerr to prepare the volume *An Introduction to Zoology* (78 pp.) as one of the delightful ' Sixpenny Library,' No. 57, issued by Messrs. E. Benn, Limited. The Professor deals with the subject under the heads of A Simple Type of Animal, *Amoeba proteus* ; A More Complex Animal ; The Evolution of the Individual ; The Evolution of the Animal Kingdom ; and Zoology and the Citizen. Those who are familiar with his writing will thank the publishers for the way in which they have put this work before students at so small a cost.

I presume we shall now be hearing no further about ghosts and goblins, as Mr. J. Reid Moir has printed a pamphlet of seven pages entitled ' Disembodied Spirits : A Short Essay on Spiritualism.' In this he states that there are no such things as ghosts, and if the matter is investigated on *scientific lines* (the italics are his) the ' belief in ghosts will probably be found to be baseless, and be relegated to the limbo of past and happily forgotten things.' As Mr. Moir says, ' It is not difficult to imagine the reception a man would receive if, when applying for a post, say, as an engineer, he informed his prospective employer that, hitherto, he had been engaged in running a poultry farm.' Just in the same way we consider that a man who may be good at making shirts may or may not know anything about what happens to the spirits which have escaped from shrouds.

The Naturalist

Printed by A. BROWN & SONS, Ltd., 40 George Street, Hull, and published by A. BROWN & SONS, Ltd., at 5 Farringdon Avenue, in the City of London.
March, 1929.

APRIL 1929.

No. 867
No. 641 of current Series

THE NATURALIST.

A MONTHLY ILLUSTRATED JOURNAL

PRINCIPALLY FOR THE NORTH OF ENGLAND.

EDITED BY

THOMAS SHEPPARD, M.Sc., F.G.S.,
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The Museums, Hull;

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Tolson Memorial Museum, Huddersfield,

WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF

JOHN W. TAYLOR, M.Sc. RILEY FORTUNE, F.Z.S.

Contents :—

LONDON:

A. BROWN & SONS, LIMITED, 5 FARRINGDON AVENUE, E.C. 4.
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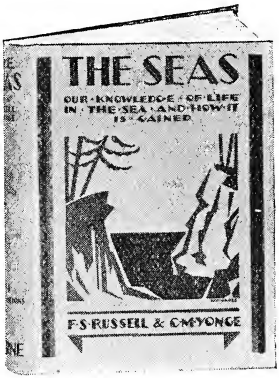

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NOTES AND COMMENTS.

PROFESSOR F. O. BOWER, F.R.S.

Members of the Yorkshire Naturalists' Union and readers of this journal who have had the privilege of reading Professor F. O. Bower's admirable address delivered at the Sheffield meeting of the Yorkshire Naturalists' Union, will be interested to hear that Professor Bower has been chosen as President of the British Association for the Advancement of Science for 1930. This is as great an honour as it is possible to give a British scientist, and we are glad that the British Association has seen fit to follow the example of the Union in making him its President.

LORD NORTHBOURNE ON MUSEUMS.

Lord Northbourne, Chairman of the Sudeley Committee, in writing to *The Times*, points out his Committee attaches particular importance to ' (1) The strengthening and extension of the system of guide lecturers in museums and galleries ; (2) the intelligible and convenient arranging and labelling of exhibits ; (3) the extension of the hours of opening to the public ; (4) the provision of adequate lighting and convenient seating ; and (5) the principle of free admission, in connexion with which they note with satisfaction that the evidence presented to the Royal Commission was generally against the charging of fees.'

' THE TIMES ' ON MUSEUMS.

Commenting on this letter and Editorial in the same paper states : ' The exhibits should be so arranged and, specially, so labelled that, without a guide-lecturer, the visitor may get an elementary idea of what they are and how they are related to each other. The galleries should be kept open at hours during which the general working public can go to see them. They should be well lighted ; they should be made comfortable (instead of being notoriously fatiguing). Admission should be free, with the fewest exceptions possible. And advertisement should make known to every one what there is to see and when and how it can be seen.'

BRITISH MUSEUM POSTCARDS.

The British Museum (Natural History) in its series of postcards has now issued seven envelopes, Nos. F22 to F28, each of which contains two postcards in colour and two in monochrome illustrating British trees, sold at 6d. for each set, which is accompanied by a four-page leaflet giving a description of the particular tree referred to. The seven already dealt with are Alder, Wild Apple, Ash, Beech, Sweet Chestnut, Horse Chestnut, and Sycamore.

BRITISH TREES.

The following introductory note appears on the first page of the leaflet dealing with the Sycamore, and a similar one is printed with each set : ' In these series of cards the term " British " has not received too rigid an interpretation as it has been thought proper to include within their scope various well-known and common trees which are, strictly speaking, not native ; for instance, the Horse Chestnut and the Larch. Readers desirous of more complete information about the trees of this country than is contained in the leaflets of the series are advised to consult the following works :— Elwes & Henry, " Trees of Great Britain and Ireland " (7 vols., 1906-13) ; Percy Groom, " Trees and their Life-histories " (1907) ; Boulger, " Familiar Trees " (3 vols., second edition, 1906-07) ; Step, " Wayside and Woodland Trees " (a pocket guide). If information be required about timber reference should be made to " The Timbers of Commerce and their Identification," by Stone (1904).'

EARLY IRISH MAN.

The pages of *Man* contain further notes on ' Early Man in Ireland.' In the January issue J. Kaye Charlesworth, referring to the Sligo ' implements,' says : The problematical nature of these ' is shown not only by their entire rejection as artifacts by some archæologists, but by the serious divergence of view as to their age, revealed in the statements of those who do believe in them. They have been assigned to the Early Mousterian by Mr. Reid Moir, to Pre-Chellean by Mr. Burchell, to a period " très reculée du paléolithique " by l'Abbé Breuil, who denies the Mousterian affinities stressed by Mr. Moir, and to an age unknown by a number of other writers. The divergence is further emphasised by the fact that a few " implements " accepted as human by Messrs. Moir and Burchell, were found by l'Abbé Breuil to be reconcilable with the action of natural forces.' and R. A. Macalister, on another page, informs us that : ' I have visited the Rosses Point sites four times, each time in the company of a geologist of position. The *First,* when we came on the ground, said " What is this? " " This, sir," said I, " is Mr. Burchell's ' rock-shelter.' " " You are not serious ? " " Quite serious ; here is his own photograph of it, in his own book." " But I never realised that the case was as bad as this ; this is past a joke." The *Second* said much the same thing, yet more emphatically. The *Third,* after we had seen all the sites, said, " I don't care what they have found ; the geology condemns them absolutely." The *Fourth,* in answer to a question of mine, said that it would be quite legitimate to

describe the affair as an insult to Science. Each visit occupied a whole day, during which, and during the subsequent railway journeys back to Dublin, little else was discussed ; and in all those long conversations I do not recollect a single word spoken to mitigate the universal condemnation of Messrs. Moir and Burchell's theories.'

FORM IN FOSSILS.

An address on this topic appears in *The Proceedings of the Geologists' Association* issued on January 21st, by Dr. W. D. Lang, the Keeper of the Geological Department. Dr. Lang concludes : ' Organic Form is a synthesis of the environment's impression and the organism's expression, of the action of the environment and the organism's reaction ; a synthesis involving contingency, rather than a resultant implying inevitability. To the morphologist these matters, although of alluring interest, are strictly secondary ; he is primarily concerned with the facts of form—the bare facts some would say, only they are not bare for him, for it is the beauty of organic form which attracts him. He may not know " why the forms are fair," as the artist has been said to know, but he realises that in organic form Science is so linked with æsthetics that there at least " Beauty is Truth, Truth Beauty." '

CARLISLE NATURALISTS.

We should like to thank Messrs. L. E. Hope and F. H. Day for the care they have exercised in selecting and editing the papers appearing in Volume IV. of *The Transactions of the Carlisle Natural History Society,* recently issued (136 pp., 3/6). If all our northern natural history societies used the same discretion in deciding what papers should be printed, the task of the student would considerably be simplified. Every line has a bearing upon the Carlisle area, and we find nothing of Chinese fishes, Peruvian birds, and the Plays of Bernard Shaw. The papers are ' William Hodgson, A.L.S., Botanist, A Memoir,' by James Murray ; ' The Raven,' by E. Blezard ; ' The Minerals of the Caldbeck Fells,' by F. H. Day, jun., B.Sc. ; ' The Lepidoptera of Cumberland, Tortrices, Tineæ, etc.,' and ' The Orthoptera of Cumberland,' by G. B. Routledge ; ' Local Wild Fowl (Ducks and Geese),' by Ritson Graham ; ' The Hemiptera Heteroptera of Cumberland,' ' The Dragonflies of Cumberland,' and ' Cumberland Coleoptera,' all by F. H. Day, F.E.S.

MINERALS OF BRANDY GILL.

We feel we must quote one paragraph from Mr. F. H. Day, jun.'s, valuable paper. He writes : ' Perhaps the most

sought for mineral at Brandy Gill is tetradymite, a telluride of bismuth, and small specks and spangles of it are quite common, though large masses with a well-crystallized form are rare. The sulphide bismuthine and the native metal also occur, but I do not think either is as common as the telluride. The most abundant metallic minerals are wolfram and mispickel, both of which often occur in quite large masses, not as a rule exhibiting any well marked crystalline form. Wolfram is the black, shining tungstate of iron and manganese, and it is not infrequently accompanied by the calcium tungstate scheelite, which is generally quite well crystallized, the crystals being a light yellowish brown colour. The scheelite occurred in sufficiently large amounts to be worked along with the wolfram. Small amounts of tungsten oxide, formed by decomposition of the wolfram, are also found in the form of yellowish incrustations.'

THE UPPER ESTUARINE SERIES OF YORKSHIRE,

At a recent meeting of the Geological Society of London, Mr. M. Black read a paper with the above heading. 'The Estuarine Series of Yorkshire is, despite its name, of deltaic rather than estuarine origin, and bears a close resemblance to the Coal Measures. The Upper Estuarine Series is best exposed in the coast section between Gristhorpe and Cloughton. Where it is well developed, the series as a whole has a thickness of about 200 feet. Fossils are rare in the normally developed Moor Grit, but are present in the beds above. It is possible to distinguish between autochthonous plant-beds and allochthonous, or drifted, ones. The former are rare in the Upper Estuarine Series, and where they have been found, they possess a very restricted flora, limited to *Equisetites* and *Coniopteris*. The drifted plant beds, on the other hand, are much better developed. Among these, a definite relationship exists between the type of sediment and the flora which it encloses. Deposited in the beds of the wash-outs are comparatively large logs and branches, while patches of shale enclosed in the same channels often contain fronds of Cycads. In the Current-Bedded Sandstone there are pockets of shale with Ginkgoales, Conifers, and Ferns. The more widespread plant-beds of the series are found as normal members of the level-bedded division, and contain Ginkgoales, Conifers, and Ferns, usually in greater variety and of more delicate types than is the case with the current-bedded division. From the distribution of the plants, it is suggested that the composition of the flora in a drifted plant-bed is determined by a process of sorting, and that the plant-fragments have behaved as a sediment transported by the water of the distributaries.'

The Naturalist

AND DELTAIC ORIGIN.

In the discussion, Professor P. F. Kendall said that* 'it was gratifying to have a thorough and detailed account of the formation known as the Upper Estuarine Beds, and he offered his congratulations upon the author's work; at the same time he would point out that the view that the series was deltaic, not estuarine, had long been entertained, and had been stated in 1906 and again in greater detail in 1924. The delta conformed fairly closely to the Jurassic block of North-east Yorkshire, although an attenuated extension was traceable to and beyond Northampton. The three members into which the Estuarine Series was divided were marked off by marine deposits which, however, were not all recognizable at any one spot. The distinction drawn by the Author between the autochthonous and the allochthonous floras was of great value, and the speaker had emphasized the importance of this distinction in the case of the Coal Measures: to take a single instance, the Halifax Hard Bed, from which the petrifactions known as "coal-balls" were obtained, yielded a floral assemblage differing greatly, as Dr. D. H. Scott had remarked, from the plants contained in petrifactions, "roof-nodules," found in the overlying shales. The former were manifestly autochthonous, while the latter might have been swept down by a river in flood from a region scores or hundreds of miles away, possibly from a different botanical province, a contingency that might impair the usefulness of a classification based wholly on botanical evidence. The Author had found only *Equisetites* and *Coniopteris* in position of growth. When he extends his investigations to the Middle and Lower Estuarine Beds, he will find the old cane-brakes of *Equisetites* in many places, at one of which the speaker discovered the much desired rhizomes. Near the Yellow Sands at Whitby, at the very base of the Lower Estuarine Series, there are remains of a forest of *Dadoxylon* which was seated on a Dogger Conglomerate, and the roots could be traced ramifying in the shales of the Upper Lias. Coal-seams also occur in the overlying strata, and, 70 or 80 feet above the Dogger, there is a bed of shale yielding the oldest European example of the genus *Unio* and tridactyle footprints of reptiles.'

SEA SQUIRTS WITH VISIONS.

In his admirable Presidential Address to the South Western Naturalists' Union, referred to elsewhere, Prof. G. P. Bidder writes: 'There is another class of animals whose gut begins with a sieve of gill-slits, and they are the Sea-Squirts or Tunicates. They are seen on the rocks as shapeless lumps or

* *Abs. Proc. Geol. Soc.*, No. 1193, pp. 44-45.

colonies, embedded in a peculiar tough jelly called the tunic, and are usually supposed by the fishermen to be " fish-spawn." Each has two tubes to give and take the ceaseless current that passes through the sieve ; in the body there is a coil of gut and not much more. With trouble you find something of a nervous system and a length of contractile tube that keeps the blood stirring, but the tunicate is a low sort of beast. Yet he is our relation. When he hatches from the egg he is quite different ; he has a tail with which he swims about, and in that tail is a notochord of cartilage, and above the notochord is a nerve-chord, and the front end of the nerve-chord ends in a brain, and the brain has an eye and an ear. The young tunicate is a tadpole, and swims about like a tadpole, seeing and hearing the world and going as far from home as possible. There comes a day when he adopts a fixed career, which requires no intelligence ; and he exchanges freedom for prosperity, loses his vision, ceases to use his brain, becomes flourishing and successful, and propagates a large family. But there was a time when the sea-squirt was young, backboned, and ambitious, with visions ; and for that reason we acknowledge him, and unite Tunicates and Lancelet as the *Proctohordata.*'

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

Income Tax.

At the meeting of representatives of scientific societies, convened by the British Association on January 4th, 1929, to consider the taxation of societies' income, Sir William Bragg, F.R.S., president of the Association, was in the chair. Sir Josiah Stamp, G.B.E., General Treasurer of the Association, addressed the meeting, and replied to points raised by subsequent speakers. The meeting was consequent upon the decisions of the Special Commissioners, the High Court, and the Court of Appeal, according to which the Geologists' Association and the Midland Counties Institution of Engineers were adjudged on the facts, as found by the Special Commissioners, not to be ' charities ' exempted from taxation under the Income Tax Act, 1918.

The following principal considerations have emerged :—

(1) No satisfactory definition of a ' charity ' applicable to scientific societies generally has been found. The cases referred to above were brought as test cases : the judgments show that they do not provide a common ' test,' and indicate that no individual case can indeed act as such.

(2) It has been laid down by the judicature that—

(*a*) If a society exists mainly for the purpose of furthering science, and, incidentally, its own members' benefit, such society is entitled to exemption.

(*b*) If a society exists mainly to benefit its members individually (as in the case of conferring professional prestige), while incidentally furthering science, such society is not entitled to exemption.

(3) Some societies definitely fall on the side of non-liability, some on that of liability ; as to a third category, it is arguable on which side they should fall.

(4) Therefore the case of each society must be separately investigated.

(5) But in the mutual interest of societies, the meeting recommended community of action in order to ensure a pooling of experience, and to that end the officers of the British Association offered—

(*a*) To advise societies (so far as lies in their power) as to procedure, and

(*b*) To file in the office of the Association records of the results of individual societies' appeals and of the grounds of their success or failure, in order that such records may be available for consultation and general guidance.

(6) As to procedure—

(*a*) Appeal lies first to the Board of Inland Revenue. The case of the British Association itself gives an example of the simplest procedure : the Revenue authorities, being in posession of the Association's charter, statutes, and accounts, asked for evidence of its public activities, and were supplied with marked passages in a printed history of the Association, and in its current report. The claim was allowed.

(*b*) In other cases, it is understood, claims have been allowed after personal discussion between officers of a society and of the Board.

(*c*) Failing agreement with the Board, appeals lie to the Special Commissioners and thereafter to the High Court, etc. (see par. 9 below). The employment of counsel accustomed to Special Commissioners' procedure and to this particular type of enquiry was advocated at the meeting, and on this matter the British Association is prepared to advise.

(7) As to record—

The Association office will act as a clearing-house, and the Secretary (British Association, Burlington House, London,

W.1), will, therefore, be grateful to receive from the secretaries of other scientific societies, statements to be filed, and if necessary circulated, indicating *in the briefest possible summary*—

(*a*) The grounds upon which the society has claimed exemption.
(*b*) The procedure followed by the society in claiming.
(*c*) Whether the claim has succeeded or failed, and, if failed, the reason assigned therefor.
(*d*) What further action, if any, is contemplated.
(*e*) Subsequent summary report of such action and its result.

The following were among further points and opinions brought forward at the meeting on January 4th:—

(8) Sir Josiah Stamp expressed the view that if individual action and common consultation by the societies (as outlined above) resulted in a series of decisions which it was thought did not give Science due recognition, then there would be a case to present to the Chancellor of the Exchequer for an alteration of the law. At the moment it did not seem to him that there was such a case.

(9) If an appeal to the Special Commissioners fails, it is open to a society to go to the Courts on a point of law, but if the judges rule that this is not a point of law but a question of fact and that the Commissioners' ruling was final, that is the end unless it is possible to show that the Commissioners did not address their minds to a particular point which the society considers vital.

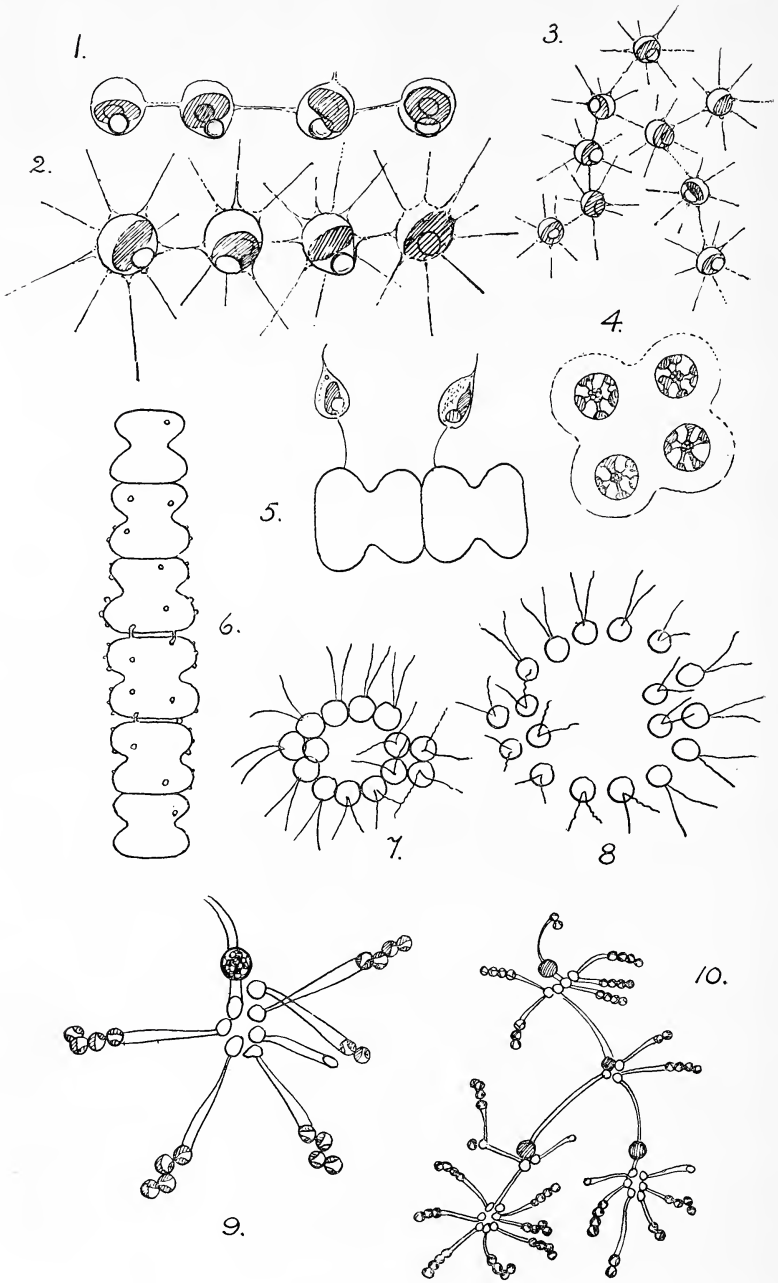
(10) It was recommended to ask the Special Commissioners to appoint one or two of their number to deal with all cases affecting scientific societies, in order to assist correlation.

(11) Instances are known of societies (other than scientific) which come within the Inland Revenue Acts because of the terms in which their objects were originally stated, such statement not indicating 'charitable' work, whereas the work actually done might be adjudged 'charitable.' All alteration of the statement of objects in such cases might lead to exemption.

(12) It was found desirable at the meeting to make clear that the discussion was upon the assessment for tax of revenue from invested funds; not upon assessment as a trading concern under Schedule D. Trading profits are liable to taxation if made from the sale of goods to the public, irrespective of what is done with the profits.

O. J. R. HOWARTH, *Secretary.*

British Association,
Burlington House, London, W.1.
January, 1929.



Details of some Plankton Algæ of the English Lakes.

THE PLANKTON ALGÆ OF THE ENGLISH LAKES.

W. HARRISON PEARSALL AND W. HAROLD PEARSALL, D.Sc.

(Plate V.).

In 1925 we published a full list of the species of algæ observed during 1920-22 in the larger lakes of the English Lake District (2). Numerous additional plankton collections have been made since that time, especially in 1928, and in these collections—now numbering nearly 100—many additional species have been observed, two of which are new to this country. The following notes deal with such of these as are of taxonomic interest, and with those occurring with sufficient abundance or constancy to warrant their inclusion as members of the lake phytoplankton. Isolated occurrences are not recorded, and the notes given are based not only upon the original plankton collections, but also—and usually very largely—upon the material from cultures of the plankton under semi-natural conditions. Considerable changes have been observed in the phytoplankton of most of the lakes, from year to year, but no detailed mention of these will be made in this paper.

Chrysomonadinæ.

Chrysidiastrum catenulatum Lauterborn in Pascher and Lemmermann (1). Windermere and Bassenthwaite. This species, hitherto unrecorded in this country, and, indeed, imperfectly known, was seen in several forms, the colonies containing 2—24 cells. The most usual form (fig. 2) consisted of four or more cells in a row, each cell of diameter 11—16μ, provided with fine radiating pseudopodial strands, a single distinct yellow or olive-brown chromatophore, and a highly refractive granule apparently consisting of leucosin. In other cases (fig. 1) the cells were smaller, the leucosin granules more conspicuous, and the pseudopodia like radiations were absent. In still other specimens (fig. 3) there was a larger number of cells (six or more) with a tendency for the linear arrangement to be lost or obscure. Our material resembles rather Lauterborn's original drawing than that of Smith. (3). The latter gives the alga a much more amœboid appearance than was the case in our specimens. Neither of the published figures shows the prominent refractive granule, but it is conceivable that our material was in a more advanced state of development, and we are inclined to regard our second form (fig. 1) as one in which there was accumulation of photosynthetic products and resultant (?) contraction of the protoplasts. It seems justifiable to assume that pseudopodia are not permanent characters of such species.

1929 April 1

HETEROKONTÆ.

Stipitococcus Lauterbornei Schmidle. Bassenthwaite, Wastwater and Ennerdale. Our material does not exactly fit either of the known species of this genus, but its general resemblance to *S. Lauterbornei* is clear. It has been observed a number of times epiphytic on *Spondylosium planum*, and also on *Gonatozygon monotænium*. The cells are rather ovate, with a distinct apical projection shorter than the cell, the latter being 7—9μ long, 4—5μ broad. The stalk varies from 10—20μ. There is a single chromatophore, at times possibly two, and the cells contain no starch, but clear granules, apparently of a fatty character. There is no clearly defined cell-wall, though at times the outer covering seems to be distinct from the edge of the protoplast. The apical projection and stalk apparently do not differ greatly in character from the protoplasm.

Mischococcus confervicola Nägeli. This alga is usually epiphytic on filamentous species. The form we provisionally place under this specific name was observed in Crummock, and particularly studied in cultures. It grew quite unattached amongst abundance of *Tribonema bombycinum*. A typical example (figs. 9, 10) shows a number of scattered groups of empty cells, from each of which radiate stalks, each usually terminating in four cells, 3—5μ in diameter and possessing two distinct yellow-green chloroplasts. Most of the colonies seen showed occasional larger cells, 8—9μ in diameter, with dense fatty contents which suggested resting spores. *M. confervicola* is rather polymorphic and we provisionally regard our form as a planktonic form of this species.

Tribonema bombycinum D. and S. forma *minor* (Wille) G. S. West. Crummock. The forms of this species found in the plankton of lakes are frequently smaller than those found elsewhere.

CHLOROPHYCEÆ.

Asterococcus limneticus G. M. Smith (3). Crummock and Windermere. This alga has not been previously observed in this country. Our material showed 4—8 spherical cells lying in a homogeneous layer of mucilage. The chloroplast showed 4—6 rays, from a central pyrenoid, each ray ending in a disc at the cell wall. The cells varied between 11—15μ in diameter (fig. 4).

Gonium sociale (Duj.) Warming. Ennerdale, Bassenthwaite, Lowes W., and Windermere.

Gonium pectorale Müll. Windermere and Esthwaite. In cultures from Windermere material a great variety of forms

was observed, which should perhaps be included under this species (figs. 7, 8). The numbers and arrangements of the cells were very variable. In size, some of these forms with cells 11—14μ broad, approached *G. sociale*, and these also had the cilia vibratile at the tips. They lacked, however, the characteristic ovoid cell-shape of that species. In other forms, the cells were smaller, 7—9μ in diameter, and the general appearance was rather more suggestive of *G. pectorale*. The colonies contained from 8—18 cells. These forms were observed in cultures containing both *G. sociale* and *G. pectorale*.

Volvox aureus Ehrenb. Windermere and Esthwaite. Although frequently observed this species was inadvertently omitted from our previous list. In 1928, *Volvox aureus* was rare and *V. mononæ* was not seen, their comparative absence being possibly due to the abnormally wet and cloudy summer.

Tetraspora limnetica West. Abundant in Ennerdale, Windermere and Esthwaite.

Tetraspora lacustris Lemm. has been frequently thought to be a form of *Sphærocystis Schrœteri*. The seasonal relations of the two forms in the English lakes agree with this idea, for *S. Schrœteri* reaches its maximum between May and July, subsequently decreasing or disappearing, and the appearance of *Tetraspora* synchronises with the decrease of *Sphærocystis*. In Windermere, where both are at times abundant, the following percentages were observed in 1928, similar differences being noticed in other lakes :—

	Jan.	Mar.	May	June	July	Aug.	Sept.	Nov.
Sphærocystis Schrœteri ...	+	+	14	1·5	+	+	+	1
Tetraspora lacustris ...	+				+	2·5	.15	+

In some of our cultures which contained abundant *T. lacustris*, occasional colonies were observed in which pseudo-cilia, even after staining, were indistinct or absent. Colonies lacking pseudo-citia retained the characteristic quadrate arrangement of the cells, but frequently, if not always, the mucilage envelope was more swollen and less distinct. Pseudo-cilia, when present, are often arranged at right-angles to the long axis of the cells, in a way we have not seen figured.

Conjugatæ.

Spondylosium and *Sphærozosma*. During our examination of the plankton we have had abundant opportunities of examining *Spondylosium planum*, *S. papillosum* and *Sphærozosma granulatum*. We have come to the conclusion that these two genera, though perhaps legitimately separated on grounds of convenience, are not really distinct. Apart from the fact that individuals at times occur in nature, which are difficult to place in either group, we have observed in

cultures filaments in which the characters of both genera are present. An example of such a filament from the Windermere plankton is figured (fig. 6) in which the two central cells are *Sphærozosma*, with a distinct space between them, the normal interlocking processes and large lateral granules. These cells are 9μ long and 9μ broad. On either side are transitional cells and beyond these small *Spondylosium* cells (long. 8μ, lat. 7—8μ), showing no trace of lateral granulation or apical processes and in form resembling *S. planum*.

Some interesting variations of *Pleurotænium coronatum* (Breb.) Rabenh. var. *fluctuatum* West appeared in the August collection from Derwentwater. These had the dimensions of typical *P. coronatum* (long. 600μ, lat. at base, 51μ, at apex 45μ), but the semi-cells were undulate along their entire length as in the var. *fluctuatum*, but very unevenly so, one semi-cell being much more undulate than the other. The apical tubercles were very much reduced, as in var. *nodulosum*, and the cell-wall very thick and finely scrobiculate. In the same collection were examples of normal *P. coronatum* with granulate walls, the granules being well seen as projections on the lateral margins.

Staurastrum Arctiscon (Ehrenb.) Lund is described (*Brit. Desm.* V. 193) as having the body of the cell smooth. Many of the examples from the Lake plankton (especially those from Derwentwater) have the cell-body uniformly and conspicuously punctate.

S. Ophiura Lund. In our previous paper we stated that all the specimens we had seen in 1920-22 were 8-rayed in vertical view. Singularly enough, all those observed in 1928 were 9-rayed.

S. megacanthum Lund var. *scoticum* W. and G. S. West, previously only seen by us in Hawes Water, was recorded this year from Crummock, Bassenthwaite and Lowes Water. We are in agreement with the suggestion of Dr. N. Carter (*Brit. Desm.*, V., 20) that this variety should be placed under *S. curvatum*. It appears to us to be merely a large planktonic form of this species having spines rather less divergent than usual. It differs essentially from the typical form of *S. megacanthum* in the slightly concave apex and more inflated ventral margin of its semi-cells, their much longer and divergent spines and the usually narrower isthmus.

Penium truncatum Bréb. has only been seen by us from Buttermere and Ennerdale, but in each case the cells were unconstricted and quite smooth.

Arthrodesmus Ralfsii W. West. Ralfs originally described this as an unnamed variety of *A. incus*—'*A. incus* var. β, Ralfs,' *Brit. Desm.*, 1848, p. 118, Pl. XX,, figs. 4 e-h. It was first considered a distinct species by William West (*Journ.*

Linn. Soc. Bot. 29 : 168, 1892) and five years later by both W. and G. S. West (*Alg. S. Engl.*, 1897, p. 497). Subsequently it was again placed under *A. incus* as *A. incus* var. *Ralfsii*, W. and G. S. West, *Alga-fl. Yorks.*, 1901, p. 109. There it remained till 1924, when G. M. Smith (*Phytopl. Wisc. Lakes*, Pt. II., p. 129) gave it the specific status originally assigned to it by W. West. We agree with Smith's view that 'the alga is sufficiently distinct to warrant the specific recognition that William West first gave it.' We have seen it in the plankton of all the English lakes, with the notable exception of Esthwaite Water, but no forms intermediate between it and *A. incus* have been observed. The constant and uniform convergence of the spines is a marked distinction between this species and *A. incus*, and, as pointed out by Smith, the shape of the semi-cells is different, as is also the ratio between their length and breadth. In examples we have seen the ratio L/B in *A. Ralfsii* is about 1·6, but in *A. incus* 1·1 or at most 1·2.

Bacillariales.

Rhizosolenia morsa W. and G. S. West. We have met with no descriptions of this species which include forms under 70μ in length, but have rather frequently observed smaller specimens in the English lakes. These are otherwise normal, but at times occur in chains of four or five cells and frequently possess resting spores. Examples (giving the length/breadth ratio in μ) are :—Esthwaite $\frac{52}{4{\cdot}5}$, setæ each 28 ; Crummock $\frac{50}{7}$, setæ 28 ; Windermere $\frac{49}{3{\cdot}5}$, setæ 21 ; all with resting spores. Without spores : Ennerdale $\frac{42}{3}$, setæ 20 ; Windermere $\frac{36}{3}$, setæ 18.

Myxophyceæ.

Anabæna flos-aquæ (Lyngb.) Bréb., var. *Treleasi* Born. et Flah. Esthwaite and Lower Water, abundant with the type. Vegetative cells up to 7.5μ long and 3.5μ broad, longer, narrower and more slender than type. Heterocysts 7μ long, barely 6μ broad.

Oscillatoria tenuis Ag. var. *tergestina* (Kutz.) Rab. In most lakes, if not all, abundant along with type. Cells very short, 2.5—3μ, granulate at partitions. Filaments bright blue-green in colour, feebly constricted at the transverse partitions and not attenuate at the ends.

Microcystis incerta Lemm. Occasional in Ennerdale, Crummock, Bassenthwaite, Derwentwater, Windermere, Esthwaite and Lowes Water.

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Illustrations.

1-3. *Chrysidiastrum catenulatum.* 1. Without pseudopodia. × 550. 2. Normal form. × 550. 3. A large colony. × 270.

4. *Asterococcus limneticus.* × 500.

5. *Stipitococcus Lauterbornei* on *Spondylosium planum.* × 1000.

6. Filament containing *Sphærozosma* and *Spondylosium* cells. × 1300.

7-8. Supposed *Gonium* forms. × 350.

9-10. *Mischococcus confervicola* f. *planktonica* ? 9. Detail of a small group of cells. × 500. 10. General arrangement of colonies.

Among the many memoirs in Part I. of Volume VIII. of the *Proceedings of the University of Durham Philosophical Society* are 'The Distribution of the Mussel Bands of the Northumberland and Durham Coalfield,' by Wm. Hopkins; 'Recent Developments in Plant Feeding,' by C. Heigham; 'The Plankton of the River Tyne Estuary,' by O. M. Jorgensen; 'Investigations on the Lateral Sense Organs of *Gadus merlangus*,' and 'The Projected Chemical Sense in the Coelenterata and Echinodermata,' by H. C. Regnart.

In *The Proceedings of the South London Entomological and Natural History Society* for the year 1927-28 is a paper on 'The British Snakeflies (Raphidia)' by W. J. Lucas, B.A. This is a very useful revision of the diagnostic characters of the four British species, and of their known distribution in the British Isles. Reference is made to the frequent occurrence in Yorkshire of *Raphidia xanthostigma.* Information is given of the habits and economy of the Raphidiidæ, and two excellent plates illustrate the life stages and details of nervuration.

In Part I. of Volume II. of *The Proceedings of the South Western Naturalists' Union* the editor, F. S. Wallis, 'comes into the limelight with a blue pencil,' which he seems to have used and gets his publication well within twenty pages. It includes Prof. G. P. Bidder's Presidential Address, in which he tries 'to make out how the various groups of animals which we study are related to each other'; J. L. Sager reports on the Conference of Delegates at Glasgow; and there is a report on the Sixth Annual Conference of the Union at Bristol. At this a visit was paid to the National Fruit and Cider Institute, where 'above all, various ciders were sampled.' There was a trip to the Cotswolds, and a visit to and discussion upon the Avon Gorge.

THE PRESERVATION OF PYRITISED AND OTHER FOSSILS.

E. G. RADLEY, F.C.S.

For many years it has been noticed that certain fossils, especially those occurring in the Gault, Greensand, Lias and London Clay formations, readily decompose when stored in collections. In this manner countless excellent specimens are being constantly destroyed.

The cause of the decomposition of many of these is ascribed to the oxidation of Iron Pyrites or Marcasite, with which the fossils are impregnated.

In the Folkestone area, at the base of the Greensand, there exists in the ' Black Band,' a bed of rock of dark colour, containing many highly phosphatised fossils. Specimens from this ' Black Band ' also rapidly decompose, but not so quickly as those which are recognised as pyritised. The phosphatised fossils contain Pyrites or Marcasite, but the phosphatic constituents predominate. The decomposition in the case of these specimens is no doubt due to the same cause as that of the pyritised fossils.

Pyritised fossils have been kept for many years in collections with no apparent decomposition. After the first signs of change have been noticed, however, it is often not long before complete destruction of the specimens is effected. Occasionally, fossils which have been kept in boxes containing cotton wool have suffered such rapid decomposition, that traces of free sulphuric acid have charred the wool, and even the boxes, before being absorbed and neutralised by the lime constituents of the fossils.

Instances have been noted where specimens have been in good condition for several years. Suddenly one specimen has shown signs of change, and soon after it has been found that many others, in close proximity, have also given evidence of decomposition. To account for this, it has been suggested that the change is effected by a microbe. Such a theory is quite a possibility, a microbe having been described which may, and does, exist in sulphuric acid, which is one of the products of the decomposition of pyritised fossils.

The ultimate product of the decomposition is a white powdery substance which has been proved to contain a sulphate of iron, besides calcium sulphate. In some specimens, where the change has been so complete that nothing remains but a white powder, tests have proved that almost complete oxidation of the mineral sulphide has taken place.

The cause of the decomposition, apart from that of the microbic theory, appears to be oxidation by the air, accelerated

by moisture, of the Iron Pyrites, or more probably Marcasite, contained in the fossils. The resulting sulphuric acid attacks the lime constituents and gives rise to the formation of calcium sulphate.

It is impossible to extract the Pyrites or Marcasite from the fossils without destroying them, as the mineral is often in a very fine state of division and is disseminated throughout the specimens.

Many attempts have been made to prevent the oxidation of the pyritic mineral by the use of covering materials, the most popular being either ordinary varnish or paraffin wax. These are very useful, but they have their limitations.

The principal objection to the use of either wax or varnish seems to be that with both materials the appearance of the specimens so treated is quite different from that of the untreated fossils. If the varnish has been used, another objection is, that although the specimens may be preserved for several years longer, eventually the result is the same. The varnish coat cracks and peels off in places and so allows access to air and moisture. Why varnish is affected in the course of time in this manner cannot be defined with absolute confidence. It may be due to evaporation of volatile constituents (this is very likely), or to contraction or expansion caused by differences of temperature.

What is apparently required as an effective covering material is one which can be easily applied, is impervious to air and moisture, and is flexible under all normal differences of temperature. With such a material it should be easy to prolong the life of pyritised fossils to a much greater extent than has been possible hitherto.

It was thought that ' Celluloid Varnish ' (celluloid in amyl acetate) would be found suitable as a protective medium. In 1919 some apparently sound specimens from a collection which had mostly decomposed, were, without being specially dried, coated with this varnish and replaced in the same cupboard in which the others had suffered change. They were examined every year for six years and showed no signs of decomposition. After a further three years another examination took place and the greater part of the treated fossils were found to be very decomposed. In 1921 another suite of fossils, carefully washed and dried, were coated with celluloid varnish and placed with the original set. Up to this time no change in the original test set had been observed, but as the protective qualities of celluloid varnish were still unproved, in 1921 it was determined to try other media on additional specimens.

For the purpose of this further investigation, suitable fossils were obtained from Folkestone. The fossils were all

collected at Copt Point, from boulders on the beach, from under boulders, and, in a few cases, from the cliff, where the matrix had been weathered away.

All the specimens were soaked in warm water and thoroughly scrubbed to remove all loose material, then washed in several changes of cold water, and left in water all night to remove, as far as possible, any soluble chloride which might be present. A final washing with distilled water was carried out the next morning and the washing continued until all trace of chloride, as tested by a solution of silver nitrate, had disappeared. This was considered necessary, as a deliquescent salt might be one of the causes of the specimens attracting moisture, and so decomposing the iron sulphide, with the formation of ferric chloride. This substance, on being attacked by any sulphuric acid present, would again decompose and give hydrochloric acid, which would further aid the destruction of the fossils.

In the cliffs at Folkestone a band of yellow material may be noticed. It consists of nodules which are decomposing. A specimen of the yellow decomposition was digested with water and the filtrate was found to contain ferric chloride, sodium chloride and magnesium chloride. Decomposed fossils which showed the yellowish colour were tested and the same compounds detected.

The cause of the yellow colour can be attributed to the decomposing influence of salt from the sea. Although, apparently, the sea never touches the band of nodules, there is always a certain amount of spray during high tides, and probably salt-laden moisture would reach the band.

After having been proved to contain no chlorides, the washed specimens were roughly dried with a cloth, left for a day and night to dry in the open air, and then put into a fairly cool oven for a day to complete the drying. They were finally well scrubbed with a dry brush to remove any remaining dust and detachable iron stains, and so prepared for the various covering materials it was proposed to use. It was thought that although ' Celluloid Varnish ' had so far proved an excellent covering material, under more or less normal conditions, there might be other substances which would be of equal or greater value.

Such an investigation, if carried out in a natural way, that is merely by covering the specimens with the protective media and then storing them under the usual conditions, would obviously take time, and it would probably be at least twenty years before a medium could be considered satisfactory. To eliminate the time factor in this enquiry as much as possible, it was decided to adopt such drastic methods as would produce in a short time changes that would,

in the case of normal storage, be spread over a number of years.

The agents of destruction of fossils impregnated with iron sulphides, apart from the possibility of chlorides, are oxygen and moisture. Sulphides on oxidation produce sulphur dioxide.

The methods adopted were, to submit the specimens to a current of moist air at atmospheric temperatures ; at intervals to pass the air through concentrated hydrochloric acid to determine whether chlorides aid the decomposition ; and at other intervals to treat the fossils with an atmosphere of sulphur dioxide, the latter being used as it is apparently the first result of the oxidation of the Pyrites, and its presence would probably increase the rate of decomposition.

(*To be continued*).

SOUTH-WEST YORKSHIRE ENTOMOLOGISTS.

The Annual Meeting of the South-west Yorkshire Entomological Society was held by invitation at the residence of Mr. G. H. Nash, Kirkstall, Leeds, on January 19th, Mr. B. Morley presiding. Arrangements for 1929 included five field meetings in various parts of South-west Yorkshire.

The President introduced the subject of insect parasitism, and dealt briefly with the carnivorous habits of various forms of insects. He also remarked upon a few instances of hyperparasitism which had come under his notice. Useful and interesting parasites which come before the notice of lepidopterists are generally regarded more with disgust than objects for close study, the most detestable being the dipterous spiny flies.

Exhibits included a remarkable specimen of *Gonodontis elinguaria*, with the discoidal spot of the left fore wing missing, while that on the opposite side was broadly divided into a twin spot, shown by Mr. C. P. Gledhill ; a fine *Archerontia atropos* obtained from Raistrick, by Mr. E. A. Smith ; a series of *Spilosoma mendica* bred from a cross between the white Irish var. *rustica* and the ordinary English forms ; the males were of a light buff more or less clouded with smoky, and the females very heavily marked with black, shown by the President.

Mr. Nash showed his collection of lepidoptera and an original method of arrangement. Each species was mounted separately in a case 15 by 10 inches. A good series representing as much variation as possible, and with the sexes marked, was pinned lengthwise across the top of the case. In the centre beneath the life cycle was graphically described. Oh each side of the life cycle were the parasites and all the characteristics that occur during the metamorphosis. A spray of the food plant neatly arranged across the case below, on which was mounted a number of larvæ, completed the display for each species. Forty species were shown all mounted in this remarkably effective way, and every case possessed, besides its scientiffc value, a further attraction of either great beauty or of economic importance. Perhaps some of the most outstanding were *Abraxas grossulariata, Pieris brassicæ, Catocala nupta, Lasciocampa callunæ, Vanessa atalanta, Biston betularia.*

A most enjoyable meeting was concluded by the members cordially thanking Mr. and Mrs. Nash for their kind hospitality.—J. Hooper, *Hon. Secretary.*

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Salt, and the Salt Industry, by **A. F. Calvert.** London: Sir Isaac Pitman & Sons, Ltd., vii.+151 pp., 3/- net. Mr. Calvert's work was noticed in these columns when it first appeared, and, as we then opined, its popularity has been such that a second edition has been called for. It is well illustrated, of particular interest being a reproduction of a woodcut, dated 1556, showing methods of dealing with the mineral. The various uses of salt, and the curious effect of subsidences as a result of brine pumping, are described and illustrated.

The work of C. Davies Sherborn and the late A. W. Rowe have made us familiar with the general appearance of sections in the white chalk of this country in different parts. We are reminded of their excellent work by the plates in **The Geology of the Country near Ramsgate and Dover,** by **H. J. Osborne White,** recently issued (Geological Survey Memoir. London: H.M. Stationery Office, xii.+98 pp., 2/9 net). There always has been a close resemblance between the geological features of Kent and Sussex and those of Yorkshire, and this seems to be brought out remarkably well in the present memoir. The view of the chalk stacks on Plate IV. might almost have been taken at Flamborough. After dealing with the general physical features of the area and the underground geology, the well-known sections in the chalk, Eocene Beds and Superficial Deposits are dealt with, followed by a number of notes on the Economic Geology of the area.

In Memoriam.

SETH LISTER MOSLEY, F.E.S.

(1848-1929).

The name of Mr. S. L. Mosley will be familiar to all the older members of the Yorkshire Naturalists' Union, as well as to many of the younger ones. In the early days of the Union he was an energetic member, did excellent work,

especially in entomology, and was a frequent contributor to *The Naturalist*. Mr. Mosley, who died at Fartown, Huddersfield, on Wednesday, February 6th, was born at Lepton, near Huddersfield, on March 16th, 1848, and was the son of James Reid Mosley, at one time gamekeeper at Heaton Lodge Woods. The father took a keen interest in birds, and was well known locally as a taxidermist. Many of the specimens in the collection of the late Alfred Beaumont, and now in the Tolson Memorial Museum, Huddersfield, were prepared by him. Being a weakly child, S. L. Mosley had not much schooling, but early picked up a taste for natural history and taxidermy from his father, and from these humble beginnings, like many West Yorkshire naturalists, gained an extensive knowledge

and a wide reputation. At the age of sixteen he was apprenticed to a house painter, where he showed a talent for decorative work and a keen eye for detail. He early joined the Huddersfield Naturalists' Society, and had as fellow members G. T. Porritt, C. P. Hobkirk, George Brooke tertius and others ; he showed much enthusiasm for natural history studies, and made considerable collections. Eventually he abandoned his trade as a house painter and devoted his whole time to natural history and taxidermy, in which he showed considerable skill. Upwards of forty years ago he became acquainted with Miss E. A. Ormerod, an early pioneer in economic entomology, and under her guidance and influence prepared cases of specimens and models illustrating the life histories of economic insects. In this work he was very successful and supplied sets of cases to many museums and colleges, both in this country and abroad. He also arranged the collections of economic insects in several museums, including Bethnal Green. In connection with his work he obtained a small printing press and henceforth set his own type, did his own printing, and eventually cut his own blocks for illustrations.

In 1880, in his house at Beaumont Park, Huddersfield, he started a museum which became the centre of interest for many young naturalists, in whom he always took a keen interest. He became a Fellow of the Entomological Society of London, was for many years secretary of the Huddersfield Naturalists' Society, and during this time took an active interest in encouraging the study of natural history among school children. Mr. Mosley was a prolific writer on nature subjects, full of plans and ideas, and it is doubtful if anyone can say how many different publications he issued, nearly all of which were printed and published by himself. He was a clever painter, and made copies of figures from illustrated works by the thousand, especially of insects and birds. From 1879 to 1882, along with J. E. Robson, he issued *The Young Naturalist*, and in 1894 a monthly magazine, *Naturalists' Journal*. But the works by which he was more widely known, and which he illustrated by hand-coloured figures, were 'Butterflies of Europe,' 'Varieties of British Lepidoptera,' 'British Birds, Nests and Eggs,' and in 1915 an illustrated volumeon the 'Birds of Huddersfield.' Many of the drawings for his 'Varieties' were made during extended tours to examine the chief collections in the country.

In 1900 he was appointed part time curator of the museum at the Technical College, Huddersfield, holding also a similar post at the museum at Keighley, eventually, on relinquishing the latter post, he served as full-time curator at Huddersfield. In 1920, on the founding of the Tolson Memorial Museum at

Ravensknowle, Huddersfield, he served as curator under the present honorary director until 1925, when he retired under the Corporation superannuation scheme. At this time (when 74 years of age) he prepared most of the cases in the Bird Room at the museum (opened during the annual meeting of the Yorkshire Naturalists' Union by Prof. Garstang), also a large collection of life-history cases of insects. During the past fifteen years Mr. Mosley contributed weekly articles to the Huddersfield *Examiner* on ' Nature Around Huddersfield,' and in these his own personality was kept prominently before his readers and proved a great source of interest to a wide circle of admirers. Mr. Mosley was buried on Saturday, February 9th, at the Almondbury Cemetery.—T.W.W.

WILLIAM GARDENER SMITH.

(1866-1928).

Recently death has made serious inroads among scientific workers in Yorkshire, and one which will have been felt with especial keenness is that of Dr. W. G. Smith at Edinburgh on the 8th of December last. During Dr. Smith's long residence in Leeds, Yorkshire naturalists had learnt to look on him as one of themselves, and felt a deep regard and respect both for his lovable personality and his valuable contributions to Yorkshire botany.

Born at Dundee on the 20th of March, 1866, Dr. Smith, at the age of 18, entered the University College there and studied botany under Prof. P. Geddes and zoology under Prof. D'Arcy Thompson. Here he had a successful career as a student, and in 1890 took his B.Sc. degree. After a short time as science master at the Morgan Academy, Dundee, he was appointed demonstrator in botany at the University of Edinburgh under Prof. I. Bayley Balfour. His leaning was on the applied side, and in 1892-3 he was lecturer in Agriculture for the county of Forfar. In April, 1893, he decided on a course of work in the University of Munich, where he studied botany under Prof. Goebel. While here he carried out research on plant diseases under Prof. Hartig and Prof. Tubeuf, and prepared a thesis on the deformation of trees caused by exoasci, and in 1894 obtained his degree of Ph.D. He translated from the German Tubeuf's Pflanzenkrankheiten, and this was published in 1897.

When Dr. Smith returned to Edinburgh he was appointed lecturer in plant physiology at the University, a post he held for three years (1894-7), and in 1897 he came to Yorkshire on being appointed assistant lecturer in botany in the Biological

Department of the University of Leeds under Prof. Miall. Soon after settling down in this new post he joined the Yorkshire Naturalists' Union, and his quiet, unassuming, lovable personality quickly endeared him to all with whom he came in contact, and he was always a welcome and valued colleague at meetings and excursions.

Both Dr. Smith and his brother Robert, while students at Dundee, had been impressed by Prof. Geddes with the value of local surveys, and in this direction Robert had been further influenced by a course at Montpellier under Prof. Flahault, and on his return to Scotland, Robert began a survey of Scottish

vegetation, for which he had exceptional talent. He soon found that Flahault's method of mapping vegetation was not applicable to Scotland, and he struck out a line of his own, and soon made rapid progress. Unfortunately, on the eve of publication of his 'Plant Associations of the Tay Basin,' he died suddenly in 1900. Some of his work was left unpublished, but his brother William, realising the importance of such studies, prepared the unfinished MS. for publication, and himself continued the work with great keenness, and in 1901 at the meeting of the British Association at Glasgow read a paper on 'A Botanical Survey of Scotland.' Meanwhile he commenced an active survey of Yorkshire vegetation,

and in this he enlisted and aroused the enthusiasm of his pupils, among whom at this time were C. E. Moss, W. M. Rankin, and the writer, and he did much to stimulate and increase the value of botanical research in the county. He founded the Botanical Survey of the Union, and was long its convener and secretary; he was also active in initiating the Committee of Suggestions for Research. In 1902 he wrote a paper on 'Botanical Survey for Local Naturalist Societies, which was circulated by the generosity of the chairman, John Farrah. In the same year, in conjunction with C. E. Moss and W. M. Rankin, there were issued the first vegetation maps in England, dealing respectively with the Leeds and Halifax, and the Harrogate and Skipton Districts. In this year too, for his contributions to vegetation surveys he was awarded the Back Bequest by the Royal Geographical Society. The Clevelend area was surveyed, and two vegetation maps prepared, but unfortunately were never published.

In December, 1904, a meeting was held at his house, 29 Broomfield Crescent, Headingley, to consider the formation of a Committee for the Survey and Study of British Vegetation (afterwards called the British Vegetation Committee) and this was immediately formed with Dr. Smith as secretary. It consisted of all the active workers on problems of British vegetation at the time, about ten in number. The activity of this little society was largely due to the enthusiasm, organising capacity and mastery of essential principles displayed by Dr. Smith as secretary, and many new and extended researches were the result. Out of these small beginnings sprung the British Ecological Society, the first number of the *Journal of Ecology* was issued in March, 1913, and in the following month, at the inaugural meeting of this Society, Dr. Smith was elected honorary member in recognition of his services to Ecology in Britain. In 1918 and 1919 he was President of the Ecological Society, and in the latter year was also President of the Yorkshire Naturalists' Union.

After 11 active years in Leeds, Dr. Smith was appointed lecturer in biology at the Edinburgh and East of Scotland College of Agriculture, and from this time he devoted his energies especially to the improvement of hill pasture which is such an important problem in Scottish agriculture, and in this direction did valuable work in connection with the School of Animal Nutrition in Cambridge. In this work his ecological outlook stood him in good stead. He continued in this post at the Edinburgh Agricultural College for 18 years when in 1926 he was appointed Advisory Officer in Agricultural Botany, work which he carried out with conspicuous success. At the Glasgow meeting of the British Association in September last he read a paper before the

Forestry Sub-section on ' Bracken and the Heather Moorland,' giving the results of big experiments he was engaged in in relation to the spread of bracken to the detriment of hill pasture. An account of some of this work, in the last number of the *Transactions of the Botanical Society of Edinburgh* (Vol. XXX., Pt I.), on ' Notes on the effect of Cutting Bracken' proved to be his last contribution. On the morning of December 8th, while members of the Yorkshire Naturalists' Union were assembling for their annual meeting at York, he passed quietly and unexpectedly away after a short illness at his home in Edinburgh, and was buried at Morningside Cemetery on December 11th, his funeral being attended by a representative gathering of friends and colleagues.—T.W.W.

NEWS FROM THE PRESS.

According to the press, a stuffed Great Auk in Trinity College, Dublin, disappeared recently, but was subsequently found hidden in another part of the premises. The paragraph is headed ' Great Auk Comedy.'

The Eastern Morning News for January 25th, in an interview with the Museums Director at Hull on the Policy of Museums generally, gives a portrait, underneath which is printed, ' Mr. T. Sheppard, Director of Museums, carefully preserved in glass-top cabinets.'

We learn from *The Daily News* that ' A dear old lady called at the Ministry of Agriculture and asked to see the Minister. They told her that he was very busy at the moment : perhaps she would wait. She said that she did not want to disturb him, but she had two bulbs that were giving her a lot of trouble.'

The daily press for February 22nd records a Red-necked Grebe having been found shot at Armathwaite (Cumberland). Two days previously, the Hull papers recorded that at Withernsea some seagulls had been seen to attack a ' crow ' in flight, and then to tear it to pieces and eat it, apparently due to hunger on account of the severity of the weather. A week later the press reported that some rooks ate a seagull!

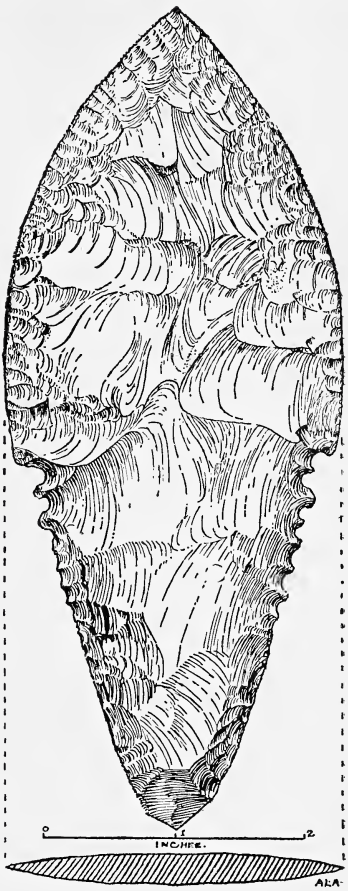
On a supplementary estimate being considered for repairing the stone-work of the House of Commons, we learn from *The Daily Mail* that : ' Several members objected to the stone chosen, and developed unsuspected scientific knowledge. Mr. H. Charleton (Soc., Leeds), for instance, an ex-engine driver whose annual and eagerly awaited contrib - tion to Parliament hitherto has been an appeal for cheaper tea for the drivers of the Scottish expresses, proved to be an eloquent lapidarian, and pleaded for a return to the methods of mediæval builders.

We gather from *The Yorkshire Herald* that ' Mr. J. Sanders, a well-known Thirsk antiquary and owner of one of the best private collections of primitive implements in the country, addressed the Sowerby Church Men's Fellowship, at the Parish Hut, on " Unwritten History and how to read it." The Vicar (the Rev. F. M. Windley) presided. Mr. Sanders, speaking of what are known as the " crab-mill " stones at Sutton, generally held to have been used for the production of verjuice, entirely discounted this idea. They were, he said, as was shown by the radiating lines, ordinary mill stones, and had probably come from the near-by flour mill. He showed several specimens of flint arrow heads and other crude instruments, and said he believed he was the only person to possess arrow heads of quartz. There were two specimens of stones with a hole by which could be produced a shrill whistle, which he considered had been made for this purpose.'

FIELD NOTES.

ARCHÆOLOGY.

Rare Flint Dagger from North Lincs.—The accompanying illustration we are kindly permitted to reproduce from a recent number of *The Antiquaries' Journal*, where it is described by Mr. A. Leslie Armstrong. The original dagger found near Scunthorpe is now in the possession of Sir Berkeley-Sheffield. It will be noticed that the lower part of the dagger is notched for securing to a handle, and the weapon is quite typical of those found with Bronze-Age burials. An article on Flint Daggers in general, by Mr. Reginald A. Smith, appeared in *The Proceedings of the Society of Antiquaries*, Vol. XXXII., in which a large number of similar weapons were figured, together with the drinking cups or other articles with which they were found in association. While nothing apparently occurred with the dagger here figured, there is no doubt that it is part of the grave furniture of a Bronze-Age burial. A cast has been made for the Hull Museum, by the kind permission of the owner. The Mortimer Collection contains quite a large number of daggers of this type, and an example from Derbyshire is in the Sheffield Museum.—T.S.



FILICES.

Cystopteris fragilis Bernh. near Goathland, North Yorks.—On the 10th September, 1928, Mr. Francis Druce, F.L.S., of Culford Gardens, London, who was working on the flora of the Whitby district, discovered a fern growing on masonry near Goathland, which he named *Cystopteris fragilis*, and he very kindly brought a specimen to me. The identifica-

tion he confirmed on his return to London, and it has been corroborated by Dr. G. Claridge Druce, F.R.S., and the Director of Kew. I have taken some trouble to have the identity of this plant thoroughly established, because Baker, in ' The Flora of North Yorkshire,' does not record *Cystopteris fragilis* as growing in No. 4—the Esk area. It is interesting to find a lime-loving plant established here. The lime salts essential for the persistence of the plant will be derived from the mortar in the joints of the masonry. It grows only on one part of the masonry, and how it became established here is somewhat of a mystery. This is the only station so far as I know for *Cystopteris fragilis* in No. 4 area, and as Baker makes no mention of it we must consider the record a new one.—R. J. Flintoff.

BIRDS.

A Peculiar Colouration of the Great Spotted Woodpecker, near Goathland.—On the 8th February, 1929, I received a letter from Mr. James Patterson, of Wheeldale Lodge, near Goathland, in which he described a peculiar marking of the Great Spotted Woodpecker. Mr. Patterson is a well known ornithologist of wide experience, and a very careful observer. He writes: ' On Wednesday, the 6th February, I saw a Great Spotted Woodpecker near a low hedge on the western side of a small field close to the junction of the Rutmoor and Ghyll becks. I flushed the bird about 25-30 yards in front of me. It flew away 10 or 12 yards, settling on the other side of the fence. I immediately stooped down, and advanced very carefully. After a little while I noticed the bird climbing up one of the hedge stakes, apparently to look for me, and in this position it afforded an excellent view of itself. It must have been a female, for there was no red on the head. But the most interestiug character of the bird's colouring was the breast, of which I had a good view. With the exception of a light-grey narrow band between the throat and the breast, the whole front and underparts of the bird were of a bright chestnut red. I understand this to be a rare occurrence.' So far as my knowledge of the Great Spotted Woodpecker is concerned, I am entirely ignorant of such a distinctive eccentricity of colouring as the one referred to by Mr. Patterson. I have made enquiries in several directions without obtaining any enlightenment on this point. I therefore assume it is something unusually rare, and have pleasure in recording Mr. Patterson's observations.—R. J. Flintoff.

We have received from Mr. T. Petch a reprint of his paper on ' Tropical Root Disease Fungi,' from *The Transactions of the British Mycological Society*.

NEWS FROM THE MAGAZINES.

H. C. Hayward gives 'Some Notes on Lepidoptera in the Isle of Man,' in *The Entomologist* for March.

A. Cuthbertson has an account of some habits of the Crane-flies, in *The Scottish Naturalist* for Jan.-Feb., 1929.

H. W. Daltry writes on '*Hyponomenta stannella* Thab. : An addition to the British List,' in *The Entomologist* for January.

Excellent photographs of the Peregrine, by G. C. S. Ingram and H. M. Salmon, are reproduced in *British Birds* for February.

J. A. Johnson gives a well-illustrated account of 'Planning and Constructing the Buffalo Museum of Science,' in *Hobbies* for February.

L. R. Wager writes on 'Metasomatism in the Whin Sill of the North of England: Part I., Metasomatism by Lead Vein Solutions,' in *The Geological Magazine* for March.

A particularly charming coloured plate of the Beautiful Sunbird (*Nectarinia pulchella*) appears in *The Avicultural Magazine* for March. The plate is the gift of Mr. J. S. Lewis.

An illustrated account of 'The Evolution of the House,' from Palæolithic times, appears in *Ours*, the magazine of Reckitts. It represents a report of an address by Mr. T. Sheppard.

The journal *Canada* for February 16th, has a paper on 'Zoology in the Arctic,' containing a report on Dr. R. M. Anderson's Expedition on behalf of the National Museum of Canada.

Hobbies, the journal issued by the Buffalo Society of Natural Sciences, has a particularly well illustrated and useful article on 'Louis Agassiz and the Glacial Age Theory,' by Dr. Reginal H. Pegrum.

I. A. Richmond reports on 'Excavations on Hadrian's Wall during 1928,' in *The Durham University Journal* for March. Part of the wall excavated is under the London & North Eastern Railway Company's line.

A Radiograph of a Coal Slice from the Ravine Seam, Lancashire, appears with a note on 'The Mineralogy of Coal as suggested by X-ray examination,' by Prof. H. Briggs, in *The Colliery Guardian* for February 15th.

A well illustrated article dealing with 'The Capture of Prey by the Bladderwort,' by Alexander F. Skutch, appears in *The New Phytologist* for December, and in the same journal W. R. Ivimey Cook continues his researches on 'The Inter-Relationships of the Archimycetes.'

The *Museum Journal* advertises for an assistant at a Museum and Art Gallery for two years at £39 per annum. 'All facilities will be given to a *serious person* to train for Museum Curatorship and to "do research."' It is expected that the applicant intends to, or has already graduated in Science or Arts. 'Smallcombe' seems an appropriate name for the person to whom applications for the post should be made !

The late William Boyd Dawkins, M.A., D.Sc., F.R.S., F.S.A., F.G.S., referred to in our March issue, was the subject of one of the well-known 'Eminent Living Geologists' Series which appeared in the *Geological Magazine* for December, 1909. On that occasion, the then Editor, Dr. Henry Woodward, gave an account of Sir William's achievements, accompanying which was a list of his various publications between 1862 and 1907, compiled by D. M. S. Watson.

E. W. Gudger, of the American Museum of Natural History, gives accounts of 'More Rains of Fishes' in *The Annals and Magazine of Natural History* for January. He reproduced two quaint wood-cuts of a rain of Fishes in Scandinavia in 1555, and of another in Saxony in A.D. 689, illustrated in 1557. He enumerates several rains of fishes in Great Britain, including an article by Charles Dickens in 'All the Year Round' in 1863, in which he records several British records.

NORTHERN NEWS.

A Black Conger Eel, over 7 feet long, 18 inches in girth, and weighing 7 stones, is reported to have been caught on Filey Brigg, on February 28th. It was sold to a dealer for 8/-.

Mr. Norman L. Silvester, deputy curator at the Sunderland Museum and Art Gallery, has been appointed curator at the Beechfield Museum, Doncaster, in succession to the late E. C. Senior.

A Descriptive Catalogue of the Exhibition of Pictures and Relics of Old Sheffield in the Mappin Art Gallery, compiled by J. W. Baggaley, has been issued. It contains 74 pages and can be obtained for threepence.

From the Safety in Mines Research Board we have received Paper No. 37, dealing with ' The Estimation of Firedamp : Flame Caps,' by C. S. W. Grice and D. W. Woodhead (London : H.M. Stationery Office, 1/- net). In a very graphic way the effect of different percentages of firedamp upon flames is illustrated.

For the small price of 2d. (or 6/3 for 50 copies, The Safety in Mines Research Board has issued its Paper, No. 30 dealing with the Support of Underground Workings in the East Midland Coalfield. There are 48 pages and numerous diagrams. The Report is by Sir Thomas Mottram (Chairman), Mr. A. D. Stedman (Secretary), and several others.

Among obituaries recently announced we notice that of C. E. Senior, Curator of the Doncaster Museum and Art Gallery, and Abel Chapman, naturalist, author of ' Bird Life of the Borders,' and other works. It will be remembered that the latter was a prominent member of the International Ornithological Congress, which met at Bempton some years ago.

Dr. Humphrey Purnell Blackmore, who has died at Salisbury, aged 93, was one of the founders, more than 60 years ago, of the Salisbury and South Wilts. Museum. In those days his investigations led to the discovery of valuable mammalian remains, and he was also associated with excavations of an Early Iron Age settlement in Salisbury, one of the first sites discovered.

In view of the discussion taking place in the Press at the present moment respecting the possibilities of a Channel Tunnel, from a geological point of view, the Geological Survey Office has issued two excellent maps geologically coloured, each of which is accompanied by a section. One covers the Ramsgate area, and the other that around Dover. The scale is one inch to a mile. They are excellently printed in colours and are sold at the low price of 2/- each.

The twenty-fourth report of the University of Leeds is a wonderful compilation and a marvellous record of the University's numerous activities. As an illustration the List of Donors and Subscribers (which contains the names of those contributors of £25 and upwards only, and does not include the donations to the Appeal Fund (1925-1928) occupies 25 pages of small type, and records annual subscriptions amounting to £9,689, and donations of £602,560. The ' Index to Staff ' occupies five pages of names in double columns !

During a discussion on the fauna of Greenland, at a recent meeting of the Linnean Society, Lt.-Col. J. H. Tull Walsh referred to the colour of hares and stoats in England, and suggested that different degrees of inherited impressions of colder climates in the past either in this country or in some other land from which they had emigrated, might account for the variation in winter changes of colour which had been important in more arctic climates than those in which they are now presented. Prof. J. Graham Kerr pointed out that two factors are at work : the ancestral tendency to brownness, and the more recently inherited winter change in Arctic species. In a boundary zone particular members of a fauna might not conform with the regular arrangement.

BOOKS, ETC., FOR SALE.

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Printed by A. Brown & Sons, Ltd., 40 George Street, Hull, and published by A. Brown & Sons, Ltd., at 5 Farringdon Avenue, in the City of London.
April, 1929.

MAY 1929. No. 868
No. 642 of current Series

THE NATURALIST.

A MONTHLY ILLUSTRATED JOURNAL

PRINCIPALLY FOR THE NORTH OF ENGLAND.

EDITED BY

THOMAS SHEPPARD, M.Sc., F.G.S.,
F.S.A.(Scot.), F.R.A.I., M.B.O.U.,
The Museums, Hull;

and T. W. WOODHEAD, Ph.D., M.Sc., F.L.S.,
Tolson Memorial Museum, Huddersfield;

WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF
JOHN W. TAYLOR, M.Sc. RILEY FORTUNE, F.Z.S.

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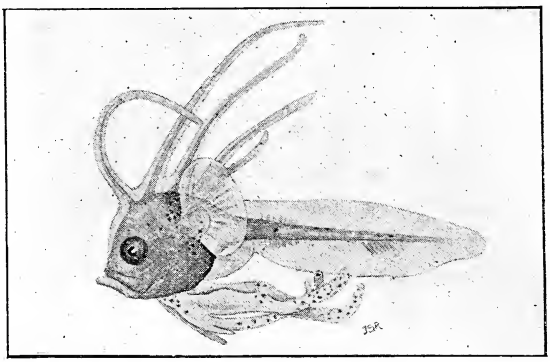

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NOTES AND COMMENTS.

POST-GLACIAL FORESTS OF EUROPE.

Dr. T. W. Woodhead's paper on ' The Forests of Europe and their Development in Post-glacial Times,' read at the Glasgow meeting of the British Association, is printed in *The Empire Forestry Journal*, Vol. VII., No. 2. He gives Table I., Vegetation in Middle Europe during the last Inter-glacial Period, W. Szafer ; II., Inter-glacial Succession of Vegetation in Jutland and North-west Germany, Jessen and Milthers ; and III., Correlation and Suggested History of the Post-glacial Forests of North-western Europe. In the British Isles the Vegetation is traced back to B.C. 10,000 of De Geer's Geochronology.

SHAKESPEARE AND ANIMALS.

' On his bow-back he hath a battle set
Of bristly pikes, that ever threat his foes ;
His eyes, like glow-worms, shine when he doth fret ;
His snout digs sepulchres where'er he goes ;
Being moved, he strikes whate'er is in his way,
And when he strikes, his crooked tushes slay.'

The above description of the wild boar and its hunting is one of many quotations given by S. T. Burfield, to show Shakespeare's familiarity with animal life. They occur in his Presidential Address to the Liverpool Biological Society, printed in Volume XLII. of its *Proceedings*. This admirable publication also contains ' Observations on the Habits and Life History of *Pectinaria* (*Lagis*) *koreni* Mgr.,' by an old supporter of *The Naturalist*, the late A. T. Watson. Prof. J. Johnstone gives his reports on the Marine Biological Station at Port Erin, and on the Sea Fisheries Laboratory at Liverpool, and the Sea Fish Hatchery at Piel. The Hon. Secretary, the Rev. C. E. Y. Kendall, has done good service in publishing an Index to the *Proceedings and Transactions* of the Society, Volumes I.-XLI., 1887-1927.

THE DERBYSHIRE DOME.

At a recent meeting of the Geological Society of London, Drs. A. Jowett and J. K. Charlesworth read a paper on ' The Glacial Geology of the Derbyshire Dome and the Western Slopes of the Southern Pennines.' The Derbyshire Dome of the Southern Pennines was overridden at the period of maximum glaciation by ice from the north and north-west. This is shown by the occurrence of fairly extensive patches of true Boulder Clay, ranging up to 20 feet in thickness, by the wide distribution of erratics of Lake District and Galloway rocks over the dome and along its valleys, and by a southward carry of the local rocks, such as Carboniferous Limestone

(dolomitic and non-dolomitic, cherty and non-cherty varieties) Millstone Grit, and Toadstone. The upper limit of the Galloway and Lake District erratics follows the outer flanks of the South-Western Pennines at an average height of about 1250 feet above sea-level, decreasing slightly southwards in the direction of flow. The ice-recession from this position was associated with a copious marginal drainage, which eroded a well-developed suite of channels linking a number of big extra-glacial lakes in the valleys of the western Pennines. These waters escaped at the same successive stages : (1) by the Walsden Gorge into the Todmorden valley and the Humber drainage ; (2) by Dove Holes into the Wye, Derwent, and Trent basins ; (3) into the Trent drainage by its tributaries north and west of Stoke-upon-Trent and by the Rudyard Gorge, north of Leek ; and (4) by the Market Drayton Gap into the Severn and the Bristol Channel.

GREAT BRITAIN.*

In this comprehensive work the editor has gathered together a series of essays dealing with different areas in Great Britain as well as an Introduction by Sir E. J. Russell, and one on 'The Climate of Great Britain,' by Dr. H. R. Mill. Twenty-six different and well-known authors have contributed essays to the volume, which was published in connexion with the Twelfth International Geographical Congress at Cambridge. Probably no greater monument could be made to the work now being put forward in Regional Geography than this volume, and certainly the Editor has been successful in the selection of experts. We were particularly interested in a map showing the lost towns, etc., of the Yorkshire Coast, though the author seems to have forgotten where he copied it from, and when on the one occasion he happened to refer to the source of much of his information, he could not spell.

MUSEUMS,

A writer from 'The Office Window' in *The Daily Chronicle* for January 28th states : 'I am afraid Sir Henry Miers has undertaken an uphill task in coming forward as a defender of museums. They belong, it seems to me, to a bygone age. They were formed by dull people ; therefore they were dull. There was far too much in them and their contents were unimaginatively displayed. There are brilliant exceptions, at South Kensington for example, but the whole museum idea belongs to the past, and I doubt whether it is possible, in this age, at all events, to revive it.' Apparently the 'Office

* 'Essays in Regional Geography,' edited by A. G. Ogilvie. London : Cambridge University Press, xxx.+486 pp., 21/- net.

Window ' in question, or something else, could do with a good cleaning, as the opinion there seems to be very different from that held by almost every other newspaper in the country. To give an idea of the sort of stuff the writer of ' The Office Window ' column considers good, we quote his next paragraph which he has printed in italics throughout.

AND A HEN.

' *The Hen's Umbrella.—An old hen regularly laid her eggs in a dilapidated hen coop, from which the roof had long since disappeared. Whenever it rained she strutted to the farmhouse door, and clucked loudly until the farmer's wife appeared with an umbrella. When it was placed over the coop the hen settled quietly on the eggs.*' Oddly enough, the adjoining column is praising Britain to-day for what it is doing in another aspect of museum work, namely pictures. Evidently some of the *Daily Chronicle's* ' windows ' admit daylight.

A BRITISH FRESHWATER BIOLOGICAL STATION.

A Committee appointed at the Glasgow meeting of the British Association is unanimously of the opinion that ' it is essential to start and maintain in continuous operation throughout the year a Freshwater Biological Station. The particular nature of the problems in the British Isles would appear best to be met by arranging the site of the laboratory on a lake within easy reach of suitable streams. The most convenient position appears to the Committee to be a site in the Lake District. A few essential details of their proposal, together with the estimated costs of starting and maintaining such a station, are set out below : (*a*) At the commencement there should be a permanent staff consisting of a minimum of two trained workers, one more particularly a Botanist, and one more particularly a Zoologist, and one or both with a sufficient knowledge of Chemistry. In addition there should be a laboratory assistant and a laboratory boy. (*b*) The Director of the Station should be one of the permanent members of the staff. (*c*) It is estimated that the initial annual maintenance costs would run to about £1250 per annum including salaries. (*d*) It is estimated that the acquisition of the site and the erection and equipment of the laboratory would cost about £1500.' More particulars can be obtained on application to Prof. F. Balfour-Browne, the Secretary to the Committee, at the British Association, Burlington House, Piccadilly, London.

CARBONIFEROUS GONIATITE ZONES.

We should like to congratulate Mr. W. S. Bisat on the publication of his memoir on ' The Carboniferous Goniatite

Zones of England and their Continental Equivalents,' read to the Congrès de Stratigraphie Carbonifère. He gives descriptions of the following new species: *Reticuloceras eoreticulatum, Homoceras eostriolatum, Goniatites elegans, G. waddingtoni, G. crenistria dinckleyense, G. crenistriatus,* and *Cravenoceras edalense.*

MIDLAND CARBONIFEROUS AS BASIS.

Summarising, Mr. Bisat writes, 'It is suggested that owing to various circumstances, the Carboniferous beds of the Midland Province of England lend themselves extremely well for use as a basis for zoning the sequence. In this area the sequence is unusually complete, and the exposures renowned. Further, the other faunal phases are well developed in a closely adjoining basin, with a certain amount of intermingling of faunas in the famous knoll hills near the Craven Faults. It is hoped that the coral-brachiopod workers will establish a sequence of zones based on the North of England succession, and eliminating the vague and loosely used terms D_2 and D_3. The correspondence in fauna between the beds of the Midland Syncline and Westphalia is extremely great, and far greater than that between the Midland Syncline and the coral-brachiopod basin of the North of England.'

TABLE OF DIVISIONS.

'The names of divisions and the boundaries of divisions are put forward in tabular form, not with any idea that they should be universally used, but in order that workers in other areas may have a clear view of the sequence and natural divisions of the rocks and fauna in the great Midland Province of England, so far as its goniatite yielding beds are concerned. Similar tabular schemes for other areas and other faunal phases are in existence or will doubtless follow. From these it will then be possible to erect a combined table for Europe, but I think it will take some little time and much further field work before this becomes practicable. At the same time so far as the equivalence of the goniatite beds are concerned I find myself in practically complete agreement as to respective horizons with Dr. H. Schmidt, of Göttingen. In the Midland Province, however, we have a great thickness of beds between his zones III. and IV., and there are minor discrepancies still to clear up.'

THE BRITISH ASSOCIATION REPORT.

This Annual Report is gradually approaching its pre-war size, and the volume for 1928 (Glasgow) recently received contains nearly 800 pages in all. As well as the various addresses and summaries of papers already in type for the

Glasgow meeting, there is considerable additional matter arising from the discussions, etc., which there took place. Otherwise the volume would doubtless have appeared towards the end of the year the meeting was held, as it actually did on one memorable occasion. As an example, the Report of the Conference of Delegates, in addition to Dr. Vaughan Cornish's address on 'The Preservation of Scenic Beauty in Town and Country,' there is the discussion by Dr. C. R. Gibson, Mr. T. Sheppard, the Earl of Crawford and Balcarres, Sir John Stirling-Maxwell and others; and reports of the following addresses: 'Geography of the English Lake District,' by Dr. H. R. Mill; 'A Note on Wordsworth's Interpretation of Nature,' by Dr. C. H. Herford; 'Wordsworth as a Pioneer in the Science of Scenery,' by Dr. Vaughan Cornish; and 'Regional Planning for the English Lake District,' by Mr. Ewart James.

BRITISH MYCOLOGY.

E. J. Butler's Presidential Address on 'The Development of Economic Mycology in the Empire Overseas,' appears in the substantial part of the *Transactions of the British Mycological Society*, published in March. In addition there is a wealth of material suitable for mycological students, with an admirable list of common names of British plant diseases. Among the memoirs printed are 'Strains and Taxonomy of *Phytophthora palmivora* Butler,' by S. F. Ashby; 'Two Downy Mildews of the Nettle,' by E. S. Salmon and W. M. Ware; 'The Structure and Mode of Reproduction of *Siphula tabularis* Nyl.,' by S. Garside; 'The Investigation of Aspergilli by Serological Methods,' by T. Matsumoto; 'Seeds Mixtures and the incidence of Fungal Disease,' by E. W. Fenton; 'Note on *Rhizoctonia crocorum* (Pers.),' by W. M. Ware; 'Field Notes on an Attack by *Rhizoctonia crocorum* on Sitka Spruce,' by H. Watson; 'Further Notes on the Connexion between *Rhizoctonia crocorum* and *Helicobasidium purpureum*,' by W. Buddin and E. M. Wakefield; '*Rhizoctonia bataticola* and Tea Root Diseases,' by C. H. Gadd; 'Observations on the Spread of the Apple Mildew Fungus,' by F. R. Petherbridge and W. A. R. D. Weston; 'The Bacterial and Fungal Flora of the Upper Air,' by W. A. R. D. Weston; 'A Comparative Morphological and Physiological Study of a number of Strains of *Botrytis cinerea* Pers., with special reference to their Virulence,' by W. R. C. Paul; and 'The Gonidium common to many Lichens,' by R. Paulson.

WHY FISH IS SCARCE AT SCARBOROUGH.

According to the press, at a recent meeting of the Scarborough Field Naturalists' Society, Mr. J. A. Stevenson gave

an address. In this he described a trip which he had made in a local trawler in search of specimens, and referred to the gear used and the method of fishing. The vessel fished eight miles from shore, and an interesting description of the animals caught was given, special reference being made to the enormous destruction of small fish, caused by this method of fishing, undoubtedly one of the chief causes of the diminution of fish now being experienced in these waters.

HOW PRE-HISTORY IS MADE.

We quote the following from a recent journal devoted to antiquarian research : A trimmed flake was found by Mr. J. E. Sainty *in situ* in the Lower Till, of glacial origin, at Sidestrand, Norfolk. ' The specimen, which shows upon its under-surface a bulb of percussion and *eraillure*, is of a greyish-purple colour, and carries upon its flaked surfaces a well-developed gloss. The upper surface is composed of one complete and two incomplete flake-scars, while the right-hand side shows flaking giving rise to a steep edge against which the forefinger of either hand might be placed, while the opposite side of the flake was used for cutting or scraping. That the specimen was put to such use is shown by the small flake-scars present upon the edge opposite to the thick back of the flake. This artifact, which, from its coloration and condition, was apparently derived from the Upper Freshwater Bed, was found close to the site where Mr. Sainty discovered an Upper Chellean head-axe *in situ* in the Lower Till. This implement, together with another, also discovered by Mr. Sainty at the same place, exhibites the well-known patination found upon flints in the Upper Freshwater Bed, and, like the flake under description, they were in all probability derived from this deposit by ice-action. The discoveries now made in the Cromer Forest Bed point clearly to the fact that the three divisions of this deposit contain specimens ranging from early to late Chellean times, and place this prolonged cultural epoch in the First Inter-Glacial Period of East Anglia.'

Art in the Life of Mankind, by **Allen W. Searby.** Two volumes. London : B. T. Batsford, Ltd., 5/- net per volume. In the first of these (vii.+105 pp.) the author gives a General View of Art : Its Nature, Meaning, Principles and Appreciation, and in the second (vii.+110 pp.) deals with Art in Ancient Times : Prehistoric, Sumerian, Egyptian, Babylonian, Assyrian, and Aegean. He severely criticises bad methods in the way of drawing, painting and designing. He illustrates by examples from various prehistoric areas, from Saxon, Roman and British times, and, particularly in the second volume, the different representations of the human form and dress as illustrated in statues and monuments. Recent discoveries have enabled him to supply many useful illustrations, not omitting the tomb of Tutankhamen.

THE PRESERVATION OF PYRITISED AND OTHER FOSSILS.

E. G. RADLEY, F.C.S.

(*Continued from page 138*).

Further tests were to be undertaken to see what effect great differences of temperature would have upon such specimens as had resisted the other factors at ordinary temperatures.

The covering materials used, and the methods of covering the fossils, were as follows :—

A. *Spermaceti Wax.* The wax was melted and the fossils dipped therein, the superfluous wax being vigorously shaken off.

B. *Paraffin Wax.* Melting point 60°. Method as above.

C. *Waxing Solution for Carbon Process* (*Photographic*). Applied by brush.

D. *Waxing Solution for ' Kerotype ' Process* (*Photographic*). Applied by brush.

E. *Ordinary Varnish.* Quality as used for good class work. On wood it forms a hard surface. Applied by brush.

F. *Copal Varnish.* The variety known as ' Picture Copal Varnish.' Applied by brush.

G. *Celluloid Varnish.* A thin solution of celluloid in amyl acetate. Poured over specimens and worked in by brush.

H. *' Dope.'* A nitrocellulose with amyl acetate and alcohol, etc. It is largely used for waterproofing, amongst other things, the wings of aeroplanes. Recently motor cars have been coated with this material, replacing varnish to a great extent. Dilute solutions of ' dope ' are sold under the name of ' invisible lacquer.' If this thin variety of ' dope ' be used for protective purposes, it is advised that two or three coats be given. Applied as ' Celluloid Varnish.' An instrument is now made to spray articles with the liquid. This would doubtless give a better coat than a brush.

I. *Gelatine.* For this, isinglass in water was used. A quantity was warmed over a bath until dissolved. On cooling, the mixture ' set ' into a moderately stiff jelly. Applied hot by brush.

J. *Glue.* This may be considered an impure form of gelatine, but of greater adhesive properties. The consistency was that used by carpenters when ' glueing up ' wooden articles. Applied warm by brush.

K. *Photographic Retouching Medium.* Applied by brush.
L. *Photographic Negative Varnish.* Applied as ' Celluloid Varnish.' The variety used was supposed to be acid proof.

The specimens tested were of both pyritised and phosphatised character. In addition to these, crystals of Pyrites and Marcasite, also portions of a nodule of Pyrites were provided.

The fossils were coated with the various materials enumerated above, but the crystals of Pyrites and one of the nodular fragments were not covered.

A supposed wholly phosphatised specimen from another formation was coated with ' Celluloid Varnish ' and included with the specimens to be used. Before covering, a portion was taken and tested for the presence of sulphur. None was found, either as iron sulphide or as a sulphate.

A glass tank was prepared to contain the specimens during the prolonged tests. A sheet of glass, bored in two places, formed the lid of the tank. In each of the holes a rubber stopper was fitted, each stopper carrying a glass tube. One of these tubes was long enough just to pass through the lid, and was attached to a water pump; the other extended to the bottom of the tank. The lid was smeared with vaseline where it rested upon the tank, so as to ensure freedom from admixture with other gases during the passage of the gas employed.

Shelves and supports were provided to accommodate the specimens while in the glass tank, and a wash bottle, designed to hold water or acid, was attached to the long tube.

Everything being ready, the pump was started and thereby a steady stream of air saturated with moisture or hydrochloric acid was drawn through the apparatus.

At first only water was used to moisten the air. The treatment was carried on for about two hours every day for two months.

There were considerable changes to be observed in specimens coated with *Waxing Solution for Carbon Process (Photographic)* and *Waxing Solution for ' Kerotype ' Process (Photographic)*, and these were withdrawn from the tests. Probably the reason why these two materials failed so soon is because of the small quantity of solid material carried by the liquid. Apart from these instances, no great changes were noted. There appeared to be some specimens which were slightly affected by the treatment, but the changes were not sufficient to necessitate removal to examine more carefully.

Concentrated hydrochloric acid was then substituted for the water in the bottle and the air pumped through as before,

the treatment being for two hours a day for two months. During this period some marked changes were seen. It was, however, thought to be preferable to examine the whole of the specimens later, so as to preserve the special atmosphere employed from any changes of composition, and care was taken to prevent air coming in through the tubes during the resting period. In this manner the atmosphere inside the tank was thoroughly moist and impregnated with acid, the composition remaining constant.

After these experiments were concluded, the tank was opened and the condition of the specimens noted, with the following results :—

First Experiments.

(Moist air and hydrochloric acid.)

Covering Material. Condition.

A. *Spermaceti Wax.* Unchanged.
B. *Paraffin Wax.* Unchanged.
E. *Ordinary Varnish.* Unchanged.
F. *Copal Varnish.* Fossil unchanged, matrix showing whiteness.
G. *Celluloid Varnish.* Slight whiteness upon upper surfaces, easily removed. Otherwise, no change.
H. *Dope.* Unchanged.
I. *Gelatine.* Slight signs of oxidation, also white bloom.
J. *Glue.* Damp and sticky.
K. *Retouching Medium.* Unchanged.
L. *Negative Varnish.* Unchanged.

Of the crystal and nodule specimens those either covered with celluloid varnish or not showed no signs whatever of change. The phosphatised fossil showed no change.

Thus where celluloid varnish, dope, paraffin wax, spermaceti wax, negative varnish, retouching medium and ordinary varnish, no considerable changes had taken place.

Second Experiments.

After examination the specimens were restored to the tank, which was re-sealed. Moist air was drawn through the apparatus as before for about two hours daily for five months, and on re-examination the following details were noted :—

A. *Spermaceti Wax.* Whiteness seen in patches and as a fluffy mould.
B. *Paraffin Wax.* Unchanged or rather dull. No decomposition visible except in one case where a small white patch occurred.

E. *Ordinary Varnish.* A good deal of white material on some specimens, others duller.
F. *Copal Varnish.* Much white material on especially duller portions, where it was speckled.
G. *Celluloid Varnish.* No change.
H. *Dope.* No change.
I. *Gelatine.* Dull and misty whiteness over specimens.
J. *Glue.* Dull and sticky, but no whiteness.
K. *Retouching Medium.* No change.
L. *Negative Varnish.* Misty whiteness, patches of white, and in places oxidised brown.

These changes may have taken place during the progress of the first experiments. The best resistant media appear to be paraffin wax, negative varnish, celluloid varnish, dope, and retouching medium, and of these negative varnish and retouching medium, although preservatives, appear to become moist under the unusual conditions.

The covered pyrites, and the covered and uncovered nodule specimens, showed no change whatever at this stage, but the Marcasite appeared to be breaking up. The wholly phosphatised fossil remained unchanged.

It was considered advisable at this point to test the supposition that the presence of hygroscopic chloride salts might have an influence upon the decomposition of the fossils. Fresh sets of fossils were procured from Folkestone, one set being washed and dried as before, and the other unwashed. Of these two sets, specimens were taken in each case (1) as collected, (2) dried but not washed and not covered, (3) covered, (4) half covered ; the covering media being celluloid varnish and dope. These two protective media were selected, as from previous experiments they appeared to provide the most resistance.

A few specimens which had shown signs of slight decomposition were also used. It was considered that if such slightly affected specimens could be treated and prevented from further decay, a valuable medium would be discovered ; and many specimens, which on showing the first signs of whiteness are thought to be valueless, could be preserved for a more or less indefinite time. These specimens were carefully dried and brushed to remove all visible decomposition products and coated with celluloid varnish and dope.

At the same time, specimens which had almost completely decomposed were added. This was to provide an extra chance of conversion should the microbic theory be correct.

The whole collection was introduced into the tank and experiments were carried out as with the previous assemblage

of fossils, but the total tests only occupied three to three and a half months. The results proved that the washed covered specimens resisted the treatment excellently ; that in the case of the unwashed but covered fossils, several cases of complete immunity occurred ; those which were half covered showed decomposition products on the unprotected portions in both washed and unwashed sets ; finally, those which were unwashed and uncovered showed changes from the first week of treatment and decomposition was so rapid that in a month to six weeks they had broken down into powders. As washing removes the chloride salts it is obvious that their presence aids in the destruction of such fossils.

The Influence of Sulphur Dioxide Gas on Decomposition.— As one of the products of the oxidation of the Pyrites (or Marcasite) must be sulphur dioxide, which in the presence of air and moisture eventually forms sulphuric acid (hence charring of receptacles in which specimens are kept) and finally sulphates, it was decided that, very drastic conditions being used, the specimens should be submitted to the action of an atmosphere highly impregnated with that gas.

A further reason for the employment of sulphur dioxide gas is that similar fossils are usually kept in places where there is a more or less free access of air. In this air notable quantities of sulphur dioxide are often present, especially where fires are used. Furthermore, during periods of coloured fog the amount of sulphur dioxide in the atmosphere is greatly increased and is easily distinguished by its physical effects.

All the specimens were placed in the testing tank and a small wash-bottle containing water attached to the exit to indicate the rate of gas flow and also to absorb the gas which would otherwise escape into the surrounding air. The sulphur dioxide was prepared by heating a mixture of metallic copper and sulphuric acid, and the gas was passed through the water to absorb acid before proceeding to the tank.

The gas was passed through the tank for about thirty minutes, and in this manner the atmosphere in which the specimens were being treated must have consisted to a great extent of sulphur dioxide. When the period of admission was ended the apertures were securely closed for twenty-four hours. This treatment was carried out seven times. When removing the stoppers for a fresh admission of gas, it was noticed that a partial vacuum existed, proving absorption by the fossils, as no visible moisture existed throughout the experiments. After the last admission the partial vacuum was found to be considerably less than formerly, and at each test large quantities of gas remained, so it is certain that the fossils were continuously in an atmosphere largely consisting of sulphur dioxide.

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After the tests, the gas was removed by means of the pump used in the former experiments, and the specimens were then examined.

There was a great change in many of them.

First Set.

	Covering Material.	Condition.
A.	*Spermaceti Wax.*	All attacked.
B.	*Paraffin Wax.*	Only one specimen absolutely unchanged.
E.	*Ordinary Varnish.*	All specimens showed signs of change.
F.	*Copal Varnish.*	Much white powder all over specimens.
G.	*Celluloid Varnish.*	A few showed slight changes.
H.	*Dope.*	No change.
I.	*Gelatine.*	A great deal of fine white material.
J.	*Glue.*	Very much decomposed.
K.	*Retouching Medium.*	Showed bluish enamel appearance, others white 'whiskers' and enamel.
L.	*Negative Varnish.*	Covering material apparently destroyed. All specimens showed whiteness.

The Marcasite had been completely converted into a white powder, the crystals of Pyrites and the celluloid-covered nodule were unchanged, but the not-covered nodule was just showing a little whiteness at the point where the crystals meet in the centre. The wholly phosphatic specimen showed a fair amount of whiteness.

Second Collected Set (Celluloid Varnish).—In this set it was seen that whether the specimens are pyritised or phosphatised, those that are completely covered are usually unchanged, while those which are half covered or not covered show decomposition signs. As a general rule, those which are carefully washed and dried before covering offer more resistance then the unwashed specimens. Even the uncovered specimens which had been washed and dried exhibited much less decomposition than those which had not been similarly treated.

The specimen which showed decomposition when collected was very much affected, the cracks were wider, and there was much white material. This specimen was unwashed.

After examination, the whole of the two sets of fossils were replaced in the tank and a current of moist air was drawn through the apparatus for two and a half hours every day for about seven months. The tank was then re-opened and the specimens allowed to dry in the open air for about a month. Many of the specimens were found to have decomposed badly, and, in cases where but little change had

apparently taken place on the top surfaces, much whiteness was seen underneath. There were no cases of charring of the cardboard boxes in which the fossils reposed, probably because of the excess of moisture present during the test.

The following results were noted :—

	Covering Material.	Condition.
A.	*Spermaceti Wax.*	Most, badly affected. Going to powder in places.
B.	*Paraffin Wax.*	In some cases there was much white powder, and in others the fossils were duller but unchanged.
E.	*Ordinary Varnish.*	Most covered all over with white, one very shiny white.
F.	*Copal Varnish.*	All specimens showed considerable whiteness.
G.	*Celluloid Varnish.*	Usually only a little whiteness, but one specimen showed ' whiskers.'
H.	*Dope.*	No change whatever.
I.	*Gelatine.*	Much white, in fine needles or ' whiskers.'
J.	*Glue.*	Much white. Sticky in places.
K.	*Retouching Medium.*	Yellow stains. Much white material.
L.	*Negative Varnish.*	Filmy white powder on nearly all specimens.

The covered Pyrites still resisted, but the uncovered portion of the nodule exhibited more white material in the centre.

The wholly phosphatic specimen showed much more decay.

(To be continued).

BIRDS.

Oiled Birds in the Isle of Man.—On January 29th, an inward bound oil tanker collided with another steamer just outside the Liverpool Bar. Though the oil tanker was not sunk, about 1000 tons of crude oil was, unfortunately, lost. This oil had its inevitable effect on the sea birds in the district, with the result that on February 5th, over a distance of 500 yards, 64 Common Guillemots, 9 Razor-bills and two Black Guillemots were found in a dying condition at the Point of Ayre, Isle of Man. Most of the birds were put to death when found, and so released from their miserable condition. No oil was actually seen in the Isle of Man, and it would appear that the oil travels up the English coast, along the

Scottish coast, and eventually round the Mull of Galloway.—RALPH HOWARTH, Peel, Isle of Man.

Male Goosander near Thorton-le-Dale, North Yorks.—Mr. T. Green, of Thornton-le-Dale, asked me to visit this village on February 23rd to identify a water-fowl which had been shot on the low-lying land near the Derwent where there are thousands of water-birds during the winter. It was a male goosander in beautiful plumage. I was told it had been dead about six days, and the beautiful pink suffusion over the breast had almost entirely disappeared. I heard that two other goosanders had been shot. During severe winters it is not very uncommon for adult males to visit inland waters in Yorkshire. None of the Sawbills is common in the county, and I fail to understand what useful purpose can be served by their destruction. Their status has been well established ; they are not fit for food, and ornithologically there is little to be learnt from the prolonged inspection of a decomposing bird. Therefore, there only remains the possibility of its finding a home in some private or public museum. And to one of these it has gone. I can't help thinking this handsome bird, an object of great beauty when alive, a messy nuisance when dead, might have been spared.—R. J. FLINTOFF, Goathland.

This uncommon species has been unusually abundant during the severe winter early in the year ; quite a number of occurrences in the midlands and even in the south being recorded. A large flock of 20-30 occurred on Staines Reservoir. —ED.

NATURAL HISTORY.

Hull Museum : Natural History Department.—For the guidance of students it is desirable to place on record that the British Herbarium formed by Mr. William Falconer, an ex-President of the Yorkshire Naturalists' Union, and the collection of mollusca, crustacea, etc., from the Scarborough district, formed by Mr. J. A. Stevenson, have been presented to the Natural History Department of the Museum at Hull. Mr. Falconer's collection consists of 1407 British species and varieties of plants, and Mr. Stevenson's collection includes many of the species described in his papers in *The Naturalist*, and is particularly strong in the section devoted to crustacea and mollusca. There is also a large number of organisms preserved in formalin. These specimens were collected by Mr. Stevenson on his trips on the Scarborough trawlers. We much regret that he is leaving this interesting area in which he has done so much good work.—T. SHEPPARD.

The Yorkshire Weekly Post records the finding of the remains of a Honey Buzzard on the sands at Filey, on March 7th.

THE STATUS OF MUSEUMS.

For some time now, on behalf of the Carnegie United Kingdom Trust, Sir Henry Miers, D.Sc., LL.D., F.R.S., has been making a thorough examination of the various London and provincial museums. This necessitated a careful examination of the national collections of natural history, science and art, and of the various museums in the provinces. A Royal Commission has also considered the whole status of museums in the country. The Commission's preliminary report and recommendations dealing with the National museums have already been published. Sir Henry Miers' preliminary report on behalf of the Carnegie United Kingdom Trust has also appeared.

Recently at the Royal Society of Arts, London, the whole question was reviewed by Sir Henry A. Miers (who was at one time in the National Museum at South Kensington, and later Vice-Chancellor of the Liverpool University), who spoke on 'Museums and Education.' There were present the Right Hon. the Earl of Crawford and Balcarres, President of the Society of Antiquaries, in the chair ; and among other speakers were Sir Frederick Kenyon, Director of the British Museum, Bloomsbury ; Sir Henry G. Lyons, Director of the Science Museum, London, and others. Several provincial museum curators also accepted invitations to be present. Mention was made of the work done by some museums and the preservation of ancient buildings.

From the reports which have appeared in the Press, it is apparent that at last the status of the museum is to be considered on a broad basis. The recommendations of the Royal Commission so far as the provinces are concerned have not yet been made, but with regard to London they recommend additions to the National Gallery and other important art centres at a cost of several thousands of pounds. A similar recommendation was made with regard to the science and natural history museums.

Sir Joseph Duveen, a Hull man, promptly came forward and volunteered to meet the expenditure, provided the Royal Commission recommendations were made with regard to the various art galleries, on condition that the Government should meet the recommendations made by the same Commission so far as its museums were concerned. This question is now being considered.

With regard to the provinces there is every reason to believe that the general policy adopted by the Government will be encouraged, and, it is hoped, with the assistance of the Carnegie Fund, which already has done such great work with regard to popularising libraries.

In his review of many of the smaller institutions in the

provinces, Sir Henry Miers, quite correctly, stated that in some cases the museums played no real part in the life of the people and it was not regarded as one of the assets of a town. Those who suffered in childhood from enforced visits to one of the old-fashioned and more dismal might be forgiven for a life-long dislike to all museums. If, however, they would correct their impression by a visit to a really good museum of the present day they would see how attractive and useful they could be made if administered by a good curator and an enlightened committee of management.

The remainder of Sir Henry Miers's address was in decrying the miscellaneous collections of odds and ends from all and any quarter of the world, devoid of proper labelling and arrangement such as existed in the old Literary and Philosophical Societies' collections. Sir Henry also stressed the fact that each museum should, if possible, illustrate the history of its own district and specialise in such collections as referred to the historical or natural features of the area. He also deplored the lack of interest taken throughout the country in the preservation of ancient buildings, and while there are probably exceptions to this, he considers more should be done. He even goes so far as to suggest that the Botanic Gardens in Regent's Park should be transformed into an open-air museum, where old buildings of this character should be preserved.

The museum curators and others who visited Denmark during the Museums Association Conference at Hull a few years ago will remember the wonderful interest attached to the old buildings preserved in the open-air museums there. There is certainly room for this sort of thing in England.

The Tithe Barn at Easington might be cited as being one of the special type of museum he referred to, and the East Riding Antiquarian Society is to be congratulated on the steps it had taken, and the Hull Corporation on the way it had assisted in preserving this ancient building and preparing one of the first folk-lore museums in the country.

Many North of England examples of ancient buildings being preserved for museum purposes might be given. Sir Henry also deplored the fact that, with the exception of Hull, which is now being copied by Liverpool, not a single museum in the country existed relating to the shipping industry. He further mentioned that museums of commerce were practically unknown in this country, although in America particularly, and abroad, they played a very important part from the advertising point of view.—T. S.

In *Man* for April Mr. J. R. Moir describes an oval pebble, which ' remarkable object ' was found beneath the Red Crag. He considers that it is a ' slingstone ' and ' humanly worked.'

YORKSHIRE NATURALISTS AT HELLIFIELD.

F. A. MASON, F.R.M.S., AND J. M. BROWN, B.Sc., F.L.S.

THE 346th excursion of the Union was held at Hellifield during Easter week-end, March 30th to April 1st. The weather was fine, and, although the attendance was not large, three thoroughly enjoyable days were spent in investigating a district not visited by the Union during the last thirty years; Hellifield was made headquarters for excursions in 1893 and 1896, but no observations were placed on record in either year. For the first time for many years this was a meeting at which the Union was unrepresented by its Honorary Secretariate, one secretary being abroad and the other prevented from attendance at the last moment by illness; a vote of sympathy with Dr. Pearsall was unanimously accorded by members in attendance. In those circumstances the Executive business fell largely upon the Hon. Treasurer, Mr. S. D. Persy Fisher, who proved fully equal to the occasion. A general meeting was held at headquarters on Monday. In the absence of the President (Mr. H. E. Wroot), who had been obliged to leave earlier, the chair was occupied by Mr. H. B. Booth. Reports were made by Messrs. J. Holmes, Greevz Fysher, J. M. Brown, and the Chairman. A vote of congratulation to Prof. Bower, F.R.S., on his election to the Presidency of the British Association for 1930 was unanimously passed, and the best thanks of the meeting were tendered to the landowners of the district.

The President writes :—We were specially indebted to the kindness of Mr. and Mrs. Nicholson in showing us Hellifield Peel. It is of great interest. It is one of the several defensive border towers built amid our Yorkshire hills after the English disaster at Bannockburn left the Scottish border open to raids. There is another peel-tower at Kildwick, and still another embodied in the Bolling Hall Museum at Bradford, and the church tower at Bedale is a half brother—' half church of God, half castle 'gainst the Scots,' as the poet said of Durham. But Hellifield Peel has a specially strong resemblance to Haig's old home at Bemerside, which, like it, is a border tower of barbarian days made habitable by the addition later of wings. Like Bemerside, too, Hellifield Peel is charming for the exquisite taste of its furniture. It was a privilege to see it.

GEOLOGY (The President) :—Hellifield is not particularly attractive to a geologist. It lies just midway between the Craven highlands and those Bowland hills which by their striæ first gave Tiddeman an inkling, in days of ' submergence ' and ice-sheet heresies, of the real nature of the land-ice flows with which he had to deal in studying the Ice Age. So the site of Hellifield and the hills about it must have been buried under great glaciers, which have left the solid rocks encumbered by immense, smoothly rounded hills of boulder clay—the ' drumlin ' type of glacial deposit. Except in some parts of the Stainmore area there is scarcely to be seen in Yorkshire a more weird and a drearier type of landscape than that which presents itself on the north-west of the village, where for miles nothing is to be seen but these bare rounded hills, with only here and there where their curves meet in a little watercourse a little sheep farm or a plantation ensconsed. It is only in these little watercourses, usually revealing the Carboniferous Limestones and shales beneath, that any geological research is possible, but most of the geologically minded rather used Hellifield as a centre from which to approach the charms of Malham and the Craven Fault country.

BOTANY (J. M. Brown) :—The general lateness of the season, coupled with the early date of Easter, gave little hope of much interesting botanical work, and this promise was unfortunately fulfilled. The majority of the early plants were merely showing through the soil, and comparatively few were in flower, the most plentiful of these being the

Coltsfoot, which occurred in most of the rough pastures. Few of the trees showed much signs of leafage, but the Hazel, Alder, Sallow, Elm and Yew were in full flower.

In Tenley Plantation, a small hillside of mixed woodland adjoining 'Hellifield Peel,' *Mercurialis perennis, Ranunculus ficaria,* with occasional flowers of *Primula vulgaris* were noted, while the white florets of *Petasites albus* were well open, and the plant appeared to be well established. From the staminate flowers of the Yew, on the slightest touch, arose the well-known 'dust clouds,' while of considerable interest were the examples of *Tsuga* (the Hemlock Spruce), still bearing last year's cones On the barer parts of the ground large patches of *Lunularia cruciata* were conspicuous.

In a plantation by the Ribble, between Nappa and Paythorne, flowering specimens of *Mercurialis perennis, Ranunculus ficaria, Potentilla sterilis* and *Anemone nemorosa* were noted, while the green parts of *Arum maculata* and *Viola* sp. were showing. By the river side *Equisetum arvense* was in cone, *Cochlearia alpina* was coming into flower, and occoccasional plants of *Barbarea vulgaris* were well up. In ditches by the river *Myriophyllum* (probably *alterniflorum*) was abundant.

Near Malham village *Ranunculus auricomus* was in bud, and *Chrysosplenium oppositifolium* was in full bloom.

The small cresses one expects on the limestone edges at this time were only slightly in evidence. A few flowering plants of *Erophila verna* and of *Thlaspi alpestre* were seen near Malham Cove. On the slopes above, the purple inflorescences of *Sesleria cærulea* were just opening. On the limestone faces the characteristic liverwort, *Reboulia hemisphærica* was plentiful, and in other places the interesting *Tetraphis pellucida,* with its well-known gemmæ-cups, was observed. *Asplenium ruta-muraria* and *A. trichomanes* were collected, and an undertermined Myxomycete was obtained on rotten wood.

Bryology (W. H. Burrell) :—A mossy wall between Long Preston Church and Holme Bridge yielded *Barbula cylindrica* and *Eurhynchium myurum* in addition to many other common species. The most abundant mosses in Preston Beck were *Eurhynchium rusciforme* and *Hypnum palustre,* which in many places covered the rocks together with some *Cinclidotus fontinaloides* cfr., *Fontinalis antipyretica, Barbula spadicea* cfr. *Dichodontium pellucidium, Brachythecium plumosum* var. *falcatum, Marchantia polymorpha,* etc. Exposed soil on the valley slopes yielded *Dicranella varia* cfr. *Dicranella schreberi* and some good patches of *Fissidens bryoides* in fruit. A gritstone rock carried an unusually large mat of *Seligeria recurvata.* The most interesting note of the day was made about half a mile below Scaleber Force, where two birch trees carried *Orthodontium gracile* var. *heterocarpum.*

Mosses everywhere showed signs of the severe frost of the past winter. Cushions of *Dicranoweisia cirrhata* growing on trees hid their identity under a silver grey colour and special notice was taken of *Hypnum molluscum, Hypnum commutatum* and *Fissidens adiantoides,* which had their more exposed parts bleached, the leaf cells in these bleached places being seen under the microscope to be empty.

On the way home a sheep was seen on Hellifield Moor with its lower jaw caught in a rabbit snare ; the stake remained firm and held the beast on an 18 inch tether.

Plant Galls (J. M. Brown).—Very few galls were noticed. In Tenley Plantation the characteristic form of 'Witches' Broom' was seen on the Cherry, and the artichoke-like gall caused by *Oligotrophus taxi* was plentiful on the Yew. Near Nappa, last year's oak leaves still bore galls of *Dryophanta agama,* which contrary to the usually described course of events, still contained fresh pupæ. In the same locality plants of the Dogs' Mercury were obtained galled by the fungus, *Synchytrium mercurialis.*

Freshwater Biology (J. M. Brown) :—Several of the smaller streams and becks were examined by Mr. W. Newbould and the writer. Among the stones by Newton Beck were *Agonum albipes* and *Bembidion tibiale*, while beneath the stones in the beck itself, among the common 'stone shelterers,' the Triclad Planarian, *Polycelis cornuta*, the larvæ of stone-flies and of may-flies, and the molluscs, *Ancylus* and *Pisidium*, were common. There was the web-forming Caddis larvæ, *Plectrocnemia*, with its snares attached to the under surface of stones, and the May-fly larva, *Ecdyurus*, which showed particular adaptation to the strongly running stream by its very flattened form and its thigmotaxy. In the backwaters *Velia currens* was active on the surface, and by the margin *Salda c-album* was hopping from one medium to the other.

In a small beck entering the Ribble near Nappa, the thread-spinning larvæ, and the case-weaving pupæ of the sand midge, *Simulium*, were found ; and in a water trough near by, all stages in the life history of the gnat, *Chironomus*, were observed. On the stones in the river, the cases of the Caddis larva, *Agapetus*, consisting of small stones, with its ventral aperture for the exit of head and limbs, were particularly plentiful.

The presence of empty shells of *Anodonta* in the Ribble, the very stoney bed of which appeared unsuitable to the animal, was puzzling.

The upper waters of the Goredale Beck supplied *Chara fragilis* in plenty, and the stream issuing from Malham Cove yielded larvæ of *Perla cephalotes*, while the Collembolan, *Agrenia bidenticulata* was exceedingly plentiful and active, both on the water and on the stones bordering the stream, and some particularly large specimens of the mollusc, *Ancylus fluviatilis*, were taken from the beck.

Special value was added to the meeting by the opportunity of examining many of the day's captures under the microscope provided by Mr. Newbould, and in this way many of the activities of the larvæ of *Chironomus* and of *Simulium*, of leeches and flat-worms and other creatures, were displayed during the evenings.

Entomology, etc. (J. M. Brown) :—As with the plants, the date was too early to expect very many of the more conspicuous insects to be about. Remarkably few were seen on the wing. Several specimens of *Vanessa urticæ* were seen at Settle and Gargrave. An occasional Humble bee, several Stone-flies and a few May-flies, a Saw-fly or two, about complete the list. Only varieties of *Myrmica rubra* were noted among the ants. One member brought in a fine wasps' nest taken from a fir tree.

Beetles were more numerous. A dead rabbit near Newton Beck supplied *Silpha rugosa*, an old willow near Nappa yielded *Sinodendron cylindricum*, and some cut pine logs near Newton Beck provided *Hylastes palliatus* and *Myelophilus piniperda*. By the side of Newton Beck *Agonum ruficorne* (*albipes*), *Bembidion tibiale* and *Stenus guttula* were obtained.

The following beetles were taken :—

Notiophilus biguttatus.
Bembidion tibiale.
B. 4-guttatus.
Ocys harpaloides (*rufescens*).
Trechus minutus.
Badister bipustulatus.
Pterostichus strenuus.
Agonum ruficorne (*albipes*).
Hydroporus pubescens.
Cercyon melanocephalus.
Stenus guttula.
Olophrum piceum.
Silpha rugosa.
Sinodendron cylindricum.
Strophosomus lateralis.
Myelophilus piniperda.
Hylastes palliatus.

The only Hemiptera noted were :—

Corixa affinis, Arctocorisa striata, A. falleni. Taken at Malham.
A. fabricii, Callicorixa præusta, Arctocorisa carinata. Taken on Kirkby Fell.

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Salda c-album (f. *vestita*), *Velia currens*, *Stiroma affinis* (immature). Taken at Newton Beck.

Two species of Scale Insect (Coccidae) were obtained. On Sallow near Nappa occurred *Chionaspis salicis* ; and on the Horse-chestnut a species closely related to *Lecanium capreæ*, though differing slightly in detail, was brought in by Miss K. Morehouse, who helped considerably in the collection of insects.

Collembola were more plentiful, the most interesting being *Cyphoderus albinos*, a commensal in the nest of *Myrmica rubra*, taken at Wharfe, and *Agrenia bidenticulata*, which was very plentiful in the beck at Malham.

The following species were obtained :—

Onychiurus armatus.
O. ambulans.
Neanura muscorum.
Anurophorus laricis.
Isotoma cinerea.
I. arborea.
I. viridis.
Agrenia bidenticulata.
Isotomurus palustris.
Tomocerus minor.
Entomobrya nicoleti.
E. nivalis.
Lepidocyrtus lanuginosus.
L. cyaneus.
Orchesella cincta and var. *vaga.*
Heteromurus nitidus.
Cyphoderus albinos.

The only Thysanuran noticed was *Campodea gardneri*.

Among the Woodlice the following were obtained :—

Trichoniscus pusillus, and the finely coloured variety *violaceus*, taken in old wood, near Nappa.
Trichoniscus roseus.
Oniscus asellus.
Philoscia muscorum.
Porcellio scaber.

A number of Myriopods belonging to the following genera were collected at various places : *Glomeris*, *Julus*, *Polydesmus*, *Lithobius*, *Geophilus* and *Scolopendrella*.

Harvestmen :—Two species were obtained, viz., *Nemastoma lugubre*, and *Platybundus triangularis*.

Vertebrate Zoology (H. B. Booth) :—The few members of the Vertebrate Zoology Section present had an enjoyable time. Curlews were very numerous and noisy in their courtships ; and Snipe, which have been decreasing in numbers for several years, are again more in evidence. Carrion Crows, in pairs, were comparatively common on the moors to the north of Hellifield. The Wheatear was the only summer migrant seen, but most of them were already paired. Of winter migrants two fairly large flocks of Fieldfares were seen on the hills, and a flock of Goldcrests in Park House Ghyll Wood. The Skylarks and Meadow Pipits were just returning to the grassy moors, and appeared to be full of joy. Other species noted included the Redshank, Lapwing, Dipper, Mistle Thrush and Ringdove.

On Easter Monday a few of the party pushed on further south than Paythorne, to the heronry in Park House Ghyll, and enjoyed a fine sight immediately before them of ten Herons rising from the ground down a slope in the bright sunshine. Affairs in the heronry seemed to be rather late. Only one Heron appeared to be incubating, although we counted seven nests completed or building, and we were informed on good authority that there were one or two outlying nests. The only eggs actually seen were those of the Song Thrush.

At Coniston Cold several of our members were privileged to inspect the lake, and also the collection of mounted birds in the hall.

Among other vertebrates very little was seen. But a few members managed to walk round one of the oldest and largest Rabbit Warrens in the district ; at Bookilber, near Long Preston. In this warren quite

a number of the Rabbits (3 or 4 per cent.) are natural blacks. The presence of the Mole was evident, but not excessive, a Stoat was seen, also a dead Hedgehog, and the Hare appeared to be fairly scarce.

In fish the chief object of interest was Paythorne Bridge, where 'Salmon Sunday' is celebrated annually on the nearest Sunday to November 20th, and is a very old institution. One of our members picked up a dead Pike (about 4 inches long) on the shingle at the side of the Ribble. The only other fishes seen were immature Minnows and Trout in the River Ribble. Frogs were just commencing to spawn.

CONCHOLOGY.

Cyprea etc., ex Hull Museum.—Mr. J. F. Musham has examined the Cypreas in the Museum at Hull, and made the following list, which is put on record in case students care to refer to them. These are additional to those in the Hans Schlesch Collection.

5 *Cyprea cervus* L.
7 *C. tigris* L.
3 *C. mauritiana* L.
9 *C. arabica* L.
2 *C. mappa* L.
3 *C. argus* L.
1 *C. cervinetta* Kien.
2 *C. talpa* L.
2 *C. vitellus* L.
1 *C. pantherina* Auct.
3 *C. pantherina* var. *theriaca* Melv.
4 *C. lynx* L.
4 *C. carneola* L.
6 *C. arabicula* Lam.
6 *C. caput-serpentis* L.
4 *C. helvola* L.
2 *C. asellus* L.
10 *C. caurica* L.
1 *C. arabica* var. *histrio* Meusch.
5 *C. annulus* L.
1 *C. turdus* Lk.
5 *C. erosa* Lk. (1 dwarf).
1 *Cyprea lamarcki* Gmel.
1 *C. cribraria* L.
5 *C. undata* Lk.
1 *C. ocellata* L.
1 *C. esontropia* Duclos.
1 *C. punctata* L.
10 *C. moneta* L.
3 *C. isabella* L.
4 *C. ursellus* Lam.
5 *C. fimbriata* Gmel.
2 *C. cicercula* L.
3 *C. coffea* Sow.
1 *C. cribellum* Gask.
8 *Trivia nucleus* L.
2 *T. radians* Lam.
2 *T. globulus* Gray.
4 *T. pustulata* L.
5 *T. staphylea* L.
1 var. *limacina* Lk.
3 *T. solandri* Gray.
T. europea Mont.
2 *Cyphoma gibbosa* Lin.

MARINE BIOLOGY.

Ichthyological Notes from Scarborough.—On February 21st, 1929, a cod of unusual size was caught near Scarborough by the steam drifter, *Girl Annie*, and was landed on the local fish market. It weighed 63 lbs., and is the second heaviest of its kind of which I have any note as being taken locally. In 1755 one was caught at Scarborough which measured 5 ft. 8 ins. in length and weighed 78 lbs. It was sold for 1s. A Lemon Sole weighing $5\frac{3}{4}$ lbs., an exceptional weight for a fish of this species, was caught near Scarborough on February 25th, 1929, by the Steam trawler *Strathdee*. On February 28th a large Conger Eel weighing 87 lbs., and measuring 7 ft. in length, was picked up in shallow water near the Brigg at

Filey, by a fisherman named George Cappleman. It was brought to Scarborough and sold for 8s. The fish was one of three which washed ashore on the same date, disabled by the severe frost prevailing at the time.—W. J. Clarke, F.Z.S.

Ommastrephes sagittatus at Scarborough.—During the last twelve months there seems to have been more than usual of these deep water Squids on the Yorkshire coast, and several have been noticed, both taken in the trawl nets and stranded on the beach. The largest example I have seen measured 3 ft. 8 in. in extreme length, and stranded in the South Bay on November 28th, 1928. Its head was sent to the Natural History Museum, South Kensington. Usually only single specimens have occurred, but on March 22nd, 1929, I found three perfectly fresh examples stranded on the south beach at Scarborough. All were of comparatively small size, the largest measuring 20 inches in length. In each case the tail fin was folded tightly round the body, and was scarcely visible unless looked for.—W. J. Clarke, F.Z.S.

VERTEBRATE ZOOLOGY.

Red-necked Grebe in Wharfedale.—On the evening of March 1st a friend telephoned me from Esscroft (between Ben Rhydding and Burley-in-Wharfedale) that he had a strange bird that had been caught on the snow, unable to fly, that afternoon, in a field near to the frozen river. As by his description, which included ' webbed feet '(!) I felt uncertain about its identity, so I told him I would call round and see it, quite expecting to find a Common Guillemot. However, I found it comfortably housed in a large hamper with a cover over it in a warm kitchen, and with a saucer of bread and milk ! ! Although starving it had sufficient vitality to strike out forcibly with its sharp bill at any hand that approached it. As fish was unobtainable, excepting tinned sardines, I recommended that if alive in the morning it should be liberated in an open part of the river ; if dead (which I expected that it would be), it should be sent on to me. My friend informed me that it was very much alive the next morning, and was liberated in the river. The next day (March 3rd) I walked the whole way along the river between Ben Rhydding and Burley, but could not see anything of it. As it did not appear to have an abnormal bill for this species I put it down to be the European form (*Podiceps griseigena*), which is a rare visitor to this district.—H. B. Booth.

The Proceedings of the Society of Newcastle-on-Tyne recently issued contain an account of three Bronze Age axe-heads found near Haltwistle, Northumberland, with illustrations.

LICHEN NOTES FROM RHOSNEIGR (ANGLESEY).

W. E. L. WATTAM.

This charming resort on the south-west coast of the Isle of Anglesey is most attractive to anyone interested in botanical study. The lichen flora is truly grand, and is an eloquent testimony to the healthy conditions prevalent at Rhosneigr and the surrounding neighbourhood. Although there is little woodland, the hedgerows, chiefly of hawthorn, blackthorn and field maple, with occasional trees of ash and oak, provide habitat for corticolous species, and the stone boundary walls are a feast of colouration by reason of the varied species of lichens which mask their roughness.

Particularly beautiful on the silicious stones of walls were the huge bosses of *Xanthoria parietina* Th. Fr. with its forms *virescens* and *cinerascens*, and the variety *aureola* Th. Fr. with its form *congranulata*, and *Parmelia perlata* Ach., with ofttimes its variety *ciliata* Schær. Other conspicuous species of the walls and inland rock masses are *Parmelia prolixa* Carroll, *P. conspersa* Ach., *P. proboscidea* Tayl., *Lecanora atra* Ach., *L. parella* Ach., *L. muralis* Schær., *L. sordida* Th Fr., and *L. sulphurea* Ach. Earthen embankments, where mosses congregated, were denizened by abundant *Cladonia pyxidata* Hoffm., and *C. fimbriata* Fr. with ofttimes *C. squamosa* Hoffm., *Bilimbia sabuletorum* B. and R., and sheets of *Peltigera canina* Willd. Limed crevices of walls yielded *Collema pulposum* Ach., *Placodium citrinum* Hepp,, *Candelariella vitellina* Müll.-Arg., *Lecanora galactina* Ach., and *Diplochistes scruposus* Norm. Tree boles are chiefly clothed by leafy Parmelias, such as *P. saxatilis* Ach. with its form *furfuracea* Schær., *P. sulcata* Tayl., *P. perlata* Ach., *P. caperata* Ach., *P. fuliginosa* var. *lætevirens* Nyl., *Cetraria glauca* Ach., *Evernia prunastri* Ach., *Pertusaria faginea* Leight., and *P. pertusa* Dalla T. and S. The moorland areas, where dwarfed ling and cross- and fine-leaved heaths are dominant plants, gave typical species on peaty accumulations, *i.e.*, *Cetraria aculeata* Fr., *Cladina sylvatica* Nyl., *C. uncialis* Nyl., *Gladonia gracilis* Willd., *C. coccifera* Willd. in several varieties, *C. bacillaris* Nyl., *C. cervicornis* Schær., *C. furcata* Schrad., *Lecidia granulosa* Schær., and *L. uliginosa* Ach., with *Parmelia physodes* Ach. and *Lecanora varia* Ach. on ling stems.

The Towyn Trewan Common, west of the township, with its immense sanddunes merging into heathland, along the shore towards Cymyran, is a glorious area of botanical wealth. The dominant ground lichens of the sandunes are *Collema pulposum* Ach., *Leptogium turgidum* Cromb., *Peltigera canina* Willd., *P. horizontalis* Hoffm., and *Cladonia foliacea* Willd., the abundance of the large yellowish-green congested squamules

of the latter species making it most conspicuous. The heath area of the common, besides the moorland species previously mentioned, gave the variety *pocillum* Fr. of *Cladonia pyxidata*, whilst a calcareous rock outcrop here yielded *Dermatocarpon miniatum* Th. Fr. with its variety *complicatum* Fr.

Eastwards of the township are hugh rock masses fully or partially affected in varying degree by every tide, and frequent spittals of rock running from shore until buried in the sea. At the ultimate extremity of this part of the bay, in addition to the permanent rock masses, is a vast accumulation of erratic boulders, which have been washed out of the glacial drift which covers the shoreward land. The rock masses and the spittals are igneous in character, the erractic boulders being either granitic, calcareous or silicious in nature. Here is comparative permanency, and in consequence, an abundance of lichens which make a veritable colour picture, and wondrous ground for the lichen student. The species prevalent may be divided into the following three distinct zones, viz.:

Tidal Zone.—Where the rocks are uncovered only for brief periods on the receding of the daily tides. Here occur *Lichina pygmæa* Ag., *Verrucaria maura* Wahlenb., *V. mucosa* Wahlenb., *V. microspora* Nyl.

Inter-Tidal Zone.—Where the rocks are affected in varying degree by every tide. Here occur *Lichina confinis* Ag., *Parmelia prolixa* sub-sp. *delisei* Nyl., *Placodium ferrugineum* var. *festivum* A. L. Sm., *Buellia colludens* Tuck., *Rhinodina demissa* Arn., *Rhizocarpon alboatrum* Th. Fr. and var. *epipolia* A. L. Sm., *Verrucaria maura* Wahlenb.

Coastal Boundary rock outcrops and erratic boulders. These are seldom affected by the sea, except on exceedingly high tides, and only under stormy conditions by much sea spray. The species here occurring are *Parmelia perlata* Ach. and var. *ciliata* Schær., *P. saxatilis* Ach., *P. sulcata* Tayl., *P. prolixa* Carroll and sub-sp. *delisei* Nyl., *P. fuliginosa* Nyl., *P. omphalodes* Ach., *P. conspersa* Ach., *P. revoluta* Floerk., *P. proboscidea* Tayl., *Ramalina siliquosa* A. L. Sm. (most abundant), *R. curnowii* Cromb., *R. subfarinacea* Nyl., *Usnea florida* var. *hirta* Ach., *Physcia fusca* A. L. Sm., *P. hispida* Tuck, *Candelariella vitellina* Müll.-Arg., *Xanthoria parietina* Th. Fr., and forms *virescens* and *cinerascens*, and var. *aureola* Th. Fr. with its form *congranulata*, *Placodium lobulatum* A. L. Sm., *P. flavescens* A. L. Sm., *P. ferrugineum* var. *festivum* A. L. Sm., *Rhinodina demissa* Arn., *Lecanora galactina* Ach., *L. atra* Ach., *L. muralis* Schær., *L. sordida* Th. Fr., *L. sulphurea* Ach., *L. polytropa* Schær., *L. parella* Ach., *Stereocaulon evolutum* Gr., *S. coralloides* Pers., *Acarospora smaragdula* Massal., *Lecidia coarctata* Nyl., *L. goniophila* Schær., *L. contigua* Fr., *L. confluens* Ach., *L. immersa* Ach., *L. rivulosa*

Ach., *Buellia canescens* De Not., *B. colludens* Tuck., *B. atroalba* Th. Fr., *Rhizocarpon alboatrum* Th. Fr. and var. *epipolia* A. L. Sm., *R. confervoides*, DC.. *R. geographicum* DC., *Pertusaria pertusa* Dalla T. and S., *Verrucaria maura* Wahlenb., *V. nigrescens* Pers., *V. calciseda* DC., *V. viridula* Ach.

The rock spittals in Cymyran Bay, westward of the township, also give the Tidal and Inter-Tidal species enumerated.

FISHES.

Flounder in York Waterworks.—A Flounder was taken in the nets of the Yorkshire Fishery Board on April 17th, 1929, when clearing coarse fish from one of the reservoirs belonging to the York Waterworks Company at Poppleton, York, this fish having been pumped in from the River Ouse. Flounders occur commonly at Naburn Lock, six miles below the city, but this is the first instance I have known of a Flounder being taken at this point.—S. H. Smith.

The Transactions and Proceedings of the Perthshire Society of Natural Science, Vol. VIII., Part V., contains J. Menzies' Presidential Address on 'The History of the Potato in Britain'; E. Crapper gives notes on 'The Birds of Tentsmuir,' with illustrations; there are Museum Notes, and shorter records, all of value to the working naturalist.

As Volume LX. of *The Transactions of the Cardiff Naturalists' Society* is the Society's Diamond Jubilee Number. W. R. Atkinson writes on '1895-1926, a Retrospect'; D. H. Morgan describes 'The Diamond Jubilee Celebrations'; A. W. Sheen on 'The History of the Cardiff Naturalists' Society,' with the group of the delegates attending the celebrations, reproduced from *The Naturalist*. There are also reports on local Hymenoptera Aculeata, Ornithology, Entomology, etc.

The boys of *The Marlborough College Natural History Society* are to be congratulated on the enthusiasm with which they publish their *Report* each year, and the innumerable details of animals and plants collected and studied during the session indicate the thoroughness of the Society's work. In addition Dr. H. F. Barnes has a contribution on the 'Gall Midges on Meadow Fox-tail Grass,' and there are shorter notes on Fungi, Marine and General Biology, Ecology, etc. An interesting note appears recording the fact that one of the hare skulls examined by Professor MacIntosh for abnormalities with regard to teeth, proves to have been fitted with a false tooth by a taxidermist.

At the recent annual meeting of the Yorkshire Philosophical Society, reported in *The Yorkshire Herald*, it was stated that: 'Valuable additions had been made to the collections, including a series of sculptured stones from Precentor's Court, York, forming a third series of parts of St. William's shrine and reredos of the Great High Altar of the Minster. They had also received an ivory whistle, once the property of the highwayman, Dick Turpin. The number of students attending the museums for study and instruction was 765. The Chairman, Mr. W. H. St. Quintin, announced that he had received intimation that day from the Income Tax authorities that the Society was likely to get its tax repaid. This was after a fight of three years, and the money would not only put the Society on the right side, but would help them with future work.

ADDITIONS TO THE YORKSHIRE DIPTERA LIST.

CHRIS. A. CHEETHAM.

THE last list of additions will be found on page 184 of *The Naturalist* for 1928. Many of the present list are due to Mr. W. J. Fordham's work at Barmby Moor and Allerthorpe Common. Mr. H. M. Stuart and Mr. W. D. Hincks have also added interesting species.

Our thanks are again due to Messrs. J. E. Collin, F. W. Edwards and C. J. Wainwright, who have identified the insects in the list to which their initials are added in brackets.

Sciara (*Phorodonta*) *flavipes* Mg. Cawthorne, 7/7/28.
Mycetophila guttata Wz. Barmby Moor, 19/4/27, W.J.F. (F.W.E.).
Sciophila nigra Lndrk. Spurn, 26/5/28.
Platyura discoloria Mg. Buttercrambe, 23/6/28.
Dilophus humeralis Ztt. Spurn, 26/5/28.
Forcipomyia (*Ceratopogon*) *picia* Win. Escrick, 1919, W.J.F. (F.W.E.).
Culicoides obsoletus (Mg.) Edw. Farley, 17/7/28.
Ochlerotatus rusticus Rossi. Buttercrambe, 23/6/28.
Limnobia dilutior Edw. Spurn, 26/5/28.
Therioplectes tropicus Mq. var. *bisignatus* Jnk. Buttercrambe, 23/6/28.
Symphoromyia immaculata F. Filey, 8/22, W.J.F. (J.E.C.).
Rhamphomyia dissimilis Ztt. (*maculipennis* Ztt.). Spurn, 26/5/28.
R. nigripennis F. Buttercrambe, 23/6/28.
R. hirsutipes Coll. Cragwood, Rawdon, 5/9/28.
Pachymeria tumida Mq. (*Erberi* Lw.). Barmby Moor, 2/8/28, W.J.F. (J.E.C.).
Chilifera divirsicauda Coll. Cawthorne, 7/7/28.
C. concinnicauda Coll. Cawthorne, 7/7/28.
Dolichopus lepidus Staeg. Buttercrambe, 23/6/28.
Tachydromia nigritarsis Fal. Spurn, 26/5/28.
Hercostomus chærophylli Mg. Barmby Moor, 26/7/28, W.J.F. (J.E.C.).
Chrysotus femoratus Ztt. Allerthorpe, 11/7/28, W.J.F. (J.E.C.).
Argyra confinis Ztt. Cawthorne, 7/7/28.
Chilosia cynocephala Lw. Spurn, 26/5/28.
Tropidia scita Har.. Welwick, W. D. Hincks, 26/5/28.
Ptychoneura rufitarsis Mg. Cawthorne, 7/7/28.
Dexiopsis lacteipennis Ztt. Spurn, 26/5/28.
Hydrotæa meteorica L. Allerthorpe, 21/5/27, W.J.F. (J.E.C.).
Pegomyia (*Hylemyia*) *virginea* Mg. Buttercrambe, 23/6/28.
Chirosia crassiseta Stein. Cawthorne, 7/7/28.
Fannia monilis Hal. Cawthorne, 7/7/28.
Cænosia nigridigitata Rnd. Spurn, 26/5/28.
Cnemopogon apicalis Mq. Scarthingwell, H. M. Stuart, 8/28.
Helomyza (*Blepharoptera*) *modesta* Mq. Allerthorpe, 6/4/28.
Carphotricha guttularis Mg. Newby Moor, 14/7/28.
Meromyza nigriventris Mcq. Spurn, 26/5/28.
Limosina zosteræ Hal. Spurn, 26/5/28.
Phora tincta Schmtz. Buttercrambe, 23/6/28.
Dicranota longitarsis Bergr. Crag Wood, Rawdon, 27/9/27.
Nemotelus nigrinus Fln. Allerthorpe, W.J.F.

The last mentioned was called *N. uliginosus* in error in the annual report, 1928.

' Oyster Cultivation and related researches in the British Isles,' by Dr. J. H. Orton, appears in *Nature*, No. 3093.

In Memoriam.

SIDNEY S. BUCKMAN, F.G.S.

(1860-1929).

GEOLOGY has suffered a great loss by the death of Sidney Savory Buckman, who passed away at his home, Southfield, Thame, on February 26th. He was the eldest son of Professor

James Buckman, F.L.S., F.G.S., of Bradford Abbas, Dorset, whose contributions to geological literature are well known. Inspired by his father's example and teaching, S. S. Buckman devoted the greater part of his life to the study of geological problems, especially those relating to jurassic stratigraphy and palæontology. His acute researches in this direction resulted in his becoming widely recognised by palæontologists as an authority, especially on the brachiopod and ammonite faunas of the Liassic and Oolitic rocks. Mr. Buckman was one of the first in this country to interpret the mutational changes in fossil organisms on phylogenetic lines. Referring to Buckman in his address to Section C of the British Association in 1920, Dr. F. A. Bather made the following remark :

' Devoting his whole life to abstruse research he has persevered in the face of distrust, and has produced a series of brilliant studies which, whatever their defects, have illuminated the problems of stratigraphy and gone far to revolutionise systematic palæontology.' Mr. Buckman's first published paper was a prize essay written at the age of 18 when he was at Sherborne School (' On the Species of *Astarte*,' *Proceedings of the Dorset Field Club*, Vol. II., 1878).

Since then he has enriched geological literature with about eighty important contributions, three of these being of monographic proportion claim special mention, ' A Monograph of the Ammonites of the Inferior Oolite Series,' published by the Palæontographical Society, 1887-1907 ; ' The Brachiopoda of the Namyau Beds of Burma,' *Memoirs of the Geological Survey of India*, 1917 ; ' Yorkshire Type Ammonites,' continued as ' Type Ammonites,' published by Wesley and Son and later by the author, 1909-1928 ; this latter work contains over 1000 plates illustrating about 800 species of ammonites. In addition to his geological publications, Buckman has contributed several papers on ' River Development,' ' Problems of Evolution,' ' Anthropology,' and other subjects. For his geological researches the Council of the Geological Society in 1913 awarded him the Lyell Medal.

Mr. Buckman's work was carried on despite many difficulties and anxieties, including in the later years periods of ill health, but his perseverance and enthusiasm never failed him ; during his last illness he was contemplating bringing to maturity schemes for which material had been prepared during odd moments in the preceeding years.

To be intimately acquainted with Mr. Buckman was a great privilege ; apart from his professional studies, his wide knowledge and acute observations on general subjects, coupled with a keen sense of humour, made him a delightful companion and correspondent.

Many geologists will acknowledge their indebtedness to Buckman for inspiration, advice, and encouragement, in addition to help received in the identification of specimens, services always freely rendered.

Mr. Buckman married, in 1882, the eldest daughter of Robert Holland, F.L.S., of Norton Hill and Mobberley, Cheshire. He leaves a widow, four sons, and four daughters to mourn their loss.—J. W. Tutcher.

The magazine of the Imperial Chemical Industries for February contains a well-illustrated article on The Buxton Lime Firms Co., Ltd. It includes an account of the working of the enormous limestone quarries owned by the company, and there are several interesting photographs taken from the air showing the extent to which the company is changing the landscape.

CORRESPONDENCE.

CRAY FISH IN YORKSHIRE.

With reference to your recent notes, some years ago I was walking along a very small spring in the grounds of Bramham Park (the residence of the Rt. Hon. George Lane Fox), and found it literally swarming with fine large cray fish, several of which were about 6 in. long. It was well up on rising ground. I suppose they must have been introduced there at some time, and had done well.

I have also caught them in the Ure. They also occur in the Eden, as I once saw one just below the red cliff opposite Temple Sowerby.—Chas. F. Procter.

STARLINGS AT BELFAST.

Great flocks of starlings some time ago selected the Municipal Technical College at Belfast for their roosting place at night. For some reason they suddenly deserted and went to the Custom House, at the harbour, half a mile away. This they left when scaffolding was erected for repairs, going back to the Technical College for a time. They then moved away over a mile to the great steel gantries of Harland & Wolff's shipyard, where they caused much trouble, and men were told off for regular shoots, with many victims. The birds stood this for a time, but have now settled on the City Hall, east side, where the din they make would be a nuisance if the houses opposite were residential. Do any readers of *The Naturalist* know of similar flittings in a large English city.—R. J. Welch, Belfast.

THE CARLISLE MUSEUM.

Under the curatorship of Mr. L. E. Hope, the Tullie House Museum at Carlisle has become well known. The gradual development of the museum has been entirely due to Mr. Hope during his thirty-eight years of service.

Carlisle has just appointed a new Town Clerk, and is on the eve of appointing a Director of Education, but the filling of Mr. Hope's place will be a much more difficult duty, for, while there are many Town Clerks and many Education Directors, there are very few men possessed of the essential qualities which go to the making of a successful Museum Curator. Mr. Hope's knowledge of local Roman history and local plant, animal, insect and bird life are unique, and are worked out in wonderful completeness in the cramped space at his disposal. He is well and widely known and popular. He is a perfect encyclopedia upon local history and natural history, and will be sadly missed. It is no exaggeration to say that Carlisle is best known to the people who matter by its museum, its biscuits, and its hitherto abortive efforts to provide higher education facilities for its young people.

The news of Mr. Hope's retirement has caused consternation locally, as no one seems to have realised he had reached the age of retirement, and an effort will be made to induce the local authorities to press him to stay at his post at least until after the Museum's Conference, which is due to be held in Carlisle next year.

Mr. Hope has done all the spade work and left plans for future development of the museum, and it is hoped the Council will be fortunate in their choice of a well-qualified and enthusiastic successor to carry on what Mr. Hope has so ably and efficiently built up.—T. F. M.

RIVER DERWENT.

Dear Sir,—Mr. G. T. Lyle refers in your March issue to Rev. Isaac Taylor's interesting work on the meanings of place-names, and asks if I have considered the name of this river to mean *clear water*. I have always felt that this could not be a suitable interpretation, as the river can hardly be called ' clear ' water in Yorkshire, carrying as it does

so much dark water from the peat of the moorlands. A river flowing like the Derbyshire Derwent over different geological strata might deserve the name *clear water*, but I hardly think it is the same with the Yorkshire Derwent. Further, the idea of clear water implies a comparison with some other kind of water, and in the region drained by the Yorkshire Derwent there is nothing else for this comparison.—H. J. Burkill.

NEWS FROM THE MAGAZINES.

J. W. H. Johnson writes on the diseases of coarse fish, referring to Yorkshire examples, in *Nature*, No. 3091.

Mr. Bernard H. Knight writes on ' The Great Whin Sill of the North of England—its uses in Road Work,' in *The Quarry* for April.

' The Transition from Live to Dead : the Nature of Filtrable Viruses,' by Prof. A. E. Boycott, forms a special supplement to *Nature*, No. 3090.

Sir Henry G. Lyons' presidential address to the Geographical Association, on ' The Geographer and his Material,' appears in *Geography* for March.

Mr. W. B. R. King favours us with a reprint of his paper on ' The Geology of the District around Meifod (Montgomeryshire),' which appeared in *The Quarterly Journal of the Geological Society* for December.

Charles Elton gives some ' Notices of Publications on Animal Ecology ' in *The Journal of Ecology* for February, from which it would appear that *The Naturalist* takes a prominent place in supplying information to the student.

From Mr. Hans Schlesch we have received a paper entitled ' Eine Berichtigung des Vorkommens von *Clausilia parvula* (Stud.) und *Helicodonta obvoluta* (Müll.) in Schleswig,' reprinted from *Archiv. für Molluskenkunde*, 61, 1929.

The Journal of the Ministry of Agriculture for April, in addition to many other items, contains notes on ' British Finches : Their Economic Status,' by F. C. R. Jourdain ; ' Red Spider Mite,' by E. R. Speyer ; and ' " Button Top " of Backet Willows,' by H. F. Barnes.

An important contribution on ' The Classification of Lichens,' by W. Watson, appears in *The New Phytologist* for March. In the same journal Mary Pilkington writes on ' The Regeneration of the Stem Apex,' and Prof. J. H. Priestley on ' Cell Growth and Cell Division in the Shoot of the Flowering Plant.

The first part of E. M. Nicholson's ' Report on the Census of Heronies, 1928,' which occupies over fifty pages, appears in *British Birds* for April. There is a map showing the present position of the heronries in England and Wales, and we notice several of the contributors to *The Naturalist* have assisted in this remarkably fine piece of work.

In *The Journal of Conchology* for April, A. S. Kennard describes the Land Mollusca of Kent ; W. Gyngell refers to the Cephalopods washed up at Scarborough during 1928, and describes a sinistral specimen of *Helix hortensis* in the Scarborough Museum ; J. Davey Dean refers to *Aporrhais pes-peterani* (with illustrations) ; C. Oldham records *Pisidium lill ebongii* in Gormire, and J. R. Dibb gives the annual report of the Yorkshire branch of the Society.

The Journal of the Manx Museum for March contains articles on the Colchester Museum, British Museum, National Gallery, Victoria and Albert Museum, Royal Scottish Museum, National Museums of Wales, Washington Museum, Metropolitan Museum of Art, New York, and the American Museum of Natural History, New York. The editor evidently intends to keep his readers familiar with what is being done in other institutions. There is a note on Wild Pansies of the Isle of Man as a result of the investigations of Dr. Eric Drabble, of the Isle of Wight. The Viking Age and Old Plants of the Sea are other subjects dealt with.

NORTHERN NEWS.

The Daily Mail, March 15th, records the discovery of a dozen heads of different species of reptiles near Bloemfontein. They are ' believed to belong to the Stone Age.'

The Leeds Naturalists' Club has issued an admirable syllabus with copy of its rules, list of various officials, members and honorary members, catalogue of the library, etc.

Mr. J. R. le B. Tomlin gives Reports on the ' Marine Mollusca in the Collections of the South African Museum,' in the Museum's ' Annals,' Volume XXV., Part 2, recently to hand.

A sturgeon weighing 17½ stones, said to be one of the largest ever landed at Hull, arrived at Hull Billingsgate in time for the Easter festivities, and was photographed for the press.

The fourth edition of the ' Guide to the Worthing Museum and Art Gallery ' has been called for, and contains over two dozen illustrations of prehistoric implements, etc. The price is twopence.

The Journal of the Ministry of Agriculture for March contains articles on ' The North of England Dual-Purpose Shorthorn,' by A. Mann ; and ' The Common Green Capsid Bug,' by F. R. Petherbridge.

Mr. W. Gyngell, a well-known naturalist, and one of the founders of the Scarborough Field Naturalists' Society, has been appointed curator at the museum. In recognition of the many services freely given by Mr. Gyngell to the Philosophical Society in past years the society has elected him an honorary life member.

At the Annual Conference of the Geographical Association, held in the London School of Economics, Dr. Vaughan Cornish ' gave a thoughtful exposition of the linguistic boundaries around the areas of German speech in Europe, thus contributing to the understanding of some of the fundamentals of historical geography.'

The Department of Scientific and Industrial Research has issued an admirable report on ' The Yorkshire, Nottinghamshire and Derbyshire Coalfield—South Yorkshire Area : The Parkgate Seam ' (64 pp., 3/-). It is accompanied by a map, sections and photographs. As appendices there are (1) General Considerations of the Uses of Parkgate Coal, and (2) A Comparison of the Value of Parkgate and Barnsley ' Hards ' as Locomotive Fuel.

According to *The Daily Chronicle*, a salmon was found on February 27th, frozen stiff in the ice of the River Dovedale, which flows into Brothers Water. Naturalists say that no salmon has been known in the Ullswater watershed within living memory. The fish must have come from the Solway Firth, up the River Eden into the River Eamont. The ' wire ' on the Eamont is too high for salmon to leap, and the fish must have travelled through the flooded fields last November and rejoined the river above the weir. It must then have proceeded through Ullswater Lake and out by Goldrill River into Brothers Water, and so into Dovedale River.

Section 10 of Volume IV. of *The Royal Natural History*, published by Messrs. F. Warne & Co., Ltd. (2/6), is devoted to birds, and has admirable coloured plates of the Golden Eagle, Hoopoe, Kakapo Parrots, Macaws, as well as about 100 other illustrations in the 192 pages of letterpress comprising this cheap half crown's worth. In Section 12 of the same publication, Pigeons, Grouse, Ptarmigans, Pheasants, Turkeys, Cranes, Plovers, Curlews, Gulls, Penguins and Ostriches form the main themes ; while those interested in Reptiles will find a fund of valuable information extensively illustrated by coloured plates and figures in the text, the whole occupying 192 pages, in Section 13.

The British Museum (Natural History), South Kensington, has issued five further series of cards, in colour and monochrome, illustrating various British Trees. Those recently published are F29, Smooth-leaved Elm ; F30, Wych Elm ; F31, Scotch Fir ; F35, Common Oak ; F37, Hazel. Each contains four cards in a stout envelope with four pages of letterpress, and is sold at 6d.

Under the heading ' 3000 Years Old,' *The Daily Mail* informs us that in digging a field in Holland ' antlers of an eland or antelope of a large size ' were found. Also, ' this particular kind of animal has so far only been found in America.' We have not seen a photograph of the specimens, but we feel sure the antlers will be those of either the red deer or elk, both of which are common in peat beds all over Europe.

We were somewhat alarmed to read the following items in a catalogue recently to hand, until we realized that the entries were from the list of a topiary expert, and they refer to box-trees, and one and a half guineas per foot of trained dog ' laying ' down strikes us as not an excessive price :—' Peacocks : Absolutely perfect specimens, beautifully trained, 3 ft., £7 7s. od. Chickens : Perfect specimens, beautifully trained, 2 ft., heavy specimens, £5 5s. od. Dogs : Laying down, perfect specimens, beautifully trained, 2 ft., £3 3s. od.'

Dr. J. J. Simpson, the Curator of the Museum at Liverpool, is resigning his position in June on account of ill-health. Dr. Simpson went to Liverpool a few years ago from the Zoological Department of the National Museum of Wales, Cardiff, and since he has been at Liverpool has made many notable improvements in the collections, and has paid special attention to the shipping section of the museum, which naturally should be well represented at such an important port. For many years he has occupied the position of Secretary of the Museums Association.

Wonders of Animal Life, edited by J. A. Hammerton, and published by the Amalgamated Press, Ltd., is a popular publication appearing in parts, at 1/3 each, well illustrated by phototones and plates in full colours. The work is described as ' The Pictured Story of all that is most interesting in Natural History,' and certainly the illustrations are of rather unusual fascination, and will doubtless appeal to a very large section of the public. Among the illustrations in Part 3 is the well-known example of *Ceratias holbolli*, which was brought into the Hull fish market some years ago.

The French Association for the Advancement of Science has invited the members of the British Association for the Advancement of Science to attend their meeting at Havre in July. The Council of the British Association has appointed Sir Henry Lyons, of the Science Museum, London, Dr. F. A. Bather, F.R.S., late of the British Museum, Dr. C. Tierney, and Mr. T. Sheppard as a committee to make the necessary arrangements for the Havre Meeting. At the same time, the British Association Conference of Delegates will meet at Havre. Mr. Sheppard will act as local secretary of the Havre Meeting. The last occasion upon which the two Associations had a joint meeting in 1914 when the meeting was brought to an abrupt conclusion on account of war being declared.

The death is announced of Sir George Fordham, a familiar figure at the meetings of the British Association. As Chairman of the County Council for Cambridgeshire, Justice of the Peace, Barrister at Law, High Sheriff, and in many other ways, he occupied an exceptionally busy life. In the way of a hobby, he collected and studied early road maps generally, and is the author of a number of books on the subject. At different meetings of the British Association and elsewhere he has held exhibitions of sections of his collection, which we understand has been bequeathed to the Royal Geographical Society. He was one of the first members of the Corresponding Societies of the British Association, and was to have been President at the Conference of Delegates at Havre in July had not his unexpected death intervened. He was born in 1854.

YORKSHIRE NATURALISTS' UNION.

PLANT GALLS COMMITTEE.

A Field Excursion of this Committee will be held on SATURDAY, MAY 11TH. Members will meet at the Roundhay Post Office, Leeds, at 11 a.m., for Roundhay Park, and at the Moortown end of Street Lane, for Adel, at 2-30 p.m. Members of Affiliated Societies interested in Plant Galls are specially invited to attend.

W. P. WINTER, *Convener.*

British Birds with Nests and Eggs, published by Brumby & Clark in 1896, illustrated by Frohawk, in paper covers. Also Morris's **British Moths,** 4 volumes, bound in cloth, published by John C. Nimmo in 1891.

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Printed by A. BROWN & SONS, Ltd., 40 George Street, Hull, and published by A. BROWN & SONS, Ltd., at 5 Farringdon Avenue, in the City of London.
May, 1929.

JUNE 1929. No. 869
No. 643 of current Series

THE NATURALIST.

A MONTHLY ILLUSTRATED JOURNAL

PRINCIPALLY FOR THE NORTH OF ENGLAND.

EDITED BY

THOMAS SHEPPARD, M.Sc., F.G.S.,
F.S.A.(Scot.), F.R.A.I., M.B.O.U.,
The Museums, Hull;

and T. W. WOODHEAD, Ph.D., M.Sc., F.L.S.,
Tolson Memorial Museum, Huddersfield.

WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF
JOHN W. TAYLOR, M.Sc. RILEY FORTUNE, F.Z.S.

Contents :—

LONDON:
A. BROWN & SONS, LIMITED, 5 FARRINGDON AVENUE, E.C. 4.
And at HULL and YORK.

Printers and Publishers to the Y.N.U.

Price 1/6 net. Prepaid Subscription 15/- per annum.

NOTES AND COMMENTS.

GOVERNMENT POSTS.

We learn from the press that 'The Board of Education invite applications for the appointment of two assistants on the Higher Technical Staff of the Victoria and Albert Museum. Applicants must have attained the age of 22, and as a rule must not have exceeded the age of 26 on 1st April, 1929, but in exceptional cases applications from persons above the age of 26 on that date will be considered. Candidates who have served in H.M. Forces, the Royal Irish Constabulary, or as established Civil Servants may be allowed a deduction from actual age. In general, candidates should possess a University degree or other equivalent qualifications. Applicants are reminded that the Victoria and Albert Museum is a Museum of Industrial Art, and they will not be required to show qualifications in natural science for posts in it. The beginning salary for Men Assistants entering at the age of 25 or over is £250 per annum, together with the current Civil Service Cost of Living Bonus (at present £111). The commencing salary for an Assistant entering below the age of 25 will be £20 less in respect of each year, or part of a year, by which his age is less than 25. The salary scales of the Higher Technical Staff rise to £1,000 per annum with current bonus (if any). The beginning salary for Women Assistants entering at the age of 25 or over is £230 per annum, plus bonus (at present £106). A Woman Assistant entering below the age of 25 will receive an initial salary less by £15 in respect of each year, or part of a year, by which her age is less than 25. A fee of £8 will be payable by successful candidates before certification. Further particulars and Application Forms may be obtained from the Director and Secretary.' Incidentally we presume the applicants should know something of industrial art?

SOME ASPECTS OF THE POST-GLACIAL HISTORY OF BRITISH FORESTS.

No one has done more in recent years to reveal the post-glacial history of British forests than Dr. Erdtman, whose paper in *The Journal of Ecology* (XVII., pp. 112-126) provides a very valuable summary of our knowledge of the subject. In this he outlines the results obtained by the pollen statistics method which he has carried out so extensively in various parts of N.W. Europe. Long after the maximum of the last glaciation there were no forests in the British Isles. The oldest deposits examined are very poor in pollen grains or are entirely barren. The first woody immigrants were species of willow and birch, pine appearing somewhat later. These

formed the open pre-boreal forests, which eventually, under the more congenial conditions of boreal times, became invaded by elm, oak, alder, also there was a rapid dispersal of hazel northwards to the Shetland Islands, so that during the first half of this period the hazel seems to have formed extensive, almost pure forests or scrubs. Immigration, colonisation, and consolidation characterised the pre-Atlantic period, trees and shrubs immigrating from the S.E. in the following order—willow, birch, pine, hazel, elm, oak, and alder, leading eventually to keener competition and the development of mature forest. The boreal climate was an oceanic climate comparable to that of the western Mediterranean region, although not so extreme, and Dr. Erdtman makes the interesting suggestion that this would favour the immigration of the Ilex flora and also such Mediterranean elements as *Arbutus unedo*. Pine became extinct in many places, or remained only as a relic, but in the Grampians pine forests have survived down to our own time. Of Lewis's Second Arctic Bed, he says it cannot be regarded as a typical horizon, and pollen statistics show that these deposits generally belong to the Atlantic period. During the moist, cool Atlantic period lime immigrated, and later the hornbeam. Deterioration of climate at this time, except for a brief period, favoured peat formation, and in many places, deterioration of the forest. Many such areas have apparently remained deforested down to our own time. The paper is illustrated with two figures and three tables in the text.

HISTORY OF THE VEGETATION OF THE SOUTHERN PENNINES.

The above, which was the subject of the Presidential Address to the British Ecological Society in December, 1927, by Dr. T. W. Woodhead, appears in the February number of *The Journal of Ecology*, Vol. XVII., pp. 1-34. The paper summarises the results of many workers on Yorkshire vegetation, prominent among whom was the late Dr. W. G. Smith, whose portrait, along with that of his brother, Robert Smith, is given. An attempt is made to bring together the facts relating to the post-glacial history of the vegetation, and it is suggested that many of our commonest moorland plants persisted on the extensive unglaciated areas of that period, and provide a link with the pre-glacial vegetation. The results of Scandinavian and other Continental workers is considered in relation with our local flora, and recent archæological discoveries are correlated with the evidence of plant remains in and below the peat, especially tree pollen grains, from the researches of Erdtman and others. The conclusion is that the two series of Tardenois flint implements which

occur in such abundance on the Pennines, indicate that the early unpatinated ones coincide with the dry boreal climate and a birch-oak-heath forest on the summit plateau, and that the forest climax was reached at the end of that period and the oncoming of the moist, cold atlantic period, the latter indicated by the presence of the later, patinated Tardenois flints. The wet conditions of the latter period favoured the development of peat and eventually the destruction of the forest on the higher ground. Further degeneration of the forest and lowering of the tree limit is traced, during which time the activities of man have done much to reduce it to its present restricted area. The paper is illustrated with six plates and ten text figures.

LITTER.

In *The Journal of the Commons and Footpaths Preservation Society* for March, Mr. E. A. Martin states : ' It seems to me that the success of the anti-litter campaign at Vienna was directly proportional to the number of the baskets that were put up for the reception of personal rubbish, and I feel convinced that an important improvement would be seen in our towns and open spaces if the number of baskets were greatly increased.' He goes on to say : ' Probably in our country there is a certain amount of indisposition to give the police powers to inflict fines or even to issue summonses against those who offend. But the adoption of slogans on envelopes, hotel bills, touring leaflets, charabancs, and on picturesquely-designed notices in place of public resort, would have the effect of drawing attention to the litter-baskets, and the great motorists' clubs might perhaps be induced to assist in the movement by allowing a notice to appear on the motor-bicycles of their ubiquitous representatives.'

No. 66 of Benn's Sixpenny Library is devoted to **The Study of Birds**, by **E. M. Nicholson** (80 pp.). The pamphlet is well written, and in its eight chapters deals with History of Ornithology ; Classification and Collecting ; How to Observe ; Bird-marking ; The Bird Census ; Bird Protection ; and The Future of Ornithology.

Practical Flower Making, by **Violet Brand.** London : Sir Isaac Pitman & Sons, Ltd., viii.+106 pp., 2/6 net. Recently there seems to have been a change in feminine fashion and in the way of decoration (whether as ' button-holes,' or for hats, muffs, coats, sleeves, etc.), it being the practice to attach imitations of flowers, leaves and other forms of vegetation, in order to add to the charms and attractions of women folk. In some cases the imitations are surprisingly good, and very deceitful. In others, however, no attempt seems to have been made to hide the fact that the objects are copies. Judging from the shop windows, the business is getting to be an extensive one, and is also an expensive one, which means that those who are ' handy with their fingers,' so to speak, will doubtless be making artificial flowers themselves. This book is evidently written to guide those people, and as such we can recommend it.

THE PRESERVATION OF PYRITISED AND OTHER FOSSILS.

E. G. RADLEY, F.C.S.

(*Continued from page 173*).

SECOND SET.—All specimens seemed to be affected. The changes brought about by the previous treatment were accentuated. In some cases the fossils had broken up along the suture lines, and these segments were usually outlined with white.

Of all the covering media, dope and celluloid varnish seemed to have resisted the operations more successfully than the others, but it was resolved to continue the testing of other materials and also to include specimens (1) which had been coated with celluloid varnish and kept under cover for a year, (2) which had been covered with the same varnish and exposed to outdoor conditions absolutely unprotected, and and (3) which were originally coated with celluloid varnish, but during the tests had developed decomposition products to a limited extent. The last were carefully brushed to remove the visible white product, dried, and re-coated with the same material. The employment of partially decomposed fossils (3) was to discover if it was possible to prevent further decomposition, should the decay be not too pronounced.

The specimens enumerated were placed in the tank as before, and currents of moist air were passed through for two and a half hours a day for six weeks, followed by a month's treatment with air and hydrochloric acid.

The examination of the specimens revealed the following particulars :—

	COVERING MATERIAL.	CONDITION.
A.	*Spermaceti Wax.*	In some cases there was but little change, but in others the whiteness was conspicuous.
B.	*Paraffin Wax.*	Iron stained. A few white specks.
E.	*Ordinary Varnish.*	Fair quantity of white.
F.	*Copal Varnish.*	White and dull.
G.	*Celluloid Varnish.*	Some specimens affected. All the new specimens introduced were somewhat white, and the re-coated specimens almost invariably showed whiteness.
H.	*Dope.*	All specimens unchanged.
J.	*Glue.*	Obviously breaking up.
K.	*Retouching Medium.*	Considerable amount of white. Iron stained in places.
L.	*Negative Varnish.*	Much whiteness. Suture lines show up.

The wholly phosphatic specimen did not seem to be further changed.

The covered nodule and crystal of Pyrites were unchanged, but the amount of decomposition in the uncovered nodule appeared to be increasing.

After examination of the specimens they were put back once more into the tank for treatment with sulphur dioxide as before.

The same procedure as to the admission of the gas was adopted, but between each admission the specimens remained in the atmosphere of sulphur dioxide for three days. This was continued for five periods. At each fresh admission it was noticed that the usual partial vacuum existed, indicating that absorption had taken place. Sulphur dioxide was present in considerable quantities, even at the close of each period.

All specimens were affected with the exception of those covered with dope and a few of those covered with celluloid varnish. Those covered with paraffin wax and Spermaceti wax were, in some cases, highly decomposed, and those coated with the other materials were very far on the way to destruction.

Influence of Temperature.—It is possible that changes of temperature, causing expansion and contraction, may result in the fracturing of the protective covering, and so allow of the admission of destructive agents.

Freezing.—Specimens that had survived the drastic gaseous treatment, with others that had only shown a little change, together with a few freshly coated specimens, were placed in a tin box, the lid of which was fitted with one tube for the admission of air, etc., and another to serve as an exit, a thermometer also being provided to test the temperature of the interior during the freezing process. The box was placed in a mixture of ice and salt contained in a wooden box. In this manner, a temperature of from 1° to 2° was obtained, and the mixture was allowed to gradually thaw so that an atmospheric temperature was re-assumed in from three to four hours from the commencement of the freezing. On three days this freezing was repeated, the box remaining untouched during the intervals. After this the specimens were transferred to the testing tank to undergo further treatment.

Moist air was pumped through the tank for about two hours a day for a week, then the air was drawn through hydrochloric acid for two hours daily for nine days. After this, sulphur dioxide gas was introduced and as usual between admissions the tank was stoppered. Five admissions were given at intervals of three days. The usual partial vacuum was always noticed, proving again that absorption had taken place.

After freezing, the specimens were examined, and it was

found that nearly all showed signs of decomposition, the exceptions being those which were covered with dope, celluloid varnish, Spermaceti wax and paraffin wax.

Heating.—Thoroughly to test the effect of increases of temperature upon the permanence of the protective coverings, the temperature of the surrounding air should be raised to that of the boiling point of water (100° C.) or over. In this manner, if any moisture was enclosed by the covering material it would be evaporated and expand, the coating medium would split, and the coating would no longer be impervious to the moist air, hydrochloric acid, and sulphur dioxide gas, which it was proposed to use as in previous experiments.

Only those specimens which had resisted the low temperature and subsequent admission of moist gases without undue decomposition were taken for testing at high temperatures. In addition to those enumerated above as having proved impervious to gas action after low temperature treatment, specimens covered with retouching medium and negative varnish showed but little change, while others coated with glue, ordinary varnish or gelatine were so badly affected that it was considered useless to proceed further with them. Crystals of Pyrites and the covered nodule also resisted change except on the outside, and there the decomposition was not very pronounced.

The tin box used for the freezing experiment was used for the heating test. After several ineffectual attempts had been made to introduce a current of hot air of a sufficient temperature, the box was heated by direct flame, a fairly rapid current of air being passed through the box during the operation. In this manner a temperature of 109°C. was reached and retained for at least half an hour, when the box was allowed gradually to resume normal conditions. This operation was repeated on three successive days.

On opening the box it was obvious that considerable changes had taken place and the partially decomposed specimens were apparently worse than before the heating, but instead of a detailed examination being made, the whole of the specimens were transferred to the testing tank.

As usual, to commence with, moist air was drawn through the tank, this time for two hours a day for a week, and it was followed by a week's similar treatment with hydrochloric acid. Finally sulphur dioxide gas was introduced three times, intervals of two to three days being allowed between each admission. The tank was stoppered between the introductions of fresh supplies of sulphur dioxide, and at each time of opening the usual partial vacuum was noticed.

After this treatment the specimens were examined as usual, with the following results :—

All the fossils showed extensive signs of decomposition with the exception of those covered with dope, and one of these it was noted showed places where blistering had occurred, but no disintegration.

Of the other covering materials employed the next most resistant appeared to be celluloid varnish, whilst there seemed to be little to choose between the remainder, for all the specimens coated with them showed signs of advanced change.

Specimens of Pyrites crystals and the covered section of the Pyrites nodule were only changed to a small degree.

It was thus certain that the reason why pyritised fossils are often easily decomposed by atmospheric conditions is either that the Pyrites is in a very fine state of sub-division, or, as has been held by many people, the iron sulphide is the less stable Marcasite. As noted above, large crystals of Pyrites are very resistant. Uncovered crystals of Marcasite were tested under the intensive conditions and there was a very distinct change long before any alteration was seen even in the Pyrites nodule. That the permanence of Marcasite is less than that of Pyrites is, however, not established, for finely ground Pyrites and Marcasite showed almost equal degrees of alteration, a white material, tinged with yellow, being produced in both cases.

In confirmation of the permanence of Pyrites when in the massive state, it is well known that fossils, in which the original material has been completely replaced by Pyrites, are extremely resistant to any change due to weathering, either *in situ* or in collections.

In 1921 a set of fossils, washed and dried, covered with the same materials as those employed for the intensive tests, was prepared and put into the same cupboard in which the original 1919 specimens were stored. Of the 1919 specimens, those that had perished were removed, those remaining being coated with celluloid varnish and replaced. This was done to compare the behaviour of specimens that had been washed and dried before covering with that of fossils coated without washing and drying. As stated earlier, no change was observed in these suites of fossils for six years, whilst after a further three years most of the fossils of the original set were found to be very decomposed. On the other hand most of the other set showed no trace of whiteness, but ordinary varnish-covered fossils showed an inclination to blistering, and one of those covered with spermaceti wax was nearly destroyed.

The intensive tests were undertaken to represent an indefinite number of years of ordinary storage, and the value of protection when due care is taken to prepare the specimens for covering. Dope has been proved to be more resistant than any of the other materials which were tried.

1929 June 1

Analysis of the Decomposition Product.

For this purpose the white powder was taken from specimens which had suffered natural decomposition and not from those which had passed through the drastic artificial treatment.

Three samples of the alteration product were taken for analysis : (1) from a partly decomposed specimen with the central portion unchanged, (2) from a very much weathered specimen, and (3) material scraped off the outside of an apparently fully decomposed fossil. At the slightest touch this fossil fell to a powder.

Portions were boiled in distilled water and the filtrates in each case found to contain chloride and sulphate. In the least weathered specimen, on boiling in water in a current of carbon dioxide, ferrous sulphate was detected in very small quantity.

The residue was digested on a water bath with dilute hydrochloric acid for two days. Practically all the material had been dissolved by that time, but there was, in each of the three samples, a small quantity of very fine material remaining and this was shown to be Pyrites or Marcasite.

The filtrate contained a little silica, and after its removal a fair quantity of iron was precipitated in each sample, by ammonia. The filtrates from the iron were proved to contain lime in notable quantities. Magnesia was looked for in each case, but only very small amounts were detected.

When digested with water small amounts of sodium chloride were detected, also traces of magnesia, possibly as chloride.

Hydrochloric acid extracts of the powders indicated the presence of large quantities of sulphates.

The analysis proved that the white decomposition material in each sample is essentially calcium sulphate and a basic sulphate of iron, together with very small amounts of sodium and magnesium chlorides, the two latter being probably derived from sea water.

The product of decomposition of the fully phosphatic specimen, which before covering with celluloid varnish was found to contain no sulphate, consisted of a very large portion of calcium sulphate. It is therefore established that during the course of the experiments, sulphur dioxide and oxygen, in the presence of moisture, had changed the composition considerably.

The white decomposition product, apart from the calcium sulphate, may have the composition of ferrous disulphate FeS_2O_7, which is known to decompose into the normal salt and free acid. As stated, the normal salt ($FeSO_4$) had been detected.

Summary.

The cause of the disintegration and destruction of ' pyritised ' and ' phosphatised ' fossils, is the action of oxygen in the presence of water.

The sulphur of the Pyrites or Marcasite is converted into the dioxide, which, with water and oxygen, eventually produces sulphuric acid, this being absorbed by the lime constituents and forming calcium sulphate.

During the weathering of such fossils, sulphates of iron are formed.

The experiments have proved that whether the fossils are termed ' pyritised ' or ' phosphatised,' they are equally liable to destruction by weathering. In ' phosphatised ' specimens notable quantities of Pyrites or Marcasite have been discovered, whilst the ' pyritised ' are not free from phosphates.

Hydrochloric acid or chlorides are accessory agents of destruction, and, as the tests have indicated, play an important part in the changes which take place ; in fact, one of the intermediate stages of decomposition may be the production of iron chloride. Such a compound has been proved to be the colouring matter of a band of yellow nodules at Folkestone.

During the course of the experiments, crystals and nodules of Pyrites were found to be highly resistant, while crystals of marcasite were less so. The durability of Iron Pyrites when in a massive state is confirmed by the experience that completely pyritised fossils may often remain unchanged indefinitely without being covered by any protective material.

It is impossible to say whether the iron sulphide in these fossils is pyrites or Marcasite, for tests proved that very finely powdered portions of the respective minerals suffered about the same amount of oxidation into the basic sulphate in each case.

The experiments suggest that the Pyrites or Marcasite in the fossils are in an extremely fine state of division, and disseminated throughout the specimens.

Apparently there is a limit to the preservation of partially decomposed ' pyritised ' or ' phosphatised ' fossils. Should the damage be slight and apparently only on the surface, there is no reason why it should not be found that such affected fossils could be preserved by removal of the white product of decomposition, thoroughly washing, drying and coating the specimens with celluloid varnish or preferably ' dope.'

When the pyritised or phosphatised fossils are very much decomposed, it has been found impossible to save them from complete destruction, probably because the fine crystals of

the Pyrites or Marcasite disseminated throughout the mass are already in course of conversion into the sulphates.

Of all the media used as protective coverings for pyritised fossils, ' dope ' has been found to be not only the most resistant to noxious gases, but sufficiently elastic to withstand the contraction and expansion due to changes of temperature.

It therefore appears best that the pyritised or phosphatised fossils should, as soon as possible after collection, be carefully washed and dried, and then coated with this medium. Likewise, those in collections which exhibit initial signs of decomposition should be similarly treated.

If the dilute equivalent of ' dope ' (invisible lacquer, etc.) be used, it would be advisable to give the specimens two or more coats to ensure complete covering.

To ensure success, the greatest care must be taken over the washing and drying of the specimens before the preserving covering is applied.

Coleoptera near Wigton.—Among the Weevils, eighteen species of *Apion* were noted, *A. ulicis, hæmatodes, viciæ, apricans, assimile, nigritarse, æthiops, ebeninum, striatum, spencei, ervi, loti, seniculum, affine, violaceum, humile, carduorum,* and *punctigerum,* none probably rare. *Otiorrhynchus picipes,* very common. Two specimens of *O. sulcatus* were taken from a Cyclamen plant in the house. *Sciaphilus muricatus* several times beaten from Oak. *Strophosomus corylī* common, *S. retusus* much less so. *S. lateralis* common on Heather on Oulton Moss. Most of the species of *Phyllobius* were noted commonly, except *argentatus* and *pomonæ*, *P. viridicollis* occurring rather rarely on *Ulex* at Dundraw. *Barynotus obscurus,* odd specimens. *Sitones regensteinensis, tibialis, hispidulus, flavescens, lineatus,* and *sulcifrons* all common. *Hypera nigrirostris,* Kelsick, fairly common. *Orchestes quercus* not common. *O. rusci* locally common. *Anoplus plantaris,* Kelsick, not common. *Anthonomus pedicularius* not rare on Hawthorn. *A. rubri* at Aikshaw. *Cæliodes 4-maculatus* everywhere. *Ceuthorrhynchus contractus* and *C. pollinarius* common ; *C. litura* and *C. erysimi* much less so. *C. rugulosus,* one specimen at Oulton, in August, on Matricaria. *Rhinoncus pericarpius* about Kelsick, not uncommon. *Balaninus salicivorus* common on Sallows. *Hylastes palliatus,* Kelsick, rare.—Jas. Murray, Burnside, Road retna.

The Journal of the Manchester Geographical Society, Vol. XLIV., contains two important papers on ' University Facilities for the Study of Geography,' by L. M. Angus-Butterworth ; and ' Some Aspects of the Work of Ordnance Survey,' by Sir Charles Close. There is also a brief obituary notice of the late Sir William Boyd Dawkins.

BRITISH DOMESTIC SHEEP.*

H. B. BOOTH, M.B.O.U.

Six years ago, Mr. H. E. Forrest read a paper on ' Sheep and Early Man in Britain,'† from which he drew the following three conclusions :—

(1) There were no domestic sheep in Britain in Palæolithic times.

(2) Nor in Neolithic times.

(3) Domestic sheep were introduced into Britain some time during the Bronze Age.

He also stated that ' Cloth made of British wool was known and highly esteemed by the Romans before they invaded England,' and quoted Prof. J. Cossar Ewart that no indigenous wild sheep is known to have inhabited Western Europe. Although, geologically speaking, the British domestic sheep may be modern, yet historically the breeding of sheep and the growing of wool is one of our most ancient industries, and one that has done more to build up Britain, and a great part of the British Empire, than has any other commodity. For centuries wool was our chief material for barter and export. Wool paid for our early wars—chiefly those with France—by means of export taxes. Incidentally, I believe this was one of our first taxes.

There are now about thirty distinct breeds of sheep ; each with its registered flock book association, and with the exception of the Merino, practically all the *bred* wool and mutton sheep of the world are from British strains. Britain has been truly called the stud-farm of the world. In the very early days woolstaplers were rich and important men in the land. Shakespeare's father was a woolstapler at Stratford-on-Avon, and most probably young William started his career in wool. In ancient days the monks—more particularly the Cistercians—were large breeders of sheep, and growers of wool ; they have been described as more farmers than monks.

We are told in ' The Golden Fleece '‡ that as early as 1195 Cistercian wool paid a large part of Richard Cœur-de-Lion's ransom. Also, from Flemish records, that Meaux Monastery, near Beverley, possessed 11,000 sheep in the year 1280 A.D. In 1295, the Kirkstall monks won a lawsuit against the Crown, over a sum of 160 marks paid in advance by some traders of Lucca, for Kirkstall wool. Fountains

* Read before the Vertebrate Zoology Section of the Yorkshire Naturalists' Union, February 16th, 1929.

† *The Naturalist*, 1923, pp. 135-159.

‡ By Messrs. Morris and Wood, The Clarendon Press, Oxford, 1922.

Abbey had a famous shearing place at Kilnsey-in-Upper Wharfedale. Byland Abbey possessed the right to pasture 600 sheep, with their lambs, at Kilburn, and 400 at Thirkleby. Jervaulx Abbey was almost as renowned for its sheep as for its horses.

In the years 1362 to 1371 England was producing 44 different brands of wool for export. The annual average export at that date was over 11½ million lbs. of wool; valued then at about £180,000, equal to-day, it has been computed, at the least £5,000,000 sterling. No doubt, even at that date, the fleeces would be divided or graded into hogs (the first time shorn), and ewes and wethers (subsequent shearings), which at once doubles the number of brands or grades.*

The growing importance of our exports of wool led, either in the reign of Henry III., or in that of Edward I. (that is between 1216 and 1272 A.D.), to the formation of a body known as the Merchants of the Staple, who sold wool. As most of the exported wool went to Flanders, it appears to have been sent through the Cinque Ports, viz., Hastings, Sandwich, Dover, Romney and Hythe, where the king had his customs officers. About the year 1300 Kingston-upon-Hull and Great Yarmouth were added to the Staple Ports. Pirating was in great vogue in those days, and the Cinque Ports, with their 'limbs,' were given special privileges and exemptions, in return for the 'navy' they supplied.

The Statute of Westminster of 1275 fixed a definite rate on what it then called 'the ancient custom' on exports, viz., half a mark on each sack of wool, and one mark on each last of hides or skins. The mark consisted of 160 silver pennies, so that the export duty was 6/8 per sack. The weight of a sack of wool was 364 lbs., viz., 7 lbs. equals one clove, and 52 cloves equal one sack.†

It is recorded in the rolls of the Priory of Finchdale, to which the ancient church of Giggleswick-in-Craven was attached, and to which it paid tolls, that three sacks of wool were sold at Giggleswick in the year 1338 A.D., and realised the sum of £15. This sum was paid in tithe, or in part tithe, to the Priory. The following year three more sacks of wool were sold, but the price is not recorded.‡ As it had already been decreed by Magna Charta (in 1215 A.D.) that weights

* *tom. cit.*, p. 21.

† There were many quaint and curious customs in those days. It would be of interest if some antiquary would ascertain why the sack of 364 lbs. of wool was changed into the more recent and present day pack of 240 lbs.? Probably it would have something to do with the creation of our £1 sterling, which equals 240 pennies.

‡ 'The Parish Church of Giggleswick-in-Craven,' by the Rev. J. C. Cox (pp. 21-22).

and measures were to be uniform throughout the kingdom, this would work out at just over $3\frac{1}{4}$d. per lb. This must be considered as a very good price with the value of money in those days. For comparison the same account-rolls state, 36 years later :—' For the roofing of the chancel,* and the repair of the windows, 30s. 2d.' In the meantime wages had risen, as it was estimated that about one-third of the inhabitants of the kingdom had been wiped out by the Black Death in the year 1349 A.D. and later.

The questions now arise—(1) Why should England have so many distinct breeds of woolled sheep, out of all proportion to her size? ; (2) Where have they originated?

(1) As a practical wool stapler, I should like to state that, in my opinion, sheep are very sensitive to the nature of the soil on which they are reared, as it affects the quality of their wool. Most breeds of British sheep vary from type in wool when removed and reared away from their native heath. I have known Lincoln sheep lose almost all the lustre of their wool after pasturing for a year or two in the neighbouring county of Norfolk. Lincoln sheep are particularly suitable for rearing in the Argentine, where many of the best and most valuable Lincoln rams have been exported. New blood, however, has continually to be imported, or the wool ' runs off,' *i.e.*, it becomes dull, hairy and scrunty—the very opposite qualities for which good Lincoln wool is celebrated. The same applies to most of the other distinct breeds, though perhaps not to such a great extent. A geological map of England will show that it varies probably more than any other area of its size in the world. This, combined with careful breeding through many centuries, has developed the most suitable breeds for the various areas ; affected to some extent by the varying climatic conditions.

Almost as many lambs are born that are a fusion between two distinct breeds as are purely bred lambs. These are essentially mutton sheep, and are known as cross-breds, or half-breds ; but these names are valueless unless one knows what district they come from.

(2) The origin of our domestic sheep becomes a tale of a tail ! All the lambs of domestic sheep are born with long tails. Most of them are docked when only a few weeks old, and which considerably alters their appearance. All wild sheep of to-day, from which they could possibly have been derived, have short tails, whether they be Moufflons, Urials, or Ammons. The only sheep in the British Isles, so far as I know, with natural short tails, are those on the Island of Shetland, and on the precipitous stack of Soay, off the lonely

* Probably a thatched roof.

island of St. Kilda. Their wool, although fine and soft, but scanty, is not white, but 'moorit' coloured. The Soay rams have comparatively large horns, and look like small-sized Moufflons. But doubtless they have a dash of Urial or some other blood in their strain, as although most of the ewes are hornless, a few have primitive horns.* How they got to Soay is a mystery, although mythology has it that the Vikings put them on.

The Shetland sheep have probably a similar origin, but it is thought they are in part descendants of the ancient British Turbary sheep. The only wild sheep existing in Europe is the Moufflons of Sardinia, and until comparatively recently of Corsica. The rams carry large horns, but the females are hornless and have short stumpy tails. The 'baa' of the females in the London Zoological Gardens impressed me with its similarity to that of the domestic ewe. On Cyprus there is another species, viz., the Red Moufflon.

My friend, Prof. J. Cossar Ewart, F.R.S., believes that our domestic sheep originated with a mixture of some wild sheep of Asia (probably some species of Ammon) and some of the natives' fat-tailed breeds. With all respect for Prof. Ewart, whom I look upon as our greatest scientific authority on our domestic mammals, I cannot conscientiously agree with him. I think that the wild sheep, from which our domestic long-tailed woolled sheep have descended, has been extinct for a long time. Of all wild animals the wild sheep is the most defenceless, and its chief power of survival was in its ability to live on high and precipitous mountains and cliffs. As civilisation advanced the most defenceless animals would be exterminated, but sheep—valued for its wool and skin, and for its meat—would be kept in domestication by man. This appears to be exactly what has happened, and the original wild stock from which we get our celebrated woolled breeds has become extinct. Possibly the flocks of sheep mentioned in Genesis (in which their chief distinction was that some of them were spreckled and some were not), may have been a transitory stage in the formation of our woolled breeds. Some years ago I was in Morocco, and the few small flocks of sheep that I saw had long tails.

All wild sheep have an outer coat of coarse hair, and an inner coat of fine wool. The cause of this is a long story; but many of our domesticated sheep still maintain strong hairs on their face and legs.

Prof. Ewart recently pointed out to me that the view

* Mr. W. H. St. Quintin had a small flock for several years at Scampston, which afterwards came to the Leeds University. One of his rams was actually born on Soay.

adopted by Bowman (the author of our standard work on wool) was that the first coat of the lamb was hair. But in an important work published in 1908 by Dr. Friendenthal, 'Das Haarkleid des Meuschen,' it is stated that the lamb's first coat is wool, and it appears before the lamb is born. Several continental authorities have followed Dr. Friendenthal, and Prof. Ewart tells me he agrees with him. Many of our lambs, if not most, are born with a short coating of hair, but this soon comes off.

ENTOMOLOGY.

Corixa dentipes Thoms. new to Yorkshire.—Of this species, recently added to the British list by W. E. China (*Ent. Mo. Mag.*, 1928, p. 85), I possess a single Yorkshire specimen, a female, taken at Hull on September 6th, 1917. The species has been hitherto recorded in Britain from Lincolnshire, Staffordshire, Cumberland, Norfolk and Ireland.—Geo. B. Walsh, Scarborough.

The Spring Usher Moth at Huddersfield.—This species has been thought to be extinct in the immediate neighbourhood of Huddersfield. Previous to 1859 it seems to have been a common species according to the list of local lepidoptera given in 'Huddersfield, its History and Natural History,' by Chas. C. P. Hobkirk. Porritt's 'List of Yorkshire Lepidoptera' gives only one record, *i.e.*, Huddersfield (P.I.), and I can find no other record nearer than Skelmanthorpe and Cawthorn. As it is about fifty years since Peter Inchbald left Storthes Hall, a neighbourhood which he carefully worked when residing there, it is interesting to record that in Carr Wood, Woodsome Lees, near by the Hall, Mr. G. C. Varley turned up the species on March 9th last, and again on a subsequent date. The locality is within four miles of the centre of the town.—B. Morley, Skelmanthorpe.

CONCHOLOGY.

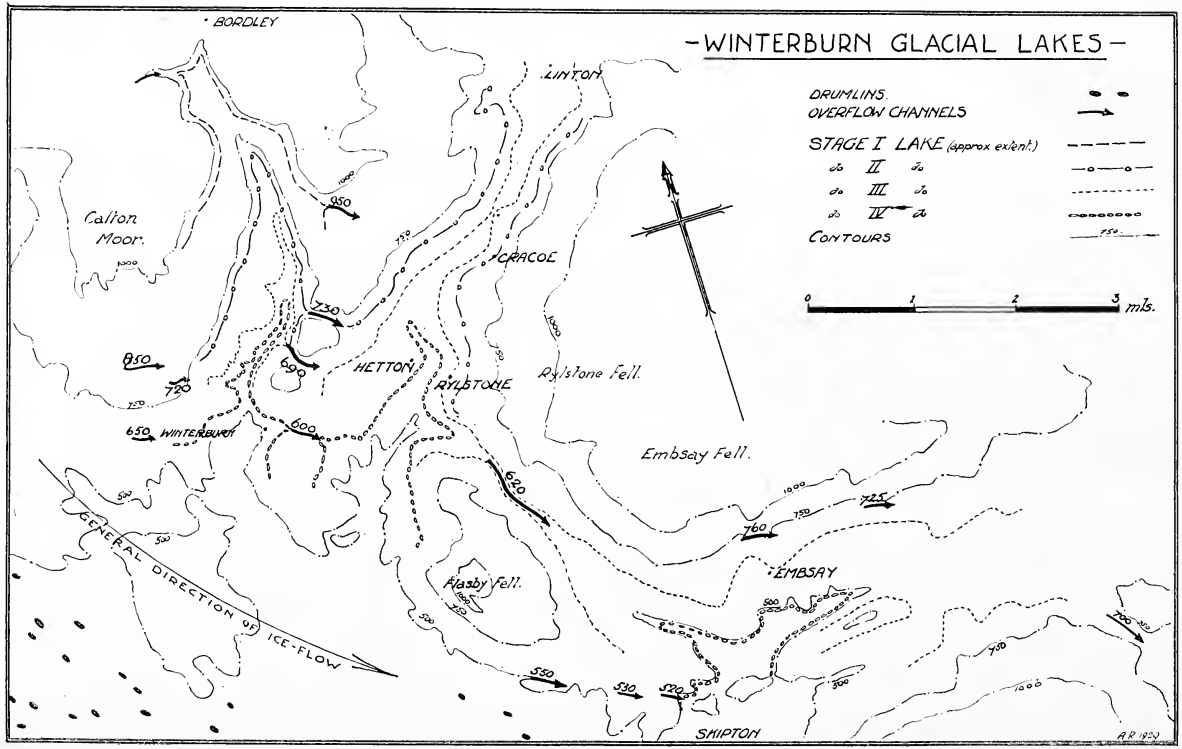
Mollusca at Hellifield, Yorks.—The Tarn at Hellifield Peel contained few mollusca; *Limnæa peregra*, *Planorbis albus* and *Pisidium* sp. were all that could be seen after a prolonged search. Land species from the woods were *Hygromia hispida*, *H. rufescens*, *P. rotundata*, *H. rogersi* or *helvetica*. Mrs. and Miss Morehouse obtained the following at Hellifield: *Succinea elegans*, *Ancylus fluviatilis*, *L. peregra*, *Vitrea pura*, *P. rotundata*, *Cochlicopa lubrica*. On Saturday morning the outflow of Malham Tarn was dredged. *Limnæa stagnalis* occurred rather undersized, and not including any of the banded form once found by the late Roebuck after a severe and variable winter.

The following also were taken : *Limnæa peregra, L. stagnalis, Sphærium corneum, Pisidium nitidum, P. subtruncatum.* Malham Cove was searched with care by Mrs. Morehouse and daughter : *P. rotundata, Hygromia hispida, Arianta arbustorum, Cochlicopa lubrica* and *Ancylus fluviatilis.* Coniston Tarn contained *L. stagnalis* of good size and fine outline. The following also were obtained here : *Limnæa peregra, L. stagnalis, Bithynia tentaculata, Ancylus fluviatilis, Paludestrina jenkinsi, Planorbis albus, Sphærium corneum, Pisidium casertanum P. nitidum, P. milium. P. subtruncatum, P. rotundata, P. rufescens, Vitrea alliaria, Arianta arbustorum, Agriolimax agrestis.* A portion of the shore of this tarn is composed of stones loosely paved together to prevent too rapid erosion of the grassy slope. The ripples of the lake keep up a constant wash like a small surf. This gentle imitation of seaside rocky shore provided just enough constant lively motion of the water to produce a fairly typical limpet ground on a small scale. This suited the limpet-like form and habits of *Ancylus fluviatilis* admirably, and this species was unusually abundant here. Its more familiar home is on stones in the broken water of shallow and not too violent rapids in the smaller rivulets anywhere and everywhere.

Gordale Scar : *Limnæa peregra, Clausilia bidentata, C. cravenensis, P. rotundata, P. rufescens, Jaminia cylindracea, Vitrea alliaria, Helix nemoralis, Arianta arbustorum.* Eshton Tarn : *Acroloxus lacustris, P. contortus, Physa fontinalis, Sphærium corneum, Bithynia tentaculata, B. leachii, Valvata piscinalis, Pisidium casertanum, P. nitidum, P. subtruncatum, P. hibernicum, Arianta arbustorum, H. nemoralis* var. *libellula, H. hortensis, Succinea elegans.* Ribble Valley : *Hygromia hispida, P. rotundata, P. rufescens, Clausilia bidentata, Caryshuim minimum, H. nemoralis, Arianta arbustorum, Vitrea alliaria, H. rogersi* or *helvetica, V. pura, Jaminia cylindracea, Vitrina pellucida, Euconulus fulva, Ancylus fluviatilis, Arion ater* and var. *brunnea.* Low Fudtheroe Pond : *L. peregra, Pyramidula rupestris* (on stones on the bank. Otterburn Mill : *L. peregra, P. contortus, Pisidium contortus.* Gargrave Canal : *Bithynia tentaculata, Sphærium corneum, L. peregra, Dreissensia polymorpha.*—Greevz Fysher.

Mr. J. S. Gayner gives ' Yorkshire's Contribution to the " Ornithology " of 1678,' in the *Annual Report of the Yorkshire Philosophical Society,* just to hand.

A map of the British Islands showing the localities at which giant squids have been stranded, accompanies a paper on ' The Stranding of Giant Squids on the North-east Coast of England,' by W. J. Clarke and G. C. Robson, in *The Proceedings of the Malacological Society,* Vol. XVIII., Part IV. From this it would appear that quite a large number of interesting records have been made between the Forth and the Humber in recent years.


WINTERBURN GLACIAL LAKES
BORDLEY
LINTON
CRACOE
Calton Moor
HETTON
RYLSTONE
Rylstone Fell.
Embsay Fell.
EMBSAY
Flasby Fell.
SKIPTON
WINTERBURN
GENERAL DIRECTION OF ICE-FLOW
DRUMLINS.
OVERFLOW CHANNELS
STAGE I LAKE (approx extent)
II
III
IV
CONTOURS
0 1 2 3 mls.
A.R. 1929

SOME YORKSHIRE GLACIAL LAKES.

DR. A. RAISTRICK, F.G.S.

(Plate VI.).

During a late stage in the retreat of the Airedale-Ribbledale glacier, a series of glacial lakes was formed in the valley of the Winterburn Beck, which, overflowing across Hetton Moor, contributed water to the Hetton Cracoe valley, blocked at its northern end by the ice of the retreating Wharfedale glacier, and at its southern end by the Airedale glacier. At some stages this lake in turn overflowed into the Embsay-Bolton Bridge valley and contributed to a lake there, between the ice of Wharfedale and Airedale. An attempt is made in this paper to sketch the main sequence of events so far as they relate to this set of lakes, the general glaciation of the wider district of which this is only part, being described in detail elsewhere.*

In the Winterburn valley, at an early period of the ice retreat, the ice stream which at that time was filling Airedale, was moving south-eastward from the high fells above Malham, across the Calton Moor to Flasby Fell and the corner of Rylstone Fell. This was the eastern edge of a far wider stream, passing from the Ingleborough-Pennygent massifs, down Ribbledale, reinforced by ice from the high fells behind Settle, and moving south-east across the Hellifield lowland. This great mass was partly deflected off the Bowland Knotts by local ice, and split on the shoulder of the Carlton Moors and Bouldsworth Hill, part going by the narrow valley of the Aire to the east, part by the western edge of the Pennines over the Lancashire lowlands.† The relatively narrow valley of the Aire below Skipton caused some congestion of the ice, and the strong eastward deflection of the ice of the Malham district, against the Calton Moor and Flasby Fells. When the ice was retreating, the edge quickly swung away from the Calton Moor, while so long as ice was passing down Airedale below Skipton, it kept in contact with the shoulder of Flasby Fell.

At the period of the first lake in the Washburn valley, the ice closed the valley through a great part of its length, the edge being about the line of Whetstone Gill. The water of the impounded lake overflowed by a channel at 950 ft. O.D., at the head of the present Long Gill Beck, across Black Park. An excellent view up this channel is obtained when going along Boss Moor Lane, from Hetton to Bordley. The lake at this stage was receiving drainage from the edge of the

* ' Glaciation of Craven (Upper Valleys of Aire, Wharfe, and Ribble).' A. Raistrick. Publication pending.

† Raistrick, A., ' Glaciation of Hellifield District.' Y.N.U. Excursion Programme, Easter, 1929.

Malham ice, largely by Moor Close Gill, south of Kealcup Hill, Bordley. The Airedale and Wharfedale ice at the same time must have been almost, if not quite, in contact along the Cracoe valley, at most there being only a small lake between the two ice lobes. There is no trace of the line of further drainage from this valley, but the most probable way was along the edge of the Rylstone Fell. The next stage (II.) followed a considerable retreat of the ice edge, when the Airedale glacier was much more restricted in its upper part to the Airton-Malham valley, reaching about 850 ft. O.D. on the spur of the Calton Moor. The water from the edge of this ice cut a deep channel along the spur, from the head of the present Foss Gill, to the head of Moor Gill, a tributary of the Winterburn. The outflow of the Winterburn lake was by a channel at 730 ft. O.D., by Long Hill, into the Hetton valley. Here a larger lake was impounded between the Airedale ice, which sent a lobe across the mouth of this valley by Hetton and Rylstone, marked by numerous morainic mounds, and the Wharfedale ice, the edge of which was between Linton and Swinden. This lake at approximately 700 ft. O.D., drained by the edge of the Rylstone Fell into the Embsay valley, but probably continued only as lateral drainage between the ice and the fell side. At this time some of the congested ice around Skipton was finding its way along the Embsay valley, into contact with the Wharfe ice about Draughton. There are two fine channels on the north side of this valley, one at 760 ft. O.D. above Embsay, and one at 725 ft. O.D., near Eastby. These belong probably to the earlier Stage I. An overflow by Chelker at 700 ft., which took this and the Wharfe lateral drainage from Nelly Park Lake (750 ft. O.D.), was utilised in the formation of the Chelker reservoir, the pre-reservoir map showing a through channel here.

At the third stage, the ice edge along Calton Moor reached 720 ft. O.D., and the drainage from Airedale is indicated by a channel at 720 ft. near Windros Laithe. The Winterburn lake was drained by a channel at 690 ft. O.D., one of the finest in the whole series for size and regularity. It is about 35 ft. deep, 200 ft. wide, and about 700 yards long in the parallel part. It testifies to the large volume of water draining along the ice edge, although the Winterburn lake at this stage was very small. The water of this channel entered a lake in the Hetton valley, at about 630 ft. O.D. This was impounded at the Wharfe end by the Wharfe ice standing across the valley by Linton, its position marked by the fine lateral moraine immediately north of Linton village. The Airedale ice was still sending a small lobe into the southern end of the valley as far as Flasby village, and a small lobe into the mouth of the Embsay valley, where the ice edge

stood across the Tarn Moor and against the high ground of Haw Bank and the corner of Skipton Moor.

The Hetton Lake drained by the channel between Flasby Fell and Rylstone Fell, into the Embsay lake, which continued eastward to the edge of the Wharfedale ice. The further drainage of that lake is part of the Wharedale system of lakes. At this stage it is probable that the Hetton valley held two lakes, as the col between Cracoe and Linton is now at 635 ft. If the two lakes were not continuous they were within a few feet of it. The Linton lake after this stage was entirely cut off from the Airedale drainage, and remained until historic time, impounded behind the lateral moraine at Linton. (XVII. century maps show the Tarn or Mere, between Linton and Swindon.)

A final stage in the Winterburn valley was reached with the Airedale ice at 650 ft. up the Calton Moor shoulder, with a drainage channel at 650 ft. at Farlands Laithe. The ice stood against Flasby Fell, entering only very slightly into the Hetton valley mouth. The Winterburn lake overflowed by a channel at 600 ft. O.D. (near the line of the road from Hetton to Winterburn), into a lake of larger size, in the Flasby valley.

The drainage of the Flasby (Stage IV.) lake was along the south flank of Flasby Fell, two channels remaining at 550 ft. and 530 ft. O.D., near Thorlby village, and a further line of channel at 520 ft. O.D., across the Tarn Moor, to the north end of the deep gorge of the Eller Beck, behind Skipton Castle. The upper part of this gorge was the end of this channel, delivering the water into a small Embsay lake, not continuous at this stage with a small lake in the Draughton end of the valley, held up by the Wharfedale ice. This Embsay lake received much drainage from the high fells of Rylstone and Embsay, and the slopes of Flasby Fell, as well as the Airedale lateral drainage. This lake was finally drained by the retreat of the ice from the edge of the Old Park, and escape of the water across the low col towards Skipton, previously blocked by ice. This escape of the water from Embsay valley became established, and the splendid late glacial and post-glacial gorge of Ellerbeck, through the Castle Woods, was initiated. The delta of this stream, in the edge of the post-glacial lake, Skipton, has recently been revealed by borings, and shows a steep delta front of shale and limestone debris, standing out into the area of lake muds south of Skipton Station, with the laminated clays partly covering and partly intercalated with the delta material.* With further shrinkage of the ice,

* Boreholes at the new Gasworks Site. Raistrick, A., 'Post-glacial Deposits of Airedale,' *Geol. Mag.*, Vol. LXIII., pp. 555-7, 1926.

the Winterburn and Hetton valleys were left open, and the Embsay drainage continued with the cutting of the Ellerbeck gorge, while the ice melt waters were impounded to form a lake in the valley around Skipton, impounded by the terminal moraine of the Aire glacier at Connonley. One is tempted to correlate the various lake stages in the Winterburn valley with the terminal moraines of the Airedale glacier, the shrinkage of the ice after the stage IV. being linked with the Skipton lake by the Ellerbeck delta. The stages of the lakes now indicated would then correspond to the moraines at Hirst Wood, Bingley, Utley, and Connonley, the ice at the earlier retreat stages marked by the Newley and Tong Park moraines being too extensive in the upper reaches of Airedale to form lakes in the valleys of this area, but probably being responsible for the earlier Bradford to Keighley group of lakes.* A full correlation of all the glacier lakes of the Aire and Wharfe valleys has been attempted, but is not yet published.

Pig-sticking or Hog-hunting, by **Sir Robert Baden-Powell.** London : Herbert Jenkins, Ltd., 312 pp., 7/6 net. Sir Robert Baden-Powell gives a revised and enlarged edition of his previous work on the subject, with forty-two illustrations drawn by the author. The stories are exceedingly good ones, and the humorous drawings add much to their raciness.

On the Barrier Reef, by **Elliott Napier.** Australia : Angus & Robertson, 173 pp., 10/6 net. The Barrier Reef has always had a fascination for the naturalist, and here the writer gives a well-written record of the fauna and flora of the area adjoining this fine collecting district. Turtles, sharks, corals, mollusca, various species of birds, etc., all enter into the compilation of a fascinating story.

Wild-fowlers and Poachers, by **Arthur H. Patterson.** London : Methuen & Co., xiv.+284 pp., 15/- net. We are glad that our veteran correspondent, Mr. Patterson, has given a review of his half-century experiences as a naturalist and sportsman. His inimitable pen-and-ink sketches add much to the value of his very entertaining stories. The author is equally familiar with rare and common species of birds, fish, and so on.

Blue Blood in Animals, by **H. Munro Fox.** London : G. Routledge & Sons, Ltd., vii.+205 pp., 5/- net. Professor Fox's essays are written in a way which makes the naturalist think. His subjects dealt with include The Control of Sex, The Homing Instinct, Tyrian Purple, Blood Relationships, Glands and Growth, Borrowed Plumes, The Meaning of Play, Colours We Cannot Imagine, Youth and Age, Is Death Inevitable?

Fishing Ways and Wiles, by **H. E. Morritt.** London : Methuen & Co., xvii.+141 pp., 6s. net. The author is a keen sportsman, has spent much time in various British and Norwegian rivers, and gives particulars of his achievements. His book contains a narrative of his fishing holidays, and has a number of illustrations, the first being a beautifully coloured view of a fishing stream, and a second, a photograph of the author with his rod, basket and two dogs. Lake fishing, night fishing, sea-trout fishing, salmon fishing, dry-fly and wet-fly fishing, all take their turn in Mr. Morritt's book.

* Raistrick, A., ' Periodicity in the Glacial Retreat in West Yorkshire.' *Proc. Yorks. Geol. Soc.*, Vol. XXI., pp. 24-29, 1927.

MANX BIRDS.

RALPH HOWARTH.

The Chough, or as the Manx people have called it for generations ' Caag ' (pronounced Keg), is a bird of which we in Manxland are justly proud. This rare bird, with its glossy black coat and red legs and beak, is, without doubt, increasing in numbers, and, when in a suitable locality, one seldom fails to see one or two pairs. They are generally present at all seasons of the year.

On one occasion, April 15th, 1927, I watched a flock of sixteen birds for quite a long time on the slopes of Beary Mountain, above Ballig Bridge, near St. John's, which is quite three miles from the sea. This is the only time I have noticed a flock inland, though odd pairs may be seen.

The Chough is gregarious, except during the breeding season, and it is then by no means unusual frequently to see flocks of six or eight on the cliffs overlooking the sea.

The nesting sites are mostly on the coast, though one or two pairs regularly utilise inland sites, usually old and dilapidated mine buildings in remote localities. One such building a few miles from Peel was used by a pair of Choughs in 1927, and also 1928, and if not disturbed will probably continue to do so in the future. On the coast the favourite nesting place is in a dark and narrow crack or fissure in the rock, on a ledge, or in a crevice in a tidal cave.

The birds claim a right to a nesting place, for the same nest is used, presumably by the same birds, year after year, and by adding a little material to it each year the nest frequently assumes considerable dimensions. The base of the nest is usually composed of sticks of gorse or heather, afterwards finer sticks of the same material and some dried grass, and finally a lining of sheep's wool, two or three inches in thickness.

Though I have visited many nests I have not been able to get to one without the assistance of a boat, ladder or rope, any of which may be very troublesome to manipulate.

The eggs, four to six in number, are laid early in April. The earliest to come under my observation was a nest which contained five young, four or five days old, on May 2nd, 1925. Allowing 17 days for incubation the first egg must have been laid on April 5th.

On February 10th this year I had the pleasure of watching 12 Choughs disporting themselves on the grassy slopes overlooking the sea. They were most of the time within a hundred yards away and my presence apparently did not concern them. In all the birds, there was a decidedly paler shade of red in both beak and legs than is usual in the breeding season.

1929 June 1

Raven: There are about 25 pairs of Ravens nesting in the Isle of Man, and considering its area, which is 227 square miles, the population of this rare bird is well above the average, and opportunities for observation are frequent. A walk on the hills or rocky portion of the coast is usually rewarded by the sight of one or two pairs.

Like the Chough, the Raven utilises its nesting site from year to year, and keeps other pairs at a reasonable distance.

There are very few inland cliffs in the Isle of Man, so most of the Ravens have their nests on the coast. There are, however, six or seven pairs which regularly nest inland, making use in these instances of disused slate quarries, of which there are quite a number in the Isle of Man.

These birds are very early in their nesting operations, the first eggs I saw last year being laid on March 7th, though Mr. Bell some years ago reported from the Ramsey district a nest with six eggs—the full clutch—on February 7th, which is exceptional.

The nests on the coast are usually in inaccessible positions, but sometimes those inland are easy to reach, and are therefore frequently robbed. In spite of consistent persecutions the raven will persist in returning to the old nesting place year after year.

In a certain inland slate quarry, where a pair of Ravens nest regularly, there are to be seen five old nests all built by the same pair at different times, any one of which is repaired and used when required. At this particular place I have never seen the same nest used in two consecutive years.

The farmer is prejudiced against the Raven, and frequently knocks the nest down with a long pole or stones, as he has an idea that the bird is detrimental to his stock. However, a farmer near Peel who has the Raven regularly nesting on his estate, the site being within 200 yards of his house, assures me that the Raven has never to his knowledge interfered with his stock in any way, but would always go to farms across the valley one to two miles away, where, of course, the bird was painted quite black and given a very bad name.

A female Raven shot by a farmer in the spring of 1926 came into my hands. It was a very good specimen, and is now mounted in the Manx Museum. I took careful measurements of the bird in the flesh, which were as follows: Weight, 2 lb. 12 oz.; full length, 24 in.; length of beak, $3\frac{1}{4}$ in.; tail, $9\frac{1}{2}$ in. in centre, $8\frac{1}{2}$ outside feathers, which will give some idea of the fan shape of the tail; tarsus, $2\frac{3}{4}$ in.; wing, 1st primary, $11\frac{1}{4}$ in., 2nd primary, $15\frac{3}{4}$ in., 3rd and 4th, $16\frac{3}{4}$ in. (longest), 5th, 16 in., 6th primary, 14 in.; full spread of wing, 43 in.

On March 14th of the same year (1926), I had the pleasure of seeing a Raven lay an egg in the nest. I had no 'hide,' but

was visiting the nest in the ordinary way to see how it was progressing. The position of the nest in this case enabled me to look into it from a distance of eight feet without any obstruction. The day was very foggy, but I was able to approach it carefully. I was startled to see the female bird in the nest in a semi-standing posture, and at this identical moment the bird deposited her egg. The time was 11-45 a.m.

The Carrion Crow is almost absent, there being only one or two records of pairs nesting here. It is replaced by the Hooded Crow—locally referred to as the ' grey back.' This bird is to be found along the coast, sometimes in large numbers, and isolated pairs nest here and there inland. As with the Raven, most of the Hooded Crows select disused slate quarries for their home, and only a few make use of a tree for their nest.

From the farmers' point of view the grey back is, if one may use the term, a ' holy terror ' and causes in some districts great destruction among the sheep and lambs. These birds quickly mark down a sickly sheep and will at the first opportunity—which they often create—pick out its eyes, and while it is still alive proceed with fierce competition to extract tasty bits from the soft portions of the back. Similar treatment ismeted out to lambs, and if the watching farmer is not actually present during the lambing period, the eyes may be picked out of the lambs as they are being born. It is thus readily understood why the Hooded Crow has earned such a bad reputation.

The ' grey back ' with us is a resident species, and is really our crow. A few instances are on record of the carrion and grey backed crow inter-breeding.

The Magpie is very plentiful. Sometimes the Magpie makes its nest in a very high tree, but this in the Isle of Man is by no means the rule. The usual place selected is a thorn hedge, and I should say the average height of the nest above the ground is ten feet. I have found nests four, six and seven feet only above the ground into which one could look without difficulty from the ground.

The Jackdaw, which aptly may be described as ' perky,' nests with us in very large numbers. It is mostly found on the coast. On the sandy cliffs it makes use of rabbit burrows for its nest, which in some cases are from four to five feet from the entrance. Where the rocks occur it builds in holes, cracks and under boulders. Some text books state that the Jackdaw is the main cause for the disappearance of the Chough. This is only too true in the Isle of Man, except that the Chough has not disappeared, but the jackdaw is its worst enemy.

Many permanent pigeon holes were made when many of the farm buildings in Manxland were built. The pushing Jackdaw has claimed these pigeon holes on many of the disused buildings as nesting places, and, when nesting inland,

seems to prefer this kind of home. On rare instances the Jackdaw will evict a starling from a hole in a tree and utilise this for her own nest.

The Jackdaw has evoked the displeasure of many a poultry keeper who asserts that he steals food intended for his stock, consequently as a form of protection the poultry keeper will frequently rob the local nests. I have seen as many as a hundred and twenty eggs taken out of a building by an irate small holder. On the coast, instances have come to my notice where farm lads have shot 200 young Jackdaws in one evening. In spite of this the Jackdaw is increasing in numbers in the Island. The Jackdaw collects a medley of nesting material; in addition to twigs, bits of string, rags and paper, a liberal lining of wool is finally added. The full clutch of five to seven eggs is usually completed during the last week in April.

The Herring Gull is the most characteristic and common of Manx birds, and occurs practically everywhere, being as familiar inland as by the sea. It is useful as a scavenger—a surface feeder, and devours large quantities of fish—swallowing whole herring and mackerel 13 or 14 in. long, also shore refuse, worms, rats, eggs and young of other birds, young rabbits, grain and potatoes! It has been accused, with a certain amount of justification, of destroying young lambs on upland sheep farms. There are thousands and thousands of these birds in the island, and the multitudes attending the fish curing station at Peel provide a wonderful spectacle, while great flocks inland follow the heels of the ploughman.

It nests in colonies which are concentrated in certain localities along the coast, sometimes nesting on a precipice, but more often on the boulders and rough slopes lower down. Strange to say there are places on the coast, which, seemingly eminently suited to the requirements of this and other birds, are entirely avoided. So noticeable is this peculiarity that such places are spoken of as 'grave yards.' Three eggs, forming a clutch, are laid early in May, and the prettily mottled young are first to be seen about the second week in June.

The eggs are collected locally for food, and I have known one family preserve more than a thousand eggs in one season, which provided them with a good supply of eggs through the winter.

The Greater Black-backed Gull, or 'parson gull' as it is called, is increasing in numbers all round the Isle of Man, though a few years ago it did not nest here. A few pairs are regularly to be seen in Peel on the foreshore, and I noticed 16 mature birds on March 6th, 1928. They nest at one or two places a little south of Peel, selecting an isolated stack which appears to be a typical breeding site, and they are usually successful in rearing their two or three young.

The Black-headed Gull, though present in fairly large

numbers during winter, does not breed here. The number seen in winter in Peel Bay is usually 70 to 100. On February 12th, 1928, 20 per cent. of these birds had attained their black hood. This year they are much later in this respect, as on February 10th only one out of 60 birds apparently had a black hood. When March arrives these birds are ready to leave for their nesting places. On March 4th last year there were 30 birds in Peel, March 11th, 20, and between this date and the 15th they took their departure. They were not seen here again until the middle of June. One bird was in Peel Harbour, June 17th; five birds on June 24th, and on June 30th there were 12 birds in Peel, after this date they were present in their usual numbers.

The Black Guillemot has six or seven nesting stations round our coast which vary in size from four or five to 25 or more pair. The local name for this pretty bird is 'sea pigeon.' These birds keep to themselves almost entirely, seem to have an aversion to the company of other species of sea birds, and are usually to be seen in company with each other, floating aimlessly about on the water, 100 yards or so from the shore, opposite their nesting place.

The wings are small, and, during flight, move with a short and very rapid motion, which gives the impression of an excited flutter, rather than normal flight. The Black Guillemots are expert divers and use their wings as well as webbed feet when swimming under the water, in which respect they are like the Puffin, Razorbill and Common Guillemot. The wings are thus used for the dual purpose of flight when in the air, and for swimming when under the water. The wing, therefore, in constructed as small as it possibly can be to support the bird in the air, and as large as it can be for propelling the bird when submerged. The wing, consequently, is relatively small, which accounts for its extremely rapid motion when in flight.

The Black Guillemot does not build a nest but lays its eggs, usually two in number, in holes or cracks in the rocks, or even under large boulders, only a short distance above high water mark. It is rather a late nesting species, and eggs are not found until the end of May or early June. The parent birds sit very tight, and may easily be caught and handled when on the eggs.

Owls: The Short-eared Owl has occasionally been seen here during the last few years, but up to the present there is no record of its breeding in the island. The Long-eared Owl is plentiful, but of other varieties we have nil. All nests of the Long-eared Owl that have come under my observation have been in old Magpies' nests in fir trees. The eggs, five or six in number, are laid in pairs and may be found early March

or even late February. The bird sits on the eggs as soon as the first is laid, and so the young are of different ages. I have known cases where the elder ones of the family, when kept too long without food, have attacked, killed and eaten their younger brother (or sister).

The Owl consumes a very large quantity of mice. I have counted more than 60 pellets (mostly mice) in an area of 2 yards square, which three days earlier was quite clean. Farmers and others do not always recognise the usefulness of this bird, and some actually look upon it as an enemy. I have found disgusting evidence of this on three occasions, when the full brood of young birds, between ten and fourteen days old, were killed, quartered and hung upon the branches of a tree, and in another case stamped into the ground by the angry foot of some misguided person.

MAMMALIA.

The Black Rat at Scarborough.—From time to time during the last forty years I have seen odd examples of the Black Rat which had been caught in the east end of the town, chiefly about the harbour side. As a rule, however, only single specimens occurred, and the species seemed to be thinly distributed, even in this stronghold. Up to about ten years ago swarms of Brown Rats lived on the piers, and no doubt kept the numbers of their smaller and weaker cousins in check. During the last three years a vigorous campaign against the rats has been waged by the Harbour Commissioners, and the results, careful records of which have been kept by Mr. F. D. Taylor, to whom I am endebted for supplying the information, seem to show that the Brown Rats have to-day almost disappeared from the piers, while the Black Rats have proportionately increased in numbers. Mr. Taylor's written record of his captures show that during 1926 thirty-eight Black Rats were captured, most of which were taken on board the fishing boats. No Brown Rats were caught during that year. During 1927 twenty-three Black Rats were taken, and a single Brown Rat was caught. During 1928 one hundred and twenty-three Black Rats were caught, and four Brown Rats. The best month's yield was thirty-six in June, and the best bag for one day was twelve, all Black Rats. Only eleven of these rats were caught on the piers, all the others were taken on board the fishing boats. The numbers of the Black Rats are no doubt kept up by importations from other seaports where the vessels call for coal and to sell their fish. This species is a much better climber than its brown relative and readily runs along the mooring ropes and so gains access to the vessels.—W. J. Clarke.

CYRTINA CARBONARIA McCOY IN THE ROTHER VALLEY DRIFT.

H. P. LEWIS, M.A., F.G.S.

In the neighbourhood of Sheffield glacial deposits are scanty. The boulders in the few patches of boulder clay and outwash gravels in the locality are largely of local origin. Erratics from the Lake District and Pennines have been recorded, but it is rarely that the Carboniferous erratics present characters sufficiently definite to enable them to be assigned to their original source.

The largest mass of typical glacial drift in the North Derbyshire Coalfield occurs five miles south-east of Sheffield, and immediately south of Beighton. It occupies a ridge between 200 and 250 feet high on the western side of the valley of the Rother, and, as mapped, covers an area about half a mile long by a quarter of a mile in maximum width.*

In the Geological Survey Memoir on the North Derbyshire Coalfield (1913, p. 104), the following description is given of this drift deposit as it is exposed in the sand-pit about one mile south of Beighton on the Eckington road. 'At the N. end of the pit the drift consists of 35 feet of contorted stratified sand with lenticles of coarse gravel and streaks of coaly detritus. Pebbles of local rocks—Coal Measure sandstone and shales—form the bulk of the gravels, but with these some quartzites from the Bunter are included. On the S. side of the excavation the gravel bands are absent, and the more evenly-bedded sands are overlain by a red loamy and clayey deposit suggesting the former presence of a superimposed boulder clay. This bed contains a few small pebbles of igneous rocks, but here and in the coarse gravels no large erratics were found, nor were any seen within the area covered by the drift or in its vicinity.'

This description given by Dr. Walcot Gibson holds good at the present time, but it may be added that towards the northern end of the working face, pockets and lenticles of rounded boulders of sandstone and Bunter quartzite, several inches in diameter, are interstratified with the sand throughout the face. On the other hand, towards the southern end of the pit the boulders appear to be confined to a deposit rich in sandstone erratics, and containing Coal Measure ironstone and *Stigmarian* casts, which occurs at the top of the working face and attains a maximum thickness af about 12 feet.

* *Geol. Survey Sheet* 100, N.S., 1 inch.

Within the last few years another pit has been opened in the drift about 200 yards to the west of the main pit. In this the boulder beds are confined to the top three or four feet in the section, and surmount about 30 feet of sand and loam in which coaly streaks and bands, sometimes containing large fragments of coal, are common. The capping bouldery deposit rests somewhat irregularly on the sands, but tends to thicken towards the south ; the matrix is composed of a somewhat clayey sand. There is little doubt that this bed is continuous with the thick bed of boulders in the larger pit to the east.

On visiting the large pit some years ago the writer discovered the posterior portion of the ventral valve of a silicified brachiopod in one of the lenticles of coarse sand a few feet from the base of the working face. When the infilling sand was removed the internal structure of the shell was found to have been preserved, and to consist of converging dental lamellæ supported on a median septum in the manner typical of the genus *Cyrtina*. In addition the shell is punctate, and enough of it remains to enable it to be identified in size, curvature of the umbonal region, external ribbing, etc., with *Cyrtina carbonaria* McCoy, the sub-zonal fossil of the *Cyrtina carbonaria* sub-zone of the Carboniferous Limestone of the North-west Province. This fossil has not, to my knowledge, been recorded from the Carboniferous Limestone of Derbyshire, and must therefore be of northern origin.

To the east of Shap the *Cyrtina carbonaria* band is well developed and is finely exposed near the top of Ashfell Edge, where numerous silicified specimens of the sub-zonal fossil are weathered out on the surface of the limestone. Most of these show good preservation of the internal structure. According to Prof. E. J. Garwood, *C. carbonaria* becomes far less common, and in places may even be unrepresented in the *Productus* zone of the Carboniferous Limestone of West Yorkshire. The *C. carbonaria* band also appears to be absent in the Craven Lowlands. It is therefore highly probable that the Beighton-derived fossil originally formed part of the material which was removed from Ravenstonedale by the ice which later became incorporated in the Vale of York glacier.

Some of the Beighton material seems to have come originally from a more southerly Pennine source. Mr. W. H. Wilcockson some years ago collected a pebble of greenish felspathic grit from the Beighton gravel in the large pit. On slicing, this proved to consist of angular quartz grains with may fresh grains of acid plagioclase felspar, set in a finer grained siliceous matrix containing green and almost isotropic chlorite in streaks, patches and isolated grains.

In fact, the grit strongly resembles the arkoses of the Ingletonian Series described by Dr. R. H. Rastall,* and has probably been derived from the Ingleton district.

BIRDS.

Tufted Ducks as Ice-breakers.—On Ilkley Tarn for some time, among other waterfowl, there have been three pinioned birds of this species—two drakes and a duck. As they are continuously diving, they are a source of much interest and amusement, more especially to the children. But from February 10th for six weeks, when the Tarn was frozen over, and on many days was crowded with skaters, they had a bad time, and had to confine themselves to a few square yards of water kept open for them. The other ducks, among which were several Muscovies, being surface feeders, were contented to remain on the island; but the three Tufted Ducks preferred their few yards of open water, and being closely jostled with skaters, dogs, etc., appeared to be very miserable and nervous. At about 4-45 p.m. on March 24th, when the ice was thawing, and when most of the people had left for home, I saw the Tufted Ducks, no doubt tired of their confined quarters, commence diving under the ice in various directions, and heaving it up with their shoulders, or upper parts of their backs, but never using their heads. The two drakes worked like Trojans, and usually went under for about three yards, working all the way. The precision with which they shot back and bobbed up like corks in the open water was amazing: only to take a few seconds' breath and then under the ice again. Of course any wrong turn to reach the open water would have been fatal. The duck appeared to take great interest in the work, but only went about one yard under the ice, and later swam about in the loose ice that was now floating in small particles, and she appeared occasionally to swallow a piece as she moved them about with her beak. However loose it became the drakes never attempted to put their heads through, but kept on working with their backs from below. In about a quarter of an hour they had broken up quite three yards on three sides of their enclosure—the fourth side being occupied by the island.—H. B. Booth, Ben Rhydding.

The Proceedings of the Liverpool Naturalists' Field Club for 1926-7 have recently been received. There are two presidential addresses on 'Some Roots of Plants,' and 'Sandhills,' by H. Reid, as well as the usual reports of excursions, etc. The Society is to be congratulated on being able to publish its proceedings in this admirable way.

* *Proc. Yorks. Geol. Soc.*, Vol. XVI., pp. 92-93, 1909.

In Memoriam.

FREDERICK BOYES.

We regret to record the death of an old contributor, Alderman Frederick Boyes, C.C., of Beverley, at the age of 87. 'Fred Boyes' as he was familiarly known, took a prominent part in the affairs of the Yorkshire Naturalists' Union nearly half a century ago, and the present writer always looked upon him as a naturalist whose observations were of an exceedingly sound and reliable character. In business he was a Bank

Manager, but retired many years ago, and since then has taken an active part in the affairs of the Beverley Pasture Masters, for whom he has acted as Treasurer for 50 years. He was also the oldest member of the Beverley Race Company, and for many years the present writer and he were colleagues on the Museum and Library Committee for the Beverley Corporation. When the suggestion for forming a museum for Beverley was mooted, Alderman Boyes worked hard and well for the movement, and rarely missed a meeting of the Committee. He placed many valuable examples of locally killed birds from his own collection in the museum, and from time to time has made additions. To readers of *The Naturalist* his

name is familiar as a recorder of the occurrence of rare birds and mammals, and some years ago he compiled an account of the birds of the East Riding of Yorkshire. When the Yorkshire Naturalists' Union decided to publish ' The Birds of Yorkshire,' Mr Boyes handed over the whole of his records, and was of considerable assistance to the present writer, who had the privilege of seeing the work through the press ; Fred Boyes, with Mr. Riley Fortune, being co-editors with the late T. H. Nelson. That handsome work of two thick volumes is still one of the most important records of a county avi-fauna in existence.

Fred Boyes was a keen sportsman, an exceedingly good shot, and has often amazed his companions with the ability with which he often brought down small birds at considerable distance away by the aid of a catapult. He was well-known in local horticultural circles, and had a more than local reputation as a grower of roses. Bee-keeping was another of his hobbies, and few people were more successful in its pursuit.—T. S.

Y.N.U. : COMMITTEE OF SUGGESTIONS.

RIVERS INVESTIGATION.

A MEETING was held on December 3rd, at the University, Leeds, to receive the report of the work which has been done, and to consider questions of publication and future operations. This reconsideration of the position is in a great measure due to the loss the Sub-committee has sustained by the appointment of Prof. Percival to a post in New Zealand.

Prof. Percival, in presenting the report of the work done by him and Mr. H. Whitehead, stated that it dealt with the organisms taken in 54 collections from three stations on the River Wharfe ; these were arranged in tables to show the varying proportions, and Mr. Whitehead promised to prepare a full notice of the work for this journal. The plankton collections made at the same time had been examined by the Rev. W. L. Schroeder, whose report showed a general agreement with the examination made and reported in this journal some years ago by Mr. R. W. Butcher.

Mr. Garner brought the analyses of the water samples which were taken on the same visits, and which had been examined by himself at the offices of the West Riding Rivers Board.

These three reports were placed in the hands of Dr. W. H. Pearsall to arrange for publication, for which he was appointed as editor.

With regard to future work, Prof. Percival said that in his opinion the most pressing need was for detailed examination of the Chirononid fauna, the larvæ of this group are one of the most important, and very little has been published with regard to their life histories.—CHRIS. A. CHEETHAM.

The February *Journal of the Ministry of Agriculture* contains the following :—' The Bardney and Brigg Beet Sugar Factories ' ; ' The Control of Apple Sawfly,' by F. R. Petherbridge and F. Tunnington ; and ' Opportunities for Students of Biology.'

NEWS FROM THE MAGAZINES, Etc.

Dr. J. H. Orton writes on ' British Oyster Fisheries,' in *Nature*, No. 3099.

R. W. Gray writes on ' The Extermination of Whales,' in *Nature*, No. 3096.

J. V. Pearman describes ' New Species of Psocoptera from Warehouses ' in *The Entomologist's Monthly Magazine* for May.

Mr. Hans Schlesch favours us with a reprint of his article on *Vertigo ronnebyensis* Westerlund, neu fur Danemark, from *Archiv für Molluskenkunde*.

A well illustrated description of the Armstrong College Mining Department, by J. T. Whetton, appears in *The Colliery Guardian* for May 10th.

Mr. H. C. Versey, of the Leeds University, whose geological work in Yorkshire is well known, has had the degree of Doctor of Science conferred upon him by his University.

British Birds for May is largely devoted to Mr. E. M. Nicholson's ' Census of Heronries, 1928,' A. W. Boyd writes on ' Bewick's Swans in Cheshire,' and on the Black-tailed Godwit inland in the same county.

Part XVIII. of C. D. Sherborn's *Index Animalium* has been published by the Trustees of the British Museum (Natural History). It contains pages 4455 to 4690, and includes all the specific names from *o-nigrum* to *pallens*.

The *First Annual Report of the Federation of Lancashire and Cheshire Museums* contains a photograph of the members, with a report of the Exchange activities, etc. From an income of £10, there is a balance in hand of £8 7s. 1d.

John Bradley sends us his entertaining and informative programme issued by the *Haworth Ramblers*. On this occasion it deals with the visit to the Towneley Hall, Burnley. A collection of these circulars in time will be exceedingly valuable on account of the care with which they have been prepared. The Haworth Ramblers are lucky in having John Bradley.

The Journal of The Imperial Fisheries Institute, Japan, for February contains the following :—' On the Detection of Fish-groups by an Acoustic Method,' by Kinosuke Kimura ; A Study on Brine Freezing of Fishes,' by Mituyp Okada ; ' On the Action of Electric Current on Fishes,' by Mituyo Okada ; and ' On the Movement of a Fish-group,' by M. Tauti and K. Miyosi.

Among the contents of *The Vasculum* for May are ' Graft-Hybrids,' by K. B. Blackburn ; ' The Vegetation of Hell Kettles,' by J. B. Nicholson ; ' The Biology of Spiders,' by J. E. Hull ; ' The Saddle Rock,' by J. A. Smythe ; ' What is the Tortoiseshell Butterfly of Wallis ? ' by J. W. Heslop Harrison ; and ' The Spring Arrival of the Fulmar on the Northumberland and Durham Coasts,' by C. Noble Rollin.

For the price of one shilling, the British Museum (Natural History) has issued a pamphlet containing 5 illustrations, in colour (Set E.53) showing ' Life Histories of British Butterflies,' and deals with the Clouded Yellow, Comma, Purple Emperor, Grayling and Holly Blue. The drawings have been specially prepared from life by Mr. F. W. Frohawk, and are accompanied by descriptive letterpress, occupying seven pages. A similar handbook has also been issued dealing with the Life Histories of British Moths (Set E.54), the five illustration again being the work of Mr. Frohawk, and represent Lime Hawk Moth, Jersey Tiger, Emperor, Oak Beauty, and Large Emerald.

YORKSHIRE NATURALISTS' UNION.

FRESHWATER BIOLOGY COMMITTEE.

An Excursion to **Askham Bog, York,** will be held on **Saturday, June 15th.**

Train dep. Huddersfield 7-47 a.m.
,, ,, Leeds 8-55 ,,
,, arr. York 9-30 ,,

The party will assemble at the Tramway Waiting Room, opposite York Station, at 9-40 a.m. Tea at Terry's Café, 4-30 p.m.

Return train—Dep. York 7-0 p.m. and 8-8 p.m.

A Committee Meeting will be held after tea.

BLODWEN FOX, *Convener.*

ENTOMOLOGICAL AND PLANT GALL SECTIONS.

Excursion to Sandburn Moor and Woods, near Strensall.

Saturday, June 22nd. Members will meet at the 'bus stand, Piccadilly, York, and take a Malton 'bus at 10-30 a.m. to Sandhutton Lane end.

W. D. HINCKS,
Hon. Sec.

Printed by A. BROWN & SONS, Ltd., 40 George Street, Hull, and published by A. BROWN & SONS, Ltd., at 5 Farringdon Avenue, in the City of London.
June, 1929.

JULY 1929.

No. 870
No. 644 of current Series

THE NATURALIST.

A MONTHLY ILLUSTRATED JOURNAL

PRINCIPALLY FOR THE NORTH OF ENGLAND.

EDITED BY

THOMAS SHEPPARD, M.Sc., F.G.S.,
F.S.A.(Scot.), F.R.A.I., M.B.O.U.,
The Museums, Hull;

and T. W. WOODHEAD, Ph.D., M.Sc., F.L.S.,
Tolson Memorial Museum, Huddersfield,

WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF

JOHN W. TAYLOR, M.Sc. RILEY FORTUNE, F.Z.S.

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NOTES AND COMMENTS.

DARWIN'S HOME.

On Friday, June 7th, the writer was privileged to be present at a ceremony which was witnessed by many of the world's leading scientific men and representatives from British and foreign scientific societies as far apart as Japan and America.

This was the occasion of the handing over to the public, through the British Association for the Advancement of Science, of Down House, where Darwin lived and worked.

The visitors for the most part were conveyed by motor-cars from Burlington House, where are the Association's rooms, and passed through a glorious country, the innumerable blossoms, and the trees and vegetation generally, being at their best.

Down House, a typical Georgian building, with lawns, gardens, and many fine old trees, has, through the generosity of Mr. George Buxton Browne, a member of a well known Yorkshire family, been preserved for all time ; as well as the estate upon which they stand. It will be remembered that at the Leeds meeting of the British Association, Sir Arthur Keith, then the President, made an appeal that this property should be saved. The appeal was met by Mr. Buxton Browne, and few know the enormous financial responsibility he then took. The house was in a ruinous condition, and has probably cost much more adequately to restore it than it would have done had it been entirely rebuilt. Not only has the place been put as it was when Darwin lived there, but the donor has filled it with a wealth of furniture and pictures, all of the correct period, such as could only have been done by an expert with a thorough knowledge of what is best, combined with an illimitable cheque-book !

In addition, much of the actual furniture, the pictures, scientific apparatus, etc., which were originally in the house, have been returned by members of the Darwin family, many of whom were present. Others have given portraits, busts, books, or other personal relics. At the meeting valuable gifts were announced from America.

In addition to having a shrine in which the memory of one of the greatest scientists who ever lived should be revered, it is intended that the building should assist in some practical way from a scientific point of view, though in what direction has not yet been decided. It was announced that, for the present, it would be the residence of the Secretary of the Association, and there were few among the many present who did not envy Mr. O. J. R. Howarth on his good fortune.

Besides the modest, but handsome, speech, in which Mr. Buxton Browne handed the gift to the public, addresses were given by Prof. W. Bragg, Sir Arthur Keith, and delegates from America and France. Every word could be heard, by each speaker, in any part of the grounds, by the aid of the finest amplifier most of us have ever heard.

SUESS.

On May 28th an interesting ceremony took place at 4 Duncan Terrace, Islington, London, N.1. This was the unveiling of a tablet recording the fact that Edward Suess, the late Austrian geologist, was born there in 1831. The ceremony was performed by His Excellency Baron Georg Franckenstein, the Austrian Minister, and among the speakers were the President of the Geological Society, Professor J. W. Gregory ; the Vice-President of the Geographical Society, the Right Honourable Sir Maurice de Bunsen, G.C.M.G., G.C.V.O., Dr. F. A. Bather, representing the Royal Society, Sir Arthur Smith Woodward, Foreign Secretary of the Geological Society, and Professor W. J. Sollas (whose daughter, Miss Hertha Sollas, translated Suess's well-known work on ' The Face of the Earth.'). The arrangements for the ceremony were made by the Honorary Secretaries of the Geological Society, who also acted as Treasurers for the fund (raised among the Fellows of that Society) for the erection of the plaque. The Mayor of Islington was present and expressed the hope that the memorial would long remain in position. The present writer was a privileged visitor, and must say that he has rarely heard so fine a series of addresses.

An Introduction to the Study of Ore Deposits, by **F. H. Hatch.** London : G. Allen & Unwin, 117 pp., 7/6 net. This book is based on a course of lectures given at Cambridge immediately preceding the War, though the enormous amount of research since carried on has necessitated the chapters being largely re-written. The historical summary of the theories of ore deposition, which forms the subject of the opening chapter, is based on a Presidential Address given to the Institution of Mining and Metallurgy in the year 1912, the additions necessary to bring it up to date having been made. There are several maps and diagrams.

The Pagans of North Borneo, by **Owen Rutter.** London : Hutchinson & Co., Ltd., 288 pp., 30/- net. This sumptuously illustrated volume deals with a part of the world all too neglected by students of ethnography, and the author's residence in the district dealt with, together with his keen interest in geography and anthropology, have resulted in the production of a work which is not only of considerable value to students, but makes very fascinating reading to those who are not necessarily particularly versed in the sciences. A large series of full-page illustrations from photographs graphically refer to the points he discusses, and views of the natives, their houses, graves, pottery, traps, utensils, etc., make the book a museum of information. Collectors will find much of service in it. We should like to congratulate the publishers on their splendid share in the work.

THE MINING INDUSTRY IN THE HUDDERSFIELD DISTRICT.

D. A. WRAY, Ph.D., M.Sc., F.G.S.

§ Introductory.

The comparatively modern town of Huddersfield lies at the confluence of the Colne and Holme valleys, and along the eastern edge of the Millstone Grit moorlands. To the east of the town, the Coal Measure series give rise to a plateau of fair altitude, with a considerably diversified surface. The town doubtless developed in the first instance primarily as a meeting place or market at the convergence of several routes leading from the hills ; though the subsequent development was very largely influenced by the presence of coal and other mineral wealth in its immediate proximity.

In regular succession, the several seams of coal and fireclay crop out in the hills to the east of the town ; and in the past they have been extensively worked. Rather more than half a century ago Huddersfield occupied a relatively important position in the coal industry. At the present day all the more profitable seams of coal have been worked out, and the centres of the industry have consequently gradually progressed eastwards. The history of the development of the mining industry from the earliest times onwards constitutes an interesting story, and may well serve as an illustration of the vicissitudes that have more or less overtaken the whole group of towns lying along the western fringe of the coalfield.

§ Mining in Roman Times.

Coal, fireclay and ironstone all occur in some abundance in the district ; and although coal would appear to be relatively the most important, it was the last mineral of the three to be exploited. In mediæval and earlier times, the local woods sufficed for all requirements of fuel, and consequently the need for coal as such did not arise. Although there seems very little doubt that even the Romans occasionally worked coal at a few places in this country, its use to any extent prior to the thirteenth century appears to have been very limited and circumscribed.

The earliest mining records of which we have any clear evidence in the Huddersfield district is of the working of the Hard Bed Band or 36-Yards fireclay by the Romans in Grimescar Wood, two miles north-west of the town. This valuable bed of fireclay has been mined in many places around Huddersfield, and is being extensively worked at the

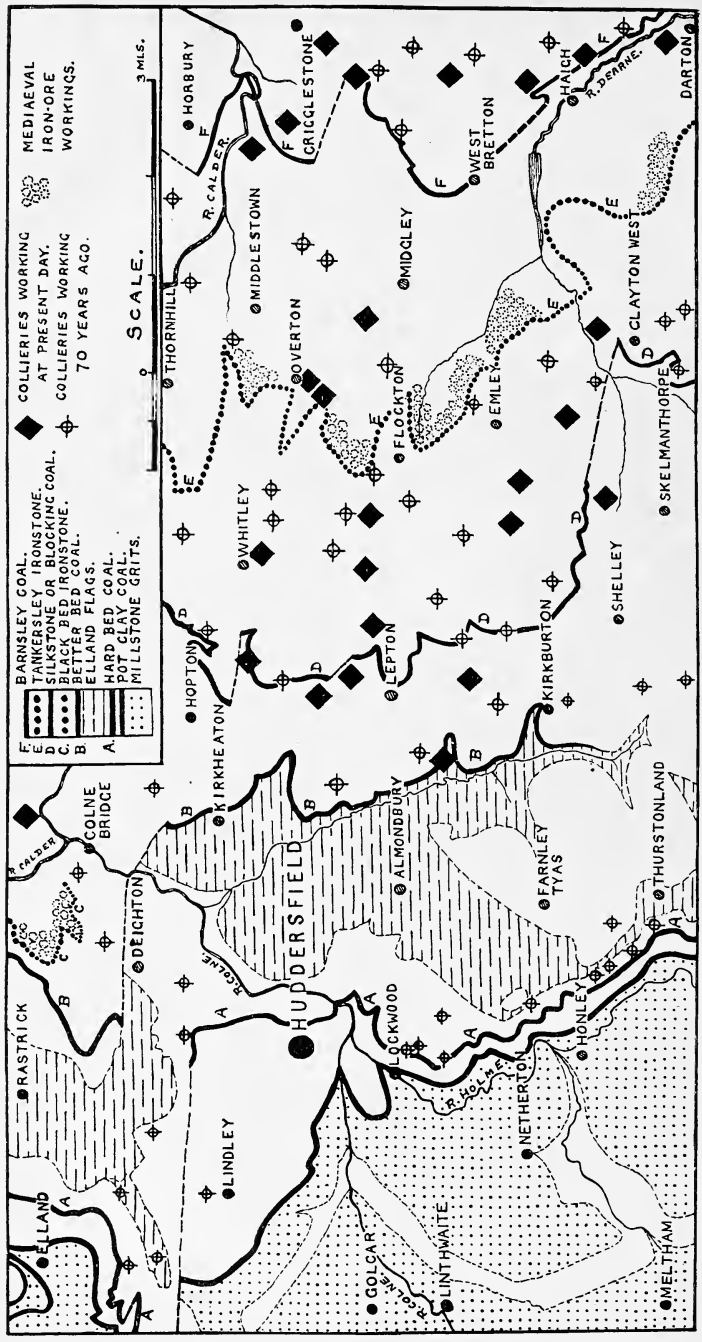


FIG. 1.—Sketch-map showing the outcrop of the principal seams of Coal and Ironstone in the Huddersfield district.

present day in the Elland district. The Roman workings at Grimescar were discovered in the sixteenth century, and a quaint description of the primitive form of tile kiln employed is given in a diary preserved among the Dodsworth Manuscripts in the Bodleian Library at Oxford.* It consisted of a small walled pit carefully arranged in connexion with a furnace, and associated with it were burnt cinders, fragmentary pottery and tiles ; the latter bearing a distinctive stamp. A large number of these stamped tiles have been discovered in the Roman camp at Slack, three miles west of Grimescar, and are now preserved in the Tolson Memorial Museum at Huddersfield (fig. 2).

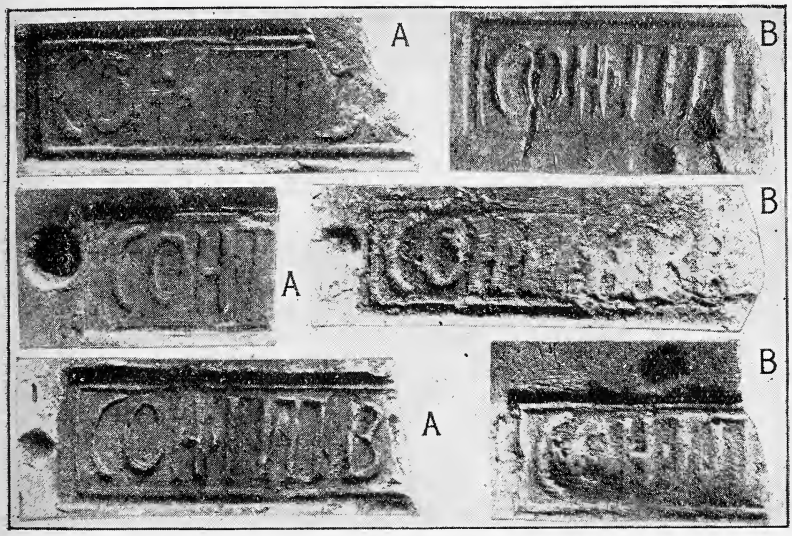


Fig. 2.—**Roman Tile Stamps from Grimescar Wood Kilns.**
The stamps are of two sizes, A and B. The holes are finger marks.

Beyond this isolated record nothing is known of any mining activity for several centuries. Thus in the great and detailed survey made in Norman times for Domesday Book there is no mention whatever of coal or other minerals. The present area, however, with the exception of the settlements at Orberie (Horbury), Crigestone (Crigglestone), and Osleset (Ossett) was within the confines of that devastated area laid waste by William the Conqueror in 1069 in reprisal for rebellion ; and the ancient records clearly show the great depreciation in value suffered by this district as a result of that devastation.

* Richmond, I. A., 'Huddersfield in Roman Times.' Tolson Museum Publications, No. IV., Huddersfield, 1925, p. 58.

§ Mediæval Ironstone Mining.

In the twelfth century there are many evidences of recovery, and the earliest documentary evidence of any mining or smelting in this area, or indeed within the whole county, relates to the ventures of the various religious houses. Wood and peat were still being used as fuel, for coal is never alluded to ; while the mineral that first attracted attention was the bedded clay ironstone which occurs at several horizons in the Coal Measures of the district. Of these by far the most important is the so-called Tankersley Ironstone, the outcrop of which can readily be traced southwards from Thornhill past Overton, Flockton, and Emley to High Hoyland and Cawthorne. Less important horizons which were also worked in the Middle Ages were the bands of nodular ironstone which occur in the shales overlying the Halifax Hard Bed Coal, and also above the 36-Yards coal and fireclay. The highly important seam of ironstone known in the Low Moor district as the Black Bed ironstone covers a small area between Rastrick and Colnebridge. South of these places it dies away and is replaced by a bed of sandstone. Similarly the Claywood Ironstone which occurs in the shales above the Silkstone Coal in the Sheffield district, and was formerly there of economic importance is practically unrepresented. Ironstone nodules do occur sporadically on this horizon in places, but they have never been worked in this district for iron-ore.

The Tankersley Ironstone usually occurs at a distance of from ten to twenty-five feet above the Flockton Coal, and it has been worked in many places along its outcrop from the neighbourhood of Ardsley as far south as Sheffield. Its thickness is very variable, being on an average about one foot, in three distinct bands ; and occurring in about six feet of shale. The yield is stated to have been from 2,000 to 3,400 tons per acre.* It is generally so crowded with *Carbonicola* shell casts as to be familiarly known as ' Mussel Shell Ironstone.' No published analyses appear to be in existence, but owing to the abundance of shell casts it probably has a high lime content.

As far as the meagre records are available it would appear that the working of ironstone by the monasteries and religious orders began about the twelfth century ; but it is by no means certain that the monks were introducing an entirely new industry into the district. Such a conclusion is simply based on the entire absence of any record of activities on the part of the lay landowners. In the first place the iron-ore was mined by the religious houses for use in their own

* ' The Iron Ores of Great Britain,' Part I., *Memoirs of the Geological Survey of Great Britain*, 1856, p. 36.

establishments ; they held extensive agricultural estates, and the sale of iron subsequently resulted from their enterprising developments. In the middle of the twelfth century iron-ore was being extensively mined in this district by the monks from Fountains, Rievaulx, and Byland Abbeys. The Cistercian monastery of Rievaulx dates from 1131, and within twenty-five years of its foundation the monks were working the Tankersley Ironstone at Flockton. From the Chartularies or ancient records of Rievaulx Abbey, we learn that Adam Fitz-Piers among other bequests to the monastery, granted fifteen acres of land in a place known as Blakeker so that the brethren might erect a forge for the making of iron, and forging therefrom the many implements necessary for the monastic house.* The exact site of Blakeker is uncertain, but it is further recorded that the bequest included all the iron-ore, and also the dead-wood necessary for the making of charcoal in Shitlington and Flockton, so that the site of the ancient bloomery was probably quite close to the modern village of Overton.

The Byland Abbey monks on the other hand were already working somewhat extensively along the outcrop or basset edge of the Tankersley Ironstone at Emley, and in the latter half of the twelfth century Jordan de Flockton granted to them wayleave from Denby to Bentley, where their forge was situate. Bentley is one mile east of Emley, while Denby lies two miles to the north, and it would thus be necessary to cross the concession already held by Rievaulx Abbey. Thus while the industry was still in its infancy the two religious houses found themselves in active competition, and in 1171 it became necessary to draft an agreement as to their respective spheres of operations. Under this arrangement the Byland Abbey monks were to enjoy exclusive rights both as to ore and charcoal in Emley, Bretton, and that part of Shitlington now known as Midgley ; while their brethren from Rievaulx were to retain similar rights in Flockton, Hreprouda, and those portions of the ancient parish of Shitlington now known as Overton and Middlestown.

The land around Emley at this period was in the possession of the Fitzwilliam family ; the Fitzwilliams of Emley being descendants of William Fitz-Godric, cousin to King Edward the Confessor. In 1217 Sir William Fitz-William, described under his seal as ' Domini de Emmalaia,' leased a further extensive area for the purpose of mining iron-ore between Bentley Grange and Emley to the monks of Byland Abbey.

* Vellacott, C. H., in ' Mediæval Mining and Smelting.' *Victoria County History of Yorkshire*, London, 1912, Vol. II., gives a very comprehensive list of bibliographical references.

Mediæval Ironstone Workings at Bentley Grange, Emley.

FIG. 3.

Overgrown ironstone pit mounds, the central sunken portion representing site of former shaft. Bentley Grange, the centre of the iron-ore industry in monastic times lies to the extreme left.

FIG. 4.

A group of disused and overgrown ironstone bell pits at Bentley Springs, Emley. Originally worked by the monks of Byland Abbey.

Photos, W. H. Sikes.

The ironstone worked by the monks of Fountains Abbey came from several lower geological horizons. At Colnebridge the Black Bed Ironstone was mined, while at Ainleys, to the south of Elland the ironstone worked occurred as irregular bands in the shales overlying the Halifax Hard Bed and 36-Yard coals. It is also recorded that the monks of Fountains Abbey possessed a forge in the vicinity of Colnebridge and that ' Ralf Fitz Nicholas of Cridling, gave them in his wood at Bradley all the deadwood required for their smelting, and for charcoal, and whatever iron-ore they could find.'*

§ Primitive Methods of Mining.

The usual method of mining the iron-ore was to sink shallow pits close to the outcrop and then remove the mineral from the base of the shaft ; the process being continued laterally by undercutting the sides as far as was practicable with safety. When the roof began to fall in to any dangerous extent the working was abandoned, and another begun a short distance away. Around Emley and Kexbrough these shafts or bell-pits were on an average forty to fifty yards apart ; and they extended to a distance of from five hundred to eight hundred yards from the outcrop of the bed of ironstone. (Figs. 3 and 4).

The smelting of the iron-ore was also originally carried out in a very primitive manner. Wood, which was doubtless plentiful locally, was employed exclusively for fuel. The present area, even to-day, is comparatively well-wooded despite the close proximity of large industrial centres. The ancient records, however, clearly show that the extensive depredations made on the local woodlands became in time a frequent source of complaint, and numerous agreements made in the fourteenth century clearly defining what timber should be taken bear witness to a rigour which was not exercised two centuries previously.

In the earliest type of furnace constructed it is improbable that an artificial blast would be regularly employed. The bloomeries, as they were termed, were placed in elevated positions or in such situations as full advantage could be taken of the prevalent winds. Later no doubt improvements would be introduced, though precise technical details are singularly lacking in the ancient records. The employment of water-power when the furnaces were built near the streams was a much later development.

The ironstone industry in this district appears to have reached its fullest development in the thirteenth century, and

* Chartularies of Fountains Abbey. Full references given by Mr. C. H. Vellacott in his article quoted above.

to have gradually fallen away later. The fourteenth and fifteenth centuries witnessed the development of a new industry, that of coal mining ; while the iron forges decreased in number ; and at the dissolution of the monasteries in the following century the iron industry had almost completely disappeared.

An interesting and isolated record, however, of the working of the Tankersley Ironstone not far from the vicinity of Bentley Grange is contained in some correspondence belonging to the Wortley family and dating from the end of the sixteenth century. It is here recorded that ' the River Dearne riseth at a place called Grange Ashe, cometh to Flockton, then to Midgley-Banke Smythies ; being ironworks belonging to Sir Francis Wortley.' The Wortley family, it may be mentioned, were connected for centuries with the iron industry in the Rotherham district. Not long after, in 1624, these workings had fallen into disuse, and since that time no ironstone has been worked.

§ Coal Mining in Mediæval Times.

The earliest mention of the digging and employment of coal as a fuel in Britain occurs in the records of the early part of the thirteenth century, and refers to the Northumberland and Durham coalfield. There are also further evidences that within the same century coal was being shipped from Newcastle to London and various other parts of the country. Thus the first allusion to coal in Yorkshire invariably refers to it as ' sea-coal.' Before any developments took place in Yorkshire, the Newcastle district was being somewhat extensively exploited, and in these early operations the monastic houses played a leading part. At the beginning of the fourteenth century coal was being employed for domestic and other purposes in London. The pollution of the city air, however, led to numerous complaints against the innovation ; and in 1306 King Edward I., in response to a petition from Parliament, prohibited its use as fuel. This proved but a temporary check, although for the next two or three hundred years the gentry in London looked upon ' sea coal ' as an objectionable and highly inferior fuel to wood.

The earliest references to the coal mining industry in Yorkshire are to be found in legal documents of the fourteenth century. Other records belonging to that period also occasionally contain casual references ; the first mention of the Huddersfield district appears to be that given in a Coroner's Report (P.R.O. Coroner's Report 215, m. 37), where it is recorded that a certain resident of Lepton, John Long, was accidentally killed by falling into a coal pit (colpyte) on the Monday after Ascension Day, 1357.

In its infancy coal-mining would be confined to workings along the outcrop of the coal seams, and many of the excavations would consist either of small day-eyes or of shallow bell pits sunk close to the outcrop in a manner exactly analogous to that employed in the primitive ironstone workings. The coal was at first employed by smiths and lime burners, and the monks who had at an earlier period assiduously developed the iron-ore industry took an active interest in the development of coal mining on their estates.

At the beginning of the fifteenth century the coal industry had become well established, and in the Wakefield Court Rolls under the date 1402, it is recorded that ' twelve pits of sea coals in Horbury lyghtes are sold this year to divers tenants for thirty-one shillings and sixpence.' Nevertheless much coal was still being imported through Newcastle and Hull from the Durham and Northumberland coalfields. Thus coal which was brought up the River Ouse and referred to as sea-coal was being employed for burning the lime required in the building of York Minster ; native coal appearing in the accounts for the first time in 1499. Thus in this year it is recorded that fourteen shillings was paid for twelve quarters of subterranean coals (*carbonum subterrenorum*) from the Wakefield district.

§ Sixteenth Century Developments.

References to ancient coal-workings now begin to be more numerous, and in the sixteenth century records of the Court Leets in connexion with the Manor of Wakefield there are allusions to the digging of coal at Flockton in 1515. They were, however, as yet not very numerous in the immediate vicinity of Huddersfield. Wood was relatively abundant for use as ordinary fuel, and it was only for special purposes such as smiths or lime-burning that coal was employed. From a survey of the Manor of Almondbury, made by Edward Stanhope Esq., Surveyor, in Queen Elizabeth's reign in 1584, we learn that ' there are not any mines of cole, lead or iron within the said Manor of Almondbury, saving a cole mine of small value digged and wrought by John Lockwood or by others, by his appointments as in the right of Francis Samwell, Esqr., her Majesty's Farmer there.'* This was almost certainly a small crop working in the Hard Bed or Soft Bed coal in the Newsome district. Almondbury Manor was a very extensive one, and it is clear from the above record very little had been done up to this period to mine the numerous coal seams cropping out in a very advantageous position along the eastern slopes of the Lower Holme valley.

* Hobkirk, C. P., ' Huddersfield : Its History and Natural History.' Huddersfield, 1868, p. 135.

FIG. 5.—**Stew and Cream Pots, Lindley Moor Potteries, Salendine Nook.**

FIG. 6.—**Bowls and Pie Dishes, Lindley Moor Potteries, Salendine Nook.**

In the middle of the sixteenth century great changes took place as a consequence of the dissolution of the monasteries. All the lands owned by Byland Abbey at Denby, Flockton, Whitley and Emley were purchased by Arthur Kaye, a member of an ancient Yorkshire family, branches of which have had long associations both with Denby Grange and Woodsome ; and it has remained in the possession of their descendants to the present day. Similarly, Bentley and Bretton were granted to Richard Andrews in 1544, who had license to alienate them to the Allott family. This included Bentley Grange, the centre of an extensive iron-ore mining area, where the Allotts had for some time previously resided as the tenants of the Abbey. The land owned by Rievaulx Abbey also largely passed into the hands of the Kayes, while that formerly held by Fountains Abbey passed into the possession of the Saville family, whose descendants still own considerable portions of the original estate. Yet despite these great changes in ownership the coal industry continued to develop, while the latter half of the sixteenth century witnessed the opening out of the several beds of thick fireclay in the Elland district for the manufacture of earthenware.

One of the most interesting of these developments took place at Salendine Nook, two miles to the west of Huddersfield. Here the Rough Rock forms a prominent feature at Longwood Edge and Lindley Moor, and at Salendine Nook it is overlain by a thick bed of fireclay together with a thin coal seam. The coal, though seldom more than a few inches thick, is remarkably persistent. Known in the Bradford district as the Cottingley Crow Coal, and in the vicinity of Sheffield as the Pot Clay Coal, it appears to be a continuous seam throughout the Yorkshire coalfield. A thick bed of fireclay resting directly on the massive Rough Rock invariably underlies it, and in the Sheffield district it has been highly prized for the manufacture of refractory goods. It contains a high percentage of alumina, and in some localities strongly resembles a bauxite. At Salendine Nook it is a very pure clay and was worked for the manufacture of earthenware. These workings were originally opened out by a Scottish family of the name of Morton, who were driven from Scotland by the persecution of the Protestants about the time of the accession of Queen Elizabeth. Being potters by trade they settled down at Salendine Nook, mining the fireclay underlying the Pot Clay coal, and establishing a pottery there. These were staffed in part by their fellow-countrymen, and also in part by workmen introduced from Staffordshire. For the past three hundred years the industry has been regularly carried on by the same family, and it is still being worked by their descendants. (See figs. 5 and 6).

§ The Seventeenth and Eighteenth Centuries.

In the seventeenth century the coal industry continued to develop, one of the chief features being the increasing demand for coal for domestic purposes. The sulphurous fumes of second-rate pit coal, and much of that obtained at the outcrop had long proved a deterrent to its extended employment for domestic purposes. Though the records are meagre, there appear to have been numerous shallow pits scattered over the area. The art of boring was well known at this period, and is referred to in documents bearing the date 1633 in reference to the Halifax district. The methods of transport and haulage underground, however, appear to have been little in advance of those employed in mediæval times, the coal being drawn up and the water pumped by means of a simple windlass. The underground workings seldom extended more than fifty to sixty yards from the base of the shaft, it being found, in fact, more convenient and less expensive to sink new shafts when opening out adjoining areas.

At the beginning of the eighteenth century all the principal landowners in the district were issuing mining leases ; and there are numerous and extensive records of these in the case of the Saviles, the Kayes, the Beaumonts, and the Dartmouth family. The main colliery shafts in the Flockton, Emley and Crigglestone districts appear to have been as much as 300 feet deep at this period. Evidences of primitive methods of mining are occasionally met with in reopening these old workings, and an old wooden pump, discovered in old workings in the New Hards Coal at Speedwell Colliery, Emley Moor, which probably dates from the latter part of the eighteenth century, is preserved in the Tolson Memorial Museum, Huddersfield (fig. 7). As late as this period the methods of transport underground were equally primitive ; and the usual employment for juvenile labour consisted in 'thrusting' the tubs, or pushing them along the ground; wheeled tubs on rails being a much later innovation.

This period, however, subsequently witnessed the advent of the steam engine, and with its general employment for winding and pumping in the latter part of the eighteenth century, the coal industry grew rapidly. The demand for coal increased immensely, and with the advantage of steam to maintain a continuous blast great advances could be made in the smelting of iron with coal and eventually coke. At the end of the eighteenth century there were thirteen furnaces in blast in the West Riding of Yorkshire, including one at Colnebridge, near Huddersfield, and another at Kirkstall, near Leeds ; the remainder being in the Sheffield district. In the seventeenth century there had been a rapid development and

growth of the iron and cutlery trades at Sheffield, and although prior to that time iron-working and smelting extended as a scattered industry across West Yorkshire from Leeds to Sheffield, the latter with superior local advantages began definitely to be established as the predominant centre. The factors that primarily contributed to this result were : the proximity of a series of more important bands of easily re-

Fig. 7.—**Wooden Pump, Speedwell Colliery, Emley Moor.**

ducible iron-ore, the suitability of several beds of gritstone as grindstones, the occurrence of limestone in the adjacent hills to act as a flux, and the fact that water-power could readily be obtained from a succession of streams of steep gradient.

The isolated occurrence of an iron-works producing on an average one hundred and fifty tons of native iron annually at the village of Colnebridge in the latter part of the eighteenth century is of considerable interest. Thus while it represented the final phase of a local industry that had been carried on

intermittently for over six hundred years, the factors that contributed to its successful working were those which later led to the establishment of the Low Moor Iron Trade ; an industry which played so significant a part in the great industrial developments in the West Riding of Yorkshire in the following century.

The ironstone mined at Colnebridge was the Black Bed ironstone, and almost adjacent lies the outcrop of the Better Bed coal. This seam is remarkably free from impurities, especially sulphur, and consequently is eminently adapted for iron-smelting. The Black Bed ironstone, however, dies out to the south of here, and consequently the amount of ore available was limited, and on its removal the Colnebridge works had finally to close down. In 1796 the Low Moor Ironworks were established and commenced to mine the same bed of ironstone in the county to the north where the reserves were infinitely greater ; and utilising the pure sulphur-free Better Bed coal for smelting, they produced a product world famous for its purity.

§ Coal Mining in the Nineteenth Century.

The great industrial expansion which characterised the earlier part of the nineteenth century, and in which coal and iron played so conspicuous a part, almost certainly synchronised with the maximum development of the coal industry in this district. All the profitable seams occur at a comparatively shallow depth, and at a very gentle and regular inclination ; factors which greatly facilitated exploitation at this period.

The accompanying plan of a local colliery working (fig. 8), for which we are indebted to Mr. J. E. Armitage, admirably illustrates the various methods adopted at successive periods in the mining of the coal. The earlier method was to drive roadways locally known as bords or straightwark, into the seam, and then extract the coal over small areas as around A, leaving large rectangular pillars or panels of unworked coal to support the roof. At a later stage, however, the pillars or ' postings ' were removed as at B. This wholesale extraction of the seam, particularly in places where the workings were shallow, led to irregular surface subsidences, and as a consequence it was only in special circumstances that this method of mining was at all extensively employed.

In the earlier days of mining, the ventilation of the workings presented considerable difficulties, and it was only on the introduction of the safety lamp in the early days of the nineteenth century that extensive mining underground could be undertaken. The modern system, which is now almost universal in all large Yorkshire collieries, consists in driving

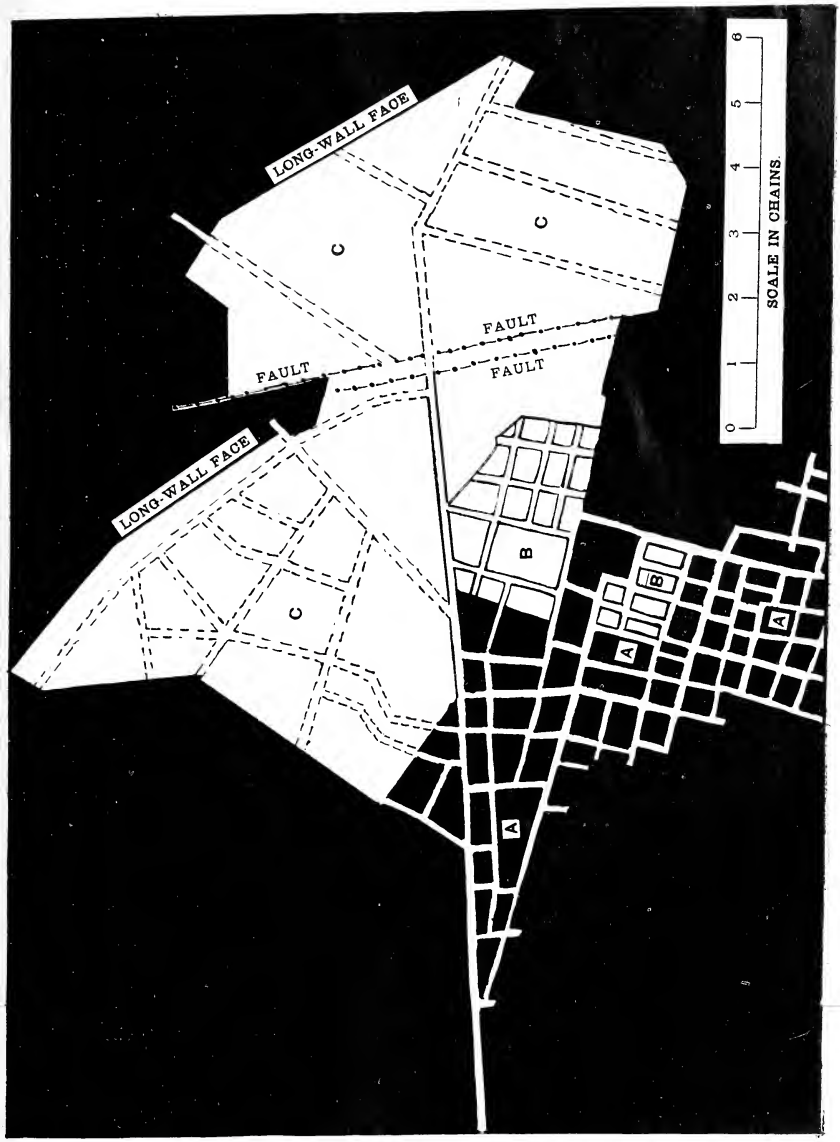


FIG. 8.—**Plan of working in the Hard Bed Coal in the Huddersfield district.**

A, 'Pillar and Stall'; B, Pillars subsequently removed; C, 'Long-wall' system. The black areas represent unworked coal.

a long straight heading in the seam, and removing the coal completely on a ' long-wall ' face as at C. The advantages of the ' long-wall ' system, in addition to the fact that it leads to more economical working, are that there is a considerable saving in timbering, while the subsidence of the overlying strata takes place more uniformly and regularly than when the coal is mined on the ' post ' system. It has, however, been found more advantageous in the present area to continue in places the ' bord and pillar ' system of working, especially where the seams lie at a comparatively shallow depth.

Excavations within recent years in the Huddersfield

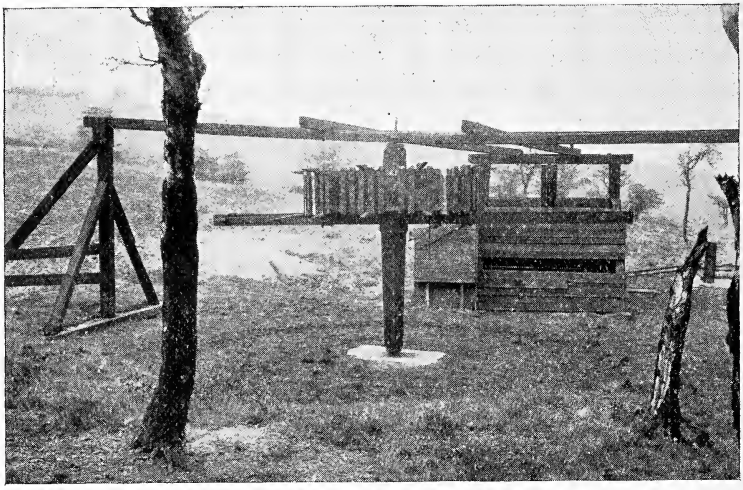


FIG. 9.—**Gin, Denby Grange, showing horse-track.**

sports grounds at Fartown revealed old workings containing upwards of thirty per cent. of the seam left in. Similar prodigality marked many of the older and shallower workings around Emley, Flockton, Grange Moor and Lepton, opened out during the coal dispute in 1925. The actual extent of the workings around Huddersfield itself at the beginning of the nineteenth century may be gauged from the fact that at least twenty pits were known to be working in the Lower Holme valley between Holmfirth and Huddersfield; while none whatever is working in this area at the present day.

An interesting relic of the methods of haulage and winding which were practised in the early part of the nineteenth century is still to be seen in the old ' gin ' (Fig. 9) at the Denby Grange Collieries, five miles to the east of Huddersfield. A long wire rope is connected to the tubs of coal to be withdrawn from the mine, and passes round a wooden drum;

the latter rotating on a stout wooden vertical axis. A horse harnessed to shafts attached to the crossbeam draws it round in a circle, the horse-track being clearly seen in the accompanying figure. This gin, which was employed both for the haulage of coal and men is still in occasional use at the present day. The methods of pumping in vogue at this period are illustrated by the pump shown in Fig. 10. The main beam of the pump can be seen to the left of the engine house. Pumping is done by a Cornish pumping engine using steam 5 lbs. per square inch, and though apparently of quite a primitive form has been found to be most economical in working, and is still

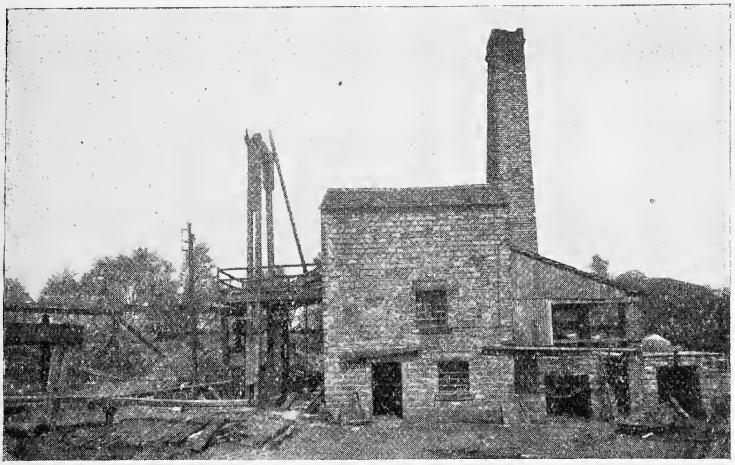


FIG. 10.—**Engine House, Denby Grange Colliery, showing gin and capstan on the left.**

in use at the present day. In the extreme left is to be seen a ' gin ' employed for the haulage of coal and miners, while in the foreground is a ' capstan ' employed for the haulage of heavier materials, such as machinery, up or down the shaft. A horse is employed in driving both.

The gin referred to above with the wire rope around the drum, and the shafts by means of which the horse was harnessed to the main driving shaft is seen in Fig. 11. It is a remarkable feature to find, in the midst of our coalfield, where every advantage is taken of modern mining equipment, and at a colliery where electrical power is utilised, these simple devices still in active use at the present time, and serving their purpose both effectively and economically.

Minor explosions due to firedamp, and often attended with fatal results, were not infrequent in the early part of the nineteenth century. The underground workings were be-

coming more extensive, and much attention was devoted to preventive measures to cope with the dangers of firedamp. Between 1840 and 1850 minor explosions took place at Lockwood and Kingsmill near Huddersfield, Briestfield and Emroyd near Middlestown, the Ainleys near Elland, and in the Holmfirth district. The total loss of life was not great, but a very high percentage of the victims were children under fourteen years of age. The only serious explosion in recent years within the present area took place in July, 1893, at the Combs Colliery, Thornhill, resulting in the loss of 139 lives.

It was largely the result of the explosions due to firedamp

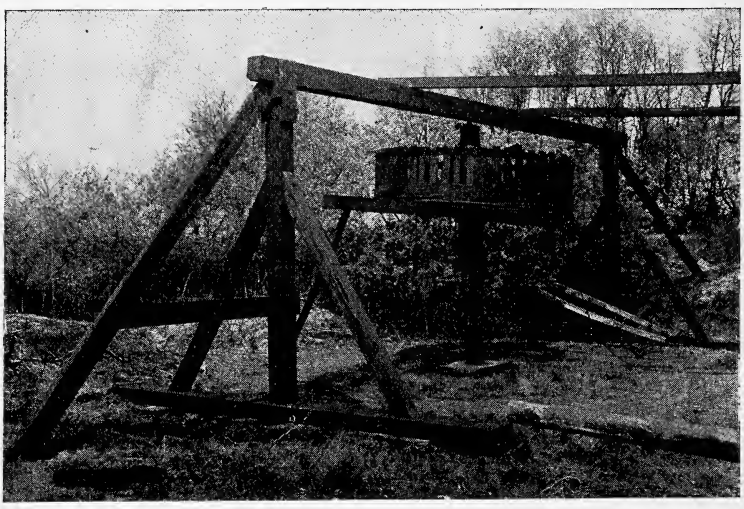


FIG. 11.—**Gin, with rope and shafts, Denby Grange Colliery.**

that diverted public attention to the subject, and in 1842 Parliament passed the necessary legislation to prohibit the employment of women and children in underground workings. Prior to that period both had been extensively employed underground, and probably the last local reference to the subject is the record of a Holmfirth coal-owner working the Hard Bed coal, who in 1844 was fined at Huddersfield for employing four girls aged respectively 12, 13, 15 and 17, as hurriers in his pits at Wooldale.

In 1850 State inspection of coal mines was instituted, and with this the compilation of more exact and reliable data as to the state and extent of the coal industry. Thus from a perusal of the Mining Records published by the Geological Survey and Museum in 1859, seventy years ago, we learn that there were no fewer than 116 separate coal pits in the

immediate vicinity of Huddersfield, Halifax, Dewsbury and Holmfirth ; while the production of coal from the same area was about one-fourth of that of whole county. At the present day the total number of working pits within the corresponding area is under forty ; as the majority of shallow seams have been worked out, and each modern colliery works over a far more extensive area.

§ Present Day Developments.

The beginning of the twentieth century witnessed a rapid development in the more eastern part of the county, and many of the large modern collieries around Doncaster date from this period. The main centres of the coal industry gravitated eastwards leaving areas such as the present one in a minor relative position.

During a protracted coal dispute, such as that of three years ago, the number of temporary workings almost certainly approached, if it did not actually exceed that of seventy years ago ; and the presence of so much vehicular transport from both near and far distant industrial centres was a faint reminder of the relatively significant position the present area occupied in the coal industry fifty years ago : at a time when the now extensive developments of deep mining in the eastern part of the county were little more than an academic proposition.

South Africa's Past in Stone and Paint, by **M. C. Burkitt.** London : Cambridge University Press, xiv.+183 pp., 12/6 net. Mr. Burkitt's work on prehistoric remains is well-known. He has just returned from an archæological tour through South Africa and Rhodesia, the expense of which has been largely met by a former pupil of the author's. The object of the book is to bring to the knowledge of Europeans the vast field for archæological research in South Africa, photographs of various sites, drawings of different types of implements, representations of cave drawings and rock sculpture, and innumerable evidences of Early Man being depicted. The famous ruins at Zimbabwe are described and illustrated.

Creation by Evolution, edited by **Francis Mason.** London : Macmillan & Co., xx.+302 pp., 21/- net. The sub-title of this work, ' A Consensus of present-day knowledge as set forth by leading authorities in non-technical language that all may understand,' indicates its scope. There is a Preface by the Editor, a Foreword by Henry Fairfield Osborn, and an Introduction by Sir Charles Scott Sherrington. Dr. D. S. Jordan writes on ' The Meaning of Evolution ' ; Professor J. A. Thomson on ' Why we must be Evolutionists ' ; Professor E. W. MacBride on ' Evolution as shown by the Advancement of the Individual Organism ' ; ' Embryology and Evolution,' by Professor E. G. Conklin ; ' The Record of the Rocks,' by Dr. F. A. Bather ; ' The Nature of Species,' by Professor J. W. Gregory ; ' The Progression of Life on Earth,' by Sir Arthur Smith Woodward ; ' Evolution of the Bee and the Beehive,' by Sir Arthur E. Shipley ; ' The Lineage of Man,' by Professor W. K. Gregory ; and ' The Evolution of the Brain,' by Dr. G. Elliott Smith ; to name only a few of the many interesting essays.

REVIEWS AND BOOK NOTICES.

Some Pathfinders of Organic Evolution, by the **Rev. Philip de Ternant.** London : Burns, Oates & Washbourne, Ltd., vii.+88 pp., 1/- net. This pamphlet contains a reprint of sixteen articles which appeared in *The London Universe*, dealing with Papal Pronouncements ; The Scope of Genesis ; God's Method of Working ; From the Fathers to Lamarck ; Lamarck : A Catholic Champion ; From Lamarck to Darwin ; and so on.

Unwritten History, Book I., The Age of Stone, by **Henry Rushton Hall.** London : T. Nelson & Sons, Ltd., 186 pp., 2/6 net. There is apparently still room for an introduction to the Stone Age, and in this book we read of Earth Changes, the Work of Rivers ; Types of Men in the Ancient World ; About Flint ; River-drift ; Cave-men ; the homes, food, crafts and bartering in the New Stone Age, and the like. There are numerous illustrations, some coloured.

Yorkshire, by **F. R. Pearson.** London : A. A. Knopf, Ltd., xvi.+173 pp., 4/6 net. This is one of the series of the Borzoi County Histories being issued under the general Editorship of S. J. Madge. The writer is the Senior History Master at Bridlington School. There is an Introduction by the Very Rev. Dean Inge, who tells us ' In later life I have often revisited my native county. I have preached in the Minster at the consecration of a bishop ; received an honorary degree at Sheffield ; made friends at Leeds and other West Riding towns ; wandered about Settle and Ingleborough, where the streams mysteriously vanish into the bowels of the earth ; walked through Wensleydale and Wharfedale ; spent a week in a village inn at Hawnby ; looked after the parish at Kirby Underdale during the vicar's absence ; and finally, this year, I have received a very warm welcome at Hull. So there is not much of the big county that I do not know something about.' The author then deals with geology, Prehistoric Man, Romans, Anglians and Danes, Normans, Mediæval Yorkshire, Tudor and Stuart periods, etc. Presumably the volume is written for those who want a general chatty survey of the history of the county, and for those it should be sufficient.

Travels and Settlements of Early Man, by **T. S. Foster.** London : Ernest Benn, Ltd., 320 pp., 21/- net. In this massive volume Mr. Foster covers a wide field. He deals with various early historic events in Great Briatin, the Eocene Dispersion, American Apes, Mental content of Migrations, Ability and Aptitude, Spanish Pictographs, Magdalenian Decadance, and innumerable other topics, ending up with Maoris of New Zealand, and a Bibliography. From his introduction we take the liberty of quoting the following, which gives an excellent idea of the author s style : ' There was in Northumbria a strong inclination on the part of the laity, both noble and simple, to forsake martial discipline for the monastic life. " What will be the end hereof, the next age will show. This is for the present the state of all Britain ; in the year since the coming of the English into Britain about 285, but in the 731st year of the incarnation of our Lord, in whose reign may the earth ever rejoice ; may Britain exult in the profession of his faith ; and may many islands be glad and sing praises in honour of his holiness." To Bede, therefore, the present suggested a hopeful outlook towards the unwritten future. To instruct posterity in the sequence of situations which had led to this general welfare appeared to him to offer the best security for its permanence and diffusion. As to the motive power, which had thus given unity to the peoples assembled in Britain, Bede had himself no doubt. Born in the year of the Council of Hertford, " the first collective act of the English race," educated in the monastery of St. Peter and St. Paul at Jarrow, where, as he remarks, he spent all the remaining time of his life, he could trace the present peace and order to no other cause than to the benevolent will of God acting through His chosen ministers of the Catholic Church. But for them the English nation would have had no existence.'

ECOLOGY OF THE BRITISH LAND MOLLUSCS.*

REV. C. E. Y. KENDALL, B.A.

THE work of the field naturalist in the past has (especially in this country) resulted in the accumulation of a vast number of records as to the occurrence, abundance, or rarity of our fauna and flora. We have a great mass of undigested facts, which have little or no practical scientific value, and do not help us to form any important generalisations bearing on problems of Biology. It is of little value to know that such and such a species has been found in a particular locality ; it may equally well occur elsewhere, if only someone takes the trouble to look for it. In fact the absence of a species is often more interesting than its presence. To quote an instance from our molluscs—*Hygromia striolata* is a species practically ubiquitous. It is hardy and a good colonizer. It has been recorded from all the Vice-Counties of England with two exceptions, viz., Leicestershire and Nottinghamshire. A few years ago the writer found it in one place in Leicestershire, and since then it has turned up in one spot in the other Vice-County. But it still remains one of the rarest molluscs in that area. Why? Evidently there is some factor at work locally, which prevents its thriving, if one could only discover what that factor is. The mere recording of a species in a locality has no scientific value, unless something more can be added. And here steps in Ecology, the assigning to a definite type of habitat a definite association of organisms of the same phylum—or of different phyla, living a well-balanced communal life under optimal conditions.

Ecological study of plant-life has been carried on for a considerable time, and the results are of great scientific value. But the methods may be equally well applied to many other groups of organisms. It seemed to a naturalist friend and the writer that the mollusca offered special advantages for these methods, for they are nearly as truly 'spot-bound' as the plants. Their feeble activities will seldom remove them far from where they start life. Their spread must be as slow or even slower than that of the flowering plants, the seeds of which may be carried far by wind. The marine biologist has his zones of life, Littoral, Laminarian, and so on ; therefore it might be possible to define somewhat similar zones on land and in fresh water. Accordingly we worked our own district and published a preliminary survey of the molluscs of that district—viz., N. Lancashire.† We soon

* Read before the Liverpool Biological Society, January 24th, 1929.

† 'On the Geographical Distribution of Mollusca in South Lonsdale,' Kendall, Dean and Rankin. *The Naturalist*, 1909, p. 314.

found that one could trace definite associations of the molluscs, and that, given definite conditions of soil and vegetation, one can forecast fairly accurately the species that will occur. We found that under some conditions one species appeared dominant, under other conditions another ; and that certain species were as characteristic of certain types of habitat as any of the plants are, or as certain marine organisms are of the various zones of life in the sea. Evidently the doctrine of the ' web of life ' applies as truly to the mollusca as to other groups ; there is the same playing their part in the struggle for existence, and in every habitat the survival of the fittest.

Since then the writer has made his observations in the field on these lines, and later on had the opportunity of thoroughly working a small inland area for a period of six years, obtaining similar results.* Here one was able to examine each locality again and again, and at all seasons of the year.

This study of the association of living organisms in little communities gives an entirely new outlook and new object in field work.

There are a number of mollusca which are not distributed generally throughout Britain. There are a few which occur only in the north, the remains of a boreal fauna. These are all of minute size, moss dwellers, and all found abundantly in Scandinavia. Then there are certain others occurring only in the south-east, incomers from the continent. Others again are confined to the south-west and western coasts. In all these cases it is probably the mean temperature and mean humidity that have limited their spread southward or northward as the case may be. In addition there are a few species of extremely circumscribed distribution, species which are apparently dying out in this country and only survive in isolated patches. But even these all have their own peculiar and well-marked types of habitat.

One can at once realize that distinct types of habitat will be occasioned by (*a*) the nature of the soil, whether calcareous or non-calcareous, whether dry or marshy, and (*b*) the nature of the habitat, whether open or wooded ; while many other factors will come into play as well.

The writer's scheme of distinguishing the various types of habitat is as follows :—

I.—COASTAL HABITATS.

(*a*) Salt Marsh ; (*b*) Sand-dunes.

(*a*) Salt Marshes are of frequent occurrence in estuaries and on low-lying coasts, and have a definite group of molluscs

* *Vide* ' The Mollusca of Oundle,' Kendall. *Journal of Conchology*, Vol. XVI., p. 240.

peculiar to them. The genus, characteristic and dominant, is *Hydrobia*, which is from a molluscan point of view the hall-mark of estuarine conditions. Locally one observes the abundance of *Hydrobia ulvæ* in the marshes of the Dee Estuary. This species is often associated with the small form of *Littorina rudis* var. *tenebrosa* Montagu, and with one or other of our only two British *Auriculidæ*, *Phytia myosotis* and *Ovatella bidentata*.

(*b*) Sand-dunes, typically developed all along low-lying shores, are usually very rich in molluscan life. This may be due to the large lime content of the sand-dunes, full as they often are of shell fragments. But one must remember that there are certain sub-genera of *Helix*, which are very tolerant of drought. *H. desertorum* for instance, thrives abundantly throughout the arid regions of Northern Africa. All the xerophile molluscs abound on the sand-dunes, viz., *Helicella virgata*, *H. caperata*, *H. itala*, and on our south-western and western coasts, *H. barbara*. *Helix nemoralis* is very commonly present in abundance, while *Pupa muscorum* and several other minute species have their home at the roots of the grasses. *H. virgata* is usually the dominant species ; and it and its congeners are the characteristic species of the sand-dune type.

II.—PASTURES.

Under this head are those tracts of grassy land, not under cultivation, such as sheep-walks, moors, marshes, and, what may be in the lowlands termed ' permanent pasture,' such as has not been turned up by the plough at all, or in any case a very long time ago. There are several distinct types of pasture :—

(*a*) Dry ; (*b*) Moist.

Also differentiated as they happen to be situated on a calcareous or on a non-calcareous soil.

(*a*) Dry Calcareous Pasture.—A typical example would be the grassy slopes of the South Downs or a permanent pasture on some form of Limestone. On such pastures the general facies of molluscan life is very similar to that of the sand-dunes, the xerophiles being again the dominant and characteristic species. One can hardly realize the abundance of molluscan life, until one has seen acres and acres of short grass on the chalk of Sussex or on the Devonian Limestones white with millions of *H. virgata*. There would appear to be some considerable competition here, as *H, itala*, *H. caperata* and *H. heripensis* are prone to appear in extensive colonies, mutually self-exclusive, while *H. virgata* often monopolizes the habitat. With them is always found the small grey slug, *Agriolimax agrestis*, which is undoubtedly a

dominant species, and though common in many other types of habitat, probably has its true place here. There also occur with them, almost invariably, *Vertigo pygmæa*, which is characteristic, *Vallonia* sps., and occasionally *Pupa secale*. Where rock faces appear, especially on the Mountain Limestone, *Helix rupestris* is a typical member of the association. The occurrence should be noted of *Hygromia revelata*, which finds its furthest limit northward in the West of England, living at the roots of grass on the dry seaward pastures on the cliff tops of the North Devon and North Cornish coasts. Also characteristic of the Dry Calcareous Pasture, but not in the association, is the small species, *Cæcilioides acicula*, which is subterranean in habit, living in the sub-soil among the grass roots, and hence not so commonly noticed as it might be.

(*a*) Dry Non-calcareous Pastures.—These are not nearly so rich in molluscan life as the Calcareous Pastures, the number of species and of individuals found for instance on the Permian Rocks being usually very small. The characteristic and dominant species is the large black slug, *Arion ater*, and with it *Agriolimax agrestis*.

Lowland heaths come under this heading with *Calluna vulgaris* (Ling) and *Ulex europæus* (Common Gorse). Here, molluscan life is very scarce ; *Arion ater* alone seems to thrive, and is certainly the characteristic species.

(*b*) 1 Wet Pasture or Marsh.—Owing to the high water content of the soil molluscan life is here very abundant. We find *Agriolimax agrestis* very plentiful, but with a rival of the same genus, *Agriolimax lævis*, which is *the* slug of very damp habitats, and the dominant, and one of the typical species. The other characteristic species of the marshlands are *Zonitoides nitidus* and the very minute *Carychium minimum*, which latter will be found on any stone or twig lying on the ground, and must exist in myriads at the roots of grasses. Another very common species in this habitat is *Vitrea crystallina*.

In a typical marsh with a very high water content and a flora consisting of the Common Rush, Cotton Grass, Bog Bean, Marestail and Peppermint, we have a very similar association. *Vertigo antivertigo* is here very plentiful, and with it occur *Agriolimax lævis*, *Z. nitidus*, *Vitrea crystallina* and *Euconulus fulvus*.

(*b*) 2, Peat Moors : Lowland or Upland, are very sparsely inhabited by molluscs. Occasionally one meets with *Arion ater* and *Agriolimax agrestis*, and, under stones, small colonies of *Vitrea alliaria*. The presence of the peat seems to be inimical to molluscan life, though even in very peaty water a few of the aquatic species seem to be able to thrive, as for instance in the ditches of the Fen Country.

(*To be continued*).

VERTEBRATE ZOOLOGY.

A MEETING of the Vertebrate Section of the Yorkshire Naturalists' Union was held in the library of the Leeds Philosophical Society, on Saturday, February 16th, Mr. R. Chislett presiding. The Sectional meeting was preceded by a meeting of the Yorkshire Wild Birds and Eggs Protection Acts Committee, Mr. Wade occupying the chair in the absence of Mr. St. Quintin.

Mr. Edmondson referred to the finding of an egg of the Song Thrush at Keighley on November 22nd, a bird being then in song.

Mr. E. W. Wade referred to a Smew shot on Hornsea Mere, on January 15th of this year, and to a very unusual form of the Great Spotted Woodpecker reported by Mr. Patterson, of Goathland : in this example the breast and under parts were bright chestnut red.

A paper was read by Mr. H. B. Booth, entitled ' British Domestic Sheep,' a full report of which will appear in *The Naturalist.*

A paper by Mr. Ralph Howarth entitled 'Some Manx Bird Notes,' was read by the Secretary, and will be found elsewhere in *The Naturalist.*

Mr. A. D. Middleton briefly referred to the work being done by the Department of Zoology and Comparative Anatomy at University Museum, Oxford, in connection with rodent cycles, and stated that the evidence so far accumulated pointed definitely to the periodicity of such cycles.

PREHISTORIC MAMMALS OF IRELAND.

A paper on the above subject was read by Mr. H. E. Forrest, in which it was stated that out of 64 living and extinct species of British Mammals (omitting the Squirrel as doubtful), exactly one half are absent from the indigenous fauna of Ireland.

Some of the absentees are remarkable, but as the conditions governing the distribution of the various species were presumably the same for all, the Mole and the Water Rat may be taken as types for investigation.

The Common Mole ranges throughout the temperate regions of Europe and Asia, and shows little geographical variation over this area ; the range in time is also very wide. It is stated to be present in Jersey, Alderney, Wight, Bute and Mull, but absent from other islands.

Fossil remains of the Water Rat are not known, but the remains of an extinct fossorial species (*Arvicola abbotti*) are abundant. Evidently the existing species is of comparatively recent origin and has not reached any of the islands except Alderney and Wight. The other Voles seem to be older members of the British Fauna, as they have colonised many of the islands, and given rise to sub species.

Before the Glacial epoch, dry land is believed to have extended from Spain and France to the South-west of Ireland, and there is evidence that a continent existed west of these lands. The Scandinavian Lemming no doubt arrived from the west, and numerous remains have been found. It is absent from Siberia, Greenland and western North America. When on these periodic migrations, Lemmings continue their progress until they plunge into the sea, and perish, and are probably instinctively making for the western country from whence their ancestors originally arrived.

Most of the Irish mammals are of northern origin. The Variable Hare, Bear, Wolf, Fox, Badger, Red Deer, Reindeer, Irish Elk, Stoat, Marten, Otter and two species of Lemming are all inhabitants of northern or temperate regions.

The Lion, Hippopotamus and Rhinoceros appear never to have reached Ireland. The Hyæna was the only southern species to do so, and doubtless arrived when Spain and France were joined to England and Southern Ireland. The northern species probably came when there was continuous land from Britain through the Orkneys, Shetlands and Faroes to Iceland, and probably Greenland and North America.

The mammalian fauna of the Isle of Man resembles that of Ireland.

There are no Voles, Moles or Weasels; the only Shrew is the Pigmy, and the Stoat is of the Irish variety. The inference appears to be that Man became separated from England at the same time as Ireland, although the sea is now very much deeper on the Irish side.

Since the Mole and Water Rat are both late Pleistocene, and both are absent from Ireland, the severance of Ireland must have occurred at least as early as this. Britain was, however, still joined to the mainland of Europe and offered no obstacle to the spread of the Mole and Water Rat.

Between these two events, the great Ice Age prevailed, and marked the dividing line between the older mammalian fauna which reached Ireland, and the later, which only reached England at its close.

In Pleistocene times dry land extended from Scotland and South Scandinavia through the Faroes to Iceland, and the whole of Western Europe stood at a much greater elevation.

At the close of the great Ice Age, the whole area of Western Europe subsided, and the lecturer believed that the subsidence was much greater to the west of Britain than towards the east. If the mountains of Ulster were originally more elevated than those of Cumberland, we can understand why the Glacier which filled the North Sea, and brought flints from Antrim, to spread them over Cheshire and Shropshire, travelled more to the east than to the west of the Isle of Man.

When the subsidence began which terminated the Glacial epoch, the whole of the land west of the Isle of Man sank a great deal more than did Britain and the continent of Europe. Man, then, became an island towards the close of the Glacial epoch, at the same time as Ireland became detached, and was not connected with England later than Ireland, as the sea-floor levels would lead one to suppose. Thus, none of the animals that reached England, after the Glacial epoch, were able to reach Man or Ireland.

Classification of Birds.

An illustrated address entitled 'Classification and Field Work' was read by Mr. R. Chislett, the President of the Section, in which the lecturer stated that the average field naturalist of to-day knew little of anatomical details, and was more concerned with external appearances and with habits.

The early ornithologists classified birds into such divisions as land birds and water birds, but to-day we have the advantage of the published works of systematists, whose energies possibly find expression more often in the laboratory than the field. The field ornithologist accepts their findings as the latest expert opinion and is not in a position to question them.

Prior to the promulgation of the Darwinian Theory, attempts to classify birds rested chiefly on external appearances and habits, and was therefore chiefly in the hands of the field naturalist. One temporarily accepted classification depended upon the theory that a classified group of animals could not be natural unless the members of the group exhibited a tendency to form a circle; the supposition being that creatures progress serially from a given point, and in the fulness of time return there again. This classification obviously rested on apparent and not real evidence of relationship.

As evolution became better understood, classification became, for the first time, something more than the expression of a fancy, as relationship had to be tested by descents from a common ancestry and structure was of first importance.

Darwin showed that superficial resemblances and differences in colour are easily produced by pigeon fanciers, but that the internal structure is much more difficult to alter, and therefore much better evidence of blood relationship.

It might seem a fairly easy matter to arrange birds in such a manner

that the various groups merge one into the other by apparently easy stages of transition, but resemblances are not real evidence of affinity at all. The Swifts were formally placed with the Swallows, and the resemblance is obviously due to adaptation to a similar environment. Structurally they differ widely and the Swifts are more nearly related to the Nightjars than to the Swallows.

The first classification of birds based on descent and blood relationship was due to Huxley, who, in 1867, recognised three great natural orders. The first, which he called the Saururae, had assigned to it one genus—that of Archeopterix—representing the oldest known form of bird life, preserved in the lithographic stone through countless ages.

Huxley's second order was that of the Ratitae, and included all the old world species that have no keel to the sternum, or breast bone, which thus resembles a raft. This order included the Ostriches, Rheas, Cassowaries, Emus, Moas and Kiwis.

The third order included all the remaining species, divided into four sub-orders and various smaller groups. This order was called the Carinatae, as the breast bones possess a keel for the attachment of the powerful flight muscles.

So numerous, and in some cases so contradictory, are the structural peculiarities which must be taken into account in classifying birds that it is not surprising that much difference of opinion has existed and that the arrangement accepted to-day may be subject to modification in the future.

The lecturer then rapidly reviewed the peculiarities of the various orders, sub-orders, families and genera, explaining in which respects the list compiled by a Committee of the British Ornithologists' Club differed from that compiled by H. F. Witherby in his ' Practical Handbook of British Birds.' A large number of lantern slides from the author's extensive collection illustrated the external appearance of many different species, and were much appreciated.

Finally, a vote of thanks was given to the lectures and the lanternist. —E. Wilfred Taylor.

F. T. Ingham writes on ' The Petrography of the Spilsby Sandstone ' in the *Proceedings of the Geologists' Association*, Vol XL., Part I.

A Bronze Age leaf-shaped sword, 23 in. long, recently found in the Isle of Man, and now in the Manx Museum, is described in *The Journal of the Manx Museum* for June.

A new publication, *The Horse*, makes its appearance. It is edited by Lieut.-Col. F. C. Hirst, of the Institute of the Horse, Ltd., 27 C Square, London W.1. It contains all sorts of material likely to interest the lovers of this animal, and can be obtained from Messrs. W. H. Smith's bookstalls.

The Seventh Annual Report of the Worthing Archæological Society has been received and contains a record of progress. The Society has a balance in hand of £100 and the Report contains a photograph of some old cottages at Tarring which are being preserved, and of a Bronze Age urn found in excavations at Blackpatch.

Dr. J. Glasspoole writes on ' Average and Extreme Seasonal Rainfall over the British Isles '; J. Bowman on ' The Consumption and Waste of Water; ' and W. T. Halcrow, G. B. Brook and R. Preston on ' The Corrosive Attack of Moorland Water on Concrete,' in *The Transactions of the Institution of Water Engineers*, Vol. XXXIII.

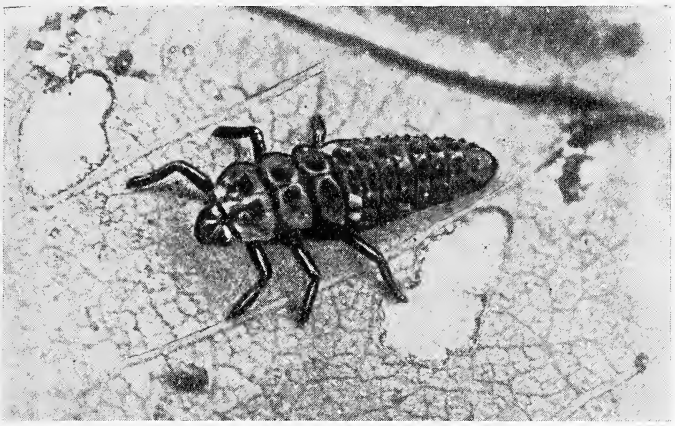
In *The Journal of the East Africa and Uganda Natural History Society*, Nos. 33-34, ' B ' gives a photograph of a hyaena, with badly mutilated feet, wihich he suggests is due to a forest fire. Had such a fire occurred the animal would certainly have had burns on its back—it would never have had all its feet burnt off without. It seems clear, therefore, that the loss of its fore-feet is due to traps.

NEW BOOKS ON BIRDS AND INSECTS.

Springtime brings the usual crop of books dealing with natural history, and, oddly enough, judging from those immediately before us, insects take a premier part, being closely followed, as seems natural, by the birds! **E. M. Nicholson** tells us **How Birds Live** (Williams & Norgate, xvi.+150 pp., 5/- net), and with the aid of coloured plates refers to the relationship of birds, their struggle for existence, the territorial system, songs of birds, migration, and other subjects, all written in an interesting manner. Appendices give 'Types of Country in Great Britain where Birds Breed,' 'Eggs destroyed in Hatching,' 'Results of Bird Marking,' and other information. Of a similar type, also with coloured illustrations, there is **How to Enjoy Birds,** by **Marcus Woodward** (London: Hodder & Stoughton, 256 pp., 2/6 net), which at first we thought might have some culinary significance, but the casserole is not even mentioned. The birds are classified according to the garden, village, hedgerow, cornfields, hills, moors, sea, marshes, etc. As with the previous volume the young naturalist is evidently catered for. A second edition of **Birds Nesting,** by **J. G. Black** (Newcastle-on-Tyne: Andrew Reid & Co., viii.+240 pp., 3/6 net), first published in 1920, indicates that, notwithstanding the teaching of nature study, and the attempts made by the bird-lover in protecting birds and their eggs, there is still a demand for books giving information as to the nesting sites, eggs, the time eggs can be collected, and so on. Each species is dealt with under suitable headings, and there are many quite good illustrations from photographs. The first words in the book indicate that there is no mistake as to the teaching of the volume, 'If you mean to collect eggs, the first thing you need is a box; and the most useful box I ever had was a tin cigarette-box (100 size) divided into compartments with strips of cardboard. Each division was lined with cotton wool, and the lid covered with the same, so that all one had to do was to open the lid, slip the egg into an empty space and shut it again, to have one's egg safely packed.' The house of Messrs. H. F. & G. Witherby still places the ornithological world under a debt of gratitude for the way in which monographs are produced, the latest county record relating to **A History of the Birds of Essex,** by **William E. Clegg** (xxxv.+342 pp., 25/- net). Here the sea border and the variety of topographical features lend themselves to a large and interesting avifauna, and of this every advantage has been taken. In addition, the author has had the privilege of seeing the manuscripts on the birds of the county in the possession of the late Miller Christy. Each succeeding historian has been helped by his predecessors, and this is clearly shown in the present work, when almost every important feature in earlier books dealing with county avifaunas is shown. A remarkable item is the bibliography, which includes over 1200 references. The illustrations are good, and there is a fine map.

Judging from the publishers' lists, it would seem that books on insects are likely to vie with those on birds for popularity. Quite a large number of valuable contributions have recently been made bearing upon insect life, and in addition to more or less technical treatises, there are several of a popular character. Messrs. Kegan Paul, Trench, Trubner & Co., Ltd., have published a new version of the ever popular **Ants, Bees and Wasps,** a Record of Observations on the Habits of the Social Hymenoptera, by **Sir John Lubbock** (xix.+377 pp., 10/6 net). This is based on the seventeenth edition, and has been edited and annotated by Dr. J. G. Myers. Besides illustrations in the text, there are coloured plates which naturalists will find useful. Our readers will be glad to hear of the re-issue of this well-known work. The importance of a thorough knowledge of insect life, and the ability to distinguish between harmful and useful insects, is being more and more recognized

by farmers, gardeners, foresters and others. The enormous variety of insects, the different forms through which they pass, and the good or harm they do to animal and plant life of all kinds is becoming a problem, so much so that it is difficult for one person to cope with it. In **Agricultural Entomology,** by **D. H. Robinson** and **S. G. Jary** (London : Duckworth, Ltd., xi.+314 pp., 15/- net), the authors have dealt with the subject as fully as we have seen it hitherto reviewed,



Larva, or 'nigger,' of Ladybird Beetle. Greatly enlarged.

and not only are the life histories of these insects dealt with, but descriptions are given of methods of control measures, poisons and so on.

We are reminded that **E. K. Pearce's** photographic atlas of **Typical Flies,** Part III. of which was noticed in our columns for February, was preceded by two volumes, both issued by the Cambridge University Press at 10/- net. The first series contained photographs of 155 species, and the second series photographs of 125 species. The three volumes together make a wonderful aid to the student of Diptera. The Professor of Entomology of the Cornell University, Ithica, **James G. Needham,** describes his new book as **Elementary Lessons on Insects** (viii.+210 pp., 9/- net), the English agents for which are Messrs. Bailliere, Tindall & Co. The volume is divided into four parts, and deals with The Principal Groups of Insects ; Injurious Insects and their Control ; Collecting, Preserving and Rearing Insects. While many of the species are unfamiliar to English readers, the book will enable them to form an idea of the insect fauna of the American continent. There are several quite good illustrations. **Notes on the Butterflies of British Honduras,** by **F. L. Davis** (The Old Royalty Book Publishers, 9 John Street, Adelphi, W.C.2., 101 pp., 6/6 net) is essentially somewhat confined in its scope, but the author, having been on medical service, has had very different experiences from those who only know collecting in the British Islands, and these he enumerates, and incidentally gives descriptions of quite a number of interesting species, the frontispiece being a coloured illustration of *Pieris viardi* (Bois) female. One aspect of insect life has been dealt with by **Dr. J. G. Myers,** who has written a substantial volume on **Insect Singers,** being a Natural History of the Cicadas (London : C. Routledge & Sons, xix.+304 pp., 21/-). Few people would have deemed it possible that a volume of over 300 closely printed pages could have been devoted to this subject, and when the songs the insects sing are set to music, the story is all the more fascinating. Some of these

are almost amusing. For instance, the notes of *Melampsalta cingulata* are described as under : ' A specimen caught by a sparrow was heard to give a series of staccato squawks while the bird was battering it on the roof of a house,' and are represented by seven semi-quavers of the same note. The record goes on : ' The song, when isolated individuals are heard, sounds rather bird-like in character, though when numbers are singing a peculiar sibilant quality is noticeable. The whole forest seems to be hissing, so that two people talking to each other—or shouting, as it had to be—accuse each other of lisping, supposedly because of an illusion by which their ' s ' sounds appear to be absorbed. The individual song begins with a long drawn-out vibrate note, sometimes lasting several minutes, and rising in pitch like the sound of a wheel as its rate of revolution increases.' The author begins with an excellent chapter on Cicadas in Mythology, Art and Literature. He then deals with the External Structure of the Cicadas ; Classification, Evolution, Sound-organs, Life-history, Distribution, etc. There is a bibliography which is as remarkable as the book, which consists of 50 pages of closely printed references to the literature on the subject.

Mr. E. W. Wade who has now retired from business and is leaving the district, has been elected an honorary Life Member of the Hull Scientific and Field Naturalists' Club, for which he has done so much.

We see from *Out-o'-Doors*, the Countryside, Footpaths and Rural England Preservation Journal for January, that Mr. L. Stanley Jast has been appointed President of the Manchester and District Ramblers' Federation, and Mrs. Nora Willington, Secretary.

The Science of Life, Part III., published by The Amalgamated Press, Ltd., at 1/3, deals with sensation and the senses, reproduction and fertilization, etc., and has a remarkable reproduction of a photograph of the human head and neck by means of the X-rays.

A further instalment of *The Natural History of Wicken Fen*, edited by Prof. J. Stanley Gardiner, has been issued by Messrs. Bowes and Bowes, of Cambridge. It contains 100 pages and deals with the Vegetation, Diptera, and Trichoptera of the Fen, the other essays being Some Modern Ecological Conceptions ; Vegetational Types of the Fen ; Agricultural Treatment of the Fen ; The ' Mixed Sedge ' and ' Litter.' There are illustrations from photographs, and this, Part V., is issued at 5/-.

Part II. of *The Geology of the Country around Wrexham* has been issued by H.M. Stationery Office (xvii.+238 pp., 5/- net). The authors are C. B. Wedd, B. Smith, and L. J. Wills, and there is a contribution by the late G. W. Lamplugh. As might be expected, the beds of the coal measures occupy the principal part of the monograph, though the Triassic, Glacial and Port-Glacial beds receive attention. Economical matters such as mineral products and water supply receive attention, and there is a valuable record of the sections passed through in various shafts and borings.

From the same source has been published *The Geology of the Country around Aldershot and Guildford* (xiv.+182 pp., 4/6 net), though in this case the memoir has been favoured with a much more substantial cover. The authors are H. G. Dines and F. H. Edmunds. The difference in the geology dealt with in this monograph as compared with the previous one is most marked, as the latter deals largely with the secondary deposits, especially the chalk and green sand. A general account of the Palæontology of the Cretaceous Series is given by Mr. C. P. Chatwin. There are numerous illustrations from photographs, and the volume is generally well produced.

Accompanying the latter memoir is a magnificent map of the Aldershot district, geologically coloured, which has explanatory sections. It is on the scale of 1 inch to the mile, and is sold at 2/-.

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July, 1929.

AUGUST 1929.

No. 871
No. 645 of current Series

THE NATURALIST.

A MONTHLY ILLUSTRATED JOURNAL

PRINCIPALLY FOR THE NORTH OF ENGLAND.

EDITED BY

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The Museums, Hull:

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Continued on page 3 of cover.

NOTES AND COMMENTS.

GLACIATION OF EDENSIDE.

At a recent meeting of the Geological Society of London, Mr. F. M. Trotter read a paper on ' The Glaciation of Eastern Edenside, the Alston Block, and the Carlisle Plain.' He stated that : ' Three glaciations separated by intervals within the glaciation have been recognised in Edenside. The ice of the First or Scottish Glaciation deployed from the Southern Uplands, swept across the Carlisle Plain, one stream continuing eastwards, the other advancing up Edenside (where it was joined by a stream from the Lake District) in a manner similar to that described by J. G. Goodchild. Exposures of the ground-moraine of this glaciation are rare, and in Eastern Edenside the moraine is in places overlaid by a series of contorted laminated clays, etc., which are interpreted as indicating the departure of the ice from Edenside. These clays are in turn overlaid by the drifts of the Second or Main Glaciation. During that period Eastern Edenside was occupied by Lake-District ice and Cross-Fell ice. Because of the presence of Scottish ice on the north and ice from Howgill and Wild Boar Fells on the south, Edenside became congested with ice. The surface-level of the ice rose to 2200 feet at least, and probably higher. An ice-shed was established in Eastern Edenside and on the Alston Block, and from it ice flowed south-eastwards into the Stainmore depression and northwards and north-westwards into the Tyne Gap area. Thus the Stainmore Glacier was fed from the north by ice from Edenside and Mickle Fell, and farther east was joined by a stream from Upper Teesdale (as proved by Dr. A. R. Dwerryhouse). The glacier in the Tyne Gap was fed by a powerful stream flowing down Edenside, and by glaciers in the valleys of the South Tyne, West Allendale, and East Allendale. On the north the Tyne Gap Glacier was confluent with eastward flowing Galloway ice.

ORDER OF EVENTS DURING THE RETREAT.

The retreat of the ice-front after the maximum of the Main Glaciation can be traced stage by stage, the following being the chief events in chronological order :—(1) Successive splitting-off, from east to west, of the East Allendale, West Allendale, and South Tyne glaciers from the ice in the Tyne Gap area ; (2) Damming-up of glacier-lakes along the western slopes of the northern end of the Cross Fell escarpment, and along the western slopes of the Bewcastle Fells, the drainage of both systems escaping into the Tyne ; (3) Recession of the Edenside Glacier from the Galloway ice ; and (4) Recession of the Cross-Fell ice from the Lake-District ice by successive splitting-off, from north to south, of six valley-glaciers of the Cross-Fell Inlier.

ÖSAR, KAMES, OUTWASH-FANS, AND OUTWASH-DELTAS.

Several öse-trains and kame-belts are recognized in the extensive deposits of outwash sand and gravel; of these the most noteworthy are the Tyne Gap öse-train, which stretches westwards from Hexham for 26 miles, and the Brampton kame-belt, which is 12 miles long and 2 to 4 miles wide. It is shown that the out-wash can be interpreted in terms of ösar, kames, outwash-fans, and outwash-deltas, and by their aid and that of overflow-channels it has been possible to plot the position of the ice-front at twenty-four distinct halt-stages in the retreat. The last glaciation of the area was the renewed advance of the Scottish ice across the Carlisle Plain, up to an altitude of 400 or 500 feet O.D. At its maximum extension, and during its retreat, this glacier dammed up glacier-lakes which drained south-westwards. Englacial or sub-glacial rivers of this glacier deposited three öse-trains.'

THE ROYAL NATURAL HISTORY.

Part XVIII. of Warne's new issue of Lydekker's *Royal Natural History* (pp. 385-568) completes the six volumes of this admirable publication. It deals with the mollusca, worms, jelly-fish, corals, sponges, rhizopods, infusorians, etc. This work contains now 3500 pages, has about 2000 illustrations, including over 60 finely-coloured plates. The work will certainly give an impetus to the study of natural history, and we should like to congratulate the publishers on their enterprise.

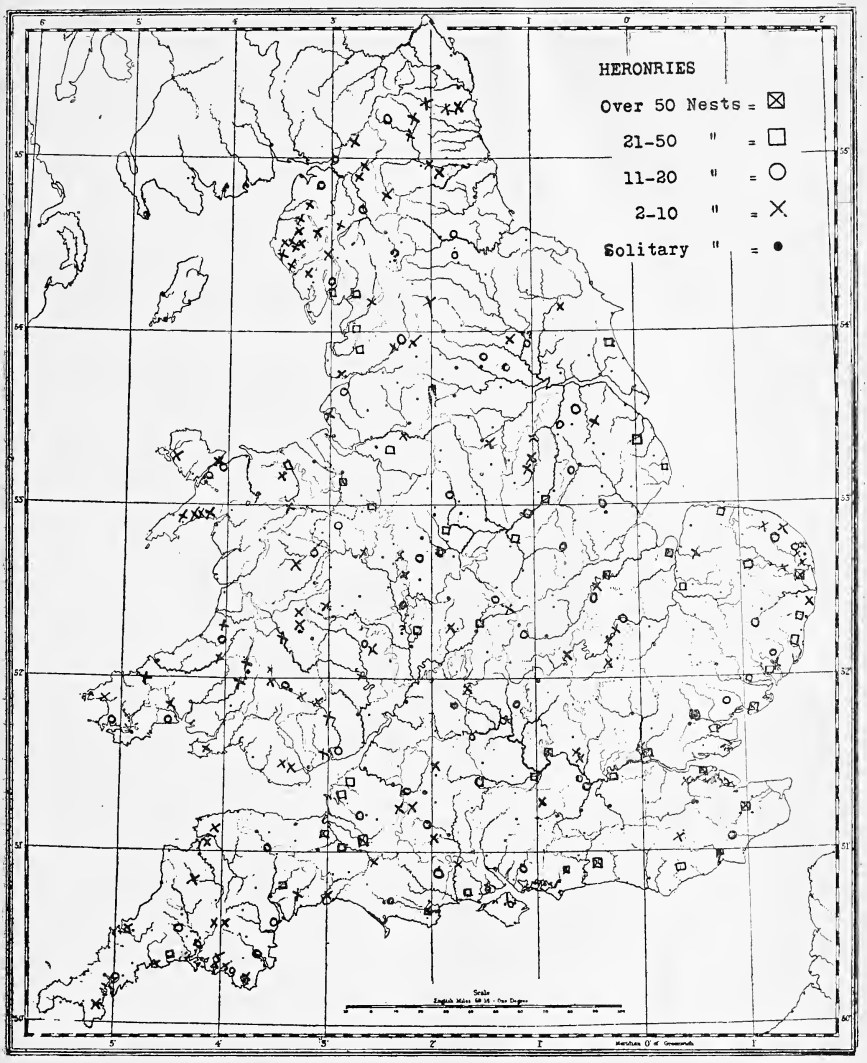
A ' RHINOCER-HORSE.'

The press informs us that ' In the Burgenland valuable antiquarian discoveries are often made. When, therefore, a large grey bone, over which a gamekeeper stumbled was pronounced by a young scientist to be part of the skeleton of a rhinoceros of the Third Ice Age, about 50,000 years old, he had no lack of volunteers to help dig in the forest, where the bone had been found. Gradually most of the skeleton was pieced together, and excitement grew. Then the oldest man in the neighbourhood told how he used to watch them bury horses thereabouts when he was a little boy. The young scientist, and two friends whom he had brought with him to share in his triumph, silently faded away.' We cannot vouch for the ancient horse in Burgenland, but a similar ' discovery ' was certainly made in East Yorkshire quite recently.

ENGLISH HERONRIES.

The valuable reports on the British Birds Census of Heronries prepared by E. M. Nicholson, which appeared in various

issues of *British Birds*, have now been reprinted and are sold by Messrs. H. G. and F. Witherby, London, at 3/6. It is



Map to show the distribution of existing Heronries in England and Wales according to their size.

astonishing what a mine of valuable information is accumulated in a report of this character, and equally astonishing to find what a large number of field naturalists have assisted. The

publishers kindly permit us to reproduce their map, showing the distribution of the heronries in England and Wales.

BRITISH WHALE FISHERY IN 1822.

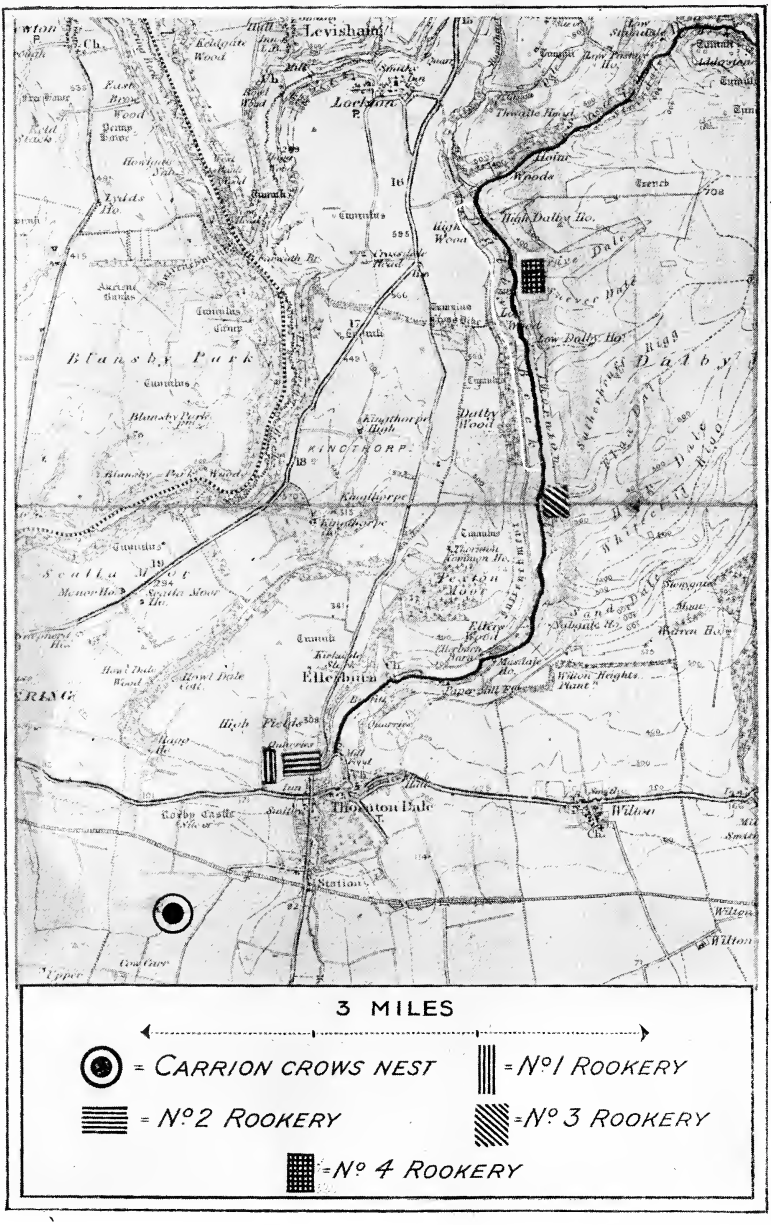
In an article on 'The History of the Whale and Seal Fisheries of the Port of Aberdeen,' James Pyper in *The Scottish Naturalist*, No. 176, gives statistics of the British Whale Fishery in 1822, printed below, which are very interesting. It gives some indication of the way in which the Northern Whale Fishery came to an abrupt ending on account of the enormous slaughter, and an Editorial in the same journal draws attention to the likelihood of similar disaster occurring in the Antarctic.

Ships.	Average Ships. 1814-17.	Port.	Tonnage.	Fish.	Tons of Oil.	Bone.	
						Tons.	Cwts.
40	$57\frac{1}{4}$	Hull	13,023	228	3,112	154	4
6	$19\frac{3}{10}$	London	1,954	29	415	18	19
10	$9\frac{3}{4}$	Whitby	3,196	31	534	17	13
4	$5\frac{3}{4}$	Newcastle	1,436	9	141	8	1
2	?	Berwick	543	3	41	1	10
5	10	Leith	1,635	23	308	16	5
4	?	Kirkcaldy	1,261	23	283	13	8
3	?	Liverpool	778	9	136	6	2
10	8	Dundee	3,291	47	648	34	1
5	$3\frac{3}{4}$	Montrose	1,668	30	428	24	0
14	$13\frac{3}{4}$	ABERDEEN	4,184	90	1,225	62	1
1	?	Greenock	316	13	155	5	10
1	?	Kirkwall	279	...	...	0	...
16	$8\frac{1}{4}$	Peterhead	4,580	95	1,237	60	14
121	...		23,144	630	8,663	422	8

THE AQUARIST.

The Spring Number of *The Aquarist and Pond-Keeper*, formerly known as *The Amateur Aquarist*, is before us, and is an excellent means of communication between those interested in ornamental ponds or natural pond life. This issue contains a large number of photographs illustrating articles on Fancy Fish Fallacies; An Amateur's Pond; Bristlebacks; The Kingfisher; Freshwater Snails; Culture of Captures; An Arboreal Anomaly; Readers' Records; Plants for Pond or Tank; Tree-frog Case; Popular Aquarium Fishes; The Smooth Newt as a Pet; and so on.

The Naturalist



× **Carrion Crow's Nests, built for the first time in 1929.**

DESERTION OF NESTS BY ROOKS NEAR PICKERING, YORKS.

JAMES GREEN AND R. J. FLINTOFF.

These notes are in two parts. Firstly, a statement of facts, and from the consideration of these only one inference can be made, that carrion crows are not responsible for the desertion of nests by the rooks. And, secondly, a tentative suggestion is offered as to the cause of the desertion of nests by rooks.

We thank Mr. F. A. Mason for his help, especially in preparing the plan, Mr. W. Raw, Mr. A. S. Frank and Mr. Walker, of Whitby, for their kindness in discussing the subject with us.

F. B. Kirkman, in *The British Bird Book*, Vol. I., pages 44-45, writes: 'It is now (the nesting season) also that from time to time a tragedy occurs which generally results in the break up of the rookery for the season. This is the arrival of a pair or more of carrion crows, hoodies or ravens. These enter the nests, peck open and suck the eggs, the rightful owners, after much turmoil and fighting, deserting sometimes at once, sometimes coming back day after day, only to be driven off again, not to return until the following year. In one case about half the birds returned to a rookery ravaged in the previous season by a pair of crows. The latter reappeared, and in one day robbed thirty nests, and drove away the owners. The remaining pairs were able to hatch their young, as one crow was shot and the other disappeared. . . . It may be added that the carrion crows explain almost every desertion of a rookery about the cause of which we possess unquestionable evidence.'

The sudden desertion of a rookery by all the birds is an experience somewhat uncommon to ornithologists, and when this happens simultaneously with two rookeries a few miles apart, the event is of interest. Between 1864-1899 about twenty cases of rooks leaving their nests were reported in *The Field*, the cause in every case being attributed to the presence of carrion crows. Indeed, this is the usual explanation, and so far as we can learn carrion crews are probably the only agents—apart from the shooting of the rooks—capable of banishing rooks from their nesting quarters. We have heard it said rooks will leave their nests if the trees carrying the nests are in a state of more or less advanced decay. Such a condition did not obtain in the happenings we are about to relate, which show unusual conditions, and should be recorded.

We have prepared a plan indicating the relative positions of the four rookeries, and we purpose considering the activities of the rooks at all of them in the spring of 1928.

The distance between the two extreme plantations is about 3½ miles in a straight line, so that all the rookeries are near together. No. 1 rookery, in 'Lewis's Plantation,' is on the western outskirts of Thornton-le-Dale. The plantation consists of larch and ash trees, but chiefly larch, and the rookery is confined to the northern portion, and is at least thirty years old. It has been shot hard, and has always yielded a large number of young rooks. On or about the 13th April, 1928, the birds, while incubating, deserted the rookery, and all left at the same time. With the exception of six pairs, we have been unable to learn where they eventually settled, but it was not in any of the rookeries in the area wth which we are concerned. The six pairs we can trace nested in Scots firs on the north-western end of No. 2 rookery—'The Nursery Wood,' about 150 yards away from No. 1 rookery. We cannot be quite certain the six pairs were a part of No. 1, but it is very probable. These birds hatched their young and brought them off successfully.

In this wood, near its eastern end, is a rookery not quite so large as No. 1, referred to here as No. 2 rookery, which has been established in tall sycamore trees for 30 years, but it has never been so prolific in young birds as No. 1.

About a mile to the south-west of No. 1 rookery a pair of carrion crows nested in an oak tree, and every year for many years there has been a pair of carrion crows breeding in the locality.

Before the rooks deserted their nests in No. 1, the carrion crows had been seen near, and afterwards they came to the rookery and removed the eggs to an adjoining field where they ate them. It is to the menacing attitude of these crows that the desertion of this rookery has been attributed. Therefore, it is only after 30 years that the carrion crows have succeeded in striking so great a terror into the hearts of the rooks as to cause them to leave their nests during the period of incubation.

The six pairs of rooks breeding in the Nursery Wood, about 150 yards away, were carefully watched. The carrion crows came frequently to molest them, but every time the rooks succeeded quite easily in driving off the crows. If therefore, six pairs of rooks could send away the crows, it must, at least, seem strange if 150 pairs could not do so, more particularly in so far as the six pairs formed a small part of the larger number which had been driven away.

There is another curious feature. The rooks in No. 2 did not desert their nests in spite of the crows being so near, for there is only a stone's throw between the two breeding sites, and there is no reason why the crows should molest one lot of rooks more than the other. The nesting of these rooks

and the six pairs followed the normal course, and the young birds in both instances were quite successfully reared. Therefore, assuming the carrion crows to have been responsible for the 150 pairs of rooks deserting their nests in No. 1, it seems pertinent to enquire why the rooks in No. 2 did not desert their nests also, and why the six pairs didn't leave their nests a second time when the cause of their first desertion still operated. Further, if six pairs of rooks could defend themselves, how is it that 150 pairs were unable to do so when the same enemy menaced them in both cases ?

About two miles from No. 1, we have No. 3 rookery, which we call Low Dalby. The plantation is composed of ash, alder and hawthorn, and the nests are chiefly in the ash trees. There is a large elm containing 17 nests. The height of the trees will be about 25 feet. They grow by the side of the stream on the bank remote from the high road between Whitby and Thornton-le-Dale. The age of the rookery is 30 years, and for this period a pair of carrion crows has bred in the centre of the rookery, and the crows have in no way troubled the rooks. Yet in 1928 these birds also left their nests at the same time as did the birds in No. 1 rookery, $2\frac{1}{2}$ miles away. Here again we have the condition of a pair of carrion crows near at hand, and in this case the crows actually nested among the rooks. Careful attention must be given to the fact that crows have nested here for thirty years, and during this period the rooks have not deserted, at all events, until the spring of 1928. If, then, the carrion crows are responsible for the rooks leaving their nests, it certainly seems very remarkable.

One and a half miles north of No. 3 there is No. 4 rookery in a cluster of trees, and this we call High Dalby. Here there are about 100 nests which have been built in whitethorn, mountain ash and a few oaks. The nests are, on an average, 15 feet only from the ground. These rooks did not desert their nests.

It so happens this rookery is in the vicinity of the land where afforestation is being tried, and in 1927 the authorities, being troubled by the wastage of seedlings, owing to their being uprooted, blamed the rooks, and proceeded to shoot them on their nests. Very curiously, in the following year, there occurred no decrease in the number of rooks nesting here. In some of the thorn bushes there are as many as eight nests in one bush. This rookery has not been deserted.

The four rookeries divide naturally into two groups, two in the north close together, and two in the south also quite near each other. In both cases the rooks deserted one in each group, but did not leave the other. Had the birds deserted both rookeries in the north, or in the south, the position might have been more easily understood. But even in this

case we should still have to deal with the difficulty of the carrion crows not affecting the activities of the birds at the other group.

We have now to record the state of affairs in the rookeries in the spring of 1929, and in order to be quite definite we will fix the day as the 6th of May. To the largest rookery, No. 1, the rooks have not returned.

At No. 2, quite close to No. 1, the rooks are carrying on their nesting activities as usual. The six pairs which bred in the Scots firs have increased their nests to 18 or 20.

We will consider all the nests as part of one rookery, but really they are two, the old and the new, both in the same plantation. Last year one pair of carrion crows bred about a mile away, and 150 nests were deserted in No. 1 rookery. This year three pairs of carrion crows have nested about the same distance away in different directions from No. 2 rookery and the crows have menaced the rooks, yet as far as we can tell not a single pair of rooks has left the nest. Therefore, assuming the orthodox view to be correct, it follows that one pair of carrion crows can drive away 300 rooks, but three pairs of crows are unable to disturb a smaller number of rooks, which seems manifestly absurd.

Of the northern rookeries a similar tale may be told. To No. 3 the rooks have returned, but whether they be all the same birds that left in the spring of 1928 we have, of course, no means of knowing. Quite recently we have learnt that one of the crows which bred here last year, and remained after the rooks had gone, had been flushed from the nest by a man with a gun. He shot at the crow and apparently wounded it to some extent, for it was only able to fly away with some difficulty. The crows did not return to their nest, which was later examined, and found to contain addled eggs. We cannot express a definite opinion as to whether the crows are again breeding in No. 3 rookery, but we think not.

At No. 4 breeding is going on as usual.

Both these rookeries have been menaced by crows. A pair is ranging the valley, and the nest has been located near the " Fox and Rabbit Inn."

Here again the rooks are breeding in spite of being harassed by the crows. Therefore we can only repeat our point that crows do not drive rooks away from their nests, a conclusion clearly demonstrated by the facts we have related.

We would like to say a few final words about the suggestion to which reference has already been made, and to the best of our knowledge and belief we are the first observers to introduce this notion.

The idea we wish to convey, plainly stated, is that during

the nuptial period, a period when all birds manifest great and wonderful nervous activity, there comes over the members of an old rookery an overmastering passion for change, for movement, for flight, for migration, for some reason we are not able to understand, a reason independent of crows, of storms, or owls or rotten trees, but contingent on an urge deeply implanted in the nature of the rook, an urge related in some way to the nervous stimulation associated with the process of reproduction and effecting a condition essential for the persistence of the species. We are of the opinion that in so far as any interpretation of the facts determined by Mr. Green can be given, they support the explanation we have brought forward. It is a theory to be proved or disproved by further reference to a large number of observations.

Messrs. Witherby, who are rapidly becoming the recognised publishers of standard ornithological works, have recently published two county avifaunas which fall into line with the series gradually being placed before the ornithological world. **The Birds of Ayrshire,** by **E. Richmond Paton** and **Oliver G. Pike** (xxi.+228 pp., 21/- net), deals with a district which has yielded many interesting varieties of bird life. The authors are well known for their photographic work, and many excellent pictures are reproduced. The frontispiece is a particularly fine view, in colours, of an adult male Greenland Falcon, sketched by E. R. Paton ; and there are large numbers of plates and illustrations of the typical avifauna of the area. There is also a coloured map of the county. **The Birds of South-east Devon,** by **Lewis R. W. Loyd** (176 pp., 10/6 net) contains a list of the species of that area, including the country to the east of the Exe Valley. Here again are a map and numerous photographs. There is a particularly interesting view of the nest and eggs of the Little Grebe, and what seems to be a quite new feature, a Ringed Plover's nest camouflaged by a large collection of Helix shells. The Ringed Plovers breed annually on Dawlish Warren, where they were once fairly numerous but are now almost extinct. An average of half a page is given to each species, and this is still another contribution towards the avifauna of the British Islands which various ornithologists and Messrs. Witherby are preparing.

An Introduction to the Study of Bird Behaviour, by **H. Eliot Howard.** London : Cambridge University Press, xii.+136 pp., 10 in. by 12½ in., £2/2/-). This handsome volume deals with an aspect of bird life rarely touched upon by the ornithologist, though Mr. Edmund Selous some years ago made in *The Naturalist* many valuable observations on the behaviour of different species. Mr. Howard describes the habits of different kinds of birds during the nuptial season, and gives minute observations such as few ornithologists have had an opportunity of recording. The volume deals more particularly with the behaviour, under these conditions, of Reed Bunting, Yellow Bunting, Skylark, Hedge Sparrow, Chaffinch, Pied Wagtail, and allied species. Perhaps the most striking part of the volume is the magnificent and unusually artistic series of sketches by G. E. Lodge, that of the Cormorant showing ' Reaction in the female low in intensity ' being a particularly fine piece of work. Doubtless the expense of these beautiful plates accounts for the rather high price for a work dealing with such a special phase of bird life, but as obviously it is a question for the expert student alone, there are possibly reasons why it is as well the volume will be out of the reach of superficial readers.

A Hind in Richmond Park, by **W. H. Hudson.** London : J. M. Dent & Sons, Ltd., xv.+330 pp., 6/- net. This, Hudson's last work, was first published seven years ago. It is now reproduced in an attractive form and at a cheap rate, and we feel sure that it only requires the attention of our readers to be drawn to it in order to enable them to purchase a copy. Hudson's books are increasing in value at a rapid rate, and we would recommend readers to secure them while they may.

The Story of Architecture in England, by **Walter H. Godfrey.** Part I. London : B. T. Batsford, Ltd., 154 pp., 6/6 net. The author refers to architecture from Roman times to the Reformation. As is truly pointed out, an intimate knowledge of architecture can only be obtained by affectionate acquaintance with the buildings themselves, and certainly the scores of carefully selected illustrations indicate the thoroughness with which he has carried out this principle. He touches upon Roman architecture, the great Norman Churches, mediæval and fortified towns, parish churches, civil and domestic buildings of the Middle Ages, and so on.

British Floods and Droughts, by **C. E. P. Brooks** and **J. Glasspoole.** London : E. Benn, Ltd., 399 pp., 10/6 net. The authors have gathered together a mine of information relating to the meteorological happenings which have taken place in this country for many years. Descriptions of great rains and floods, variations in rainfall and drought, the effect they have had on different parts of the country are given. The authors have made considerable research into the historic records, and are even able to write a chapter on ' Raininess in Britain since Roman Times,' illustrated by a diagram. Those interested in meteorological phenomena, or those desiring information as to the possibilities of floods and droughts in the future, will find this volume invaluable.

Some Notable Surveyors and Map-makers of the Sixteenth, Seventeenth and Eighteenth Centuries, and their Work, by **Sir Henry George Fordham.** London : Cambridge University Press, xii.+99 pp., 6/- net. This, the last work of the late Sir George Fordham is a memorial to his researches in the study of early cartography. He deals in detail with The Elizabethan Surveyors, their Work, and Its Influence on the British Cartography of the Seventeenth Century ; The French School of Cartography of the Seventeenth Century ; Cartography as an Exact Science : Its Development in the Eighteenth Century in France ; British Cartography of the Second Half of the Eighteenth Century, its Connection with the Triangulation of France, and the Ordnance Survey. There is also a list of Works of Reference.

Modern Psychology : Normal and Abnormal, by **Daniel Bell Leary.** London : J. B. Lippincott Co., xiv.+441 pp., 18/- net. The Publishers informs us that ' Here is a new, synthetic and extremely valuable approach to modern psychology. It is behavioristic without violating the facts of human personality ; it treats of the integrated personality without violating the methods of behaviorism. The concept of adjustment and consummation is consistently used, both for normal and abnormal behavior, and the relationship of so-called normal and abnormal conduct is shown from a new point of view. A new theory of learning and a new system of personality classification are included. This is the first extended study of the behaviorism of the whole personality as well as the most inclusive behaviorism that has ever been presented, covering every point from the simplest behavior—of reflexive and automatic nature—to the functional behavior of " belief " and " as if " attitudes, and the complex personality adjustments shown in reactions to art, religion and philosophy.' We fear we are not in a position to contradict this statement, but have pleasure in drawing the attention of our readers to this substantial contribution.

ANTHRACOMYA PHILLIPSI IN THE BARREN RED MEASURES OF AYRSHIRE.

J. PRINGLE AND W. MANSON.

THE object of this note is to record the presence of *Anthracomya phillipsi* (Will.) and *A.* cf. *tenuis* Davies and Trueman in the so-called Barren Red Measures of Ayrshire. The discovery of these shells is of considerable stratigraphical importance, since they afford a means of correlation with other coalfields in which the zonal scheme of Messrs. Davies and Trueman* has been applied. Further, the occurrence of the shells confirms the opinion tentatively held by many geologists that the Scottish Red Measures of Upper Carboniferous age are now, so far as Ayrshire is concerned, the equivalents of rocks included in the Staffordian and Radstockian Series of English Coalfields.

The lamellibranchs have been found at two localities in Ayrshire. One is a section exposed in the right bank of the River Ayr, at Catrine, and at this spot the fossiliferous beds are estimated to be about 1,500 feet above the well-known Skipsey's Marine Band (which may be regarded as the equivalent of the Mansfield Marine Bed of Yorkshire), and about 300 feet below the base of the so-called Permian lavas. The beds are of a pale red colour, and the shells, which lie crowded together on a bedding-plane, appear to be confined to a thin layer. They are well-preserved, and less crushed than the examples commonly found in the English or Welsh coalfields.

At the second locality, which is near Fail, Tarbolton, a bed containing the same species was passed through in a boring at a depth of 866 ft. from the surface. About 430 ft., below this fossiliferous layer, and still in the Red Measures, the cores yielded the following plants, kindly identified by Dr. R. Crookall :—*Alethopteris grandini* Brongn., *A.* sp., *Neuropteris rarinervis*? Bunbury, *N. scheuchzeri* (Hoffm.), *Sphenopteris* sp., *Calamites suckowi* Brongn., *Lepidodendron* cf. *lanceolatum* Lesqx., and *Pinnularia capillacea* L. and H. Some of these plants are characteristic Staffordian species.

According to Messrs. Davies and Trueman, the zone of *Anthracomya phillipsi* in South Wales† is not sharply marked off from the overlying zone of *Anthracomya tenuis*, but the dividing line has been drawn by these authors at the level characterised by the incoming of shells, which may be referred to *Anthracomya tenuis*. The association of the two species

* J. H. Davies and A. E. Trueman. 'A Revision of the Non-marine Mollusca of the Coal Measures.' *Quart. Journ. Geol. Soc.*, Vol. LXXXIII. 1927, pp. 210-259.

† *Op. cit.*, p. 245.

in the Red Measures of Ayrshire, therefore, suggests that the fossil-beds of Catrine and Fail approximately mark the junction of the zones of *A. phillipsi* and *A. tenuis*. This leads us to take a further step in correlation. In South Wales and in the Midland coalfields, the base of the *phillipsi* Zone is drawn just above the highest marine band. The 1500 ft. of Red Measures lying between Skipsey's Marine Band and the fossil-bed just described, may be assumed to fall within the zone of *A. phillipsi*, and therefore would be roughly equivalent to nearly the whole of the Pennant Series of South Wales, whilst the red beds lying between the shell-bed and the so-called Permian lavas in Aryshire may be safely referred to the zone of *A. tenuis*, and would thus correspond in age to the Keele Series of North Staffordshire.

The Principles of Applied Zoology, by **Robert A. Wardle.** London: Longmans, Green & Co., xii.+427 pp., 21/- net. This substantial tome is divided into three sections, namely: Medical and Veterinary Zoology; Agricultural and Horticultural Zoology; and Animal Industries. In addition to these there is an extensive Index and Bibliography. As we expect from our American friends, the subject is thoroughly dealt with, is remarkably well illustrated, and will be of especial value to the English student for comparing American species and methods with those of Britain.

A Manual of Helminthology, Medical and Veterinary, by **H. A. Baylis**, London: Bailliere, Tindall & Cox, xi.+303 pp., 30/- net. Until one peruses a volume such as this, it is difficult to realize the enormous parts played by the parasite worms which seem to penetrate everywhere. Dr. Baylis has had unrivalled opportunities of studying this very difficult subject, and with the aid of 200 figures, has produced a monograph which certainly will be the principal book of reference on this subject for a considerable time to come. While obviously medical men and veterinary surgeons are likely to benefit by a study of this volume, the general naturalist will find much of interest, especially as it would almost seem impossible to find anything which is not attacked in some way by these parasites.

Sykes of Sledmere: The Record of a Sporting Family and Famous Stud, by **J. Fairfax-Blakeborough.** London: Philip Allan & Co., xvi.+263 pp., 21/- net. The Sykes family of Sledmere has been known to the sporting world for generations, and one or other of its members have taken a prominent part in the breeding of horses and of horse racing, and have a world wide reputation. Mr. Fairfax-Blakeborough, a well-known writer on topics of this character, has added to his laurels by giving this account of the various members of the Sykes family. He deals with famous Sledmere poachers, stud methods, characteristics and peculiarities of different members of the family, etc. Sir Tatton Sykes and his sister were strong supporters of the brothers Mortimer in their researches among the Prehistoric remains on the Yorkshire Wolds, and frequently contributed large sums of money for scientific investigation when the work undertaken was beyond the means of the Mortimers. Mr. Cholmondeley gives a valuable appendix dealing with the best horses bred in the Sledmere stud, with an account of the winners, etc., and there are other appendices, including a description of the inscription in the Parish Church, Hull, in memory of Richard Sykes, Merchant, who died in 1726, whose first wife was the daughter of Mark Kirkby, of Sledmere.

CORRECTIONS OF CEPHALOPOD NOMENCLATURE.

DR. L. F. SPATH.

In my 'Notes on Yorkshire Ammonites' in *The Naturalist* (May and June, 1925, and February 1926) I made frequent use of the ammonite names *Deroceras* and *Microceras*. The former, however (now almost universally used for the *armatus*-group of ammonites), had already been employed in a different sense in 1820 and must therefore be changed. *Microceras* was used for a heteropod already in 1845, but retained for an ammonite, following Buckman, who was under the impression that there was a difference of one letter in the spelling of the name.[1]

While rectifying these two names it seems advisable to incorporate in this note a few more corrections; some are in respect of names used by myself in various publications; some are emendations of other names of ammonoidea. For directing my attention to some of these nomenclatorial problems I am indebted to Messrs. C. D. Sherborn, J. R. le B. Tomlin, and H. Woods. The reason for publishing this note is not that I consider the nomenclature of ammonites a matter of general interest, but that the corrections would otherwise be made by someone unfamiliar with the subject. The few obvious errors of Professor Strand,[2] rectified below, will show how work like his only leads to further confusion.

Arctoceras, Hyatt, 1900 (in Zittel-Eastman, 'Text-book of Palæontology,' p. 559), is valid and has to be used instead of '*Arctocerodes*,' Strand, 1929 (p. 6).
(*Arctoceras*, J. Boehm, 1899, being a *nomen nudum* was replaced in 1903 (*K. Sv. Vet. Akad. Handl.*, XXXVII., No. 3, p. 61) by the genus *Nathorstites*, J. Boehm).

Aturoidea, Vredenburg, 1925 (*Mem. Geol. Survey India*, Vol. L., pt. 1, p. 9) antedates *Paraturia*, Spath, 1927 (*Pal. Indica*, N. S., Vol. IX., Mem. No. 2, pt. 1, 26th January, 1927, p. 22).

Austiniceras, Spath, 1922 ('Senon. Ammon. Fauna of Pondoland,' *Trans. Roy. Soc. S. Africa*, Vol. X., pt. 3, p. 127). The rendering of this as '*Austeniceras*' in Fossilium Catalogus (I., pars 29, 1925, p. 127), and in Strand (*loc. cit.*, 1929, p. 6) is incorrect (see Spath: 'Zones of the Cenomanian and Up. Albian.' *Proc. Geol. Ass.*, Vol. XXXVII., 1926, p. 420, footnote 4).

[1] *Microcera* was also in existence (Meigen, 1803).

[2] 'Miscellanea nomenclatorica zoologica et palæontologica,' *Archiv f. Naturgesch.*, Vol. XCII., 1928, A, Heft 8; also 'Zoological and Palæontological Nomenclatorial Notes,' *Acta Universitatis Latviensis*, Vol. XX., 1929, pp. 1-29.

Belemnopsis, Bayle, 1878 (*Explic. Carte Géol. Dét. France*, Vol. IV., Atlas, Pl. XXIX.) is not invalid, as Strand (1928, p. 65) states, '*Belemnopsis*' of Gray (*Cat. Moll. Brit. Mus.*, I., 1849, p. 158), being a misprint for *Belemnosis*, Edwards, 1849 (*Mon. Eocene Moll., Pal. Soc.*, I., p. 38).

Cheiloceras, Frech., 1897 (not 1899 as Strand states), must be used instead of '*Cheilocerotes*,' Strand, 1929 (p. 8).

Clypeoceras, J. Perrin Smith (in Zittel-Eastman, 'Text-book of Pal.,' second English ed., 1913, p. 645) antedates '*Aspiditella*,' Strand, 1929 (p. 6).

Desmophyllites, nom. nov., for *Schlüteria* Grossouvre ('Amm. Craie Supér.' *Mém. Carte. Géol. Dét. France*, 1894, p. 216), *non* Fritsch and Kafka (Crust. Boehm, Kreideform.,' 1887, p. 33). Genolectotype:—*D. larteti* (Seunes) Grossouvre sp., 1894, p. 218, Pl. XXXIV., figs. 2a, b.

Dufrenoyia (Burckhardt, MS.) Kilian (1915), and '*Stenhoplites*,' Spath, 1922, are not now considered separable, as suggested in 1923 (see Spath, Appendix II., *Summary of Progress for* 1922, *Mem. Geol. Survey*, p. 147).

Eoderoceras, Spath, 1925 (*Naturalist*, p. 363). This is not now considered distinct from '*Deroceras*,' Hyatt, 1867 ('Foss. Ceph. of the Museum of Comp. Zool.,' Bull. I., No. 5, p. 81) as emended by Buckman ('Yorkshire Type Ammonites,' I., 1911, p. *iv.*) and replaces '*Deroceras*,' invalid through prior use (Rafinesque, 'Annals of Nature,' 1820, p. 10). (Family Eoderoceratidæ, nom. nov.).

Hemimicroceras, Spath, 1925 (*Naturalist*, p. 140), includes '*Microceras*,' Hyatt emend. Buckman ('Type Ammonites,' Vol. V., 1924, p. 24) invalid through prior use (Hall, *Amer. Jl. Sci.* (I.) XLVIII, 1845, p. 294). Family name becomes Hemimicroceratidæ, which together with Eoderoceratidæ (see above) and Xipheroceratidæ, Spath, 1926, may be united in a super family Xipheroceratida (see Spath, *Quart. Journ. Geol. Soc.*, Vol. LXXXII., 1926, p. 171).

Hemiprionites, nom. nov., for '*Goniodiscus*,' Waagen (*Mem. Geol. Surv., Pal. Indica*, Salt Range Fossils, Ser. 13, Vol. II., pt. 1, 1895, p. 126), non *Goniodiscus*, Mueller and Troschel (Syst. Asterid., 1842, 12 and 57).

Hoplotropites, nom. nov. for '*Margarites*,' Mojsisovics (*Verh. K. K. Reichsanst.*, 1889, p. 278; *Abhand.*, Vol. VI., pt. 2: *Cephalop. d. Hallst. K.*, 1893, p. 297), non *Margarites* Gray (*Ann. and Mag. Nat. Hist.*, Vol. XX., 1847, p. 271, No. 86).

Palæoechioceras, nom. nov. for '*Protechioceras*,' Trueman and Williams (*Proc. Cotteswold Nat. Field Club*, Vol. XXII., 3, p. 248, 1926) non *Protechioceras*, Spath, 1925 (*Naturalist*, p. 362).

Parastephanites, Hyatt, 1900 (in Zittel-Eastman, Text-book of Pal., p. 558) must be used instead of *Acrochordiceroides*,' Strand, 1929 (p. 5).

The case of *Ophiceras* (and *Lytoceras*), which would cause universal confusion and disagreement, is being referred to the proper international body for standardisation. Nomenclatorial rules are too often allowed to be bad masters instead of good servants, and there is no need to change these firmly established names.

Naturalists at Pickering.—The accompanying illustration is taken from a photograph of a section of the party of

Yorkshire naturalists at Pickering. The exposure was made by Mr. Peck, Junr., of Scarborough, who will be glad to supply prints, postcard size, at sixpence each.—Ed.

Golden Oriole in Yorkshire.—On the evening of Wednesday, May 8th, a strange bird flew into a bedroom of a cottage in Runswick Bay. The bird was captured, though some tail feathers were lost in the process. I enclose a coloured drawing of these. The bird was carefully examined and subsequently released. It was identified as a Golden Oriole, and of this I think there can be no question.—Rowland H. Hill.

We submitted the coloured drawing to Mr. Ernst Hartert, of the Zoological Museum at Tring, who writes:—There is not

the slightest doubt that the feathers figured are those of the Golden Oriole, which makes, as you know, occasional visits to England. This species is very seldom kept in captivity, perhaps because it is not very suitable for a cage bird, requiring a very big cage, it being a voracious feeder, while I do not think it ever utters its song in a cage. It is, therefore, most unlikely that this was an escape ; in fact, out of the Zoo, I never heard of the Golden Oriole being in captivity in this country. I think, therefore, the record must be accepted.—Ernst Hartert.

Unionicola ypsilophora (Bonz.) in Yorkshire.—A short time ago I received a number of Water-mites from Mrs. E. Morehouse, of Doncaster. They were taken from the mantle chamber of Fresh-water Mussels (*Anodonta cygnea*), obtained in the neighbourhood. The mites proved to be *Unionicola ypsilophora* (Bonz.), a species which spends its life as parasite or commensal in the common fresh-water bivalves. According to Soar and Williamson (' British Hydracarina,' Vol. II., pp. 123-126), the previous British records are from Potter Higham, Barnes Common, Higham Park, and Kirton-in-Lindsey, so this is apparently a new Yorkshire record. According to the text-books the common species found in the Fresh-water Mussel is *Unionicola* (*Atax*) *bonzi*. The identification has been confirmed by Rev. J. E. Hull.—J. M. Brown, Sheffield.

The Annual Report of the Colchester and Essex Museum for 1928, by M. R. Hull, contains a wonderful record of Roman remains and other additions to the museum. The cover looks somewhat odd with V's in place of U's. For example, ' ANNVAL REPORT,' but to be consistent the curator's name should surely be spelt HVLL ?

The Huddersfield Naturalist, Photographic and Antiquarian Society has issued its *Annual Reports* and *Balance Sheets* for 1924-1928, with particulars of the officers, details from each syllabus, etc. The Society is wise in keeping a permanent record of its activities in this way. The pamphlet includes quite an interesting series of observations in various branches of natural history. There is a photograph of Alfred Clarke, with an obituary notice, but, oddly enough, we find no reference, except in a very indirect way, to the loss of G. T. Porritt.

Vol. I. of *The Natural History of the Sheffield District*, the Proceedings of the Sorby Scientific Society, Sheffield, has recently appeared, and we should like to congratulate the editor on the way in which he has steered clear of the popular desire to publish notes and addresses of general interest, and has succeeded in adhering to those of local value. The first article is an admirable ' Resume of the Biological Work of Dr. H. C. Sorby, F.R.S.,' by Prof. A. Denny, and there are articles on ' Algæ of the Sheffield District,' by R. O. Ducker ; ' Birds of the Sheffield District,' by A. Whitaker ; ' The White-tailed Sea Eagle in Derbyshire,' by C. H. Wells ; ' Geology of Stoney Middleton,' by T. O. Morris ; ' Brachiopoda of Stoney Middleton,' by H. M. Muir Wood ; ' Meteorology of Sheffield,' by W. Hugill and Dr. S. C. Blackin ; and ' Flint and Stone Implements of the Sheffield District,' by A. Leslie Armstrong.

ECOLOGY OF THE BRITISH LAND MOLLUSCS.

REV. C. E. Y. KENDALL, B.A.

(*Continued from page 250*).

III.—WOODLANDS.

As a guide to these the writer has adopted the analysis of the woodlands as arranged by Messrs. Moss, Rankin and Tansley in their paper on 'The Woodlands of England,'* published in *The New Phytologist*. It might be possible to take some other arrangement, but theirs seems very complete and satisfactory ; and as it has been the basis of a great amount of ecological work done by the botanists, it would seem to be the best for our purpose, and enable one to correlate the ecology of the fauna with that of the flora.

In field work the writer has not taken note of plantations and woods of recent origin. It is, of course, true that in this country there is to-day very little primitive woodland, though perhaps there is more than is generally supposed, especially in mountainous districts. But there are still very extensive woodlands throughout the country that have been as they are for ages, the woods to-day being, so to speak, the direct descendants of the primitive woodlands and bearing much the same facies. In lieu of scientific forestry common-sense taught our ancestors to replace the trees they felled with others of the same kind. So to-day, in the woodlands that remain, fragments of the widespread forests of the past, we have the same species of trees with only here and there an odd alien, and therefore the same natural conditions that have always prevailed.

The following shows the analysis of the different woodland types :—

(*a*) Alder-Willow Woodland.

(*b*) Oak-Birch Series of Woodlands.

1 Oak Woods on non-peaty soils.

2 Oak-Birch-Heath Association.

(*c*) Beech and Ash Woodlands.

1 Ash-Oak Wood.

2 Ash Wood (at high elevations).

3 Beech Woods.

The two requisites for molluscan life are Calcium Carbonate and Water. Optimal conditions are those where the lime-content and water content of the soil are high. It is probable

* 'The Woodlands of England,' Moss, Rankin and Tansley. *The New Phytologist*, Vol. IX, p. 113, March and April, 1910.

also that depth of shade is a factor in producing optimal conditions, for life is very rich as a rule in the deep shades of the beech woods. Few of our molluscs actually feed on the living plant in natural conditions. The majority feed on decaying vegetable matter; some on moss, lichens and fungi. The writer's experience tends to the belief that those soils which the farmer commonly speaks of as 'warm' are the most favourable to molluscan life. A cold clay soil, even if rich in lime, is not nearly so favourable.

There is an intermediate stage between pasture and woodland, in which most of our larger Helices find their favoured habitats. This stage might be defined as 'Scrub'; where are tangled patches of thorn, hazel, brambles, thistles, and a luxuriant growth of grasses and plants. A similar type of habitat as to conditions, but of artificial origin are the hedges in country lanes. Here are extensive colonies of *Helix nemoralis, Helix hortensis* and *Helix arbustorum*, sometimes intermingled, sometimes individually monopolizing the area. Within its limits, from the south coast to mid-Yorkshire here occurs also *Helicella cantiana*. These are the usual denizens of the 'Scrub,' along with our two largest slugs, *Limax maximus* and *Arion ater*. In the scrub on the chalk of Sussex, Surrey and Hertfordshire, and on the Oolite of Gloucestershire is found with the others our largest land mollusc, *Helix pomatia*. *Helix aspersa*, the plague of the garden, is found in the same association; but the writer's experience is that it only occurs in the immediate vicinity of villages and cultivated ground. These larger Helices sometimes invade the margins of the woods.

(*a*) Alder-Willow Woodlands.

These woods are found on the borders of rivers and streams, and are invariably very damp, often marshy in places. The molluscan association as one might expect is very similar to that of the Marsh. The characteristic species are *Agriolimax lævis, Zonitoides nitidus* (Dominants) and *Succinea elegans*. With these may be found a rich and varied fauna of the damp-loving species, such as *Vitrea cellaria, V. alliaria, V. radiatula, V. crystallina, Euconulus fulvus, Hygromia hispida, Pyramidula rotundata, Cochlicopa lubrica, Carychium minimum* and *Limnæa truncatula*.

(*b*) Oak-Birch Series of Woodlands.

1 Oak Woods on Non-peaty Soils.—Such woods occur commonly on Siliceous Soils, the dominant tree being *Quercus sessiliflora*, with a typical ground flora of blue-bell, *A. nutans*, and soft grass, *Holcus mollis*. The characteristic molluscs of this type are *Acanthinula aculeata* and *Clausilia bidentata* with *Pyramidula rotundata* as the dominant.

2 Oak-Birch-Heath Association.—Of these woods with the ancient indigenous birch woods at higher altitudes the writer has had few opportunities of observation, and is therefore unable at present to generalize.

(*c*) Beech and Ash Woodlands on Calcareous Soils.

1. Ash-Oak Woodlands.—The Ash here dominant, with the Oak (*Q. pedunculata*) and *Corylus avellana*. Of this type of woodland there are plenty of examples throughout the country, natural and indigenous, on all the Limestone formations. It is extremely rich in mollusca, both in species and in individuals. The characteristic species are *Vitrea helvetica, Azeca menkeana* and *Clausilia laminata*. Most of the slugs are found, and a large number of other species. Where the Hazel is plentiful *Cyclostoma elegans* is usually to be found in large colonies.

2. Ash Wood at High Elevations.—These woods are usually of pure Ash, and *Vitrea helvetica* would seem to be the characteristic species.

3. Beech Woods.—These are typically developed on the chalk and on the Jurassic Limestones ; and usually consists of pure Beech with very little admixture of other trees. One noticeable thing about the Beech Woods is that the molluscs with a hispid epidermis seem to have a strong preference for them. In the north, to which the species is confined, it is here that one finds *Acanthinula lamellata*, while the only habitat in Britain of *Helix obvoluta* is the beech woods on the northern escarpment of the South Downs in West Sussex and Hampshire.

Of the Beech woods, the dominant and characteristic species are the two large slugs, *Limax maximus* and *L. arborum*. On the tree trunks may be found commonly *Clausilia bidentata* and *Ena obscura*, and in the restricted range of its occurrence *Ena montana*. In the deep shade on the ground under the usual dense canopy of Dog's Mercury are a large number of the more common species.

One has not mentioned all the species which occur in each type of habitat, as such lists would be of no interest but to the conchologist, but has just pointed out the characteristic or dominant species, hoping that one has proved that there are definite associations of the mollusca in every type of habitat, just as certainly as there are of the plants ; and that many accurate generalisations can be made as the result of repeated observations in various localities.

There is a large new field of observation open to the naturalist. One would like to see what a combination of forces could do ; the results of observations made in one

area by botanist, lepidopterist, coleopterist, etc., all working together. This combination of observers could produce a perfect picture of the life, animal and vegetable, in their locality, and linking it up with the observations made in other areas we might be able to arrive at conclusions of real value.

In an issue of the *Daily Mail* recently appeared two articles, one headed ' Miss Naturalist. No Longer Chasing Butterflies,' in which they kindly stated that members of the Yorkshire Naturalists' Union are far removed from the caricatured naturalists, and among them are ' many sunburned young women.' The other, headed ' Barn Museum, Butter Boards and Man Traps,' refers to the Tithe Barn at Easington and its contents, but also states that among the exhibits are ' Remarkable articles made by a former resident from such materials as finger nails and onion leaves.' Certainly objects of this character were made by the late Philip Loten a quarter of a century ago and were then exhibited in his house, a charge for admission being made. But they are not in the Tithe Barn.

The Earth : Its Origin, History and Physical Constitution, by **H. Jeffreys.** London : Cambridge University Press, xii.+346 pp., 20/- net. Largely as a result of the advances in the science of Seismology, Eddington's revised theory of stellar constitution, and in other ways, the first edition of this excellent work, which was published so recently as 1924, has had to be considerably revised and altered, in addition to which the gist of the papers awarded the Adams Prize of the Cambridge University in 1927, has been included. The author deals with an unusual aspect of the science of the earth which can only appeal to those thoroughly familiar with mathematics, but no student of the theories of the origin of the earth can afford to be without the volume. We should like to add that the Cambridge Press has produced the book magnificently.

Handbook of Microscopical Technique, by **C. E. McClung.** London : Humphrey Milford, xiv.+495 pp., 36/- net. The Professor of Zoology in the University of Pennsylvania has obtained the assistance of twenty-four specialists in writing monographs dealing with one or other aspect of microscopical technique from the point of view of both animals and plants. Each is responsible for his particular section, and the editor is to be congratulated on the success of his choice. The essays are upon almost every conceivable aspect of microscopical research, and include Section and Non-section Methods of Preparing Microscopical Slides ; General Botanical Microtechnique ; Embryological Methods ; Histological Methods ; Protozoological Methods ; Fixation and Fixatives ; Stains and Staining ; to mention only some of the many chapters.

The Bondage, by **Bernard Acworth.** London : John Murray, xxiv.+229 pp., 7/6 net. In the author's opinion, ' Birds in free flight are the only living things that have never felt a breath of the wind that is blowing, no matter how fierce or tempestuous the wind may be . . . The simple fact of absence of wind-pressure on air-borne bodies, whether birds, insects, or machines, and the very general, but quite natural, misunderstanding of the lay public on this important matter, gave rise in the author's mind to a long series of reflections of which this modest volume is the emdodiment. Considerable portions of this book have previously appeared, in a somewhat different form, in the *Spectator*, *National Review*, and *Discovery*.' This will give an idea of the nature of the volume which deals with the law of currents, curves of flight, migration of swallows, desertion of nests, the flight factor in insects, mechanical flight, and so on.

The Naturalist

YORKSHIRE NATURALISTS AT PICKERING, YORKS.

F. A. MASON, F.R.M.S., AND W. H. PEARSALL, D.Sc., F.L.S.

THE Whitsuntide Meeting of the Yorkshire Naturalists' Union was held at Pickering from May 18th to 20th, this being the 347th meeting of the Union. Both the weather and the locality combined to make the meeting exceedingly enjoyable to the large party of members present. The main object of the meeting was the further examination of the southern valleys of the Cleveland Hills. The Saturday excursion, led by Mr. E. G. Highfield, was up the Pickering and Levisham Becks to Lockton, examining the numerous quarries near Pickering. Mr. R. J. Flintoff led the party on the following day to Saltersgate, *via* Newton Dale, Levisham, and the Hole of Horcum. May 20th was devoted to the examination of the Crosscliff area and that south of it by the Bride's Stones and Staindale, under the leadership of Mr. A. I. Burnley.

Saturday evening was devoted to a paper by Messrs. Flintoff and J. Green on 'The Desertion of Nests by Rooks at Thornton-le-Dale.' The subject dealt with the common belief that carrion crows are responsible for the desertion of nests by rooks, and the authors disproved that theory, and gave rise to the interesting suggestion that the phenomenon may entirely be explained by the mating instinct of the birds. The meeting was exceptionally well attended, and Messrs. H. B. Booth, Wm. Raw, P. Russell, and others spoke on the subject. It was agreed that carrion crows did not drive away the rooks. (See page 261).

On Sunday, while most of the naturalists walked to Saltersgate, a small party investigated the woods and moors adjacent to the railway line, commencing at Levisham Station. The results appear mainly in Mr. Wattam's notes on this excursion. We had the advantage of Mr. Green's guidance, and visited the ruins described to us as 'Chilton's Folly,' alleged to be an old smelting works. We have it on the authority of Mr. Pickering, the Pickering antiquary, that it is the remains of a coal-mining venture, and certainly the evidence is in favour of his assertion. Mr. Booth, in his report, makes no mention of the Fox, but some striking evidence of its not-too-welcome occurrence in the district was obtained on the moors near Skelton's Tower. A lamb, which Mr. Green affirmed had been killed a few hours earlier, was discovered in a partially eaten condition in a hollow into which it had been driven or dragged, and a litter of cubs was located within a few hundred yards. In addition to the birds mentioned by Mr. Booth, the Merlin was seen on the same moor as the Nightjar.

Although the dry and cold spring had retarded the development of the flora and fauna, domestic animals were less backward—particularly a donkey which tried to join the party,* and a hen which seized the opportunity to lay an egg in the car of one of the Secretaries! Unfortunately the owner of the hen appeared, and arguments that the egg was 'treasure trove' proved unavailing.

The meeting concluded at Headquarters on May 20th, when the President occupied the chair. Fourteen societies were represented, and six new members were elected. Cordial votes of thanks were carried to Messrs. A. I. Burnley, R. J. Flintoff, and E. G. Highfield, the interest and local knowledge of whom greatly facilitated the work of the meeting.

It is of interest to compare the following notes with some phenological observations made 150 years ago. Contemporary with Gilbert White, there lived at Pickering, William Marshall, author of the agricultural classic, 'The Rural Economy of Yorkshire,' and other pioneer works of agricultural science. He was a keen, and for his time, a competent

* This seems almost unnatural!—Ed.

observer of all natural phenomena, and in the book referred to, first published in 1788, he gives the following notes : ' The Progress of Spring, 1787, at Pickering, Yorkshire. The Grossberry foliated—10 March ; the Sallow in full blow—5 April ; one Swallow near water—12 April ; the Hawthorne foliated—1 April ; Swallows about houses —27 April ; Cuckoo first heard—6 May ; Swifts—12 May ; Oak foliated —29 May ; Hawthorne blowed—10 June ; Ash foliated—11 June. During May, cold piercing winds ; and, in the beginning of June, a very smart frost.' From these observations it seems that the seasons have not altered much in a century and a half, and if anything, it was later in 1787 than in 1929.

Botany (W. H. Pearsall) :—The area visited shows three characteristic zones, (1) the heather moor of the flat tops of the plateaux where the soil is thoroughly leached and acid, (2) the valley slopes which contain most of the remaining woodlands, (3) the pastures—chiefly alluvial—on the valley bottoms, with occasional remains of Alder woodland. Most attention was devoted to the second of these zones, the valley slopes, where considerable variation in the vegetation may occur. Owing to the dip of the rocks, the southern ends of the valleys have usually more calcareous soils than the northern ends, which are developed entirely on sandstones. In general, therefore, the woodlands change from Ash or Oak-Ash at the entrance of the valleys to Oak and Oak-Birch as one moves up the valleys. The Ash-Oak woods at the mouth of the valley of the Pickering Beck have frequently been cut and planted. The greater success of Sycamore seedlings in the shade and of Ash seedlings in the open, which was previously reported (*Naturalist*, 1922, 290), was observed again in this locality. Mr. R. J. Flintoff writes the following description of the Kingthorpe Woods, which belong to this general type : ' Oak is the dominant tree, and there are large Larches measuring nine or ten feet round the bole at five feet from the ground. Tradition records these as being the first Larches introduced into England. We noted some rather pale specimens of *Lathræa squamaria* growing parasitically on the roots of the Oak, and nearby large beds of *Convallaria majalis* and *Aquilegia vulgaris* had formed buds, but showed no signs of bursting into flower ; later, however, we found a *Convallaria* in bloom. The *Aquilegia* was one of the most interesting plants seen on this excursion. *Hypericum hirsutum* grew in plenty by the woodland path ; the snowy blossom, which literally covered the branches on several tall trees of *Prunus cerasus*, rendered this species markedly distinctive in the wood. *Euonymus europæus* also grows here, and among the ground vegetation of *Mercurialis perennis* in abundance, *Oxalis acetosella*, *Lathyrus macrorhizus* and *Viola riviniana*, all in flower, and a few specimens of *Ranunculus auricomus* are to be found. There are many ferns in these woods, including *Scolopendrium vulgare*, *Polypodium vulgare*, *Aspidium aculeatum*, *Asplenium trichomanes*, and large specimens of *Asplenium filix-fœmina* and *Aspidium filix-mas*.'

Most of the oak woods higher up the valleys are in a fairly primitive condition, but they did not show many signs of regeneration except where the larger grazing animals were excluded, and where the soil was, through flushing, less acid. In most of these woods the soil is quite acid, and Mountain Ash and Birch (*B. pubescens*) are the principal seedlings. There is nearly always a well-defined difference between the upper and lower parts of these woods, owing to the leaching of the upper areas and the flushing of the lower ones. In one case examined by Mr. A. Malins Smith, the soil of the upper zone was very acid (pH5) down to depths of one foot. Here were bracken and bluebell with anemone, *Lychnis dioica*, and Male Fern less common. At the base of the slope the soil was less acid, and the acidity markedly decreased as the depth increased. Here were *Mercurialis*, *Ficaria* and *Anemone* in abundance, while the trees included both Ash and Birch. Mr. Wattam

describes below similar zoned woods near Levisham Station. Generally the ground flora includes much Anemone, Bluebell and Bracken as local dominants, with *Mnium hornum* as the most characteristic moss. The ground flora is less abundant as one approaches the head of the valley or the top of a slope, and *Dicranum* spp. and *Mnium hornum* become striking members, while bracken markedly decreases as the soil becomes shallower. The series of woods suggest what may also be seen elsewhere, that as grazing increases the proportion of grasses also increases, while the usual herbaceous undergrowth tends to disappear. Further, the woods facing north, particularly at Crosscliff, have usually a much more heathy ground flora in which *Vaccinium myrtillus* and *Dicranum majus* become more abundant. We find a north-facing slope covered by moorland species, while an otherwise similar south-facing slope retains its original woodland. In Staindale, there is a similar striking contrast between the east and west sides of the valley, the former being chiefly covered by *Calluna*, with frequent *Erica cinerea* and some bracken at the base, and the west side bearing Oak wood in fairly primitive condition. While these differences might be due to cutting—it seems more likely that the dip of the rocks, which is here gently to the south-east, maintains the western slope in a damper and more 'flushed' condition, while on the eastern slope water and salts tend to move away from the surface. A similar explanation may apply to some of the north- and south-facing slopes in this neighbourhood; though of course, light and temperature will also differ markedly in the latter case. These were analysed in a previous report in a description of the north-facing woodland on the Crosscliff escarpment (*Naturalist*, 1922, 290). The latter wood, as typical of the more acid and moister type, contained as ground flora: *Vaccinium myrtillus* (ab.), *V. vitis-idæa*, seedlings of *Pyrus aucuparia*, both Birches, and a few Oaks, *Calluna vulgaris*, Bracken, *Galium saxatile, Deschampsia flexuosa, Anthoxanthum odoratum, Oxalis acetosella, Luzula pilosa, Hypnum cupressiforme, Dryopteris dilatata, Dicranum majus, D. scoparium, Mnium hornum, Sphagnum acutifolium, Leucobryum glaucum, Cephalozia bicuspidata*, and *Lepidozia reptans*, all frequent or locally abundant. *Trientalis europæa* was locally abundant in the Vaccinium edge just above the wood, and *Cornus suecica* was just appearing there.

Less frequent were *Melampyrum pratense* (var. *hians*?), *Dryopteris filix-mas, Blechnum spicant, Polytrichum formosum, Plagiothecium undulatum, Dicranum fuscescens, Lophocolea bidentata* (with perianths), *Sphagnum quinquefarium, Calypogeia trichomanes*, and *Dicranella heteromalla*. Mr. W. H. Burrell, who supplemented the list of mosses and liverworts, observed no *Orthodontium gracile* either in this wood or elsewhere in Staindale. Miss L. I. Scott similarly failed to find any during a stay in the Robin Hood's Bay district. The great wealth of bryophytes and ferns (in bulk if not species) is a noticeable feature of the Crosscliff Wood. They suggest (particularly the Sphagna) an abundance of surface water, and probably a high and persistent air humidity, the latter being borne out by the arborescent mosses, which are scanty elsewhere in this district. The steep north-facing slope and the rather impervious soil are probably responsible for these conditions.

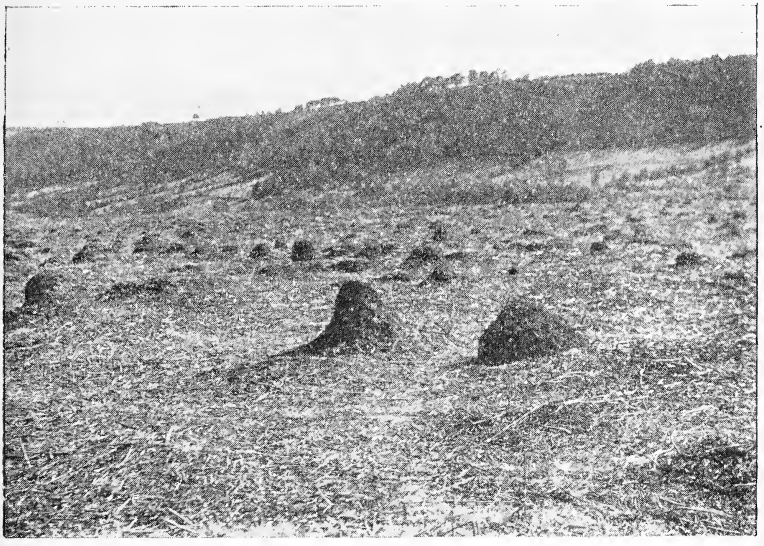
Occasionally, at the south ends of the valleys, the ordinary zonation of sloping woods is inverted owing to the presence of a limestone cap on the plateau. This is the case in the Dalby Nut Wood, near Thornton Dale, described in *The Naturalist* for 1922. This wood was then being cut, and Mr. A. Malins Smith provides the following details as to the conditions of the site. 'The deep soiled lower slopes are acid, and the road cuts down through 5-6 feet of soil. Vegetation here is now mostly rough grasses, including *Agrostis* and cocksfoot. There are striking flushes where cuts have been made to drain the slope and road. Below

these, on the fine waste carried through them, is *Mercurialis* and a good deal of *Heracleum spondylium*, with occasional primroses. Further up the slope the *Anemone luzula* is still clear—but it is now a closed community, the spaces being filled by grasses. *Mnium* is now practically absent. There is a little Sanicle, Honeysuckle; and *Orchis mascula* begins to be common. The uppermost zone, the soil of which is nearly neutral, is still dominated by *Mercurialis*, with a fair amount of *Hypericum hirsutum* and less frequent Garlic, Columbine and *Actæa spicata*. Both *Paris* and *Convallaria* appeared to be failing. *Brachypodium sylvaticum*, Strawberry and Ground Ivy still maintain themselves. So far as the trees are concerned—Hazel is regenerating from the cut stumps and Birch also—but the latter only in the two lower zones. The planted Douglas Fir is in very poor condition in the uppermost zone.'

The following account of the Levisham district refers first to Oak woods, which are nearly primitive at the top, but which have been much cut and grazed lower down. In spite of this they give a good picture of the ground flora in the lower flushed areas, and of the effect of cutting and grazing upon the tree population.

Mr. W. E. L. Wattam writes: 'The area to the left of the railway track from Levisham Station as far as Raindale Mill was examined. The ground rises very steeply to the summit woodland, reaching a height of over 700 feet. The summit woodland is almost pure Oak, with *Betula alba* and occasional Ash, Mountain Ash, Spruce and Scot's Pine. Between this summit woodland and the basal woodland is an area of grazing ground, apparently itself once woodland judging by the old stumps, scattered trees of *Betula alba*, *Betula pubescens*, Sycamore, Hawthorn, and Holly, and phases of the ground flora. This grazing area is a grass-heath association, *Festuca ovina*, *Deschampsia*, *Anthoxanthum*, and *Agrostis vulgaris* being the dominant grasses, intermixed with which is dwarfed ling, *Erica cinerea*, *Polygala vulgaris*, *Potentilla tormentilla*, *Galium saxatile*, and patches of *Pteris*. Before merging into the basal woodland the blossoms of the Wood Anemone were a most conspicuous feature. Particularly attractive was a large patch of blossoms (about two hundred) of a bright purple colour, all the more pronounced by reason of the countless surround of white blossoms. There was no intermediate stage of colouration. The trees of the basal woodland are *Betula alba*, *Betula pubescens* as dominants, with an admixture of Oak, Ash, Hazel, Mountain Ash, *Salix caprea*, and *Prunus padus*. Interspersed are thickets of *Rosa canina*, *Prunus spinosa*, *Ulex europæus* often reaching to a height of six feet, Bramble and Honeysuckle making progress in parts either unattainable or most difficult. Towards Raindale Mill there has apparently been much felling, and open areas are of much more frequent occurrence. Where denser shade was prevalent, the ground vegetation consisted of *Hedera helix*, *Oxalis*, *Viola hirsuta*, and Dog's Mercury. *Brachypodium sylvaticum* was the dominant grass, with a little of *Holcus mollis*. The ferns were Northern Hard, Male, Lady, and *Lastrea dilatata*. Many species of moss were also prevalent, along with an abundance of three lichens, *Cladonia pyxidata*, *C. gracilis* and *C. fimbriata*. Clothing the steep banks of the cleft, which served for the pathway up the hill, was a prominent flora of Barren and Wild Strawberry, Greater Stitchwort, Tuberous and Smooth-podded Vetch, *Viola sylvatica*, Herb Robert, *Hypericum humifusum*, Ling, *Erica tetralix*, *Erica cinerea* and *Agrostis vulgaris*. Where this woodland thinned and the steepness was not so pronounced, the ground carpet was Lesser Celandine, *Ranunculus auricomus*, Dog's Mercury, *Allium ursinum*, *Oxalis*, *Sanicula*, *Asperula odorata*, Primrose, *Geum urbanum*, *Orchis mascula*, and *O. maculata*. In one part, associated with Ling and *Deschampsia*, Miss J. Grainger found many plants of *Pyrola media*. At the extreme base of the hill a swamp association was developed. Here were noted the three Cardamines, *amara*, *hirsuta* and *flexuosa*, *Nasturtium*

officinale, *Stellaria ulginosa*, Raspberry, Brooklime, *Ajuga reptans*, Hairy Willow Herb, *Mentha aquatica*, Fleabane, Meadow Sweet, Marsh Thistle, and occasional plants of *Trollius*, *Geum rivale* and Lousewort. Also occurring were *Juncus glauca*, *J. effusus*, *J. conglomeratus*, *Aira cæspitosa*, *Glyceria fluitans*, *Poa trivialis*, *Carex præcox*, and *Equisetum palustre*. The return journey was made by crossing the Pickering Beck and railway to Chilton's Folly, climbing up the steep escarpment to Levisham Moor, at an height of over 800 feet. Beyond Skelton Watch Tower considerable surface peat paring was in progress. This paring is about three inches in depth, consisting of a dark-brown heather peat, and very fibrous. Judging from adjoining areas pared in previous years it was noticeable how quickly *Pteris* and *Festuca ovina* assumed dominancy, with *Nardus*, *Deschampsia* and *Juncus squarrosus* as sub-



dominants. Ling, *Erica tetralix*, *Erica cinerea*, and *Empetrum*, the dominant plants of the unpared areas west of the Tower being much slower in their re-establishment on the pared areas. The final portion of this moor to the road presents a curious appearance, being strewn with countless boulders and blocks of calcareous grit, which here is very near the surface, interspersed with innumerable conical vegetative hillocks, twelve to eighteen inches in height.* These hillocks of soft sand, denizened by *Festuca ovina* and *Pteris*, and summitted with Ling, rest upon calcareous grit boulders, the best of the peat having been cut away during paring operations, and what remained being in course of disintegration. The new plant growth in this boulder strewn area is of the plants previously mentioned.'

In addition to Mr. R. J. Flintoff's notes on the Kingthorpe Woods which have already been quoted, he also contributes the following notes on the excursion of the main party on Sunday, May 19th, from Kingthorpe to Saltersgate.

* We are glad to be able to illustrate this interesting condition, and are indebted to Mr. W. G. Bramley for the photograph.

Mr. Flintoff adds : ' In the grass field, which we crossed to enter Kingthorpe Woods, a delightful display of colour enlivened the bright green of the spring grass. The rich purple of many spikes of the Early Orchis, the snowy white—sometimes tinged with pink—masses of wood anemone, and innumerable umbels of the yellow flowers of the Cowslip and Primrose combined to make an appealing show of bright colour of wide contrasts, yet in perfect harmony. After leaving the woods, we proceeded to the railway embankment and adjoining fields where many interesting plants grow, but owing to the late spring these had not developed so much as usual at this time of the year. We found the leaves of *Carduus heterophyllus, C. pratensis* and *Sanguisorba officinalis.* In a grass field which is somewhat marshy during a normal season, but this year much drier than usual, we identified *Selaginella selaginoides,* a plant I have not noted here on previous visits, and *Trollius europæus, Thalictrum flavum, Valeriana dioica, Myrica gale.* In the ditch by the side of the line *Potentilla palustris* is plentiful, and near Levisham that spreading shrub, *Genista anglica,* was recorded.

At Yew Tree Crag we climed the steep side of the dale to the moorland, and here we had a splendid view of the general character of this sinuous, water-worn valley. Among the *Calluna vulgaris* we saw its variety *pubescens.* A tramp of a mile or two over the moor to Saltersgate completed the walk.

Some doubt had been expressed as to the accuracy of the identification of *Sambucus ebulus* reported in my notes in the circular. Therefore this plant was pointed out to several botanists, who agreed that it had been named correctly, and expressed their satisfaction on finding it growing so prolifically. Baker, in ' The Flora of North Yorkshire,' records it for every area except No. I.—the Ouse and Foss—and states it is ' Clearly indigenous in, at any rate, some of its stations within our limits.' Although he gives a number of stations, he makes no reference to the one in the Pickering district.

(To be continued).

The Thirty-eighth Annual Report of the Royal Society for the Protection of Birds contains the usual useful record of work.

The Saga-Book of the Viking Society, Volume X., Part I., including the *Proceedings* from 1919 to 1924, contains a remarkably well-illustrated description of ' The Oseberg Ship,' by Professor Anton W. Brogger ; ' Queen Asa's Sculptors ' ; ' Wood Carvings found in the Oseberg Ship, Norway,' by Dr. Haakon Shetelig ; ' The Norse Discoveries of America,' by M. M. Mjelde, and many other items of exceptional historic interest.

The Journal of the Marine Biological Association recently issued (Vol. XVI., No. 1., 360 pp., 12/6 net) seems to exceed all its predecessors in the value of its contents and the wealth of illustration. There are no fewer than 20 separate memoirs in the journal, including : ' Herring Investigations at Plymouth,' by E. Ford ; ' The Organs of the Herring in relation to Growth,' by V. C. Wynne-Edwards ; ' A Sailfish new to the British Fauna,' by J. R. Norman ; ' A New Rhizocephalan,' by H. Boschma ; ' The Fauna of the Estuaries of the River Tamar and the River Lynher,' by E. Percival ; ' Factors limiting the Habitat of *Arenicola marina,*' by D. M. Reid ; ' Rate of Growth of *Tellina tenuis* da Costa in the Firth of Clyde,' by A. C. Stephen ; ' The Nematocysts of Sea Anemones,' by T. A. Stephenson ; ' Fungus allied to the Saprolegniaceæ found in the Pea Crab,' by D. Atkins ; ' The Larvæ of the British Sabellarians,' by D. P. Wilson ; ' The Cœlomic cilia and circulation of the body fluid in *Tomopteris helgolandica,*' by A. Meyer ; ' Observations on *Patella vulgata,*' by J. H. Orton ; etc. There is a large number of plates and diagrams, and illustrations occur in the text.

In Memoriam.

JOHN ASHWORTH HARGREAVES.

J. H. HARGREAVES was born at Lumb, Rossendale, Lancashire, on April 10th, 1856. His father, Richard Hargreaves, was the owner of a mill in which he carried on the business of a cotton weaver, assisted by his sons. Hargreaves' education at Burnley necessitated long walks over the moors. But work at the mill not being to the liking of the subject of this

memoir, he left it in early life, and became the schoolmaster at Baildon, Woodbottom, near Bradford. On 3rd July, 1880, he married Susannah Spencer, the daughter of a Lancashire stone quarry owner, whose interest in fossils probably inspired Hargreaves, whose taste for collecting commenced early in life, and continued until a few months of its close.

Soon making congenial friends in Bradford and other West Yorkshire towns, the remains of dead animals and plants gave place to an interest in living species, and the Conchological Society was joined in 1887. But he was not doomed to spend all his days teaching the young idea how to shoot, in the

smoky and depressing atmosphere of large cities. In 1888 he purchased a bookselling and stationery business on the South Cliff, Scarborough, and from that time till near the close of his life continued to deal in paper, plain or printed. Natural history at Scarborough had few active students in 1888, but the following year saw the birth of the local Field Naturalists' Society, of which Hargreaves was one of the foundation members. Soon the rocks rang with his hammer, and his dredge disturbed the waters of pond and rock pool. The author of these notes recalls many pleasant rambles along shore with such incidents as the discovery of a Shap granite boulder, tons in weight ; watching the slow slip and fall of another huge erratic from the boulder clay cliff almost to our feet ; our first finding of the mineral, Scarbrorite ; wanderings to the Speeton Clay and home-coming with tiny ammonites glittering with iron pyrites and belemnites like pointed slate-pencils ; giant footprints on rocks, and pockets bulging with huge Phasianellæ.

One of his most enjoyable excursions was taken in company with the late Robert Gilchrist, an energetic naturalist taken from us in his prime. These two visited the Norwich Crag, and had a fine time with sinistral *Neptunea* and other classic forms ; and I remember his relating how at the Winnats, in Derbyshire, he could have got ' blue john ' by the hundredweight.

But it is as a conchologist that he will best be remembered. In the field his ready identification of a *Vertigo* or a *Vitrea* was most helpful to those of less experience, while an evening at home with him, and a tin full of shell-sand was most entertaining. Nor were his interests limited to insular forms, for his cabinets contained some fine exotics. He usually kept aquaria, marine and freshwater, and his last bell-jar probably contained a brood of *Limnea peregra*, dextral and sinistral breeding with mendellian or other results. His eldest son, Herbert, also keeps aquaria, and thus perpetuates one of his father's hobbies.

Though of sturdy physique, his health failed, and he suffered much in late years. A teetotaler and non-smoker, yet perhaps he was not the most careful feeder. I have known him chew raw rice or peas. His favourite drink was milk, which he took in quantity at all times. Taking tea at a friend's house, if asked to have another cup he would decline, and beg a glass of milk ; and it was a glass of milk that he sought when on a country excursion the first farm house came in sight.

Endowed with a good menory, he was often a welcome help when visiting a friend who had unnamed or doubtful conchological species or varieties. Yet his own collection was not the perfection of order. Cabinet drawers only partially closed

might contain anything but natural history specimens. There were fossils on the top of the kitchen copper.

Two years ago his very happy married life was terminated by the death of his wife from pneumonia.

Fond of scientific literature, Hargreaves was an interesting man to know, nor was our mutual friendship limited to the strictly personal, for it extended to the home circle. In his last days, to get relief from asthma, various districts were visited, and some time was spent in Italy, but with little or no benefit. Lincoln was the last resort visited, and in that city he died, April 25th, and was buried at Scarborough on 29th April, 1929.

Besides his eldest son, Hargreaves is survived by his sons Arthur and Wilfrid, all engaged in some department of the paper trade, and his daughters, Constance and Hilda.

Soon after he became a widower, Hargreaves left Scarborough and went to live at Leeds, where he renewed close acquaintance with such veteran conchologists as J. W. Taylor, A. Hartley, F. Rhodes, and others.

He was the author of a number of notes and papers, all of which appeared in *The Journal of Conchology* and *The Naturalist*, his list of the mollusca in the Scarborough district being, perhaps, the most substantial.

He was a member of the Conchological Society of Great Britain and Ireland, the Yorkshire Conchological Society, the Yorkshire Naturalists' Union, Scarborough Philosphical and Archæological Society, and Scarborough Field Naturalist Society.—Wm. Gyngell.

WILLIAM JOHNSON: A YORKSHIRE BOTANIST.

W. H. BURRELL.

In the herbarium of the University of Leeds is a collection of lichens made by Rev. William Johnson. Search for information about the author having failed to trace any reference to his death in the scientific journals, the opportunity is now taken to record the passing of a naturalist who was widely known in the north of England. William Johnson was born at Halifax, February 11th, 1844; he entered the Primitive Methodist ministry 1864, and during a period of forty-four years held charges at Maryport, Shildon, Alston, Gateshead, South Shields, Darlington, Stockton, Bishop Auckland and Hull; owing to failing health he was superannuated from the last-named circuit in 1908, retired to Harrogate in 1910, where he died July 20th, 1919. For five years (1903-1908) he was the principal of Hartley Theological College, Manchester.

He is described by a colleague as ' a rare blend of poet and

scientist ; painstaking in his research, and well known throughout the Primitive Methodist Church as a man of keen intellect ; exceptionally gifted as a preacher, though his appeal was rather to the scholar than the man in the street.'

His interest in natural history started with the purchase of a book on lichens, which opened out a new world, a source of recreation from which he never wavered ; his specimens were gathered as he tramped the roads and moors on preaching appointments or on holidays which, on two occasions, took him to Norway.

He was a fellow of the Linnean Society of London for twenty-five years (1888-1913), his recommendation form being signed by James M. Crombie, George Murray, William Carruthers and Anthony Gepp. He added two lichens to the British flora *Lecanora privigna* Nyl. var. *flava* Johns. (=*Biatorella flava* A. L. Smith) *Naturalist*, 1917, p. 88, and *Sarcopyrenia gibba* Nyl., *Naturalist*, 1918, p. 103 ; the latter appears not to have been recorded for England since he discovered it at St. Bees. His other publications include :—

' Introduction to the Study of Lichens,' *Northern Microscopist*, 1881.

' *Lecanora weardalensis* Johns. occurring on sandstone in subalpine places.' *Grevillea*, 1886, XIV., 91.

' A New Lichen found in Northumberland,' *Nat. Hist. Trans. Northumb. Durh. and Newc.*, VIII., 184 (1884).

Lichen Memorabilia, ibid. VIII., pt. 2, pp. 217-219 (1886).

A catalogue of Mr. N. J. Winch's Lichens now in the Museum of the Nat. Hist. Soc., Newc.-upon-Tyne, *ibid.* VIII., pt. 3, pp. 307-325 (1889).

' The Lichens of Cumberland,' *Trans. Cumb. Ass. for the Adv. of Lit. and Sc.*, pt. 6.

Nature and Naturalists. 8vo, London 1903.

In Denison Roebuck's bibliography, *Naturalist* 1895, p. 221, there is a list of twelve papers on lichens that appeared in the *Wesley Naturalist* during its brief life, 1887-1889.

In 1894, Wm. Johnson commenced the issue, for public subscription, of a local herbarium of the North of England Lichen Flora, of which the thirteenth fascicle appeared in 1918 shortly before his death. The material now stored at the University of Leeds is not the exsiccata issued to subscribers, but his own working collection in thirty-three fascicles, which was offered to the University by the family in accordance with a wish expressed during his lifetime.

We learn from *The Yorkshire Herald* that ' a large new bronze and glass case has been installed in the central hall of the Museum at York.'

Canada, an illustrated weekly journal, No. 1216, contains an illustrated description of Elks fighting near the Bank Springs Hotel, Alberta.

NEWS FROM THE MAGAZINES.

'Notes from a Lancashire Aviary,' by J. Appleby, appear in *The Avicultural Magazine* for June.

A list of the flies which form the food of trout is given in *The Entomologist's Record* for May. The principal forms belong to the Trichoptera.

A. Raistrick and S. E. Chapman give a well-illustrated account of 'The Lynchet Groups of Upper Wharfedale, Yorkshire,' in *Antiquity* for June.

R. G. Carruthers describes 'Burnt Outcrops associated with the High Main Coal at Newcastle-upon-Tyne,' in *The Colliery Guardian* for June 21st.

The Bergen Museum Arbok (Natural History Section) for 1929, contains an admirable and well-illustrated monograph on 'The Changes of Plumage in the Willow Grouse.'

The Henry Crowther's collection of Miner's safety lamps, together with many others in the Hull Museum, are illustrated and described in *The Colliery Guardian* for May 31st, by Mr. T. Sheppard, M.Sc.

The Journal of the Imperial Fisheries Institute, Tokyo, Vol. XXIV., No. 3, is entirely devoted to a highly technical account of 'The Resistance of Bonito Fishing Boats,' with numerous tables, diagrams and other illustrations.

The Ministry of Agriculture and Fisheries, as *Miscellaneous Publication No.* 64, has issued 'The Culture of Fish in Ponds,' being a summary of the successful methods employed in fish-farming countries, by C. B. Hall (20 pp., 4d. net).

'Go to the ant,' King Soloman enjoined upon his sluggard race. Now, Professor E. B. Poulton reveals its falling from grace by getting inebriated. Alas, this failing intends to show 'The ant's degenerated; antwards the sluggard must not go!' ('G.C.L.' in *The Entomologist's Record*.).

Brigadier-General B. H. Cooke, C.M.G., C.B.E., D.S.O., in *The Entomologists' Record* for May, gives his experiences in rearing larvæ of *Callophrys avis* from ova laid by a female captured by the Brigadier-General in April, 1928, at Cavaliere on the Riviere coast. Even *Callophrys* cannot elude a British Brigadier-General.

The Twenty-fourth Annual Report of the Manx Museum and Ancient Monuments Trustees contains a record of the additions to the Museum, including a Viking glass bead from Cronk Conoly, and what is described as an engraved pillar of Bronze Age, which contains a number of more or less rectangular lines considered to be representations of reindeer.

The New Phytologist for May is a particularly well-illustrated issue, and contains: 'The Classification of Lichens,' by W. Watson; 'The Protein Metabolism of the Green Plant,' by Muriel Elaine Robinson; 'The Structure of Fasciated Plants of *Campanula carpatica* Jacq.,' by W. C. Worsdell; 'The Pycnidia of the Rust Fungi,' by W. B. Grove.

The Bulletin (No. LVII.) *of the South-eastern Union of Scientific Societies*, Brighton, June 5th, is before us. It is recorded that the Union has suffered a great loss by the death of Dr. W. Martin. 'A Bibliography of Key Papers' on the geology of the Brighton district is given. Dixon, Mantell, Rowe, Sherborn and others who have made serious contributions to the geology of the area are not included, but a list of seventeen items is given, six being by E. A. Martin, one being 'a popular article.' It is also interesting to learn that a small heart-shaped charm bracelet was found during the Rochester Congress.

NORTHERN NEWS.

Our contributor, Mr. Hans Schlesch, has been elected an Honorary Member of the Malta Historical and Scientific Society.

Mr. Douglas A. Allen, of Armstrong College, Newcastle-upon-Tyne, has been appointed Director of the Liverpool Museums.

At a recent meeting of the Geological Society of London, Mr. F. M. Trotter read a paper on ' The Glaciation of Eastern Edenside, the Alston Block, and the Carlisle Plain.'

The Haworth Ramblers have issued an instructive four-page programme of the ramble to Hawes and Hardraw Scar on Whit Monday, when Mr. E. Earnshaw and M. Holmes were the leaders.

' Art and alcohol have never been incongruous terms. It will, therefore not surprise us to find that the greatest musical artists of the insect world are among its deepest drinkers ' (Myers' *Insect Singers*, see page 225).

The Commons, Open Spaces and Footpaths Preservation Society, in its *Journal* for June, refers to many botanical subjects including The Regulation of Commons, Gipsies on Epsom Downs, Hightown Common, Hampshire, etc.

We learn from the local press that the Upper Wharfedale Antiquarian and Naturalists' Society decided to present a testimonial to Mr. John Crowther, curator of the Grassington Museum, in recognition of his 40 years of scientific work in Upper Wharfedale. Mr. Crowther recently presented his ' finds ' to the new Skipton Museum.

All interested in aphids, thysanoptera, centipedes, millipedes, scorpions, spiders, mites, ticks, king-crabs, crayfish, crabs, shrimps, copepods, barnacles, water-fleas, sea-cucumbers, brittle-stars, starfish, crinoids, sea-urchins, cuttle-fish, gastropods, etc., should see Part 17 of Lydekker's ' Royal Natural History ' (pp. 193-384), published by Messrs. Warne & Co., at 2/6.

The Daily Mail informs us that at Grimsby on July 17th was landed a cod fish from Iceland said to be the largest ever seen at the Port, and *seven times the normal size*. It was 66 inches in length, so that, according to the *Daily Mail* the normal length of a cod fish is a little over 9 inches in length. This may be the average size of codfish in Grimsby, but those landed at Hull are considerably larger.

At Stevens' Auction Rooms on May 7th, the collections of birds' eggs made by the late J. J. Dagleish, M.B.O.U., and others, were offered for sale. There were 489 lots, which were particularly strong in eggs of vultures and other birds of prey. The total realized, however, was only about £200, the low price doubtless being on account of the fact that the original data tickets were not with the eggs. Many of the lots contained thirty or more eggs, of different species.

Messrs. F. Warne & Co. have issued a particularly attractive and substantial series of covers for *The Royal Natural History* by Lydekker. The cases are beautifully bound in high quality cloth, on extra stout boards, with bevelled edges, and lettered in real gold on spine : Vols. I. and II., Mammals ; Vol. III., Mammals, Birds ; Vols. IV., Birds ; Vol. V., Reptiles, Fishes ; Vol. VI., Invertebrates. These are sold at 2/- net per case or 12/- net for the set of six, and can be had of all booksellers.

The 31st May will be a date long remembered in the annals of journalism, as on that date *The Daily Mail* discovered that Gulls nested on Skipwith Common. Under a lengthy article which vied with the results of the General Election, the *Mail's* ' own correspondent ' describes a visit to Skipwith Common where Gulls were actually seen with their eggs, although no fish is available for them to feed upon in the vicinity, and they get a livelihood by following the plough. The article is made prominent by a series of headings in large type, such as ' Gulls' Nesting Mystery ' ; ' Nurseries on Inland Marsh ' ; ' 50 Miles from the Sea.'

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Aug., 1929.

SEPT., 1929.

No. 872
No. 646 of current Series

THE NATURALIST.

A MONTHLY ILLUSTRATED JOURNAL

PRINCIPALLY FOR THE NORTH OF ENGLAND.

EDITED BY

THOMAS SHEPPARD, M.Sc., F.G.S.,
F.S.A.Scot., F.R.A.I., M.B.O.U.,
The Museums, Hull;

and T. W. WOODHEAD, Ph.D., M.Sc., F.L.S.,
Tolson Memorial Museum, Huddersfield.

WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF

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Excursion to Warmsworth, September 28th, 1929.

TRAINS.—Leeds, 10-15 a.m.; Bradford, 9-50 a.m.; Huddersfield, 9-30 a.m.; Doncaster, arrive 11 a.m.

RETURN.—Doncaster, 6-25 p.m.; Leeds, 7-10; Bradford, 7-54; Huddersfield, 8 p.m.

There are also frequent buses between the various towns and Doncaster.

The party will assemble at Doncaster Station at 11 a.m., and proceed by car to Warmsworth.

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Continued on page 3 of cover.

Green-Man Orchis.

Aceras anthropophora. ORCHIDACEAE.

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NOTES AND COMMENTS.

WAYSIDE AND WOODLAND BLOSSOMS.*

We have from time to time drawn attention to the beautiful series of books published by Messrs. Warne & Co., and two series have previously been issued relating to wayside blossoms. Admirable as these were, they could not possibly describe everything; consequently the author and publishers have issued a third series, which includes a number of well-known species omitted from the previous volumes, as well as rare flowers not likely to be met with everywhere. Recognizing that our native orchids had formerly too slight a representation for a group so popular, a considerable section of the new volume has been devoted to a description of all the species, preceded by an account of their remarkable symbiotic relationships. By the courtesy of the publishers we are able to let our readers have a sample of the illustrations (see Plate VIII.).

THE CARNEGIE TRUST AND MUSEUMS.

The Presidential Address of Sir Henry A. Miers to the Museums Association on 'Co-operation, the Task of the Association,' appears in *The Museums Journal* for August. The suggestion then made that the Carnegie Trust might meet the Museums Association by giving financial assistance in order to have a central office and a paid secretary has since generously been met by the Trust and a sum of £1,500 voted to the Association.

BORROWDALE VOLCANICS.

At a recent meeting of the Geological Society of London, Dr. G. H. Mitchell read a paper on 'The Petrography of the Borrowdale Volcanic Series of the Kentmere Area (Westmorland).' He pointed out that in a previous communication the succession and structure of the Borrowdale Volcanic Series in Troutbeck, Kentmere, and Long Sleddale were described. The present paper formed the sequel, and dealt with the petrography of the rocks of that area. The volcanic rocks are composed of both lava-flows and tuffs, and chemical analyses and microscopical examination show them to be of intermediate composition, varying from basic andesites to rhyolites. The rocks are greatly altered, and this has led to difficulty in distinguishing between lava-flows and tuff-deposits, particularly when the former are brecciated owing to flow. The characters of the lava-flows and tuff-deposits

* By Edward Step., xv.+176 pp., 7/6 net.

were discussed in detail. The alteration of the rocks, as shown by the changes in mineral composition, together with the materials filling the vesicles, was considered. The conclusion was reached that much of the alteration may be referred to a variety of propylitization.

PETROLOGY OF BOULDER CLAYS.

With the aid of a grant from the Royal Society, Dr. A. Raistrick has petrographically examined the Boulder Clays exposed in the section at Dimlington, E. Yorks. He concludes that ' the examination of the Dimlington clays has shown that (1) the physical condition (size, freshness, etc.), (2) abundance or scarcity of particular minerals, (3) the general mineral assemblage in the heavy minerals of the clays, are specific characters of each clay and are closely related with the petrology of the area from which the clay has been derived. It also suggests that the sands which occur at the top of the Basement clay and the Purple clay, on the coast, are definitely connected in each case with the underlying clay, and are probably in some measure the result of the denudation of that clay in the interglacial periods. The nature of the mineral content of the Hessle clay throws doubt on the suggestion frequently made that this clay is the result of weathering and resortment of the underlying Purple clay, and strengthens the idea that it is of distinct origin.''

TO OUR CONTRIBUTORS.

It will perhaps save a certain amount of correspondence if this opportunity is taken of explaining to our contributors some of the reasons why alterations are made to notes or their titles sent to *The Naturalist*. In the first place, a title should be as concise as possible, and should at once give an idea of the nature of the contribution. ' A Find,' ' A Strange Coincidence,' 'A Rare Occurrence,' or other such title conveys nothing, and may equally well refer to a patent medicine or to an elephant falling backwards. The titles we give, also, are quoted in numerous other magazines, and in addition several bibliographies and indexes are published annually in which they are again quoted. Such title, for example, as ' A preliminary note on the occurrence of a rare species of fish, namely the Spotted Ray, at low water, in Carnelian Bay, near Scarborough, on the morning of August Bank Holiday ' is quite well expressed as ' Spotted Ray at Scarborough.' Contributions are frequently received with such introductions as ' It may interest readers of *The Naturalist* to know ' or ' When recently conversing with an old school friend of mine called John Smith, whom I had not seen for

twenty years, he told me, etc.' What we require are merely the facts ; if it would *not* interest our readers, the note would not be printed. Roughly speaking each word in *The Naturalist* costs one farthing, and as we always have much more in hand to print than can be included in any one number, obviously a saving of words is an advantage, as well as saving expense.

THE ADVANCEMENT OF SCIENCE.

Although the British Association is meeting in South Africa this year, the publication of the Presidential and other addresses under the general title of ' The Advancement of Science ' has been achieved, and the work is obtainable at the rooms of the Association at Burlington House, price 6/-. The addresses are as under :—' Africa and Science,' by Jan H. Hofmeyr ; ' The International Relationships of Minerals,' by Sir Thomas H. Holland ; ' Some Problems of Cosmical Physics,' by Lord Rayleigh ; ' The Relation of Organic Chemistry to Physiology,' by Prof. G. Barger ; ' The Utility of Geological Surveys to Colonies and Protectorates,' by Sir Albert Kitson ; ' Adaptation,' by Prof. D. M. S. Watson ; ' National Surveys,' by Brigadier E. M. Jack ; ' The Public Regulation of Wages in Great Britain,' by Prof. H. Clay ; ' Science and Engineering,' by Prof. F. C. Lea ; ' South Africa's Contribution to Prehistoric Archæology,' by Henry Balfour ; ' Physiology the Basis of Treatment,' by Prof. W. E. Dixon ; ' Experimental Method in Psychology,' by F. C. Bartlett ; ' Botanical Records of the Rocks,' by Prof. A. C. Seward ; ' Modern Movements in Education,' by Dr. C. W. Kimmins ; and ' Agriculture and the Empire,' by Sir Robert Greig.

WORK AT AN AGRICULTURAL COLLEGE.

The *Journal of the South Eastern Agricultural College* (University of London) Wye, Kent (8/6 post free) for 1929 contains 220 pages, and is mainly devoted to the consideration of the scientific work which is being undertaken at Wye. A detailed account is given of a number of field trials and experiments carried out in 1927-1928. These include potato manurial trials ; hops as a manure for potatoes ; sugar beet variety and manurial trials ; manurial trials for swedes, thousand-head kale, mangolds and oats ; experiments with temporary leys ; pasture manures ; permanent grass seed mixtures and a pig feed trial. A special section deals with weather records and the effect on crops, and a summary of the year's progress on the College Farms with a map is given. The work of combating diseases of plants is dealt with by

Mycologists, Entomologists and Chemists. The Agricultural Economists contribute an article on ' Another Clay Farming Episode.' There is a paper on the role of photography as an aid to the examination of cattle foods. Other matters include soil profile, precision records on wheat, the reductase test, and millepedes and centipedes in relation to horticulture and agriculture.

ENTOMOLOGY.

Moths new to the Isle of Man.—On checking a list of my captures for last year with the Manx moths in the Manx Museum, I find the following apparently previously unrecorded for the Isle of Man :—Straw Dot (*Rivula sericealis*), taken on the stems of Woodrush, in a patch of marshy ground at Hilberry ; Common Carpet (*Xanthcroe sociata*), several specimens taken near Douglas ; Spinach (*Lygris associata*), taken in Douglas in July, 1926, but wrongly identified as Northern Spinach (*Lygris populata*). Other specimens of the last mentioned probably have previously been overlooked.—W. S. Cowin, Douglas, I.O.M.

The Common Carpet Moth is quite common here, but had not been recorded till last year. The Straw Dot, *Rivula sericealis* is a new record for the Island. I am not sure about the Spinach ; we have *Lygris populata* in our collection, and it is possible that *associata* (not recorded) may, as Mr. Cowin says, have been identified with it. Our collections so far are by no means complete, nor are our records, and I am glad to hear of any additions.—P. M. C. Kermode, Curator, Manx Museum.

Hemiptera near Wigton.—My captures in the Wigton district are included in the list of Cumberland Hemiptera-Heteroptera, by Mr. F. H. Day, F.E.S., in the *Transactions of the Carlisle Natural History Society*, published last year. *Scolopostethus thomsoni* occurred in numbers on Common Nettle in a lane near Kelsick, and I think it is more attached to this plant than any other. *Stenodema calcaratum* by far outnumbered the other two species about Kelsick. *Calocoris sexguttatus* favours the Hogweed, sometimes in considerable numbers. *Bryocoris pteridis* was very local on *Lastrea*, but plentiful where it occurred. *Orthotylus virens* ; two specimens from Bay-leaved Willow in August in a lane at Kelsick. *O. chloropterus* was common on Broom on Brownrigg Marsh. *Corixa geoffroyi* ; all my specimens from Oulton Moss were this species, no *dentipes* being present.—Jas. Murray, Gretna.

AMMONITES WILLIAMSONI, PHILLIPS, AND SOME ALLIED FORMS.

L. F. SPATH, D.Sc., F.G.S.

In the first edition of his 'Illustrations of the Geology of Yorkshire' (1829), John Phillips figured as *Ammonites*

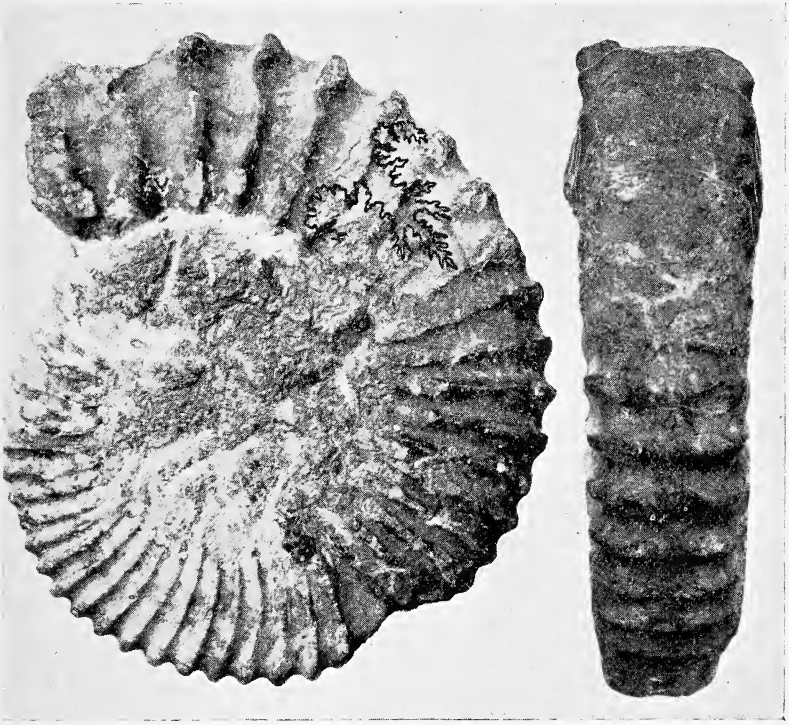

Fig. 1.—*Peltomorphites williamsoni* (Phillips). Side- and peripheral views of the holotype in the Scarborough Museum. Lower Corallian of Ayton.

williamsoni (Plate IV., fig. 19) an example from the Coralline Oolite of Ayton, which I have lately been able to examine by the kindness of Mr. Chas. H. Wilson, the Hon. Curator of the Scarborough Museum. Phillips mentioned in the 'Explanation of the Plates,' in the third edition (1875), that certain figured specimens in Williamson's collection had been transferred to the Scarborough Museum, and the type of the species here discussed is undoubtedly one of them. Its

agreement with the (reduced) figure is perfect, as will be seen on comparison of the photograph (text fig. 1) with Phillips's impressionist (but surprisingly good) sketch. There was no description in any of the editions, but in the last (edited by R. Etheridge) we note the addition of C. G. (Calcareous Grit) to the C.O. (Coralline Oolite) of the first edition.

The species was generally misinterpreted, probably largely on account of a number of specimens mislabelled by Bean having become distributed in public museums and private collections. In the same year (1875), however, Waagen,[1] with his usual perspicacity, had already recognised that Phillips's *Ammonites williamsoni* resembled *Peltoceras bidens* Waagen, but had a more squarish aperture and almost no depression of the ribs of the siphonal side. I have before me the whorl-fragment figured by Waagen in his Plate XV., figs. 3a, b (badly drawn by Waagen's artist), and I must confess that I cannot differentiate it even specifically from Phillips's species; but whether the gigantic holotype of *Peltoceras bidens* belongs to the same form is doubtful.

I do not propose to go into the synonymy of the many allied forms hitherto published, since they will be discussed in detail in fascicule 5 of my 'Revision of the Jurassic Cephalopod Fauna of Kachh (Cutch),' now in progress. But Yorkshire geologists may like to have a brief description and figures of the true *Amm. williamsoni* as well as of the species that Bean wrongly identified with Phillips's form. Mr. Sheppard kindly sent me a fine whorl-fragment of this second species from the Calcareous Grit, which had been collected in the Yorkshire Drift and was thought to be from the Speeton Clay. It shows the internal lobes as well as the external suture-line, and it is desirable to publish these also, pending the fuller discussion of the members of the family Peltoceratidæ.

The type of *P. williamsoni* here figured represents merely the septate inner whorls of a large form. Its dimensions are :—

Diameter	85 mm.	
Height of the outer whorl	32%	of the diameter.
Thickness of the outer whorl	30%	,, ,,
Width of the umbilicus	48%	,, ,,

The whorl-section is first rectangular, compressed, later quadrate, and the flat venter becomes subsulcate on the last half-whorl, owing to the development of pairs of small tubercles at the ventro-lateral angles. The greatest whorl-thickness is at the umbilical tubercles which appear at a later

[1] 'Jurassic Fauna of Kutch,' Vol. I., Cephalopoda (Ammonitidæ) fasc. 3 (*Mem. Geol. Survey India, Pal. Indica*, Ser. 9), p. 87.

stage than the outer tubercles, but soon exceed them in prominence. The earlier part of the outer whorl has merely untuberculate, slightly reflexed costæ. Most of these are single, but a few divide near the umbilical edge, and apart from the fact that its whorls are more rectangular, *Amm. williamsoni* at smaller diameters is probably closely similar to the immature *Peltoceras eugenii* (Raspail) figured by P. de Loriol.[1] Larger examples of this French species, comparable to d'Orbigny's figure,[2] and similar English specimens from near St. Ives, Hunts. (*e.g.*, B.M. No. C4363) differ from the type of Phillips's form merely in the earlier acquisition of tuberculation, and in the greater prominence of the spines, as well as of the sharp ribs. Fox-Strangways[3] listed *Amm. williamsoni* as from the Lower Corallian, but *Amm. eugenii* from the Oxford Clay. The identifications, however, are doubtful, although it is established that *eugenii*-like species appeared in numbers in the *renggeri* zone, but did not reach large dimensions until the succeeding *cordatus* zone (or Cardioceratan age).

The suture-line shows a deep and long, trifid, first lateral lobe and a very short second lateral lobe, as in most of the forms of the *eugenii* group. It is closely comparable to that of Waagen's *Peltoceras propinquum*, which will be figured in Part V. of my 'Revision of the Jurassic Cephalopoda of Kachh (Cutch).' The resemblance of this species to Buckman's *Peltomorphites hoplophorus*[4] from the lower *cordatus* zone (Upper Oxford Clay) of Weymouth, makes it advisable to adopt this genus *Peltomorphites* for the *eugenii* group, but Buckman does not seem to have had very clear views on the affinities of the various Peltoceratids. For if his Scottish specimen figured in Pl. DLXIII., and first recorded as *Peltoceras* cf. *interscissum*, has any resemblance to Uhlig species,[5] it belongs to the *eugenii* group and is a *Peltomorphites*, as here understood; whereas his Weymouth example of Plates DLXIV., *A* and *B*, labelled '*Ammonites constantii*' on the one plate and '*Peltoceras inconstans*' on the other, if it be really close to d'Orbigny's[6] or Uhlig's[7] species, would be a typical *Peltoceratoides*. I

[1] 'Oxfordien Inférieur Jura Bernois,' *Mém. Soc. Pal. Suisse*, Vol. XXV., 1898, Pl. vii., figs. 8, 8*a*.

[2] *Paléontologie Française, Terr. Jurass.*, 1848, Pl. CLXXXVII., figs. 1-5.

[3] 'Jurassic Rocks of Britain,' Vol. II., *Mem. Geol. Survey*, 1892, pp. 295, 303.

[4] *Type Ammonites*, Vol. V., 1925, Pl. DLXIV., *A-B*, very badly preserved, but interpreted with the help of a smaller specimen of an allied form from Damon's collection (B.M. No. 46750).

[5] 'Jurabildungen in der Umgegend von Brünn,' *Beitr. Pal. Österr. Ung.*, Vol. I. (1881), p. 168, Pl. XIV., fig. 2.

[6] *Loc. cit.* (1848), Pl. CLXXXVI.

[7] *Loc. cit.* (1881), Pl. XIV., figs. 1*a*, *b*, Pl. XVI., figs. 1*a*, *b*, 2.

particularly chose as genotype of the latter an Indian form (*Peltoceras semirugosum* Waagen)[1] which is intermediate between the *arduennense* and *eugenii* groups ; and if separation is to be upheld, *Peltomorphites* must be used for those forms that develop bituberculate ventro-lateral edges and a sulcate ventral

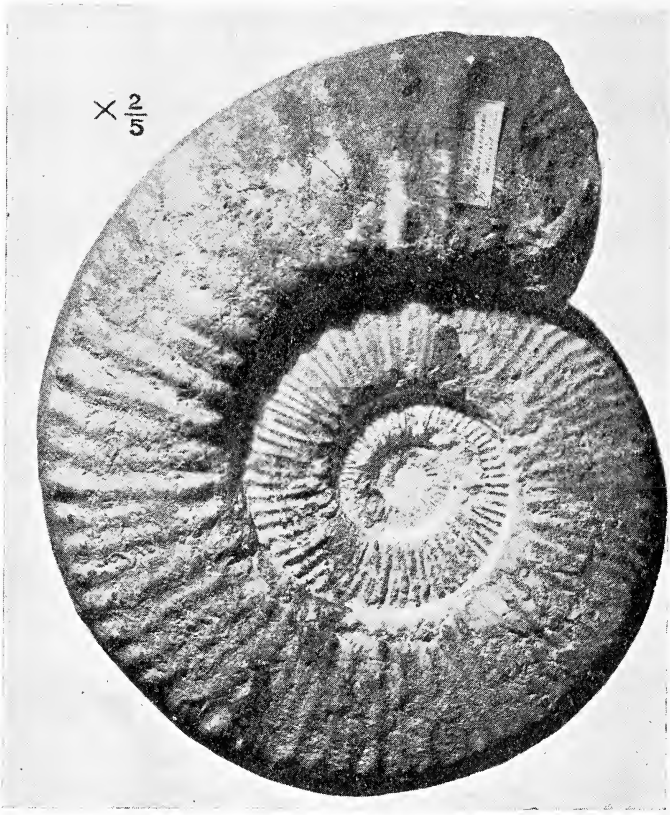

FIG. 2.—*Peltoceratoides beani*, sp. nov. Side-view (reduced to two-fifths linear) of holotype in the British Museum, Natural History, from the Bean Collection (No. 38008). Lower Corallian (Calcareous Grit), Scarborough.

area, as in the later *Epipeltoceras* (*bimammatum* group). Schindewolf's[2] genus *Wedekindia* would thus probably also fall in the synonymy of *Peltoceratoides*, not of *Peltomorphites*,

[1] *Loc. cit.* (1875), p. 83, Pl. XIV., figs. 1, 1*a*, *b*.

[2] ' Entwurf einer Systematik der Perisphincten,' N. Jb. f. Min. etc. Beil. Bd., LII., *b*, 1925, p. 321.

as he thought in 1926,[1] but small *arduennensis*-like inner whorls of either of these two genera cannot be satisfactorily distinguished.

The species that Bean took to be *Amm. williamsoni* is figured in text fig. 2 (reduced to two-fifths of the natural size), and it may be named *Peltoceratoides beani* sp. nov. It is very close to *P. constantii* (d'Orbigny),[2] but retains the very fine

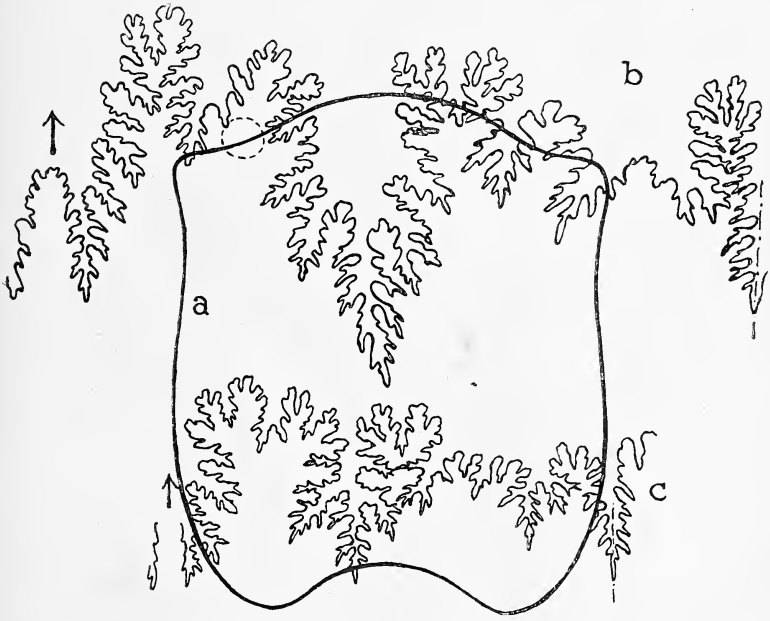

Fig. 3.—(*a*, *b*) Outline whorl-section and suture-line of a paratype of *Peltoceratoides beani*, sp. nov., in the Hull Museum. Drift. (*c*) Suture-line of *Apidoceras* cf. *catena* (Sowerby) from the Lower Corallian of the Waldershare Boring in the Kent Coalfield (Capt. Bomford Colln.). All reduced ($\times\frac{5}{6}$).

and close costation of the inner whorls to a much larger diameter. I was at first inclined to identify the Yorkshire form with Uhlig's equally large *Peltoceras inconstans*, already cited, since the more compressed whorl-section of the latter is obviously the result of crushing. There are, however, differences in the ribbing that make it advisable not to identify

[1] 'Zur Systematik der Perisphincten.' *Ibid.*, Vol. LV., *B*, p. 516.

[2] *Loc. cit.* (1848), Pl. CLXXXVI., as interpreted by *e.g.*, a Wootton Basset (Wiltshire) example in the British Museum (No. 24088), labelled by the late G. C. Crick '*Amm.* (*Peltoceras*) *williamsoni*.'

the two forms. The example here figured has the following dimensions :—

Diameter	240 mm.	
Height of the outer whorl	32%	of the diameter.
Thickness of the outer whorl	27%	,, ,,
Width of the umbilicus	44%	,, ,,

The fragment in the Hull Museum of which the suture-line and whorl section are here figured (text figs. 3*a*, *b*), corresponds to the last third of the outer whorl of the more complete holotype ; but it is still entirely septate, while the holotype shows just the beginning of the body chamber. Perfect specimens of this species are thus of gigantic dimensions.

The suture-line (text fig. 3*b*, reduced to $\frac{5}{6}$) is characterised by a wide external saddle with a slightly less prominent inner branch than the very similar suture-line of *Peltoceratoides inconstans*. I have added (text fig. 3*c*) the entire suture-line of an *Aspidoceras* of the type of *A. catena* (Sowerby) from the Lower Corallian of the Waldershare (Kent) Boring, kindly sent to me by Capt. Bomford, R.E. It will be noticed that the umbilical and dorsal elements are somewhat similar, but the broadly trifid lateral lobe is much shorter.

As I only know of a single specimen of *P. williamsoni* I am doubtful whether Blake and Hudleston[1] correctly identified this species when they recorded its frequent occurrence in the lower Passage Beds (from the Lower Calcareous Grit to the Lower Limestones) in the neighbourhood of Scarborough. Perhaps a Yorkshire geologist who recognises the forms here figured will be able to put on record the exact horizon or range of the two species.

A branch of the University of London Animal Welfare Society has recently been formed at Bedford College with Prof. W. Wilson, F.R.S., as President, and Miss C. E. Hurren as Secretary. It has undertaken as its special work the study of the conditions under which animals exist in certain continental countries.

Among many valuable memoirs in *The Proceedings of the Zoological Society of London* for April are : ' The Attachments of the Auditory Ossicles of the Common Mole,' by H. C. Wilkie ; ' A New Species of Monogenetic Trematode from the Gills of *Pagellus controdontus*,' by E. M. Brown ; and ' A Case of Bilateral Hectocolylization in *Octopus rugosus*,' by G. C. Robson.

Dr. Raistrick kindly sends a copy of his admirable paper on ' Lead Mining and Smelting in West Yorkshire,' appearing in Volume VII. of *The Transactions of the Newcomen Society*. He gives an excellent plan and section of Bayle Hill, at Winterings, Gunnerside, showing the way in which lead was smelted ; and a ' Draught of Lead Smelting Mill, Yorkshire, 1735.' from the Egerton MSS. in the British Museum.

1 ' The Corallian Rocks of England,' *Quart. Journ. Geol. Soc.*, Vol. XXXIII. (1877), pp. 323, 386.

THE CLASSIFICATION OF BIRDS.

H. KNIGHT HORSFIELD, M.B.O.U.

From the earliest times birds have attracted a greater amount of popular attention than any other objects in animated nature. The reason is not far to seek. They are constantly with us ; their power of flight renders it unnecessary for them to seek safety by secreting themselves in holes or dens, or to shrink from observation in deep vegetation or inequalities in the ground after the manner of the smaller mammals. By their song they compel the notice of the least observant, and the brightness and variety of their colouring, the vivacity of their movements, and their interesting and often most ingenious methods of nest-building all combine to make it impossible for them to be overlooked.

Possibly the very first exercise of the ornithologist's craft was to divide birds roughly into their several orders. At first sight nature appeared to have made these sub-divisions so clearly and effectively that nothing remained but to give names to each well-marked family, and subsequently to christen each species as taste or fancy might dictate. Our early naturalist, surveying the birds of his own country—Great Britain, for example—might easily congratulate himself upon the simplicity of his task. There stood the diurnal birds of prey—the eagles, falcons and hawks. with their hooked bills and sharp, powerful claws, their bold flight, and distinctive predatory habits. Clearly nature had set them sharply apart from their kin of the feathered world. Then came the owls, with their marked characteristics, the fowl tribe, hatched feathered and alert, the crows, waders, sea-birds, tree-climbers, swallows, finches, warblers, and so on, each bearing marks of its kinship, not only in a special conformation, but also in innumerable tricks and habits distinctive of its group.

But as the mind of man rested more steadfastly on the bird-world around him, it became evident that the business of classification was by no means so simple as it had at first seemed. For example, when he had arranged his families fairly to his satisfaction, strange specimens might reach him from over the seas, demanding a place in his system, which it became extremely puzzling to provide. It was apparent to him that any really satisfactory and comprehensive plan of classification must not be limited to a mere geographical area, but must embrace every bird known in the world.

Herein his troubles began, and he would be a bold and far-sighted prophet, indeed, who could predict when they would end. Professor Newton, who brought his vast learning to bear upon all the systems devised by man, from Aristotle onwards, has declared ' To theory belongs, and must belong,

all attempts at classification '—a remark as true to-day as when it was written.

Yet it must not be imagined that the workers on birds have been at all deterred by the magnitude of the difficulties to be faced. Newton gives the names of about 400 writers who have either introduced or supported various systems, the more prominent of which he examines in the coldest of cold blood, and in none finds the summit of his desire.

A brief glance at a few of the more prominent of these systems may here be permitted. Aristotle may be taken as the first of the systematists, although even he tells us that he had his predecessors. He recognised eight principal groups, and described about 170 speces ; so meagrely, however, that commentators for hundreds of years have been unable to determine with any certainty all the kinds of birds he was writing about. Still his observations formed the basis of Pliny's vast work, ' Historia Naturalis,' and it becomes obvious that some of the difficulties of classification dawned at once on this old-time naturalist's mind.

Pliny believed that from the peculiarities of the feet of birds a system of correct arrangement might be devised, and we find him establishing three leading groups, *i.e.*, ' those that have hooked talons as hawks ; round long claws as hennes ; broad, flat and whole-footed as geese, and all the sort in manner of water-foule.'

System-makers too numerous to mention now arose in succession, but nothing very definite appears to have been done until John Ray and Francis Willughby began to work together on the subject. Their book, ' Ornithologia,' published in Latin in 1676, and in English, with many emendations, in 1678, formed what may be deemed to be the foundation of scientific ornithology. In this work birds generally were grouped in two great divisions, ' Land-Fowl and Water-Fowl,' the former being sub-divided into those which have a straighter bill and claws, while the latter was separated into those which frequent waters and watery places and those that swim in the water, each sub-division being further broken up into many sections to the whole of which a key was given. Thus it became possible, it was thought, for almost any diligent reader, without much chance of error, to refer to its proper place nearly every bird with which he was likely to meet.

Two years after Ray's death, the Swede, Linnæus, described as the great reformer of natural history, was born, and in 1735 appeared the first edition of the celebrated ' Systema Naturæ.' Linnæus appears to have taken nature pretty generally for his province, and the careful distinctions drawn by him in the case of both plants and animals have been adopted and followed to a surprising extent by all naturalists

up to the present time. On his initiation, the practice became general of giving each creature a generic and specific name, thus indicating at once in its title, not only the name of the individual, but also that of the race to which it belongs.

Still, systematists continued to appear, always finding flaws in their predecessor's work, always trying to remedy them with good or ill success.

Buffon, a brilliant, but by no means reliable writer, devised a system of his own in opposition to that of Linnæus, a system which Newton somewhat cynically pronounced to be ' neither much better nor much worse than those hitherto invented.' To Buffon, however, is due the credit of proclaiming the variability of species, in opposition to the views of Linnæus as to their fixity—a most important contribution to scientific thought in view of the later work of Darwin and Wallace.

Space forbids us to make detailed reference to the systematising work of Cuvier, Brisson, Pennant and others, although they all did much to broaden the foundations upon which scientific ornithology rests.

But we cannot omit a reference to the work of Harvey. In addition to his world-famed physiological discoveries, the great doctor brought to light what was practically a new science, the science of embryology. Hitherto, bird classifiers had relied mainly on external characteristics, plumage, beaks, feet, etc., with a side-glance at habits, nest-building, colouration of eggs and so on, for their determination of species. Now they sought in embryology—in the formation and development of the chick in the egg—for the clue that should give them at last the complete system, into the pigeon-holes of which every bird known on earth should automatically fit. We cannot here touch up on the labours of the embryologists, although many of their discoveries are of the utmost importance ; nor, indeed, of those of the osteologists, and dissectors generally, who base their systems on the anatomy of their subjects, especially on the skeleton. It must suffice to say that the ideal plan has never been found, and in view of the fact that species is not a fixed thing, but is always ' in a state of becoming,' in all probability never will be.

Blyth, writing in 1838, stated that anatomy, when aided by other characters, was the only sure basis of classification. But anatomy plays some strange tricks at times, and leaves its devotees in a dilemma that they might well have prayed to be spared from. Take the case of the swift, for example. The swift is most obviously a martin, the black martin of folk-lore. Watch it as it sails through the blue sky. Note carefully its mode of flight, of feeding, nest-building, and a host of small, intimate habits which identify it with the swallow race, and with no other. If it had any respect for science, the swift

would have followed the martins in its internal economy as closely as it does in externals. But it refuses to be bound by any rule, and so the system is forced to decree that it has not the remotest affinity with the martins ; that, indeed, it differs from them to a greater extent than any other family of Passeres, and that, although it may have some faint connection with the nightjars, it is really a humming-bird. Whether this is the fault of the swift, or of the system, we must leave posterity to determine.

So the system-makers carried on. Huxley, in 1865 or thereabouts, had much to say about systems, and somewhere about 1889 the matter came well to the front at the meetings of the Ornithologists' Union. Dresser, with Bowdler-Sharpe, had completed ' The Birds of Europe,' Seebohm had written on ' Birds and Eggs " (his plates showing eggs have never been equalled), Howard Saunders had edited the last two volumes of ' Yarrell ' (4th edition), following Newton, who had done the first, and had also issued an abridged form of it—' Manual of British Birds.' J. E. Harting, for so many years Natural History Editor of ' The Field '—we think the sum of his services amounted to 50 years—had also published various works on birds. Eagle Clarke, author of ' Yorkshire Vertebrata,' was already deep in his studies of bird migration, which have led him so far ; all these, with other lesser lights, were present on one occasion at a B.O.U. meeting. It can be well imagined that when the good old question, ' When is a species not a species ? ' arose, such men would have a good deal to say. After the dinner at the Café Royal, Harting asked us to adjourn to the rooms of the Linnæan Society, at Burlington House, where in a more peaceful atmosphere the discussion could continue.

We can see them all again by the inner eye of memory. Newton—old, stern, clean-shaven, the typical University professor—a ' When-I-ope-my-lips-let-no-dog-bark ' kind of man ; Dresser, his exact opposite, slim, gentle, with a charming, half-apologetic smile ; Bowdler-Sharpe, suggesting rotund activity ; Saunders, also rather short and round, genial enough, but with very decided opinions ; Seebohm, erect, soldierly, with trimmed, pointed white beard, adventurer and pioneer in wild Siberian wastes ; Harting, big, rosy, ever ready to work in some ribald jest, even when the sacred subject of admitting the white wagtail to specific rank was the theme—all these—now across the border-line, arise again.

The crows began it. Seebohm said *C. corone* and *C. cornix* were the same : proved it to his own satisfaction, by setting up a case at South Kensington, showing all the intermediates. Newton, always a stickler against splitting species, agreed with him. Still, in this case, remembering the marked difference between the carrion and the hooded, plumage, habits and so

on, and seeing they had always been treated as separate, the majority held it was absurd to make a change. Saunders was especially emphatic. After all, whether you call a thing a species or a variety is merely a matter of convenience. Then the white wagtail, the St. Kilda wren and others came along. Newton, always a strong follower of Darwin, held that these were only forms—island or otherwise—of one species. There were differences of opinion here, but after all, these did not amount to very much. Newton, indeed, in the end, admitted the white wagtail.

So the years went by—the old classifiers passed on (Abel Chapman was one of the last), and a type arose that we think might fitly be recognised as a new species with binomials and trinomials complete. The old-timers were ignored. Darwin's dictum that the word ' species ' amounts to little more than variety—Newton's warning that if you recognise all racial forms as distinct species you strangle ornithology ; Saunder's strong protest that plumage alone must never be taken as creating a species, all these views—mere gropings in primeval gloom—were to disappear in the light of the new wisdom.

When young Dr. Hartert came from Germany to take up the position of Curator at Tring, he came as the Apostle of Thoroughness. Ornithology, with meticulous care, was to be thought out to the last trouser-button. Kindred spirits joined him, and their combined efforts appear, after many years of strenuous labour, in ' The Handbook of British Birds,' edited by H. F. Witherby. This work stands out to-day as a marvel of industry. Weeks must have been spent in counting, measuring and weighing to find facts for a brief note. Every feather on every bird, in every stage of plumage, appears to have been examined through a magnifying glass, and each minute detail carefully set down. It takes a page of closely-printed matter to describe the feathers on a blue tit. We don't forget that the conciseness and accuracy of the notes on ' Character and Allied Forms,' ' Field Characters,' Breeding Habits,' ' Distribution at Home and Abroad,' make the work most useful as a source of reference. But the microscopic examination of plumage has, we consider, led to unfortunate results. Embryology, anatomy and all the rest of it as a test of species, were set aside. Feathers (oh, shade of Saunders !) were the only things that seemed to matter, and new species sprang up like mushrooms. Newton, Saunders and the others gave seven species of British titmice ; the ' Handbook ' gives sixteen. Other species arise in like proportion. When in Ceylon a few months ago, we were asked how many species there were on the British list. We hadn't the remotest idea. We might get to know by adding up the numbers given in the ' Handbook,' but we lack the necessary energy and industry.

We fear we should fail in the most elementary examination in ornithology. In the matter of titmice alone, we don't know the difference between a marsh-tit and a willow-tit, but we are cheered by the reflection that Thorburn didn't either, when he tried to figure the two.

There are two British blue-tits on the list—*Parus c. cærulius* and *Parus c. obscurus*. We can't see the difference, with an admirable plate of both before us. It is admitted that in the matter of nest-building, colour of eggs, general habits, etc., there is no difference. Two species of Red Grouse are given *L. scoticus scoticus* and *L. scoticus hibernicus*. The latter, as its curiously Irish title suggests, being found only in Ireland and the Outer Hebrides. We have shot grouse in Scotland, Ireland and the Outer Hebrides, and we will undertake to find the two types and half a dozen equally distinctive, within ten miles of Harrogate. We have never faced the task of working out all the new species brought into being by the marks on their feathers, but the grand total must be appalling.

We are often told that the field naturalist should accept the findings of the experts without question. Why: it is really more a matter of commonsense than of deep learning. A new generation of ornithologists is growing up. They read the books. They (especially the Girl Guide Nature Study classes) are already asking pertinent questions. How do you know one species from another? they inquire, and we ought to be able to give a definite reply. We of the old brigade, who, with one or two trivial exceptions, are now dead, would have liked to have left something reasonably clear and definite behind.

We don't wish to write in any carping spirit. The hard intensive labours of the authors of the 'Handbook' can never be wasted. It is a record of condensed facts: it is only to some of the inferences that we take exception. Perhaps the meticulous registration of every mark on every feather of every bird, which has served to bring new species to light, may show future classifiers how to put them back again.

S. E. Hollingworth writes on 'The Evolution of the Eden Drainage in the South and West,' in the *Proceedings of the Geologists' Association* for July.

'The White Chalk of Lincolnshire' is the subject of the Presidential Address of Mr. C. S. Carter, in the *Lincolnshire Naturalists' Union's Transactions* for 1928. He pays tribute to the work of C. Davies Sherborn and the late A. W. Rowe. Mr. Carter also gives a list of Fossil Fauna of the Lincolnshire White Chalk. There is also the report of the Hon. Secretary (Mr. A. Smith); Reports on Botany (Miss S. C. Stow), Conchology (J. F. Mushan), Entomology (A. E. Musgrave), Ornithology (G. H. C. Haigh), Grimsby Birds (S. A. Cox) and Geology (H. Preston). The last points out that a boring at Bardney (657 feet) and one at Minsgby (470 feet), both for water, proved unproductive, although in each case a water diviner had prophesied abundance of water at a shallow depth.

YORKSHIRE BRACONIDÆ.

ROSSE BUTTERFIELD AND G. T. LYLE.

About seven hundred species of Braconidæ have been recorded as inhabiting the British Isles; of these we can claim only one hundred and six for Yorkshire. The Braconidæ are of economic importance, several destructive garden and forest pests being kept in check through their efforts. The number of species in the list could considerably be increased with the help of students of lepidoptera, coleoptera and diptera. The compilers will be glad to receive material for identification.

A list of Yorkshire Braconidæ was published in 1907 in the 'Victory County History of Yorkshire,' where it is somewhat inaccessible; this list contained about sixty species, and was compiled by the late W. D. Roebuck, who no doubt obtained many of his records from Marshall's 'Monograph of the British Braconidæ,' which appeared in the *Transactions of the Entomological Society* from 1885 to 1897. In the present list note has been made of all species appearing in the previous list.

The classification is that used in the *Genera Insectorum*, Vol. XXII.

Abbreviations Used.

E.=*Entomologist's Monthly Magazine*. L.=G. T. Lyle.
T.=*Transactions Entomological Society*. F.=W. J. Fordham.
B.=Rosse Butterfield. V.=*Victoria County History*.

HYMENOPTERA.

Family: Braconidæ.
Group: Cyclostomini Westmæl.
Sub Family: Braconinæ Forster.

Bracon minutator Fab. Selby, 1917; Barnby Common, 1916 (F.).
B. fulvipes Nees. (V.).
B. stabilis Wesm. Bubwith, North Duffield (F.).
B. mediator Nees. (V.). Bred from osier stems (T., 1885, p. 30).
B. satanus Wesm. Shibden, Hx. (L.).
B. epitriptus Marshall. (V.).
B. discoideus Wesm. Shibden, Hx. (L.), (V.).
B. variator Nees. (V.).
B. obscurator Nees. Goathland Moors, 1925 (L.).
B. anthracinus Nees. (V.). Filey, Whitby (L.).
B. prætermissus Marshall. Bubwith, August, 1922 (F.). Shibden, Hx., May, 1928 (L.).
B. terebella Wesm. Bubwith, June, 1919 (F.).

Sub Family: Spathiinæ Marshall.

Spathius exarator L. Not uncommon in Keighley Museum (B.). A parasite of *Anobium domesticum* (F.). See *Nat.*, 1918, p. 398.

Sub Family: Hecabolinæ Forster.

Hecabolus sulcatus Curtis. (V.).

Sub Family: Doryctinæ Forster.

Doryctes striatellus Nees. (V.). Lastingham (Marshall, T.).

Sub Family: Rhogadinæ Forster.

Oncophanes lanceolata. Shibden, Hx., 1925 (L.).
Colastes braconius Hal. (V.). Southowram, Hx., 6/9/25 (L.).
Clinocentrus excubitor Curt. Shibden, Hx., 1925; July, 1926 (L.).
C. exsertor Nees. (V.).
Rhogas irregularis. Filey, August, 1922 (F.). Shibden, Hx., a common parasite of the larvæ of *Noctua rurea* (L.).
R. bicolor Spin. (V.).
R. nigricornis Wesm. Cawthorne, 1925 (L.).
R. circumscriptus Nees. Shipley Glen, Keighley (B.). Shibden, Hx., common (L.). (V.).

Group: Cryptogasterini Wesmæl.
Sub Family: Sigalphinæ Forster.

Sigalphus caudatus Nees. (V.). Shibden, Hx. (L.).
S. floricola Wesm. Whitby (L.).

Sub Family: Cheloninæ Forster.

Chelonus inanitus L. Wilsden, Bradford, 1910 (B.). Allerthorpe Common, 6/8/27 (B.). Allerthorpe, 25/9/20, 3/8/24 (F.).
C. parcicornis Schaff. (V.).
Ascogaster instabilis Wesm. (V.).
A. rufipes Nees. Kildale (*Entomologist*, 1907, p. 182).
A. rufidens Wesm. Southowram, Hx.; Shibden, Hx., 25/7/28, a parasite of *Tortrix heparana* (L.).

Group: Areolarini Wesmæl.
Sub Family: Microgasterinæ Forster.

Apanteles salebrosus Marshall. Skelmanthorpe (B. Morley), *Naturalist*, 1914, p. 31. Shibden, Hx. (L.). Allerthorpe (F.).
A. cupreus Lyle. Bred from larvæ of small Copper Butterfly, Hull (Walsh).
A. congestus Nees. Huddersfield, 1925, ex *Hadena pisi* (G. T. Porritt). Keighley, September, 1927 (B.).
A. glomeratus L. Common throughout the County. The well-known parasite of the Cabbage Butterflies (V.).
A. sericeus Nees. (V.). Keighley, 1915 (B.).
A. spurius Wesm. Baildon Moor, Bradford (J. W. Carter). Wilsden (B.), (V.).
A. insidens Ratz. Southowram, Hx. (L.).
A. difficilis Nees. (V.).
A. falcatus Nees. (V.). Saltwick, Whitby, 28/8/27 (L.).
A. lacteus Nees. (V.).
A. fuliginosus Wesm. Shibden, Hx., 1925 (L.). Common parasite of *Gracillaria syringella*.
A. octonarius Ratz. (V.).
A. vitripennis Hal. Shibden Hx. (L.). A parasite of small larvæ of *Odontoptera bidentata*.
A. fulvipes Hal. Common everywhere. A gregarious parasite of larvæ of *Noctuæ* (V.).
A. pallidipes Rein. Seamer, Scarborough, 1927 (G. B. Walsh).
A. cleoceridis Marshall. (V.).
A. tenebrosus Wesm. (V.).
A. jugosus Lyle. Shibden, Hx. (L.).
A. pinicola Lyle. Saxton or Everingham (C. D. Ash). Reared from larvæ of *Thera firmata*.
Microplitis tuberculifera Wem. Keighley, 1926 (B.). Shibden, Hx., 1925 (L.).
Microgaster connexus Nees. Doncaster, 1914 (B. Morley). (V.) =*dilutus* Ratz.

Microgaster alvearius Fak. A parasite of *Boarmia rhomboidaria*. Shibden, Hx. (L.).

M. nobilis. W. J. Fordham possesses a single example, the only specimen hitherto recorded as British (*E.M.M.*, 1926, p. 117). It was formerly in the collection of William Hewitt, who was a well-known collector in the neighbourhood of York during the seventies and eighties of last century. The editor of *The Naturalist* considers the evidence insufficient to prove this to be a British specimen. Fordham sees no reason to doubt that it is such, as he points out Hewitt's collection consists entirely of British insects, and this particular specimen was placed with other Yorkshire species.

M. rugulosus Nees. (V.).

M. globatus Nees. Allerthorpe Common, 27/8/27 (B.). (V.).

Sub Family: Agathinæ Forster.

Microdus clausthalianus Ratz. Shipley Green, Bradford (B.).

Group: Polymorphini Wesmæl.
Sub Family: Calyptinæ Marshall.

Eubadizon extensor L. Shibden Hx., 1925 (L.).

Calyptus tibialis Hal. Shibden, Hx., 3/7/28 (L.).

Sub Family: Blacinæ Forster.

Pygostolus sticticus Nees. Keighley, Shipley Glen (B.). Shibden, Hx. (L.). (V.).

Blacus maculipes Wesm. Seamer Moor, Scarborough, in haystack refuse, 4/1/23 (G. B. Walsh).

B. trivialis Hal. Shibden, Hx., 1926 (L.).

B. paganus Hal. (V.).

Sub Family: Ichneutinæ Forster.

Ichneutes reunitor Nees. Allerthorpe, 1924 (F.).

Sub Family: Macrocentrinæ Forster.

Macrocentrus abdominalis Fab. Skipwith, 1916 (F.). Howden, 1925; Keighley, 1926 (B.). Commonly reared in the Halifax district from larvæ of Tortrices (L.). (V.). Skelmanthorpe (B. Morley).

M. marginator Nees. (V.). Robin Hood's Bay, 1908 (F.). Keighley, 1925 (B.).

M. thoracicus Nees. (V.).

M. infirmus Nees. Skelmanthorpe, 1914, from larvæ of *Dasypolia templi* (B. Morley).

Zele chloropthalma Nees. (V.).

Sub Family: Diospilinæ Forster.

Diospilus capito Nees. Keighley, Shipley Glen (J.W.). Whitby, Goathland, Wainstalls, Hx., Shibden, Hx. (L.). (V.).

Sub Family: Opiinæ Forster.

Biosteres carbonarius Nees. Bubwith (F.). A common parasite of the leaf mining dipteron *Pegomyia nigritarsis* Zett. Shibden, Hx., (L.).

Opius truncatus Wesm. (V.).

O. reconditor Wesm. (V.).

O. lugens Hall. Shibden, Hx., 27/8/27 (L.).

O. cingulatus Wesm. Shibden, Hx., 14/7/27 (L.).

Sub Family: Euphorinæ Forster.

Perilitus æthiops Nees. Goathland, 1925 (L.).

Euphorus pallidipes. Shibden, Hx., 1928; Cawthorne, 1925 (L.).

Sub Family: METEORINÆ Marshall.

Meteorus chrysopthalmus Nees. (V.). Ex larvæ of *Peronea forficalis*, Shibden, Hx. (L.).
M. deceptor Wesm. Escrick, 1917 (F.). Keighley, 1926 (B.). Ex larvæ of *Odontopera bidentata*, Shibden Hx. (L.).
M. pallidus Nees. (V.).
M. caligatus Hal. A common parasite of larvæ of *Eupethecia assimillata*, Shibden, Hx., (L.).
M. ictericus Nees. (V.).
M. obfuscatus Nees. (V.).
M. atrator Curt. (V.).
M. abdominator Nees. Southowram, Hx. (L.).
M. micropterus Hal. (V.). Shibden, Hx., 30/9/28 (L.).
M. bimaculatus Wesm. Shibden, Hx., 1925 (L.).
M. cinctellus Nees. (V.).
M. leviventris Wesm. (V.). Shibden, Hx. (L.). Reared from larvæ of *Triphæna pronuba* at Leeds University.

Group: FLEXILIVENTRINI Halliday.

Sub Family: APHIDIINÆ Forster.

Ephedrus plagiator Nees. Keighley, 1926 (B.).
Aphidius rosæ Hal. Shibden, Hx. (L.).
A. avenæ Hal. Shibden, Hx. (L.).
A. ephippium Hal. (V.).

Group: EXODONTES Marshall.

Sub Family: DACNUSINÆ Foster.

Dacnusa talaris Hal. Shibden, Hx., 1925 (L.).
D. semirugosus Hal. (V.).
D. temula Hal. Shibden, Hx. (L.).
D. senilis Nees. Shibden, Hx., (L.).
D. lateralis Hal. Shibden, Hx. (L.).
D. straminipes Hal. Shibden Hx. (L.). Keighley (J. Wood). Allerthorpe (F.).
D. areolaris Nees. Very similar to the last though smaller. Plentiful everywhere; it preys on the larvæ of small leaf mining diptera, the parasite emerging from the puparium of the host. This is probably the commonest Braconid in the country (V.).
Cœlinus niger Nees. Bubwith (F.). (V.).
Chænon anceps Curtis. (V.).

Sub Family: ALYSIINÆ Forster.

Chasmodon apterus Nees. Scalby, Middlesbrough, 22/7/29 (G.B. Walsh). See *Naturalist*, 1922 p. 72.
Aphæreta cephalotes Hal. (V.).
Allœa contracta Hal. (V.).
Idiasta maritima Hal. (V.).
Alysia manducator Pz. Common throughout the County, a parasite of blowflies. (V.).
A. ater Hal. (V.).
Phænocarpa conspurcator Hal. Keighley, 27/8/27 (B.). (V.).
P. eugenia Hal. Bubiwth, 25/6/19 (F.).
P. ruficeps Nees. Shibden, Hx. (L.). (V.).
Adelura apii Curt. Allerthorpe, 1921 (F.). Reared by J. A. Fisher from the Celery Fly, Skipton, 1923.
A. florimela Hal. (V.).
A. dictynna Marsh. Shibden, Hx. (L.).
Aspilota nervosa Hal. Keighley, 1926 (B.). Shibden, Hx., 1926 (L.).

YORKSHIRE HEMIPTERA FOR 1928.

JAMES M. BROWN, B.Sc., F.L.S., F.E.S.

ALTHOUGH the summer of 1928 proved to be one of really fine sunny weather, the Hemiptera did not appear in exceptional abundance ; indeed, many of the commoner species seemed less plentiful than usual, and remarkably few species of rarity were taken. This is shown by the published reports of the Union Excursions, all of which, with the exception of that to Austwick, were attended by the writer. Only three species of Homoptera new to the county were taken, three species of Aphides new to science were collected by Mr. G. B. Walsh, and described by Mr. F. V. Theobald (*E.M.M.*, 1928, pp. 225-227), and two species of Scale-insect new to Britain were obtained by Mr. H. Britten at York (*E.M.M.*, 1928, pp. 24 and 31). These last two are evidently introduced foreign species.

† New to the County. * New to the Vice-County.

HETEROPTERA.

Elasmostethus interstinctus L. Fairly plentiful in Buttercrambe Woods on birch.

Rhacognathus punctatus L. Allerthorpe (W. J. Fordham), and one immature specimen in Buttercrambe Woods.

Stygnocoris fuligineus Geoff. Spurn.

Taphropeltus contractus H.S. Spurn. This is still the only Yorkshire locality.

Acalypta carinata Panz. (*cervina* Germ.). Grassington, under a stone. 64*.

Tingis cardui L. Spurn.

Temnostethus pusillus H.S. Short-winged form only. On oak, Richmond. 65*.

Microphysa pselaphiformis Curt. Aske. 65*.

M. elegantula Bær. Aske. 65.* Ecclesall Woods, Sheffield.

Calocoris ochromelas Gmel. Buttercrambe Woods.

Dichrooscytus rufipennis Fall. Deffer Woods, on pines.

Lygus rubricatus Fall. Rokeby. 65*. On pines.

Camptozygum pinastri Fall. Aske. Also on pines.

Cyllocoris flavoquadrimaculatus DeG. Buttercrambe Woods, and Brignall Banks.

Orthotylus viridinervis Kb. Rokeby, on elm.

Harpocera thoracica Fall. Buttercrambe Woods, on oak. 61*.

Atractotomus magnicornis Fall. Richmond, Aske, and Brignall Banks. Plentiful, on pines. 65*.

Asciodema obsoletum Fieb. Richmond, on gorse. 65*.

Acanthia (*Salda*) *scotica* Curt. Richmond. Plentiful on stones by the riverside. This seems to be a characteristic species in this part of Yorkshire.

Nepa cinerea L. Millhouses, Sheffield.

HOMOPTERA.

Ulopa reticulata Fab. Aske, under heather.

Euacanthus acuminatus Fab. Brignall Banks, and Aske. 65*. Among damp vegetation.

Idiocerus lituratus Fall. Richmond. 65*.
Athysanus lineolatus Brulle. Grassington. 64*. Among grass.
Deltocephalus punctum Flor. Brignall Banks and Jockey Cap Hill, in dry grass.
D. pascuellus Fall. With the last.
Cicadula 7-notata Fall. Richmond. 65*.
Dicraneura mollicula Boh. Shireoaks.
Eupteryx germari Zett. Aske. On pines.
Typhlocyba quercus Fab. Richmond. 65*. On blackthorn.
T. nitidula Fab. Richmond. On elms.
T. geometrica Schr. Richmond. 65*.
Cixius pilosus Ol. Buttercrambe Woods. This species does not appear to be at all common in Yorkshire.
C. similis Kbm. Wharncliffe Woods. 63*.
Kelisia vittipennis Sahl. Rokeby. 65*.
†*Eurysa lineata* Perr. Shireoaks. Among grass.
Delphax discolor Boh. Grassington.
D. forcipata Boh. Grassington, 64*. Ecclesall Woods. Buttercrambe Woods, 61*. These two species occur among grass.
Stiroma albomarginata Curt. Grassington, 64*. Shireoaks.
S. pteridis Boh. Buttercrambe Woods, on bracken.
†*S. bicarinata* H. S. Grassington. A species closely resembling the next.
S. affinis Fieb. Grassington, 64*. Spurn, 61*.
†*S. nigrolineata* Scott. Spurn.
Psyllopsis fraxinicola Först. Richmond.
P. fraxini L. Deffer Woods, and Richmond. These two species are common gall formers.
Psylla mali Schm. Deffer Woods, on apple.
P. spartii Guer. Wharncliffe Woods, and Cawthorne, on broom.
Arytæna genistæ Latr. Wharncliffe Woods, also on broom.

APHIDÆ.

†*Macrosiphum nigrocampanulæ* Theo. Settle, on giant bell-flower, a new species, taken by G. B. Walsh.
†*Rhopalosiphonimus tuberculatus* Theo. Settle. Another new species also taken by G.B.W. on the same plant.
†*Amphorophora digitalisii* Theo. Falling Foss. A new species taken on foxglove, by G.B.W.

COCCIDÆ.

†*Pulvinaria psidii* Mask. A species new to Britain, taken in Rowntree's Tropical House, York, by H. Britten.
†*Pinnaspis marchali* Ckll. Another species new to Britain, also taken by H. Britten at the same place. These two species are recorded by E. E. Green, in the *E.M.M.*, 1928, pp. 24 and 31.
Cryptococcus fagi (Baren). Broughton, on beech trunks.
Chionaspis salicis (L.). Sheffield district, on sallows.
Orthezia cataphracta (Shaw). Urra Moor, on heather.

The Chester Archæological Society has issued a 'Schedule of the Roman Remains of Chester, with Maps and Plans,' by P. H. Lawson, at 1/-.

The admirable speeches delivered on the occasion of the unveiling of the Edward Suess Memorial Tablet have been printed in the *Abstracts of the Proceedings of the Geological Society of London*, No. 1202. These speeches are by Professor J. W. Gregory, His Excellency the Austrian Minister, Sir Maurice de Bunsen, Dr. F. A. Bather, the Mayor of Islington, Alderman S. C. Harper, and Professor W. J. Sollas.

The Naturalist

THE MUSEUMS ASSOCIATION.

The Fortieth Annual Conference of the Museums Association was held at Worthing from July 1st to 5th, under the presidency of Sir Henry A. Miers, M.A., D.Sc., F.R.S., whose address on ' Co-operation—The Association's Task ' is printed in *The Museums Journal* for August.

Sir Henry advocated more co-operation between the National and Provincial Museums, and suggested lines upon which this might be carried out. Other papers read referred to School museums, surplus material, children visitors, loan schemes, dioramas and cinemas in museums, museums and libraries, broadcasting and museums, foreign art exhibitions, botanical modelling, preserving paintings, insects and plants, etc. Among those who took part in the discussions were representatives from Australia, Cape Colony, Canada, the U.S.A., Japan, etc.

The Conference proved particularly attractive and holds the record for the number of delegates attending, there being just over 200 representatives of museums and galleries present. A strong Local Committee, with the Mayor, Alderman W. T. Frost, J.P., and the Chairman of the Museum and Art Gallery Committee, Major General R. E. Vaughan, C.B., with the assistance of Miss M. Frost, the Librarian and Curator, as Local Secretary, made excellent arrangements for the meetings, excursions, and for the social side of the Conference. The series of buildings including the Public Libraries, Museum, and Art Gallery, each of which had a strong section devoted to Sussex, was especially interesting to the delegates as being entirely staffed by women. Perhaps the pictures by Sussex artists, the fine collection of bygones, and the Cissbury stone implements appealed mostly to the visitors.

Ample accommodation for the Conference was provided in the Connaught Hall, which reminded one very much of the Reception Room at a meeting of the British Association. A Civic luncheon was given at Warnes Hotel, but the attendance at the last moment being much larger than anticipated, some of the members were accommodated at Mitchell's Café. At the former the guests were welcomed by the Mayor, who was thanked on behalf of the Association by Sir Henry Miers, and at the latter by the Deputy Mayor, Alderman C. B. Cook, the thanks of the Association being voiced by Mr. T. Sheppard, Past-President.

A strong feature of the Conference and one which will be remembered for many years to come was the excellent arrangements made both on the business and social side, and for visits to places of historic interest and to mansions containing treasures of world-wide reputation. The Roman pavements,

bath, etc., at Bignor ; Arundel Castle, the seat of the Duke of Norfolk ; Goodwood House, the seat of the Duke of Richmond ; and Petworth House, the seat of Lord Leconfield, were visited, and the collections of old masters and other works of art were freely shown to the members. Cissbury Hill, the well-known prehistoric fort, was examined, and an address on Prehistoric Sussex was delivered by Mr. Sheppard, who compared the early remains of that county with those of Yorkshire. A report of this address, by the unanimous vote of those present, was requested to be sent to *The Museums Journal* for publication.

As regards literature, the members were well catered for, each receiving a specially bound illustrated Guide to the Museum ; an Itinerary of the Excursions ; a copy of a new book, ' The Early History of Worthing,' by the Curator, together with postcards, guides, etc.

At the conclusion of the Conference, votes of thanks were passed to those who had read papers or otherwise assisted, and to the Local Committee and Secretary for the excellent local arrangements.

Skeleton of Ox in river gravels in Yorkshire.—Mr. H. B. Booth informs me that a skeleton of an ox has been unearthed on the side of the River Wharfe at Denton, near to the Ben Rhydding toll-bridge. The bones occurred in a deposit 20 ft. above and 100 ft. from the present bed of the river, and about six feet below the surface of the field ; and were covered up by gravel and other material which was in its natural stratified form and had not been disturbed. From the bones which Mr. Booth has submitted to me it seems clear that the animal is the ordinary domestic variety of the ox, and not *Bos longifrons* which we get in the peat beds, nor *Bos primigenius* which occurs in glacial deposits. Ordinarily one would have assumed that the bones were those of some animal which died in the cattle plague over a century ago, when thousands of horses and oxen died in the fields and were buried on the spot. Such skeletons are constantly being unearthed, and the large size of the bones, particularly the femur, and the teeth, often give the finders the impression that the bones are the remains of some extinct monster. In the case recorded by Mr. Booth, however, it seems likely that the animal had been washed away during some flood and had been covered up by the gravel, etc., until unearthed quite recently. Mr. Booth thinks that the animal might have belonged to one of the monasteries, and the condition of the bones suggests that it may date as far back as that period, but I should not like to suggest an earlier date for them in view of their condition.—T. Sheppard.

YORKSHIRE NATURALISTS AT PICKERING, YORKS.

F. A. MASON, F.R.M.S., AND W. H. PEARSALL, D.Sc., F.L.S.

(*Continued from page 282*).

Mycology (F. A. Mason):—Among the larger fungi, numerous specimens of the ascomycete, *Disciotis venosa*, were met with; the tall Morel, *Mitrophora gigas*, was found on both the Saturday and Sunday excursions, and good specimens of the common Morel, *Morchella esculenta*, were brought in. Another ascomycete, *Sclerotinia tuberosa*, was seen in some numbers by W. G. Bramley and the writer in Kingthorpe Woods; this fungus is parasitic on the rhizomes of *Anemone*, and the stipes of these particular specimens were unusually long by reason of having grown up through mole-hills; on one mole-hill half a dozen ascophores were seen, and although search was made over a fairly large area colonised by the host, the fungus was only present where moles had been at work. Agarics were few in species and in number, and with the exception of *Pleurotus ostreatus* and *Armillaria mellea*, were species of the pasture and heath, and those mainly coprophilic in habit. The fairy ring, Champignon, was scattered throughout the whole district, and a single specimen of the common mushroom, *Psaliota campestris*,* was found. *Omphalia umbellifera* and *Galera hypnorum* completed the list. Among the polypores were *Polyporous cæsius*, collected by Miss Moorhouse; it is a rather small, uncommon white species, which may be recognised by the blue colouration which develops on abrasion. *Polyporus hirsutus* on Ash, *Fomes annosus* in the coniferous plantations, and *Fomes fomentarius* on apple in a derelict garden on the moors were noted, and in Kingthorpe Woods the following fungi occurred: *Caldesiella ferruginea*, *Poria mollusca*, *Irpex obliquus*, *Stereum rugosum*, *S. sanguinolentum*, *S. hirsutum*, *S. purpureum* and *Coniophora puteana*. *Exidia glandulosa* occurred in Levisham Woods.

A small puff-ball was found by Mr. A. E. Peck on the railway track at Levisham. This proved to be *Lycoperdon polymorphum* Vitt., which has only once previously been found in the County, and that also by Mr. Peck, at Ayton, in the same division†; in the present instance it was found growing on a piece of cinder in which apparently the whole of the supporting mycelium had developed.

Uredines: The most interesting of these was *Ochrospora sorbi* (Oud.) Dietel in its æcidial stage on leaves of *Anemone nemorosa* in Kingthorpe Wood; Mr. Malins Smith collected *Puccinia tragopogi* on Goatsbeard, the leaves of the host being entirely covered with æcidia. These are both species rarely met with in Yorkshire. *Puccinia betonicæ* and *Uromyces alchemillæ* were common, and the following species less frequent: *Uromyces ficariæ*, *junci*, *poæ*, *Puccinia caricis*, *fusca*, *leontodontis*, *hypochœridis*, *lolii*, *obtegens*, *taraxaci* and *violæ*. *Puccinia adoxæ* on the moschatel in Kingthorpe Wood.

Phyllosticta leptidea (Fr.) Curr. on *Vaccinium vitis-idæa*, was collected by Mr. John Grainger; this is an addition to the County flora. *Phyllosticta mahoniæ* Sacc. et Speg., on *Mahonia aquifolium*, was found on leaves taken by Mr. J. M. Brown during a run out to Lastingham on Sunday evening—a first record for N.E. Division.

The Larch disease fungus, *Tricoscypha calycina*, was only too abundant

* This early appearance was commented upon, and good gatherings of the mushroom have been made in two localities in the York district during May, according to my correspondents, Messrs. A. W. Ping and W. G. Bramley.

† F. A. Mason, 'Yorkshire Basidomycetes,' *Naturalist*, 1928, p. 306.

in the plantations ; and much Ash canker, *Nectria ditissima*, was noted in Kingthorpe Woods.

Several members brought in specimens of Myxomycetes, among which were the following species :

Badhamia panicea.
Physarum viride.
Trichia decipiens.
T. varia.
T. botrytes.
Lycogala flavofuscum.
L. epidendrum.
Arcyria incarnata.
Reticularia lycoperdon.

In several instances *Trichia varia* was parasitized by the hyphomycete, *Tilachlidium tomentosum.*

Another hyphomycete, *Fusicladium cerasi* (Rabenh.) Lindau, was found on last years fruits of the Bullace, *Prunus institutia*, which remained attached to the shrub. The fruit was in a mummified condition, and had a velvety covering of the fungus. According to Aderhold this is the conidial form of *Venturia cerasi*, which occurs on cherries and wild species of Prunus generally. This is the first recorded occurrence of the fungus in Yorkshire.

A microscopic species producing a bright red colouration in a rotting post, discovered by Miss M. Hewlett, has not yet been identified, and two Sphæropsideæ on the rather uncommon host, *Sambucus ebulis*, have still to be determined.

Lichens (W. E. L. Wattam) :—Attention was paid to several suitable areas within the township of Pickering, but with few exceptions the species noted were of poor type. Making due allowance for smoke effect (chiefly domestic), it can only be assumed that the stones of the walls, which consisted mostly of blocks of corallian and oolitic limestones, were too porous to permit of the retention of moisture in the degree necessary for the fuller development of the plants. Blocks of calcareous grit and sandstones were also not uncomon. The species noted were :

Collema pulposum Ach. Castle boundary wall.
C. crispum Ach. With mosses, same locality.
Evernia prunastri Ach. Aged Ash.
Parmelia physodes Ach. Boles of Scot's Pine, Spruce and Hawthorn.
P. perlata Ach. Boles of Oak and Ash.
P. saxatilis Ach. Boles of Oak and Ash, and walls.
P. sulcata Tayl. Boles of Oak and Ash, and walls.
P. conspersa Ach. Walls.
P. fuliginosa var. *lætevirens* Nyl. Boles of Ash and Black Poplar.
Xanthoria parietina De Not. Walls, roof tiles.
Placodium callopismum Mer. Walls.
Pl. flavescens A. L. Sm. Walls.
Candelariella vitellina Müll-Arg. Walls, gate posts.
Physcia hispida Tuckerm. Boles of Oak and Ash.
Lecanora cartilaginea A. L. Sm. Walls.
L. muralis Schær. Walls.
L. varia Ach. Old palings.
L. conizæa Nyl. Hawthorn boles.
L. galactina Ach. and f. *dispersa* Nyl. Extremely common, lime grouting of walls and old concrete facies ; oftimes in association with *Cand. vitellina.*
L. calcarea Sommerf. Walls.
Pertusaria faginea Leight. Aged Oaks.
Per. pertusa D. T. and S. Aged Oaks.
Cladonia gracilis Willd. With mosses, old stumps and ground.
Cl. pyxidata Hoffm. With mosses, old stumps and ground.
Cl. fimbriata Fr. With mosses, old stumps and ground.
Cl. macilenta Hoffm. With mosses, old stumps.
Lecidia confluens Ach. Walls.

L. contigua Fr. Walls.
L. lucida Ach. Walls.
L. sanguinaria Ach. Walls.
Rhizocarpon confervoides D.C. Walls.
Rh. alboatrum Th. Fr. Walls.
Verrucaria viridula Ach. Walls.
V. nigrescens Pers. Walls.
V. muralis Ach. Walls.

The area of investigation included a tramp through Levisham Valley entering at the old lime kilns, finishing on Saturday at Lockton, and afterwards on the following day from Levisham Station to Raindale Mill, crossing to Chilton's Folly, and working back on the moorland to starting point. Most of the species previously enumerated were noted. The fruticose species seen were, considering the situation, of poor form, but the foliose types exhibited a much better growth. The stones of the walls were as hitherto named. The additional species seen were :—

Peltigera canina Willd. Humus of woodland floor.
Parmelia omphalodes Ach. Silicious blocks.
P. fuliginosa Nyl. Silicious blocks.
Cetraria glauca Ach. Aged Oaks.
Evernia furfuracea Mann. Walls, aged Oaks.
Ramalina farinacea Ach. Spruce boles.
Placodium citrinum Anzi. Walls.
Pl. aurantiacum Anzi. Aged Ash.
Lecanora hageni Ach. Aged Oaks.
L. pallida Schær. Aged Oaks.
L. symmictera Nyl. Boles of *Salix caprea*.
L. polytropa Schær. Silicious blocks.
L. atra Ach. Sandstone blocks.
L. sordida Th. Fr. Blocks of calcareous grit.
Pertusaria globulifera Nyl. Aged Oaks.
P. dealbata Cromb. Sandstone rocks.
P. wulfenii DC. Aged Oaks.
Bæomyces rufus DC. Sandstone blocks.
Pycnothelia papillaria Hoffm. On the peat.
Cladonia cervicornis Schær. On the peat.
Cl. digitata Hoffm. On the peat.
Cl. coccifera Willd. On the peat.
Cl. bacillaris Nyl. On the peat.
Cl. squamosa Hoffm. Among mosses Chilton's Folly.
Gyalecta cupularis Schær. Sandstone rocks.
Lecidia granulosa Schær. On the peat.
L. uliginosa Ach. On the peat.
L. rivulosa Ach. Stones of calcareous grit.
Rhizocarpon obscuratum Massal. Walls.
Rh. geographicum DC. Walls.
Opegrapha atra Pers. Boles of young Ash.
O. varia Pers. Boles of Mountain Ash (collected by Mr. F. A. Mason).

During the walk over the moorlands in the vicinity of Cross Cliff on Monday, attention was paid to the ' Swiddens.' It was noted that among the lichens to first colonize the peat, in addition to undefinable young Cladonias, were *Lecidia granulosa* Schær. and *L. uliginosa* Ach., which were quite common. There was also a very fine growth of *Cladina sylvatica* among the tall Ling of the unburnt areas.

Freshwater Biology (A. Malins Smith and J. M. Brown) :— The area investigated is divided naturally into three regions, (1) the lower end of Newton Dale where the soil is calcareous, (2) the upper reaches of the dale where soil and water tend to be acid, and (3) the moorland above. These three regions yielded different algal floras. The waters

of the first were poor in algæ, and from these there is only a doubtful record of *Chætophora elegans*, collected by Mr. J. M. Brown, and not sufficiently investigated. The second yielded a much richer flora, including, among filamentous algæ :—

Microspora stagnorum (Kütz.) Lagerh.
Œdogonium macrandrium Wittr.
Bulbochæte varians Wittr.
Spirogyra inflata (Vauch.) Rabh.
S. catenæformis (Hass.) Kütz.
Mougeotia viridis (Kütz.) Wittr.
Vaucheria geminata (Vauch.) DC.

Of the Desmids there were :—

Closterium striolatum Ehr.
C. lunula (Müll.) Nitzsch.
C. moniliferum (Bory.) Ehr.
Euastrum oblongum (Grév.) Ralfs.
Pleurotænium truncatum (Breb.) Näg.
Hyalotheca dissiliens (Sm.) Bréb.

as well as two as yet undetermined Cosmariums.

Ophiocytium majus Näg., of the Heterokontæ, was also found here.

In the third region, the moorland, the alga-flora was strikingly different and one generally characteristic of peat. On the surface of the peat were dark purple patches of *Zygogonium ericetorum* Kütz, but these were not so extensive as on some moorland areas. The pools on the peat showed *Microspora floccosa* (Vauch.) Thuret., *M. tumidula* Hazen., and *Zygogonium ericetorum* Kütz, in its submerged form, as their chief algal inhabitants, together with *Microspora stagnorum* and *Cylindrocystis brebissonii* Menegh. and a little *Sphærocystis schrœteri* Chod. These form a familiar combination characteristic of peaty upland pools. The only apparently new record among all these is *Bulbochæte varians* not recorded in West's 'Alga-flora of Yorkshire.' The more recent records are so scattered that time has not yet allowed of full reference being made to them. It was very interesting to find such an abundance of dwarf males on both the Œdogonium and the Bulbochæte. The second region provided also species of Mougeotia, Zygnema, Stigeoclonium and Oscillatoria, which were undeterminable.

Mr. W. H. Burrell observed *Hypnum ochraceum* in the beck below the Bride Stones, as the only noteworthy species. He adds that there are few records of this soft water moss in V.C. 62, except perhaps in the Esk drainage area, although it is very abundant in the West Riding. No doubt this is due to the somewhat hard waters of most of the streams, especially in their lower courses.

A short time spent at the beck near Levisham station yielded an abundance of *Gammarus pulex*, larvæ of *Perla cephalotes*, and of *Ecdyurus venosus* under the stones, while adults of *Perlodes mortoni* were in flight. The Planarian, *Polycelis nigra*, was plentiful on the surface of submerged stones, but the cases of Caddis larvæ were less plentiful than usual. The common limpet, *Ancylus*, seemed to be absent.

Cliff Beck, near Saltersgate, appeared to be richer in animal life. The alpine relict, *Planaria alpina*, was particularly plentiful under stones and decaying leaves, *Gammarus pulex* was again very common, larvæ of *Ecdyurus* and *Plectronemia* were numerous, larvæ and adults of *Nemura variegata* and *Leuctra nigra* occurred, while the larvae of the Caddis *Stenophylax*, with its cases constructed of portions of liverwort, were plentiful. The larvæ of the beetle, *Helmis*, occurred under stones and in moss, while *Velia currens* was common on the surface of the water. The larvae and pupæ of *Simulium* were found under decaying leaves, but *Perla cephalotes* was not seen. *Ancylus* again seemed to be absent.

(*To be continued*).

'Roman Eskdale,' by R. G. Collingwood, is an interesting and well-illustrated pamphlet sold by the Whitehaven News Ltd., Whitehaven, price 1/-.

FIELD NOTES.

Cypræa in the Schlesch Collection, Hull Museum.—In *The Naturalist*, May, 1929, p. 181, was given a list of Cypræa additional to those in the Hans Schlesch Collection in the Hull Museum, and examined by Mr. J. F. Musham. Mr. Hans Schlesch has now sent a new series of Cypræa, which form a part of the Arthur Russell Collection. All have been carefully examined by the prominent authority, Dr. F. A. Schilder, Naumberg a Saale, Germany. Some of the series from Aden were described by Dr. Schilder in his paper ' Die Variabilität der Schalenlänge der Cypræidæ (Moll. Gastr.),' *Zoolog. Anzeig.*, 79, Part 1-2, October, 1928, p. 5-21 (Race Studies). Some of the specimens are extremely rare, viz., *C. fuscorubra* Shaw., *C. xanthodon* Gray., *C. polita* Roberts., *C. pallidula* Gask., *C. aurantium* Martyn, etc., but also the numerous specimens of *C. pallida* Gray., *C. fabula* Kien., and other species from Aden forms a very valuable addition.

All specimens carefully examined by Dr. F. A. Schilder, Naumburg a. Saale.

C. albuginosa Gray. California.
C. annettæ Dall. (=*sowerbyi* Kien.). Gulf of California.
C. annulus L. Aden.
C. annulus L. Extreme varieties, Aden.
C. arabica L. *sensu strict.* Aden.
C. arabica L. Hawaii?
C argus L. Solomon Islands.
C. asellus L. Indian Ocean.
C. aurantium Martyn. Solomon Islands.
C. caput-serpentis L. Cocos Islands.
C. carneola L. Aden.
C. carneola crassa Gmel. New Guinea.
C. caurica L. ? Habitat.
C. caurica elongata Perry. ? Habitat.
C. cervinetta Kien. ? Habitat.
C. chrysalis Kien. (=*microdon* auct.). Aden.
C. chrysostoma Br. (=*sophiæ* Brazier). Port Blair, Andaman Islands.
C. clandestina L. Loyalty Islands.
C. clandestina L. Aden.
C. clandestina passerina Melv. Pondoland Coast.
C. coloba Melv. New Guinea.
C. cribellum Gask. ? Habitat.
C. cribraria L. Ceylon ?
C. declivis Sow. E. Tasmania.
C. diluculum Rve. (=*undata* Lam.). Philippines.
C. eburnea Barn. New Guinea.
C. edentula Sow. St. Francis Bay, South Africa.
C. erosa L. Ceylon.
C. erosa L. Aden.
C. errones L. Pondoland Coast?
C. errones L. Aden.
C. ethnographica Roch. Ceylon.
C. fabula Kien. Aden.
C. fabula Kien. Extreme varieties Aden.
C. fimbriata Gmel. Pondoland Coast?
C. fimbriata Gmel. Extreme varieties, Aden.
C. fimbriata Gmel. Small, bluish variety, Aden.
C. fimbriata Gmel. Large greenish variety, Aden.
C. fuscorubra Shaw. St. Francis Bay, South Africa.
C. gangranosa Dillw. China.
C. globulus sub sp. *affinis* Gmel. Ceylon.
C. helvola L. Solomon Islands.
C. icterina Lam. ? Habitat.
C. interstincta Wood. New Caledonia.
C. irrorata Gray. Navigator Island.
C. irrorata Gray. Elisabeth Island.
C. isabella L. Indian Ocean.

Cypræa kieneri Hidalgo. Aden?
C. lacteus Lam. ? Habitat.
C. lamarckii Gray. Dwarf race, Aden.
C. lienardi Jouss. Aden.
C. listeri Gray. Mauritius?
C. lynx L. Aden.
C. lynx L. Indian Ocean.
C. lynx L. Singapore.
C. lynx L. Japan.
C. macula A. Ad. Japan.
C. mariæ Schilder. Society Islands.
C. mauritiana L. Loyalty Islands.
C. microdon Gray. Vera, Aden.
C. moneta L. Ceylon.
C. nebrites Melv. Aden.
C. nebrites Melv. Aden?
C. nebrites Melv. Olive, Aden.
C. nebrites Melv. Monstrosity, Aden.
C. nucleus L. Aden.
C. obvelata Lam. Tahiti.
C. ocellata L. Caroline Islands.
C. onyx adusta Lam. Persian Gulf.
C. pallida Gray. Aden.
C. pallida Gray. Extreme varieties, Aden.
C. pallidula Gask. ? Habitat.
C. piperita Gray. South Australia.
C. piperita bicolor Gask. South Australia.
C. polita Roberts. Hawaii.
C. poraria L. Solomon Islands.
C. pulchra Swains. Extremely dwarf, Aden.
C. robertsi Hidalgo. ? Habitat.
C. scurra Chem. Tahiti.
C. spurca L., sub sp. *acicularis* Gmel. Panama.
C. staphylacea L. *sensu stricto*. Aden.
C. stercoraria L., *sensu stricto*. Senegal.
Cypræa teres Gmel. Pondoland Coast?
C. tigris L. Solomon Islands.
C. turdus Lam. Aden.
C. ventriculus Lam. South Pacific.
C. vinosa Gmel. Aden (Red Sea race).
C. vinosa Gmel. (probably forma *erroneus*). Solomon Islands.
C. vitellus L. South Sea Islands.
C. vitellus L. Extremely large, ? Habitat.
C. xanthodon Gray. Bundaberg, Queensland.
C. zebra L. ? Habitat.
C. ziczac L. Aden.
Trivia insecta Migh. New Caledonia.
T. merces Iredale. New South Wales.
T. oryza Lam. Solomoh Islands.
T. pullex Gray. Malta.
T. californica Gray. San Diego, California.
T. exigua Gray. Loyalty Islands.
T. monacha Da Costa. Ramsgate.
T. pediculus L. West Indies.
T. pediculus L. Barbados.
T. quadripunctata Gray. West Indies.
T. rubra H. Shaw. St. Thomas Bay, S. Africa; Jeffrey's Bay in S. Francis Bay, S. Africa.
T. sanguinea Gray. S. California.
T. suffusa Gray. West Indies.
T. solandri Gray. San Diego, California.
T. vesicularis Gask. Jeffrey's Bay, in St. Francis Bay, S. Africa. Extremely small variety (see Schilder: Annalen Mus. Wien, 1929), The Kowie, S. Africa.
Ovula carnea Poiret. Mediterranean.

A record of the wonderful work in the interests of humanity is given in 'The Rockefeller Foundation, 1928,' by the President, George E. Vincent, which has been received. The illustrations and maps indicate the diversity of ways in which malaria, yellow fever, and other diseases are combated, and a list of expenditure shows how 150 million dollars have been spent during the year.

The Leeds Mercury for July 25th has a reproduction of a photograph of a fine example of Adam's Needle (*Yucca gloriosa*) in a Leeds garden, the flower stem being $4\frac{1}{2}$ feet long, and is in the possession of Mr. A. E. Thornes, of Headingley, an amateur gardener. The flower of this species is not at all uncommon in the south of England, and in one garden there recently we saw eight examples flowering at one time. The same journal contains an account of the tree by Mr. J. G. Wilkinson, the blind botanist.

NEWS FROM THE MAGAZINES.

F. W. Edwards describes 'Some Commensal Midges,' in *The Natural History Magazine* for July.

A. Meek writes on 'Abel Chapman, Naturalist and Sportsman,' in *The Durham University Journal* for June.

'Is Shanghai to have a Museum?' is a question discussed by Arthur de C. Sowerby in *The China Journal* for June.

'The Soils of Lancashire and Cheshire are described by A. N. Smith in *The Journal of the Ministry of Agriculture* for July.

Sunlight, a journal of light and truth, for June, contains an article on 'Fresh Air and Sunlight at the Zoo,' by G. M. Vevers.

Cruel Sports for July has an illustrated article on 'Friend Brock: A Protest against Badger-digging,' by C. W. Greatorex.

S. N. Miller describes the excavations in Roman York during 1926-27 in *The Journal of Roman Studies*, in Part I. of Volume XVIII.

The Reintroduction into Britain of *Chrysophanus dispar* Haw., with a coloured plate showing *C. dispar*, *C. botavus* and *C. rutilis*, appears in *The Entomologist* for August.

Mr. E. Morton's paper on 'Some Problems in Engineering Geology,' recently read to the Institute of Civil Engineers (Manchester and District Association) appears in *Quarry* for August.

Reprinted from *The Journal of the Microscopical Society*, E. Heron-Allen and A. Earland favour us with a copy of their report on 'Some New Foraminifera from the South Atlantic.'

'How can we Help?' is the title to a photograph showing two children and an oil-saturated guillemot, taken on the sands at Hornsea, appearing in the summer number of *Bird Notes and News*.

From Mr. Hans Schlesch we have received an extract from *Archiv für Molluskenkunde* in which he describes and figures *Volutopsis norvegica* (Chem.), *V. n. dautzenbergii* and *V. n. largillierti*, the originals being in the Schlesch Collection in the Hull Museum.

The contents of the *Journal of Conchology* for July are particularly varied. Among the subjects discussed are English and German Cecilioides; Bistomatism in *Delima gibbula*; A Garden Fauna; Cockles killed by Frost; Stray Notes; Mollusca eaten by rabbits, etc.

According to the *Annual Report of the Secretary of Mines*, during 1928 Cumberland produced over 1 000,000 tons of Iron Ore; Lancashire, 162,000 tons; N. Lincs. (Lower Lias), 2,300,000 tons; Cleveland (Middle Lias), 2,272,000 tons; S. Lincs. (Middle Lias), 1,672,000 tons; and S. Lincs. (Inferior Oolite), 3,242,000 tons.

In the *Annals and Magazine of Natural History* for July, Dr. A. E. Trueman figures and describes 'Some New Carboniferous Lamellibranchs.' Eight new species of *Carbonicola* and two new species of *Anthracomya* are described. These are mostly from the Lower Coal Measures and Millstone Grit of Yorkshire. In the issue for March, Anna B. Hastings gives 'Notes on some little-known Phylactolæmatous Polyzoa, and description of a new species from Tahiti.'

The New Phytologist continues to become more and more indispensable to the professional and advanced botanist, under the editorial care of Prof. Tansley. In the July issue, Prof. J. H. Priestley gives a critical abstract of Prof. Lubimenko's review of recent Russian work on the Biology of the Living Chloroplast; F. E. Fitch refers to the Encrusting Algal Communities of Certain Fast-flowing Streams; F. T. Brooks and G. H. Brenchley describe Injection Experiments on Plum Trees in relation to *Stereum purpureum*; and E. R. Saunders gives Illustrations of Carpel Polymorphism.

NORTHERN NEWS.

The University College of Hull has issued a pamphlet with illustrations and descriptions of the Halls of Residence for women and men.

The University of Manchester has conferred the honorary degree of Doctor of Science upon Mr. J. W. Jackson of the University Museum, Manchester. We tender our hearty congratulations.

Mr. P. M. C. Kermode, the well-known Manx archæologist and naturalist, has received the hon. degree of M.A. from the Liverpool University. May we offer our congratulations on this well-deserved recognition.

An Aberdeen paper, referring to a ' Regional Exhibition ' held in that city, states : ' Attention should be drawn to a remarkable collection of local beetles—modestly encased in drawers.' To this *Punch* adds : ' We should have thought a true Aberdeen beetle would have worn a kilt.'

The death is announced of Sir Edward Ray Lankester, one of the greatest biologists the world has known. He was at one time Director of the British Museum (Natural History), South Kensington, and was the author of an enormous number of scietific works, and in recent years his pen has been busily employed in popularising science.

One hundred Pictures of Norwich, the City of Gardens, Churches and Antiquities, selected and described by G. A. Stephen, F.L.A., the City Librarian of Norwich, is an admirable pictorial record of this beautiful city, published by Jarrold & Sons, Ltd., at 2/-. The same firm has also published an ' Illustrated Guide to the Rivers and Broads of Norfolk and Suffolk,' by G. C. Davies, at 9d.

Parts IX. and X. of Vol. I. of the *Scientific Section of the Proceedings of the Leeds Philosophical and Literary Society* have recently been issued. Of the many memoirs printed, the first part contains ' Form Variation in *Ceratium hirundinella*,' by W. H. Pearsall, and on ' The Lower Carboniferous Corals—*Orionastræa* and its Distribution in the North of England,' by R. G. S. Hudson ; the second publication contains a paper on ' The Dextricolic Condition in Tunicates,' by Prof. W. Garstang.

Mr. G. B. Walsh describes some peculiar sky-blue nests of *Vespa norvegica* found near Scarborough. These wasps' nests had evidenty been made from blue paper, or, as Mr. Walsh points out, ' the possibility that the wasps had used, as a source of their nesting-material, wood which had been stained by fungoid growth. The discomycete *Chlorophlenium æruginosum* de Not, stains fallen branches of oak, ash and hazel a deep verdigris-green, and it is possible that, under the chemical action of the wasp saliva, this turns blue.

The Abstracts of the Proceedings of the Geological Society of London, Nos. 1187-1202, have been issued, with a cover. The publication records the various papers and discussions between November 7th, 1928, and June 26th, 1929. From the front cover we learn that the price is ' 6/- ; to Fellows, four shillings,' whereas on the last page (123, under ' errata ') it is ' Price 2/-.' Unfortunately the back cover is blank, or the price may have been given as 1/-? (Possibly the 2/- is the price of the part of the *Proceedings* containing the Index?)

An article on ' The Untidiest Home in Birdland,' by O. G. Pike, has appeared in a scientific contemporary known as ' Tit-Bits,' a marked copy of which has been sent to us. We believe it is suggested that the ' untidiest home ' is that of the barn owl. The article is illustrated by a sketch of a squirrel stirring up some fledglings in a nest, the picture being entitled : ' The Coming of the Enemy.' On the same page is ' The Truth about the Dole Business,' by a person with the name of ' Crook.' The International Correspondence Schools, Ltd., tells you ' the way to earn more money,' and Beecham's Powders are said to be a safe and speedy remedy when you have headache. We don't think this is kind to Mr. Pike nor Mr. Crook.

Darwin and Darwinianism, etc.—*contd.*

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Printed by A. BROWN & SONS, Ltd., 40 George Street, Hull, and published by A. BROWN & SONS, Ltd., at 5 Farringdon Avenue, in the City of London.
Sept., 1929.

OCT., 1929.

No. 873
No. 647 of current Series

THE NATURALIST

A MONTHLY ILLUSTRATED JOURNAL

PRINCIPALLY FOR THE NORTH OF ENGLAND.

EDITED BY

THOMAS SHEPPARD, M.Sc., F.G.S.,
F.S.A.Scot., F.R.A.I., M.B.O.U.,
The Museums, Hull;

and T. W. WOODHEAD, Ph.D., M.Sc., F.L.S.,
Tolson Memorial Museum, Huddersfield,

WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF
JOHN W. TAYLOR, M.Sc. RILEY FORTUNE, F.Z.S.

Contents :—

LONDON:
A. BROWN & SONS, LIMITED, 5 FARRINGDON AVENUE, E.C. 4.
And at HULL and YORK.

Printers and Publishers to the Y.N.U.

Price 1/6 net. Prepaid Subscription 15/- per annum.

NOTES AND COMMENTS.

A BRADFORD NATURALIST.

Louis William Bentley died at Bradford on August 25th, aged 65. Previous to his last, and very serious illness, of two to three years' duration, which terminated with his death, he was for many years the energetic and tireless honorary secretary to the Bradford Scientific Association, and has been greatly missed by the members of that association. L. W. Bentley was of a genial and kindly disposition, and was known personally by a large number of people of a scientific turn of mind in the West Riding. He loved Science generally. He was bachelor, and was for many years with Messrs. Pollard, Ambler & Co., Ltd., of Bradford, as cashier. His remains were laid to rest in Undercliffe Cemetery, Bradford, on August 29th.—H.B.B.

THE NATURAL HISTORY COLUMN OF THE Y.W.P.

We have heard many opinions of regret respecting the change of policy of the *Yorkshire Weekly Post*, and we are sorry that the familiar, interesting, and quite valuable natural history records and comments which appeared on the last page have gone, and in their place we have the everlasting photographs of females in scanty attire waving one arm at the camera, or photographs of real live lords and ladies in their homes. Apparently the *Yorkshire Weekly Post* has to follow the example of every other paper in the country, and publish pictures of bathing maidens in the summer, and footballers in the air in winter. We had hoped our contemporary would have shown a little more originality.

A DEVINE DEVONIAN DIVINER.

The *Daily Chronicle* informs us that a Mr. F. Stone, in North Devon, cannot use telephones or wear headphones without receiving shocks, and as he is a chauffeur he cannot put his feet on the brakes without having vulcanite insulation pads in his boots. He has spent 20 of his 49 years in hospital puzzling doctors ! Lately, under the supervision of a museum curator in the South of England, he has located nuggets of gold, gold quartz, jewellery, etc., hidden in various parts of the grounds. He managed this with the aid of a hazel twig, and for silver and copper he uses a steel clock spring. On approaching the hidden treasures the instruments writhe in his hand like a serpent, and the number of writhes indicate the number of feet below the surface the treasures can be found. After this our ordinary water diviners must take a back seat !

THE CLEETHORPES WHALE.

The reference to the Cleethorpes Whale recently made in the Press as a result of the death of Mr. Matthew Dowse, reminds us that when he first acquired this animal he wrote to the Director of a well-known museum asking under what terms he would undertake the articulation of the bones. The amount asked was evidently not satisfactory, and a blacksmith was secured and carried out the work. Some time later, on visiting the skeleton, the Museums Director revealed his identity to the owner, who proudly pointed out that the skeleton had been put together for half the amount he had quoted, and in addition there was a barrel full of bones left over !

WORLD HISTORY.

Mr. I. O. Evans, of 24 Haydon Park Road, Wimbledon, favours us with a pamphlet entitled ' Suggestions for Practical Work in World History,' which he sells for sixpence. Among other things the author is known as ' Blue Swift,' and is Ex-Kinsman (Grade 2) of the Kibbo Kift. We cannot very well quote it all, but give the following extracts, which will give an idea of its nature :—Go into a lonely place and dress by wrapping yourself in a skin-rug, held together with sharpened twigs. (It may be better to wear a bathing suit underneath.). Spend twenty-four hours as much like Neanderthal Man as possible, eating wild foods that you find yourself, drinking only water, making fire by friction and cooking over it by green-stick grids, or with a toasting-fork made of a sharpened stick, wearing nothing but a skin-rug (and bathing costume, if you wish), sleeping in a cave on rugs, and going barefoot. Do not read or talk ; if there are others with you communicate only by pointing, gestures and grunting. Try not to think of anything modern, but to make yourself as primitive in thought as possible. Amuse yourself by running, tree-climbing, swimming, and chipping flints. Get a handful of wheat, or other grain, and plant it. When it grows, grind it between stones to make flour, and bake it in the camp fire to form ' damper.' Look also for cases of present-day ' tabus ' —things forbidden for insufficient reasons. Examples are religious tabus, like working on Sunday ; social tabus, like eating peas with a knife ; those associated with Mrs. Grundy ; and those simply supposed to be ' unlucky.' Notice that angry people will sometimes treat a lifeless thing as if it were alive, and shout or strike at it. Light a blazing fire in the country, and think how strange it must have seemed when fire was first discovered. If possible go to Spain and see a bullfight. Learn the picture-writing signs used in maps, and look for others like those in the Michelin Guides, those used

in wireless diagrams, and those used as danger signals by the wayside. Copy a cuneiform inscription on a piece of clay, and bake it in a oven.

JEWS AND HORSE-RACES.

Talk to Jewish folk, and see how their views differ from those of ' Gentiles.' Act the part of a ' fool ' before your group. If you meet an American, enquire as to the ' bosses ' and compare them with the Greek tyrants. Look for modern examples of how great anger or fear or drunkenness will turn a civilised man into a good imitation of a primitive savage. Make a long roll of paper (or papyrus, if obtainable), and see how difficult it is to handle compared with a bound book. Devise a machine for winding the roll to and fro. Dry ink writing by waving it about or using sand. Visit a revue, and compare it with a Roman ' satura.' Listen to people arguing, and notice how they tend to attach too much importance to classes and names. Attend a horse-race, if possible at Newmarket. Visit Oxford or Cambridge Universities, and compare those educated at the Universities with those educated elsewhere. To get a very slight idea of war conditions, lie in a ditch containing mud and water for some time ; eat hard biscuit, tinned ' bully ' and plum and apple jam, and drink water, and tea made with water tasting of chloride of lime. Every now and again get a friend to throw stones at you. Visit war films and plays. Attend an Armistice Day Celebration. Take a trip in a baloon or aeroplane. Make a wireless receiving set. Make working models of steam engines, steamships, airplanes, petrol engines, electrical appliances.

RURAL SCENERY OF ENGLAND.

The Journal of Scientific Transactions of the British Association for the South African meeting is naturally largely confined to the area visited by the Association. There are however two abstracts which will appeal to our readers. Dr. Vaughan Cornish writes :—' The great industrial population of the Midlands, Lancashire and West Riding has three regions of wild scenery in which to seek that refreshment of body and soul which is necessary to the welfare of dwellers in factory towns—the Pennine Moors, the mountains of North-west Wales and the English Lake District. The beauty of the Pennine Moors when the heather is out owes much to the circumstance that the warm tone of the flower is complementary both to that of the cloud on dull days and to the shadowed hillside on sunny days, a colour-grouping more effective than that of any green hill. The volcanic formations of Snowdonia present the most arresting form of land relief, the range o mountain peaks and this region of natural beauty, the scen

of heroic deeds, whose gates are guarded by ancient castles, might fitly be consecrated by the Welsh people as a national park for the cult of historic piety and the veneration of nature. The effect of a lake upon the landscape is so dominant that even mountains appear to have a dependent grouping, and though Cumbria is the only land of mountain peaks in England, we call the mountainous region the "Lake District." Here the residents have long pursued the cult of scenery, and the problem of reconciling accessibility with preservation is engaging the attention of energetic organisers and generous donors who deserve the gratitude of the country. The change of climate given by sea air determines the direction in which the majority of people seek change of scene, and moreover, the coast provides a greater change in scenery than the varieties of inland view.'

PHYLLOCLADUS, A RELIC OF THINNFELDIAS.

In the same journal Dr. H. Hamshaw Thomas asks 'Is *Phyllocladus* a Relic of the Mesozoic *Thinnfeldias*?':—'In the earlier part of the Mesozoic period plants bearing leaves of the type constituting the form-genus Thinnfeldia were important constituents of the vegetation of South Africa and of many other parts of the world. Very little is known of their nature and affinities, and they may not all have been of one kind. Several writers have linked them with the modern Phyllocladus, the curious conifer of New Zealand and other islands of the Western Pacific. The author has studied the contents of a large deposit of leaves in the Jurassic rocks of Yorkshire, which are close to the typical Thinnfeldias in their general characters but differ somewhat in their stomatal structure. It seems impossible to regard these foliar structures as phylloclades. But with the leaves occurs a curious type of cone which can be linked to them with a considerable degree of certainty. This cone seems to have had a large verrucose fleshy axis in which numerous seeds were partially embedded at irregular intervals. The seeds were larger than those of Phyllocladus, but, like the Podocarps and other Taxaceæ, had an epidermis with numerous stomata. This structure seems more comparable with the ovulate strobilus of Phyllocladus than with any other plant, and it would appear that the suggested relationship cannot be disregarded. The apparent existence of a plant with pinnate leaves and a strobilus and seeds referable to the Taxaceæ is most surprising.'

A paper on 'The Baluchitherium, the Largest Mammal that ever lived,' by Arthur de C. Sowerby, appears in *The China Journal* for August.

THE HAVRE CONFERENCE.

The members of the British Association not taking part in the South Africa meeting were invited to attend the Annual Congrès de L'Association Française pour L'Avancement des Sciences held at Havre towards the end of July. Facilities were also given for the Conference of Delegates from Corresponding Societies of the British Association to be held, the President for the meeting being Dr. F. A. Bather, F.R.S. Sir Henry Lyons, F.R.S., and Mr. T. Sheppard officially represented the British Association: Mr. Sheppard acted as as Secretary for the Conference.

The French Association is organized on similar lines to those of the British Association, and has a number of sections.

Our French confreres issued a bulletin in connection with its 58th year, containing various items of information; also a journal with particulars of the excursions, list of officers, etc. A volume entitled 'Le Havre,' and another 'Normandy,' were presented to each delegate who also had facilities for visiting the different places.

In addition to the various sections, there were conferences dealing with Le Probleme de l'Heredite Tuberculeuse, and L'Orientation Professionnelle et l'Apprentissage. An Excursion was arranged to Honfleur. Sunday was devoted to an excursion to Fécamp, where a monument to Docteur Leon Dufour was unveiled, and at the conclusion of the meeting excursions were made to Grouville, Lisieux, Caen, Bayeux, Mont St. Michel, and Rouen and district.

The conference commenced with the Presidental Address of General Perrier, and in the evening a reception was given by the Municipality of Havre at the Hotel de Ville. There was a visit to the port, showing its facilities for dealing with traffic, and the members visited one of the large liners. There was an official visit to the museum at Havre, the specimens being described by the curator, Dr. Loir; also a ceremony at the French War Memorial, when a wreath was placed thereon by Sir Henry Lyons on behalf of the British Association, and another at the cemetery occupied by English soldiers, when General Perrier deposited a wreath on behalf of the French Association.

A Reception was arranged at the Hotel Frascati by the British Consul to enable the British Association party to meet members of the British colony in Havre.

The Conference had the valuable assistance of Mr. K. C. Peers, Chief Clerk of the British Association, who remained throughout the meeting.

With regard to the British section, rooms had been placed at the disposal of the Conference of Delegates in the Hotel

des Societés Savantes. This was originally intended to be the meeting place of the Conference of Delegates, but the conference was held at the Lycée de Garcons. In the former rooms were exhibited a collection of photographs of archæological interest taken from the air, lent by Mr. O. G. S. Crawford, of the Ordnance Survey, and a representative series of maps illustrating regional survey showing various aspects of the Croydon district, supplied by Mr. C. C. Fagg, F.G.S. The room was decorated with a selection of the British Association banners which were sent at the special request of our French friends. The banners had been chosen on account of their historical interest, and were as follows :— York, 1831 ; Edinburgh, 1850 ; Aberdeen, 1859 ; Bath, 1864 ; Norwich, 1868 ; Liverpool, 1870 ; Edinburgh, 1871 ; Montreal, 1884 ; Liverpool, 1896 ; Bristol, 1898 ; Manchester, 1915.

There were nearly 100 representatives at the English Conference, including both French and English members. Dr. Bather was in the chair, and there were delegates from fifteen British societies. The Chairman regretted the recent death of Sir George Fordham, who had been proposed as President for the Conference. The Chairman then called upon Mr. T. Sheppard, who referred to the assistance received from Dr. A. Loir at the previous conference at Havre in 1914, to the honour conferred upon him by the Glasgow University at the British Association meeting last year, when Dr. Loir received the degree of Doctor of Law, and to his help when the Museums Association met at Paris in 1921. Mr. Sheppard then asked Dr. Loir to accept, on behalf of some of his friends, members of the British Association, the cap, hood and gown which he was entitled to wear. Dr. Loir returned suitable thanks for this mark of esteem.

On the suggestion of the French Association, the principal subject for discussion at the Conference was on the Scientific Aspects of the Channel Tunnel, a paper on the subject being read by Mr. E. O. Forster Brown, M.Inst.C.E., illustrated with slides. Mr. Forster-Brown concluded that :—

(1) The existing geological evidence is favourable.
(2) Further geological evidence should be secured preparatory to designing the work and estimating its cost.
(3) The construction of the tunnel is likely to result, not only in material benefit to the parties constructing it, but it will strengthen still further the amicable relations existing between England and France.

Mr. Forster-Brown's paper appears *in extenso* in *The Colliery Guardian* for August 16th and 23rd, where reference to it can readily be made.

An interesting communication was also forwarded by Prof.

P. F. Kendall, D.Sc., F.R.S., which we are permitted to print below.

A discussion followed.

Subsequently the Chairman, Dr. Bather, addressed the delegates as to the value of their annual conference and asked for opinions with regard to its future working. He called upon Mr. Sheppard, the Vice-Chairman of the Corresponding Societies Committee, who had been associated with the Conference for many years, to give his views on the matter, after which many of the delegates spoke.

At the Séance de Cloture of the French Association, under the Presidency of General Perrier, medals which had been specially struck, were presented by the Association to those who had been conspicuous in assisting the Congress, the names of the recipients being in relief. Sir Henry Lyons, the Director of the Science Museum, and Mr. T. Sheppard, who acted as Local Secretary for the Havre Meeting on behalf of the British Association, each received one of these medals.

At the concluding Banquet held at the Hotel Frascati, representatives of the different countries sending delegates were 'toasted,' and members from Belgium, Portugal, Spain, Italy and Great Britain each spoke in turn, Mr. Sheppard representing the British Association.

THE PROPOSED TUNNEL UNDER LA MANCHE.

PROF. P. F. KENDALL, D.Sc. F.R.S.

(*Hon. Member Institute of Mining Engineers, and Hon. Member of Institute of Water Engineers, etc.*).

As the last survivor of the many British geologists who in the 'eighties of last century were consulted as to the feasibility of a tunnel under La Manche, and as one who has followed the fortunes of the scheme through all its vicissitudes I may venture a few observations, partly of encouragement, and partly of warning.

I assume that improved means of transit for passengers and goods are now imperative, and that upon an adequate scale they cannot be furnished by *air*. Transport by *shipping*, as at present, is subject to interruption by stress of the weather, which, in an average year, is characterised by no fewer than 150 days of foul conditions, either tempest or fog, of which the past winter has furnished more than the normal proportion. Interruptions apart, there is a large fraction of mankind ready to endorse Dr. Johnson's dictum that '*A ship is a prison, with a chance of being drowned.*'

A Train Ferry is in other respects an unsatisfactory sub-

stitute for ordinary shipping. The prospect of a frequent service of these vessels threading their way like shuttles through the warp of the traffic up and down the Channel, the busiest waterway in the World, would not be pleasing to the maritime community, and would, like the present passenger service, be liable to interruption in rough weather.

A Bridge would not be assailable by these considerations, but the danger and impediment to navigation of the many piers would certainly give the countries of Northern Europe grounds for objection to its construction.

A Tunnel seems to be the only mode of transit obnoxious to none of these objections, the only arguments against are those based upon military and financial considerations, and upon its feasibility as an engineering operation. Upon the first two of these I have no observations to offer beyond the general remark that for every expert in these subjects who is opposed to a tunnel, an expert of equal eminence can be quoted in its favour.

As to the *engineering problem*—my confidence in the skill of engineers on both sides of the Channel to deal with any difficulties that can be foreseen is complete, and the object I have kept steadfastly in view is to secure that they shall be *forewarned* of all the adverse conditions with which they may be confronted, and thus be prepared to cope with emergencies that menace life, as in the sinking of the Dover Colliery, or that involve immense difficulties and expense, such as those attending subaqueous tunnelling under the Severn and the upper part of the Mersey estuary. The geological conditions have, as far as the nature of the case permits, been determined with some approach to exactitude, but despite the heroic efforts of our French confreres, who, following the method previously employed by Sir John Hawkshaw, have carried out a minute examination of the floor of the Channel, and the facilities for the examination of the strata in the cliffs on the two shores, there is still a residuum of uncertainty.

The scheme put forward in 1906 by the late Sir Douglas Fox and his partners, including his brother, Sir Franics, at present holds the field, and has been endorsed by successive revisions down to to-day. It is one to take advantage of the low porosity and relative freedom from joints of the Cenomanian division of the Chalk, which in this respect it differs importantly from the Turonian and Senonian.

The succession of Upper Cretaceous strata of the French coast is very similar to that seen in the cliffs west of Dover, but though similar in general texture and thickness, Mr. Osman has shown that the present differences which complicate the problem of tunnelling. According to his table, which embodies the views of his predecessors, with modfica-

tions of his own, the series is as follows :—

	At Lydden Spout. Feet.	Cape Blanc Nez. Feet.
Cenomanian	252 ...	192
Gault	133 ...	42
	385 ...	234

The Turonian chalk is harder, less argillaceous, and more freely jointed, than the Cenomanian, and, therefore, is not only much more heavily charged with water, but, on account of its jointed character, permits much freer transmission. Concentrating attention, then, upon Cenomanian, the geologists from the time of the first application to the English Parliament have endeavoured to lay out a line for the tunnel which should keep within the limits of that horizon. Only one important spring emerges from this formation upon the Kentish coast—the well-known Lydden Spout, the discharge of which has been at its maximum more than three million gallons per diem, according to measurements in 1892 by Easton, but later determinations are as low as *one twentieth* of that quantity.

A practical test of the impervious quality of the rock was made at Shakespeare's Cliff, when a shaft was sunk and a heading driven for a distance of one mile and a quarter in the direction of Dover. When I visited the works in 1907 I learned that it was only necessary to pump at fortnightly intervals, and that the small quantity of water encountered came mainly from imperfect ' tubbing ' of the shaft.

The French company similarly sank a shaft at Sangatte under the condition imposed by the French Government that £80,000 should be expended on works of exploration. From the bottom of this shaft a heading was driven for a distance of about a mile. In the execution of this work a great volume of water was met with, and though the heading was kept sufficiently clear to permit a small train with its quaint two-seater ' coaches ' to travel along it, the shaft and heading were full of water when the late William Whitaker and I visited the works in 1907.

Large springs break out at Cran d'Escalles from a position in the Cenomanian approximately equivalent to that of Lydden Spout spring.

These facts led Whitaker and myself to consider that geologists took a too sanguine view and minimised the risk of encounter with faults or fissures in the strata in the subaqueous part of the tunnel. It is true that J. C. Hawkshaw fully recognised the probability of great influxes of water, and in the scheme promulgated by his father in 1867 at the

meeting of the B.A., and with modifications by himself in 1882, these difficulties were boldly faced and a line of proposed tunnel laid out which, while professing to keep within the relatively dry Cenomanian was frankly expected to meet and cope with large quantities of water. They, therefore, purposed to take the shortest route from coast to coast.

The very elaborate survey of the bed of the Channel carried out by MM. de Lapparent, Potier and Larousse gave much greater precision to our knowledge of the geological conditions, and by using a modification of Hawkshaw's sounding tool obtained, from 7000 soundings, more than 3000 samples of the Cretaceous outcrops. The interpretation of the results of these soundings was inscribed upon the Calais sheet of the Geological Map of France on the 1/80,000 scale. This map shows outcrops of the Gault, Cenomanian, Turonian and Senonian extending continuously from shore to shore, except where interrupted by the Varne Bank in mid channel, and a tract the 'Quenocs,' near the French coast covered with sand or gravel. The lines of outcrop show no indication of faulting unless an inlier of Gault off Shakespeare's Cliff can be so regarded, but in the same region sweeping inflexions of the lines must be interpreted as folds of considerable magnitude.

I have a copy of the chart showing the position of the soundings, and I must confess that it discloses several large areas in which successful soundings are lacking, or so few, as to leave unexplored spaces that may possibly include both faults and folds, *e.g.*, a north and south belt nearly in mid-channel yielded in a breadth of at the least two miles, only twelve successful soundings. The dangers of encountering either faults or folds in the driving of a tunnel have not been lost sight of by the geologists and engineers, but except by Hébert, a too optimistic interpretation of the geological data has prevailed.

Regarding faults, every geologist from de Lapparent and Potier, Boyd Dawkins, Topley and De Rance, was convinced that nothing of serious magnitude would be met, and the first named considered that 'Le resultat important de cette determination est d'avoir prouvé que la ligne d'affleurement est continue et q'elle ne presente aucun de ces decrochements qu'on devrait attribuer a une faille avec denivellement.' He argued that any small fault that might be encountered would have sealed, or, as we say, puddled, itself by the friction of the sides.

Leaving this topic for the moment, we may consider the effect of folds upon the course of the tunnel, bearing in mind, what is sometimes forgotten, that the tunnel, apart from the drainage heading, which will accompany and underlie it, will require an excavation between 20 and 30 feet in diameter.

Assuming the Cenomanian Chalk in the Boulonnais to be 192 feet in thickness, as in the cliffs at Cap Blanc Nez, and the tunnel to be exactly in the midst, the limits of vertical deviation would be about 80 feet, and a fold of this amplitude would carry either roof or floor to the limits of that formation. This is without taking into account the drainage heading. It may be that the base of the Cenomanian would not happen at such a place to present a strongly argillaceous phase, but I should not care to proceed on that assumption, but an upward deviation would be fraught with grave peril to the enterprise unless forewarnings had enabled the engineers to make suitable dispositions.

The experience of Hawkshaw's boring at St. Margaret's, where a cavity three feet in depth charged with sea water was found in the Turonian at over 200 feet below sea level should suffice to enjoin caution. It may be remarked that an acceleration of the dip would have the same effect as an actual fold, and such changes of dip are familiar to all who work in the Cretaceous rocks.

The encounter of a fold more or less transverse to the course of the tunnel would, if of considerable magnitude, best be dealt with just as such features are in coal mining, by an alteration in the line of the tunnel, though Sir John Hawkshaw declared that '*if it were necessary in constructing the tunnel to follow the circuitous line which was pointed out by Professor Hébert it could not be constructed. It could only be constructed on the assumption that it would be as nearly as possible on straight lines.*' Hawkshaw was at that time contemplating, of course, the use, as he says, of ordinary locomotives, but it is well known that electric traction permits the adoption of curves of much smaller radius than would be safe with steam.

The proposal that the Gault might prove a safer or easier horizon at which to drive the tunnel is open to the objection, a fatal one in my judgment, that, as that formation is only 42 feet in thickness on the French side, a very slight deviation from a plane could carry the excavation down into the heavily watered Folkestone Beds.

It is now the occasion to consider the probability of such irregularities as faults and folds being met with in the line of the projected tunnel. The subject has received very little consideration on the English side of the Channel, both engineers and geologists having tacitly assumed a degree of regularity favourable to the schemes advocated.

In France, on the contrary, much attention has been given to the topic, especially by Hébert (who postulated an anticlinal structure along the Straits), de Lapparent, Potier, Gosselet, Dolle, Dollfus, Bertrand, Cayeux, Parent and

finally Mr. W. B. R. King, to who I am indebted for a map of the area about Vimy, in which the Turonian Marls are expressed by contours of absolute level.

It is not my intention to discuss these important investigations in detail, but I will select two which will furnish a valuable standard of comparison. Mr. King has taken the Turonian Marls as stated and contoured their surface in a tract from Arras running N.W. to a point where his observations overlap or meet those of M. Parent on the zone of Micrasters, thence to Guines and Fretun—the latter place only three miles from Sangatte.

These observations show that the Chalk is affected by considerable plications running S.E.—N.W., and at Vimy is dislocated by a fault throwing the strata down on the N.E. to the amount of 150 metres. M. Parent's carries a similar folded structure on to the coast.

Hébert, 1875, showed that crossing the general S.E.—N.W. folding of the Chalk between Paris and Boulogne there were transverse anticlines running from S.W. to N.E. The intervening areas varied greatly in size, but in the case of two of them the space was less than that which would be required for a submarine tunnel under the Straits. His suggestion, that an anticline parallel with those described would be found under the Channel has not been borne out by the soundings.

On the English side the official geological map is at present undergoing revision during which it may be expected that attention will be paid to the tectonic structures. The existing map, however, shows that the Cretaceous rocks are subject to such changes of level between the coast at Folkestone and the great breach of the escarpment at Wye as to show that it must be affected by considerable folds ; not only so, but at Beachborough, five miles from the coast, a fault occurs which completely severs the Gault outcrop and must consequently have a displacement of more than 100 feet.

There is no reason, as far as can be seen, why the 30 miles of submarine outcrop should differ materially from comparable lengths of outcrop in France and England respectively and it behoves those upon whom the duty falls of laying down the line of the tunnel, to take these probabilities into account.

Regarding the quantity of water that engineers might have to deal with in the event of a heavily charged stratum being pierced, I would point out that experience gained from shafts and tunnels under the land area should not be accepted as a criterion of the yield of a subaqueous feeder, for the one is fed from an exhaustible source while the other will have the continuous pressure of the sea operating upon its outcrop. The task of pointing out the difficulties which confront the engineers who essay to tunnel under the Straits would be a

thankless one if no constructive proposals accompanied the criticism, but geologists have something better than negations and doubts to offer, and they will agree, I think, that co-operation and the most intimate liaison between geologists and engineers will enable this great and beneficient undertaking to be carried to a successful issue.

It seems to me imperative that, if timely warning is to be given of approach to adverse conditions, a geologist with an intimate knowledge of the lithology and paleontology of the Chalk should be in attendance at the tunnel works and should make a close examination of each length of excavation before the linings are put in place. This may mean a visit every day, and perhaps *twice* a day. He would thus be able to note any change of dip or of the texture of the Chalk and assist the engineers in the solution of the problems which arise. It may be advisable that the French and English geologists should examine in concert each the other's section. I conclude with the earnest hope that in *my time* the breach of the last barrier of Chalk between the two headings and a handclasp between French and English workers will signalise a closer bond of friendship between the two nations.

FUNGI.

Gomphidius maculatus var. cookei Massee.—On August 28th, 1929, at Beedale, near Scarborough, I discovered two specimens of this fungus, in grass by the side of a path through the coniferous wood. The variety has not hitherto been recorded for Yorkshire, and is rare. I agree with Rea (p. 325) and Massee (Vol. I. p. 348) that Cooke's plate 882 (No. 889) of *Gomphidius maculatus* Scop. really represents the variety *cookei* of Massee (so named by its author in honour of Cooke himself). The tapering stems, becoming blackish towards the base, as shown in the plate, are quite characteristic of my specimens, which are, however, much shorter in the stem; the caps of my specimens are $1\frac{1}{2}$ in. diameter and stems $1\frac{1}{4}$ in. long, quite 'squat' specimens. Massee (Vol. I., p. 348 again) describes the stem as tapering downwards, while Rea says 'attenuated upwards,' which, as he accepts Cooke's plate, I think must be a slip. The very large spores ($20\times5\mu$) are one-guttulate, and are spindle-shaped, with no tendency to contract in the middle as Cooke's figures indicate. I observe no cystidia. Apparently Massee regarded what he named variety *cookei* as worthy of specific rank, but bowed to Cooke's opinion. Massee says of the variety, 'smaller than type, stem not yellow but whitish, and turning black at the base.' ('British Fungi and Lichens,' pl. 329). Personally I am driven to the conclusion that the chief and deciding difference between the species and its variety is the presence

of yellow colour in the species, and its absence in the variety. In each case the pileus becomes spotted and edged with ' black,' and the stem also becomes ' blackish.' In each case the gills are decurrent and forked, and ' whitish becoming brownish.' The spore measurements given are practically the same. Apparently Rea has not seen the variety *cookei*, as he does not append the usual v.v. as in the case of those species which he has personally seen. On the other hand Massee (Vol. I., p. 348) published 1892, questions the right of *Gomphidius maculatus* Scop. to a place in the British list, a query repeated in ' Fungus Flora of Yorkshire ' by Massee and Crossland, 1905, although in the same volume there are records of the occurrence of the species in Yorkshire, viz., at Scarborough, Bulmer and Helmsley, presumably by Massee himself, in, or prior to, the year 1884 ! Massee rather puzzles me.—A. E. Peck, Scarborough.

ENTOMOLOGY.

Dark Green Fritillary x Meadow Brown.—On 15th July, when staying in Somerset, I captured a Dark Green ♀ Fritillary paired with a Meadow Brown ♂. I was puzzled by so apparently useless a cross-fertilization, and should be glad to hear whether any record of such mésalliances exists, and what possible result could issue.—E. W. Wade.

The occurrence is an extraordinary pairing. It would have been interesting to see if ova was laid and if it proved fertile, which I don't think would be likely. The following British occurrences are noted in Tutt's ' British Lepidoptera,' Vol. V., p. 3 :—*Dryas paphia* ♂ × *Zephyrus quercus* ♀ ; *Epinephele ianira* (=*jurtina*) ♂ × *Aglais urticæ* ♀ ; *Aglais urticæ* ♂ × *Epinephele ianira* ♀.—T. Ashton Lofthouse.

MARINE ZOOLOGY.

Rare Wolf-Fish at Scarborough.—On August 2nd, 1929, a fish strange to all the local fishermen was landed at Scarborough by the s.t. *Eccleshill*, which had caught it 17 miles from the port. The fish measured 3½ feet in length, and had been skinned and sold before I heard of it, but, fortunately, an excellent photograph had been taken. On sending a copy of this to the British Museum, Mr. J. R. Norman kindly informs me that the species is *Anarrhichas latifrons*, a wolf-fish which has only been twice previously recorded from the North Sea. It is distinguished from the common wolf-fish (*A. lupus*) by the brown colour of the skin, by the absence of transverse bars, and by a difference in the teeth. It is an inhabitant of northern seas.—W. J. Clarke.

YORKSHIRE PEAT AND OTHER LICHEN HABITATS.

W. E. L. WATTAM.

WHILE the study of Lichens does not appeal to every botanist, yet recent years have evidenced a growing interest in this class of plant life. Greater attention has been paid to the substrata upon which lichens grow, and to their distribution in general. There can be no question that the lichens present to the nature student a wide and wonderful field of inquiry. They add a charm wherever they make their habitat. What more beautiful than the colouration they give to the walls of rough stone, the ruins of old-time buildings, the boles of trees, and pleasant relief to the sternness of rocky heights. Pleasing indeed are the varied colour associations of graded shades of brown, black, grey, and yellow, in rosettes and patches, powdery granules or softening stains, which command our homage and leave pleasant memories. It is further evident to a nature student that the distribution of lichens is more strongly ecological than geographical. The lichenologist soon gains the knowledge that, as with other phases of plant life, it must not be expected even on good ground more than a certain number of species will be recordable. Cosmopolitan as many lichens are, it is noticeable that a particular locality, such as a moorland, woodland, high mountain range, or seashore, associated with the varied strata and soils, yields some definite species of lichens which are fairly certain to be met with. Quite naturally, shady situations are not favourable to good growth as the highest intensity of light rays is essential for best development. Thus, where atmospheric conditions are practically pure, profusion and excellence is found in the habitat which receives a maximum amount of sunshine. It is seldom in the vegetation of a land flora that lichens assume a dominancy, but when the ecology of a varied plant association is studied, and lichens occur as part of the vegetation, the species occurring must be studied in conjunction with the higher vegetation. If a walk is taken where the limestone is dominant, usually a rich lichen flora will be found. If, however, the varied sandstones are dominant, there will be a totally different group of lichens. Some species are common to both these geological formations. Others prefer the bark of aged trees, others the smoother barked trees. But this is only intimating in a very broad way the idea that the habitats mentioned have very definite lichen associations. A concise example can be illustrated by observing the apparent peat-loving species of a moorland area. During my tramps over a large portion of our Yorkshire Moors, I have noted the species of lichens which occur on the varied peats. The rock outcrops

on the moorlands to be mentioned are left out of consideration, whether such outcrops be calcareous, silicious, or schistose, they will be tenanted by their own species of lichens.

The peat-loving species which have been recorded on the Yorkshire Moors are :—

Cetraria islandica Ach. and var. *tenuifolia* Wain.
C. aculeata Ach. and its forms *hispida* Cromb. and *acanthella* Nyl.
Icmadophila ericetorum A. Zahlbr. *Cladina uncialis* Web.
Bæomyces roseus Pers. *Pycnothelia papillaria* Hoffm.
Stereocaulon condensatum Hoffm. *Cladonia foliacea* Willd.
Cladina sylvatica Hoffm. *C. strepsilis* Wain.
Cladonia fimbriata Fr. and var. *simplex* Wainio.
C. pityrea Fr.
C. degenerans Spreng. and var. *anomæa* Cromb. and f. *pleolepidea* Nyl.
C. lepidota Nyl. and f. *hypophylla* Cromb.
C. cervicornis Schær. *C. gracilis* Willd.
C. cornuta Fr.
C. furcata Schrad. and its vars. *spinosa* Leight. and *recurva* Hoffm.
C. cespiticia Floërk.
C. digitata Hoffm. and f. *brachytes* Nyl.
C. deformis Hoffm.
C. coccifera Willd. and several varieties and forms.
C. bellidiflora Schær.
C. bacillaris Nyl. *C. floerkeana* Fr.
Lecidia granulosa Schær. and var. *escharoides* Schær.
L. uliginosa Ach.

North-west Yorks.—In the vast moorland area within this county division, it has been noted that in Teesdale, from Cronkley to Cauldron Snout, the whole of the listed species, with the exception of *B. roseus*, and the Cladonias *strepsilis*, *lepidota*, and f. *hypophylla*, and *cornuta*, have been recorded. In the vicinity of Birkdale Tarn the only species seen are *Cladina sylvatica*, *C. uncialis*, and the Cladonias *furcata*, *digitata* and *coccifera*. In the vicinity of Dent, Whernside and Ingleborough, the absent species appear to be *I. ericetorum*, *B. roseus*, and the Cladonias *foliacea*, *strepsilis*, *lepidota* and f. *hypophylla*, *cornuta*, *cespiticia* and *deformis*. In Upper Swaledale (Muker to Nine Standards) I have only noted the following, viz., *Cetraria aculeata* and f. *hispida*, *Cladina sylvatica*, *C. uncialis*, and the Cladonias *fimbriata*, *degenerans*, *cervicornis*, *gracilis*, *furcata*, *deformis*, *coccifera*, *digitata*, *bellidiflora*, *flœrkeana*, and *Lecidia granulosa* and *L. uliginosa*.

North-east Yorks.—The Cleveland area, which includes the moors of Great Ayton, Guisboro, Greenhow, Commondale, Kildale, Battersby, and Baysdale, yield the whole of the listed species with the exception of *Cladonia bellidiflora*. In the upper part of Ryedale, such parts of the Rievaulx, Hawnby, Spaunton and Farndale moors which have received my attention have only yielded the listed species *Cetraria aculeata* and f. *acanthella*, *Cladina sylvatica*, Cladonias *cervicornis*, *furcata* and var. *recurva*, *coccifera* and *Lecidia granulosa*. Coming east-

wards, to what might be termed the Scarborough and Whitby moors, such parts as I have traversed of the Levisham, Lockton, Pexton, Fylingdales, High Wykeham, Jugger Howe, Harwood Dale and Hackness, I have only been able to note *Cetraria aculeata* and var. *hispida, Cladina sylvatica, Cladina uncialis, Pycnothelia papillaria,* and the Cladonias *foliacea, fimbriata, lepidota* and f. *hypophylla, gracilis, cornuta, furcata, cespiticia coccifera, digitata, bacillaris,* and *flœrkeana,* and *Lecidia granulosa* and *L. uliginosa.*

East Riding.—The only moorland tracts I have investigated are the Commons of Allerthorpe, Riccall and Skipwith, Holme-on-Spalding Moor, and the Warren at Spurn. The peat deposits on the whole of these areas is not of great dpeth, the subsoils are of a very sandy nature, and in consequence the species occuring are few in number. They comprise *Cetraria aculeata, Cladina sylvatica, Cladina uncialis,* and the Cladonias *fimbriata, foliacea, cervicornis, gracilis, coccifera, bacillaris,* and *flœrkeana,* and *Lecidia granulosa* and *L. uliginosa.*

Mid-west Yorks.—The moorland areas in this county division which have received my attention are those at Pateley Bridge, Sawley and Eavestone, near to Ripon, Bolton Abbey, Barden, Grassington and Buckden. My observations record only a very small number of the species mentioned in the principal list, viz., *Cetraria aculeata* and f. *hispida, Cladina sylvatica, C. uncialis,* and the Cladonias *fimbriata, cervicornis, gracilis, furcata, digitata, coccifera,* and *flœrkeana,* and *Lecidia granulosa* and *L. uliginosa.*

South-west Yorks.—Practically the whole of this area is a zone of industrial activity, and the atmospheric conditions on the moorland areas are greatly affected by smoke pullution from practically every direction. Except in very few cases the lichens enumerated in the list to follow are in a more or less depauperate condition and have a struggle for existence. Some species in certain habitats are so much begrimed by soot deposits that their determination is a matter of difficulty. The species noted are: **Cetraria aculeata* and f. *hispida, Cladina sylvatica, C. uncialis, Pycnothelia papillaria,* Cladonias **fimbriata* and var. *simplex, degenerans* and f. *pleolepidea, cervicornis,* **gracilis, furcata, deformis,* **coccifera* with several varieties and forms, **digitata* and f. *brachytes, bellidiflora, bacillaris* and **flœrkeana,* **Lecidia granulosa* and var. *escharoides* and **L. uliginosa.* The species marked with an asterisk are those which seem best to defy the atmospheric pollution.

The great majority of these peat-loving lichens of the moorland tracts mentioned are of the Cladoniaceæ. The characteristic growth of these species is well adapted to their habitat. Their primary thallus, though often evanescent, is either crustaceous or squamulose. Their secondary thallus, or

podetium, functioning as a vegetative thallus, varies in size, usually a tubular structure, simple or branched, tapering to a point, or opening into a trumpet-shaped scyphus. Many of the Cladonias listed, *i.e.*, *fimbriata*, *pityrea*, *cespiticia*, *coccifera*, and *digitata* may be classed as cosmopolitan in habitat, as these species are frequently found in habitats other than a peaty soil. *Cladonia sterepsilis* appears to be a lover of the more wet heath moors. I have only twice met with *Cladonia cespiticia*, on the moors near Great Ayton, and Fylingdales Moor. *Cladonia foliacea* would appear to be also an uncommon county species, as so far as I have only noted it at Great Ayton, Sandsend, and Spurn Point ; there is also a record for Malham Moor mentioned in Lees' ' Flora of West Yorks.,' of the two *Cladinas*, *sylvatica* and *uncialis*, the former is the more common. It occurs in great abundance on Whernside (2416 ft.), and on the moors from Cronkley Scars to the summit of Long Rake onwards to Cauldron Snout, and forms a characteristic feature of the moorland flora. This species also occurs at quite low altitudes in grassy heaths. On the belt of moorlands surrounding the industrial areas of S.W. Yorkshire it is fast disappearing, and the specimens I have noted on the county side of the Chew Valley, and the Sheffield moors to the Derbyshire borders, are of very poor form. *Uncialis* occurs in patches, and is variable in form according to the open and dry, damp and shady situations, where I have noted it in its greatest abundance on Baugh Fell, Whernside, Ingleborough, Long Rake and Nine Standards. The two most conspicuous forms of this latter species, especially in moist situations, are *bolacina* Tayl. and *elatior* Fr. I have not been able to confirm the only known county record for *Cladina rangiferina* Web. at ' the south end of the Widdale Fell ridge,' quoted in Lees' ' Flora of the West Riding,' p. 807.

The sub-Alpine *Cetraria islandica* is somewhat uncommon. Fairly abundant near the tarns on Whernside, also on the summit of Nine Standards, and in a lesser degree on Baugh Fell, Ingleborough, Long Rake and Mickle Fell. This interesting lichen is probably better known as ' Iceland Moss,' and famed for its edible and medicinal qualities. The somewhat variable *Cetraria aculeata* is quite a common species on the majority of our county moorlands. It appears to flourish best when the peat layer is based upon a sandy and gravelly substratum. It occurs at quite high altitudes, Mickle Fell, Ingleborough, Long Rake and Whernside, and is also equally frequent on most of the moorlands at lower altitudes to the coastline. In 1920, on the moors near Langthwaite, in Swaledale, the rigid, shiny, intricately-branched dark-brown thallus was in such quantity as to practically dominate great portions of the moorland. In S.W. Yorkshire the more slender, densely

cæspitose form *hispida*, forming low, dense tufts, is common. This form occurs in sweeps of practically pure heather moorland within the Huddersfield District, and appears to be one of the very few species of lichens which is able to withstand the polluted atmosphere of the industrial areas.

A further interesting feature is the nature of the species of lichen which first re-colonize the burnt portions of a moorland. Mr. F. Elgee in his 'Moorlands of N.E. Yorks.,' (pp. 44-45), records some interesting facts concerning the first plant life of the 'Swiddens,' *i.e.*, the carefully burnt portions of a Ling Moor, denuded to promote a younger growth. He states that some Swiddens on the Cleveland Moors promote a lichen growth chiefly of *Cladina sylvatica*, and the Cladonias *foliacea*, *pityrea*, *cornuta*, and *lepidota*. To these I can add *Lecidia granulosa* and *L. uliginosa*. I noted that on a very large portion of the Cronkley Moors, Middleton-in-Teesdale, in 1925, which had been burnt in 1924, the bare peat was almost covered with a new growth of *Cladonia coccifera* with some little of *Cladonia flœrkeana*. The first lichen growth after the haphazard burning continually taking place on the moorland areas within the Huddersfield district consists of *Lecidia granulosa* and *L. uliginosa*, the former especially predominating in extensive sheets and fruiting abundantly. These two species, with *Cladonia fimbriata* and *C. coccifera*, were also noted in July, 1928, as the first to colonize a burnt area of Allerthorpe Common, East Yorks.

I have also noticed that the peat accumulations removed from the reservoir at the head of Chew Valley, near Greenfield, and re-despoited in a great heap beyond the embankment, is first clothed with a growth of *Cladonia coccifera* with its form *phyllocoma*, and *Lecidia granulosa*, both common species on the adjacent moorland.

'The History of the Whale and Seal Fisheries of the Port of Aberdeen,' by J. Pyper, appears in *The Scottish Naturalist* for July-August.

In *Archæologia Æliana* for 1929, P. Brewis and J. D. Cowen figure and describe 'An Uncrusted Cinerary Urn of the Bronze Age,' found near Ryton-on-Tyne in 1928.

In a catalogue of natural history and ethnographical specimens recently offered for sale, we notice Lot 217, 'Paradise Lost,' in twelve books, and 'Paradise Regained,' in four, with 'Samson Agonistes.'

What is described as the Third Annual Report of the Corporation Museum of Halifax contains an illustration of 'Members of the British Association, Section H. (Anthropology) who visited Bardfield on September 5th.'

From the *Yorkshire Post* we learn that so many discoveries of Roman objects have been made recently that a Museum at Nottingham was unable to hold them all, and the antiquary's private house is crowded. We know of several museums which would be glad to help Nottingham in its embarrassment !

SOME EAST YORKSHIRE COLEOPTERA.

W. J. FORDHAM, M.R.C.S., D.P.H.

I HAVE recently re-examined my collection of beetles, and have found several that have not yet been put on record.

One species is new to the county, *Ceuthorrhynchus pyrrhorhynchus* Marsh., found on *Sisymbrium officinale* at Allerthorpe, 24/6/23, 9/6/26. This species is locally common in the south of England but rarer in the north. Twenty-one species have not yet been recorded from Vice-county 61 (East Yorkshire).

Aleochara bilineata Gyll. Barmby Moor, 14/6/29, in decayed cabbage roots preying on larvæ of *Chortophila brassicæ*.
Mycetoporus clavicornis Steph. Skipwith Common, 1913.
Phyllodrepa vilis Er. Allerthorpe Common, 10/11/25, under birch-bark.
Phyllodrepa ioptera Steph. Breighton, 12/17, under elder bark.
Anthobium ophthalmicum Pk. Escrick, 24/7/16.
Phlœocharis subtilissima Mar. Escrick, 9/8/16.
Gnathoncus rotundatus Kug. Bubwith, 17/9/11. Breighton, 8/5/12.
Triplax ænea Schal. Allerthorpe Common, 26/11/28, in fungus on birch.
Mycetæa hirta Marsh. Bubwith, 4/4/12.
Byrrhus fasciatus F. Allerthorpe Common, 19/6/21.
B. pustulosus Först. (*dorsalis* F.). Allerthorpe Common, 8/5/20, 19/6/21.
Cyphon ochraceus Steph. (*pallidulus* Boh.). Skipwith Common, 4/6/17.
Stenochorus meridianus L. Foggathorpe, 6/10.
Niptus unicolor F. (*crenatus* F.). Bubwith, 1923.
Zeugophora subspinosa F. Allerthope Common, 11/6/29, on aspen.
Lochmæa cratægi Först. Barmby Moor, 19/5/29.
Psylliodes napi Köch. Fields near Allerthorpe, 7/5/29.
Brachysomus echinatus Bons. Bubwith, 6/15.
Dorytomus melanophthalmus Pk. Bubwith, nine on sallows, 18/6/17.
Apion affine Kirb. Allerthorpe Common, 7/5/21.
Sphæriestes æneus Steph. (*æratus* Muls.). Barmby Moor, 12/8/23.

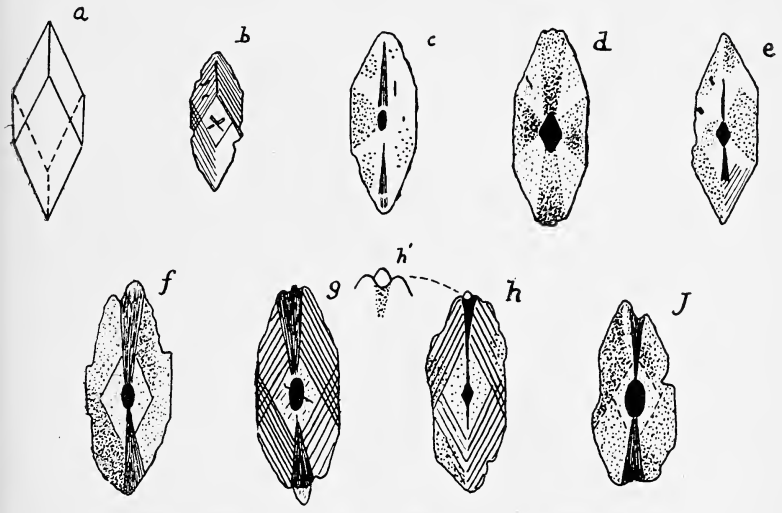
The following species are sufficiently rare or local to be enumerated, though they have already been recorded for the East Riding.

Catops morio F. Bubwith, 2/4/14.
Epurœa florœa Er. Escrick, 14/8/15.
Cryptophagus lycoperdi Hbst. Skipwith, 11/11.
Atomaria ruficornis Marsh. Bubwith, 21/5/10. 4/11/15 among dead leaves.
Prosternon holosericeus F. Skipwith, 1/8/18. Breighton, 5/6/18.
Agriotes acuminatus Steph. (*sobrinus* Kies.), North Duffield 1/4/16.
Xestobium rufovillosum Lg. (*tessellatum* Ol.). Barmby Moor 21/4/27.
Thanasimus formicarius L. Allerthorpe Common 15/9/23 under bark of a felled pine tree.
Saperda populnea L. Allerthorpe Common 11/6/29 on aspen.
Aphthona cyanella Redt. (*atrocærulea* Steph.). Bubwith 8/5/12.
Tetratoma fungorum F. Allerthorpe Common, 16/5/29, in fungus on birch.

SANDS WITH DOLOMITE IN EAST YORKSHIRE.

SIDNEY MELMORE, B.Sc., F.G.S.

THREE years ago some pipes were laid near Middlethorpe. A trench was cut nearly opposite Old St. Oswald's Church, Fulford, but on the right bank of the river, above the alluvial flat, between 20 and 25 feet O.D. The cutting showed two and a half feet of red sandy loam, containing a few pebbles, common to the district. Below the loam was a bed of fairly



Dolomite Crystals:—*a*, **the ideal form;** *b*, **from Brandesburton;** *c-j*, **from Middlethorpe.**

clean sand, a sample of which was cleared of silt by decantation, and without treatment with hydrochloric acid was separated in Sonstadt's solution in which calcite would just float. The heavy residue is remarkable for the amount of dolomite it contains. This sometimes occurs in the form of irregularly shaped plates, more rarely as coarse clear crystal fragments. But the chief characteristic of this sand is the presence of the mineral in the form of almost perfect crystals, usually with an opaque nucleus. In a crystal from Brandesburton the nucleus is a group of acicular crystals. The crystal faces are very clearly seen when specimens are mounted in water. The ideal form is shown at *a* in the figure. In balsam, total reflection does not take place, and the crystals then present the appearance shown in the drawings, unless the incident light is very oblique.

The crystals are insoluble in cold dilute HCl, but dissolve

with effervescence on warming. Their average dimensions are: length 0·47 mm., breadth 0·16 mm.; and the mean length and width of the nucleus, 0·08 mm. and 0·04 mm. respectively. Measurement of the plane angle of the rhomb under the microscope gave 46° (calc. 47°). The faces therefore belong to the form (311).

Determination of the refractive indices by the immersion method gave $\omega = 1{\cdot}68$; $\epsilon = 1{\cdot}50$.

Included dust is common, radiating along the vertical axis on either side of the nucleus (figs. *f*, *g*, *j*), and sometimes giving a cross-shaped figure as at *d*. The crystal drawn at *h* (the top enlarged at *h'*) suggests that some of the crystals are triplets and not single individuals. The minerals accompanying the dolomite include: apatite, fairly common in rounded stumpy prisms; staurolite, with outline due to cleavage; brown and pink tourmaline. At least three kinds of amphibole are present; one agreeing with the properties of arfvedsonite has $X \wedge c = 20°$, *X* dark bluish green, russet green in the direction perpendicular to X. Actinolite also occurs, with $Z \wedge c = 14°\text{-}18°$; pleochroism, blue-green parallel to *Z*, yellowish green perpendicular thereto; and one grain has been found with $X \wedge c = 30°$; pleochroism, colourless for vibrations parallel to *X*, dark yellowish green for those in the direction at right angles. An almost colourless prismatic grain giving straight extinction, $Z \parallel c$; Z pale aquamarine; X pale pinkish-brown, may be referred to enstatite. Zircon is rare and occurs in perfect crystals of small size and also in rounded forms. Garnet (colourless) and muscovite are very rare.

There can be no doubt that the dolomite crystals described were not formed in situ; some are broken, and the other forms of the mineral show no signs of secondary growth. They have not yet been traced to their source, but may be derived from the Keuper Marl underlying the Vale of York. Dr. C. Gilbert Cullis has described similar crystals from the Keuper Marl of Gloucester, but his have the form of the fundamental rhombohedron.*

The crystals are most abundant in the Middlethorpe sand, but are of fairly frequent occurrence in sand from the York moraine taken at Sand Hutton and Dunnington, though none has been found in a sample from Heslington. One or two worn specimens have been detected in material from the moraine at Grafton, near Boroughbridge.

They are also present in small amount in the shell-bearing sand of Burstwick and in the overlying red sand. None has been found in sand from Kelsey Hill. They are extremely

* *Brit. Assoc. Rept.* for 1907, p. 506.

rare at Brandesburton. They are absent from the blown sand of the Sewerby raised beach and the associated chalky rubble. A few specimens have been noted in the chalky sand and gravel near Garton station, west of Driffield.

Dolomite crystals, apparently of the same kind as those here noted, have been described by F. Hardy from the Fenland silt of the Wash.*

Dr. A. Landesborough Thomson refers to the 'Migrations of British and Irish Woodcocks,' in *British Birds* for September.

In *The Colliery Guardian* for August 30th and September 7th, is given a report on 'The Support of Underground Workings—Coal Fields of Lancashire, Cheshire and North Wales.'

Dr. L. F. Spath, in his paper in *The Naturalist* for September, page 293, refers to Mr. C. H. Wilson as 'Hon. Curator of the Scarborough Museum.' We are asked to state that this should have read 'Hon. Keeper of Geology,' as Mr. W. Gyngell is the Hon. Curator.

The " fisherman's grace " is given in *The Irish Naturalist's Journal*, as under :—

Lord, suffer me to catch a fish
So large that even I
In talking of it afterwards
Shall have no need to lie.

The Vasculum for August contains a varied series of papers dealing for the most part with the North Country. Dr. J. W. H. Harrison and W. Carter refer to the 'Symbiosis of Ants and Larvæ of the Castle Eden Argus'; J. B. Nicholson on 'The Vegetation of Hell Kettles'; G. Bolam gives a Memoir on Abel Chapman; C. N. Rollin refers to 'The Assumption of the Hood by Immature Gulls'; and H. J. Smythe refers to 'The Harwich Coast.'

Earth Flexures: Their Geometry and their Representation and Analysis in Geological Section, with special reference to the Problem of Oil Finding, by **H. G. Busk, M.A., F.G.S.** Cambridge University Press. 12/6 net. In Earth Flexures, Mr. Busk has entered into a reasoned discussion of the mathematical problem in tectonics as applied to certain earth folds and allied structures which have been studied principally in Persia, Burmah and Egypt. The author quite rightly insists upon the importance and value of precise mapping in geological work, a factor in oilfield practice which is nowadays considered to be essential. At the same time, however, it must be remembered that field sketching, apart from geometrical considerations, will always find a place in geological survey, and the present writer has found that a preliminary sketch of a field section often serves a useful purpose before the actual work of an instrumental nature has been considered. Great caution must be exercised also in the determination of surface outcrops, as the correct structural attitude of the underlying formations has not infrequently been disguised by later geological processes. Mr. Busk is to be congratulated upon his clear exposition and valuable advice in regard to surveying by means of the Plane Table. The diagrams and sketches also are excellent, and though the mathematical section of the book may not appeal to all field geologists, there is no doubt that it has a distinct value, and should be studied by all who contemplate the adoption of geology as a profession.—G.S.

* *Geol. Mag.*, Vol. LVII. (1920), p. 543.

BIRDS.

Common Sheld-Duck near Pickering, Yorks.—In December, 1928, a farmer in the low country near Pickering saw in the dusk of the afternoon two strange birds alight in the flooded part of a field. He believed them to be wild-duck, and having his gun with him, he succeeded in shooting both. Shortly afterwards they were described to me as having ' red turned-up bills,' and on this character I ventured to suggest they were sheld-duck. One was cooked and eaten, but as this duck is reported to have dark flesh of a disagreeable taste and smell, it could hardly have proved pleasant pabulum. The other has been stuffed and placed in the usual glazed box, the combination being retained as an object for household decoration. I have now had an opportunity of seeing this bird. It is a sheldrake in handsome plumage. Nelson, in ' The Birds of Yorkshire,' states that the common sheld-duck ' occasionally occurs inland,' and he makes particular reference to ' the rivers of the West Riding,' ' sheets of water on the high moorlands,' ' Wensleydale, Teesdale and Ryedale.' In the Pickering district there would appear to be local names of Skelding or Scaling Duck, which may be derived from the North Riding dialect word of ' skeldering ' meaning screaming, yelling. Howard Saunders describes the note of the male as a shrill whistle and that of the female, which is far more noisy, as a harsh bark, sometimes followed by several distinct quacks. ' At the pairing season,' according to Seebohm, ' the male develops a special call, which takes the form of a clear, rapidly repeated whistle or trill '—see Kirkman's ' British Bird Book.' But whatever the derivation of the local name may be, there is some confusion about the origin of the name ' Sheld.' Ray (1674) gives it as an East Anglian form of parti-coloured. Coward states : ' The name means pied, and has no connection with shield,' whereas the Concise Oxford Dictionary ' makes the name refer to ornamental patterns on shields, from the German schild—shield.' Another authority considers the word derived from the A.S. scyld, a shield. The shield idea seems to me far more probable, because the horizontal band of bright chestnut and the vertical black band down the middle of the breast divide the white frontal parts in such a way as to produce an effect similar in appearance to that of a shield.—R. J. FLINTOFF.

Mr. Beaumont Morfitt, of Atwick, the last of the family which made a collection of local geological and antiquarian and other objects, died in August, and we understand from a press report that the specimens have been offered to the township of Hornsea. Another press report that the famous so-called Maglemose harpoons have been left to the Hull Museum proves to be incorrect.

YORKSHIRE NATURALISTS AT PICKERING, YORKS.

F. A. MASON, F.R.M.S., AND W. H. PEARSALL, D.Sc., F.L.S.

(*Continued from page 316*).

ZOOLOGY (H. B. Booth) :—Among birds the Green Woodpecker appeared to be well distributed, and while we were in the woodlands its laughing cry was always with us. The Turtle Dove was fairly plentiful, and has extended much further north in the North Riding than in the West Riding.

Excluding the more common birds, the following species were met with : the Pied Flycatcher, Garden Warbler (common), Goldcrest (near the old coal mine), Wood Warbler, Chiffchaff, Tree Pipit, Dipper, Carrion Crow, Kestrel, Redshank, Common Sandpiper, Nightjar, and one member reported having heard the Grasshopper Warbler.

A Pheasant s nest with ten eggs was seen, and a nest of the Lesser Redpoll that was being lined with white feathers and the vegetable down of the Coltsfoot :

A slow-worm was picked up, and what was perhaps the most important record made in this section, the small Planer's Lamprey (*Petromyzon branchialis* or *P. planeri*), was found to be common in both the Pickering and the Levisham Becks. I made a brief search for it in the beck at Goathland, but did not see any. Mr. Greevz Fysher first drew attention to it. Recently systematists have treated this as the same species as the River Lamprey (*P. fluviatilis*) from which, however, it differs in size, dorsal fins, habits and habitat. I only wish many species and subspecies were as distinct.

MOLLUSCA (Greevz Fysher) :—The picturesque district of Pickering is so diversified that it offers abundant features of interest for many departments of the naturalist sciences. This is confirmed by the circular of the Whitsuntide excursion demanding the unusual space of six pages.

It may then appear remarkable that there was not a paragraph devoted to Conchology.

Such areas as Malton, Castle Howard and the like are more attractive ecologically to the average non-marine mollusc than such wild and magnificent scenery as the Hole of Horcum.

The glorious fine weather and long continued drought also was inimical to the observation of any great number of terrestrial species, and not many tranquil waters were discoverable.

PICKERING AND LITTLE PARK WOODS.

H. hortensis v. *quinquevittata*.
H. nemoralis v. *quinquefasciata*.
H. aspersa.
A. arbustorum.
P. rotundata.
V. pura.
V. nitidula.
Clausilia laminata.
Clausilia bidentata.
H. rufescens.
Agriolimax agrestis.
Arion ater.
v. *hortensis*.
v. *brunnea*.
Succinea elegans.

KINGTHORPE WOODS.

Arianta arbustorum.
Helix hortensis
Vitrea pura.
Pyramidula rotundata.
Hygromia hispida.
Clausilia laminata.
C. bidentata.
Euconulus fulvus.
Carychium minimum.
Cochlicopa lubrica.
Vitrea alliaria.
Vitrea cellaria.
Vitrina pellucida.
Acanthinula aculeata.
Limax maximus.
Agriolimax agrestis.
A. lævis.
Arion ater.
Limnæa peregra.
L. glabra.
Planorbis vortex.

Hole of Horcum:—*Helicella itala.* (dead); *H. virgata* (dead).

Whitby Road Ponds:—*Limnæa peregra.*

Kingthorpe Ponds:—*Limnæa peregra, Pisidium* sp. ?; *Sphærium corneum.*

Scarborough Race Course.

Theba cantiana.
Helix nemoralis v. *quinquefasciata.*
Helicella virgata.
Hygromia hispida.
Pyramidula rotundata.

Entomology, etc. (J. M. Brown):—Although insects appeared to be rather scarce on the first day, the heat and bright sunshine on the Sunday and Monday caused very considerable increase in activity. Butterflies became quite plentiful, *Callophrys rubi* being particularly numerous on the moors near Levisham and Saltersgate. Other species seen were *Pieris brassicæ, P. rapæ, P. napi, Euchloë cardamines, Vanessa urticæ, Pyrameis atalanta, Argynnis euphrosyne* and a specimen of what appeared in the distance to *Pyrameis cardui* flying over the moor near Saltersgate. Humble bees were numerous and active, and queen wasps of the species *Vespa vulgaris, V. rufa* and *V. norvegica* were seen either searching for nesting sites or collecting wood for building purposes. Four species of Ants were noted, *Formica rufa* nesting in old wood in Newton Dale, and *Myrmica rubra, Formica fusca* and *Donisthorpea flava* all nesting under a single large stone, and accompanied by the commensal Collembolan, *Cyphoderus albinos.* Several members of the party witnessed an interesting encounter between ants and earwigs, during which the latter attempted unsuccessfully to decamp with the eggs of the former, and on being attacked by the ants defended themselves by making use of their pincers, which however, seemed quite harmless against their small assailants.*

A single specimen of Lace-wing fly, *Hemerobius humuli,* was taken.

Hemiptera were not very numerous, these insects becoming more plentiful later in the year. Those obtained included:—

Heteroptera.

Anthocoris nemorum.
A. confusus.
Miris holsatus.
M. calcaratus.
Monalocoris filicis.
Lygus pratensis.
Dicyphus stachydis.
Salda c-album.
Velia currens.
Salda saltatoria.
Arctocorisa fabricii.
Gerris thoracicus.
G. lateralis v. *costæ.*

Homoptera.

Athysanus sordidus.
Thamnotettix subfusculus.
Chlorita flavescens.
C. viridula.
Dikraneura variata.
Zygina flammigera.
Delphax discolor.
D. pellucida.
Trioza remota,
Stiroma albomarginata.
Psylla nigrita.
P. buxi.
Trioza urticæ.

and the Scale-insect common on Sallows, *Chionaspis salicis.*

No intensive collecting of Apterygota was possible, but several species were casually taken, including:—

Onychiurus armatus.
Isotoma viridis.
Orchesella cincta and var. *vaga.*
Entomobrya nivalis.
E. albocincta.
Lepidocyrtus lanuginosa.
Cyphoderus albinos.
Tomocerus minor.
Sminthurus viridis.
Dicyrtomina minuta.

and one species of Thysanuran, *Campodea staphylinus.*

* A full and interesting account of a 'Fight between Earwigs and Ants,' by H. Vincent Corbett, appeared in *The Naturalist,* 1916, p. 348.

Woodlice were very plentiful in places and included :—

Oniscus asellus. *Trichoniscus pusillus* and the var. *roseus.*
Porcellio scaber. *Armadillidium vulgare.*

Two species of Harvestmen were noted, *Platybundus triangularis* and *Nemastoma lugubre.*

Coleoptera (M. L. Thompson) :—Messrs. J. M. Brown, T. Stainforth, A. E. Winter, G. B. Walsh, and M. L. Thompson, were the coleopterists present on one or other days. The backward state of the season accounted for the absence of many species it was hoped would be met with. On the moors the Tiger Beetle (*Cicindela campestris* L.) was abundant, and the two moorland Carabi, *C. nitens* L. and *C. arvensis* Hbst. were found. *Pterostichus adstrictus* Esch. (*vitreus*, Dej.) and *P. lepidus* F., two other moorland species, were also taken, the latter by Mr. Stainforth, who also turned up *Stenus guttula* Müll. on the margin of a stream. Mr. Brown came across *Cychrus rostratus* L. *Œceoptoma thoracicum* L. and *Phosphuga atrata* L. Mr. Walsh remained in Pickering, devoting his time to beating and sweeping. He obtained the following :—

Tachyporus solutus Er.
Stenus flavipes Steph.
Anthobium primulæ Steph.
Nargus wilkini Spence } (in
Catops kirbyi Spence } carrion)
Micrurula melanocephala Marsh.
Meligethes rufipes Gyll.
Melanophthalma gibbosa Hbst.
Aphodius constans Duft. (in dung).
Batophila rubi Payk.
Longitarsus atricillus L.
Anthribus variegatus Foure.
Phytonomus arator Lin.
Cæliodes rubicundus Hbst.
Anthonomus pomorum L.
A. pedicularius L.
Apion pallipes Kirby.

YORKSHIRE NATURALISTS AT BAUGH FELL.

F. A. MASON, F.R.M.S., AND W. H. PEARSALL, D.Sc., F.L.S.

The three hundred and forty-ninth meeting of the Yorkshire Naturalists' Union was held at Hawes Junction on Saturday, June 8th, for the examination of Baugh Fell and Long Gill. In spite of the remote area, there was a good attendance. A heavy thunderstorm during the early part of the afternoon added to the difficulty of accomplishing much. The meeting at headquarters in the evening was presided over by Mr. H. B. Booth, and the following reports were presented. The thanks of the meeting were accorded to Mr. Rosse Butterfield for arranging and leading the excursion.

Vertebrate Zoology (H. B. Booth) :—The Yellow Wagtail, Dipper and Common Sandpiper were in the valley. On the slope of the hill were Ring Ouzels and Redshanks. Lapwings and Curlews were abundant, and very noisy. On the Fell top, Golden Plovers and Dunlins were seen and heard in numbers. At the tarn about a dozen nests of eggs of the Black-headed Gull had hatched. One Lesser Black-backed Gull was seen—probably a visitor from the coast, unless there is a small unknown nesting colony in the fells, since they were driven away from Malham Tarn.

Coleoptera (Mr. M. L. Thompson) :—Among Beetles, on the higher slopes of Baugh Fell, during the earlier part of the day, were—

Patrobus assimilis Chaud.
Pterostichus adstrictus Esch.
Hydroporus morio Dej.
Atheta graminicola Grav.
Myllæna brevicornis Mat.
Aphodius lapponum Gyll.
Quedius umbrinus Er.
Othius melanocephalus Grav.
Stenus foveicollis Kr.
Arpedium brachypterum Grav.
Byrrhus fasciatus F.
Aphodius borealis Gyll.

Fresh Water Biology (H. Whitehead) :—No animal life was found in the tarn at the head of the stream. Nymphs of *Nemura* were the only animals found in the water. A few winged stoneflies were sheltering under stones, viz., *Isopteryx torrentium* Pict., *Leuctra inermis* Kmpny. and *Nemura variegata* Oliv. There was one caddis fly, *Leptocerus dissimilis* Steph.

The species taken were all characteristic of the higher reaches of moorland streams. The paucity of animal life was due to very little plant growth (algal or moss) on the stones.

Mr. R. W. Butcher gave me some caddis larvæ which he had collected in an adjoining stream. These are a species of *Halesus* at present undetermined.

Flowering Plants (W. H. Pearsall) :—Long Gill revealed a colony of *Populus tremula* on a little scar on the left bank. This occasionally occurs in similar places in the Lake District, but it is not very common in this country as a self-sown tree. On the top of the Fell, *Rubus chamæmorus* was obtained and Mr. Butterfield also got *Trientalis europea*, a small form with much purple colouring. Some members of the party returned to examine the gills below the station. Along the stream side there were interesting willow hybrids and *Salix phyllicifolia, S. aurita, S. cinereas* and *S. caprea* as the possible parents. There were also three forms of *Alchemilla arvensis* which require further attention. *Pyrola minor* was fairly abundant under some birches, while one of the gills contained magnificent sheets of Oak Fern and Beech Fern.

Bryophyta (W. H. Burrell) :—The few hours available were spent in and about Long Gill ; there was much *Sphagnum* and *Polytrichum* on the waterlogged peat, from the lower slopes to the summit. The gill is open and timberless, characterised by its heavy gravel, which made it a conspicuous gash in the hill side when viewed from Hawes Junction ; the rocks in the beck were swept clean, and there was a total absence of the clothing of mosses that makes so many of the dale becks attractive ; there was nothing to indicate whether this bareness was the normal state due to rapid discharge of storm water, or whether a cloudburst had swept through, piling up the gravel banks that were so noticeable. The bareness of the gill sides was probably increased by the severe frosts of February and March dislodging the surface.

The following were collected :—

Polytrichum aloides c. fr.
P. piliferum c.fr.
P. juniperinum.
P. strictum.
Campylopus flexuosus.
Dicranella heteromalla c.fr.
Dicranum scoparium.
Rhacomitrium canescens var. *ericoides.*
Weisia rupestris.
Aulacomnium palustre.
Philonotis fontana.
Webera nutans c.fr.
Brachythecium plumosum.
Hypnum revolvens.
H. cupressiforme.
H. cuspidatum.
H. schreberi.
Lophozia flœrkii.
L. ventricosa.
Diplophyllum albicans.
Marchantia polymorpha c.fr.

We have received the *Report of the Committee on Bird Sanctuaries in Royal Parks (England)* for 1928, published by the H.M. Stationery Office, at 9d. It gives an account of the various species of birds in Hyde Park, Kensington Gardens, St. James's and the Green Parks, Regents' Park, Greenwich Park, Richmond Park, Hampton Court and Bushy Parks, and Osborne, in some of which quite an interesting avi-fauna exists, and is apparently well protected. Among the donors of waterfowl, etc., to the Royal Parks during the year, we notice the names of the Duke of Bedford, Sir Richard Graham, Mr. W. H. St. Quintin, Mrs. D. A. MacAlister, and others.

EXCURSION TO SANDBURN WOOD, YORK.
Y.N.U.: ENTOMOLOGICAL AND PLANT GALLS SECTION.

W. D. HINCKS.

On June 22nd a party of entomologists met at Sandburn Woods for the investigation of the district. The area explored presented many features in common with the previously investigated Allerthorpe and Buttercrambe districts, and a comparison of the present list with those published in our pages from the above localities will illustrate the similarity of the three faunæ.

Mr. J. M. Brown reports the following :—

The region consisted of a small area of moorland, damp in places, a plantation consisting mainly of conifers (larch, Scots fir and spruce), and young birches, with a few oaks, sallows and other deciduous trees, and on the outskirts, some bracken. The undergrowth in the woodland was very scanty, and promised little in the way of insect life. Beneath the heather a number of characteristic Hemiptera were found, such as *Scolopostethus decoratus*, *Trapezonotus arenarius* (immature), and *Ulopa reticulata*, on the bracken the usual *Monalocoris filicis* abounded, while the firs yielded immature examples of *Camptozygum pinastri*. *Salix repens* supplied odd specimens of *Macropsis impura*, and beneath the heather a single dead example of *Rhacognathus punctatus* was found, along with a number of immature specimens of a Shield-bug, possibly *Sehirus biguttatus*.

The Hemiptera taken included :

Heteroptera.

Elasmucha grisea L.
Rhacognathus punctatus L.
Scolopostethus decoratus Hhn.
Trapezonotus arenarius L.
Anthocoris nemorum L.
Stenodema calcaratum Fall.
Calocoris norvegicus Gmel.
Monalocoris filicis L.
Lygus contaminatus Fall.
Cyllocoris histrionicus L.
Psallus betuleti Fall.
P. varians H. S.
P. variabilis Fall.
Plagiognathus chrysanthemi Wolff.
Acanthia saltatoria L.

Homoptera.

Philænus spumarius L.
Oncopsis flavicollis L.
O. alni Schr.
Macropsis impura Boh.
Deltocephalus ocellaris Fall.
Thamnotettix subfusculus Fall.
Cicadula 6-notata Fall.
Eupteryx auratus L.
Typhlocyba tenerrima H.S.
Cixius nervosus L.
C. similis Kbm.
Delphax discolor Boh.
D. difficilis Edw.
D. pellucida Fall.
Dicranotropis hamata Boh.
Psylla nigrita Zett.
Aphalara nebulosa Zett.
A. calthæ L.

Orthoptera.

Two species of grasshopper were plentiful, viz., *Stenobothrus viridulus* L. and *Tetrix bipunctatus* L.

Neuroptera.

Lacewing flies were fairly plentiful and included :—

Hemerobius nitidulus Fabr.
Boriomyia nervosa Fabr.
B. concinna Steph.
Chrysopa alba L.
C. vittata Waes.
C. phyllochroma Waes.
C. perla L.
Coniopteryx tineiformis Curt.

Psocoptera were not very numerous, but the following were taken :—*Loensia fasciata* Fabr., *Graphopsocus cruciatus* L., *Cæcilius flavidus* Steph., *C. burmeisteri* Br,. *Mesopsocus unipunctatus* Müll., *Elipsocus hyalinus* Steph.

Mr. M. L. Thompson notes the following COLEOPTERA :—

Elaphrus cupreus Duft.
Pterostichus diligens Stm.
P. nigrita F.
Anacæna globulus Pk.
Lathrobuim fulvipenne Gr.
Stenus impressus Germ.
Meligethes æneus F.
M. viridescens F.
Aphidecta obliterata L.
Mysia oblongoguttata L.
Anatis occellata L.
Adalia bipunctata L.
Pullus suturalis Thunb.
Athous hæmorrhoidalis F.
A. vittatus F.
Agriotes acuminatus Steph.
Podabrus alpinus Pk.
Cantharis pallida Goeze.
Rhagonycha lignosa Müll.
Malthodes marginatus Lat.
Cryptocephalus labiatus L.
Luperus longicornis F.
Lochmæa suturalis Th.
Longitarsus suturellus Duft.
Otiorrhynchus singularis L.
Phyllobius argentatus L.
Polydrusus cervinus L.
P. pterygomalis Sch.
Strophosomus melanogrammus Först.
S. lateralis Pk.
S. retusus Marsh.
Cidnorrhinus 4-maculatus L.
Anoplus plantaris Næz.
Cionus scrophulariæ L.
Rhyachites nanus Pk. Navis
Anaspis ruficollis Brit. Cat.
A. maculata Fourc.
A. rufilabris Gyll.

Mr. W. D. Hincks adds the following species to Mr. Thompson's list :—

Bembidium lampros Hbst.
Lathrobium quadratum Pk.
Elater balteatus L.
Limonius æruginosus Ol.
Helodes minuta L.
Cantharis nigricans Mull.
Haltica oleracea L.
Anthribus variegatus Fourc.
Micrelus ericæ Gyll.
Orchestes salicis L.
Rhamphus pulicarius Hbst.
Apion curtirostre Germ.
Rhynchites betulæ L.

Mr. Hincks reports the scarcity of Diptera at Sandburn during the excursion, even the common species were absent. Several species are at present unidentified, including a small Dolichopod very abundant on dried up *Sphagnum*, and a large Tachinid which occured in good numbers on bracken, are unmentioned in the short list below :—

Tipula variicornis Schum.
Chloromyia formosa Scop.
Leptis scolopacea L.
Therioplectes tropicus Mg.
Dysmachus trigonus Mg.
Thereva annulata F.
T. nobilitata F.
Platychirus peltatus Mg.
Sphærophoria menthrastri L.
Sarcophaga carnaria L.
Lucilia sericata Mg.
Hydrotæa irritans F.

Miss E. M. Pilkington submits the following list of Galls obtained, which has been verified by Mr. J. M. Brown :—

PLANT GALLED.	GALL PRODUCER.
Betula alba L.	*Eriophyes rudis* Can.
Veronica Chamædrys L.	*Perrisia veronicæ* Val.
,, ,,	*Eriophyes anceps* Nal.
Picea Sp.	*Chermes abietis* Kalt.
Alnus rotundifolia Mil.	*Eriophyes axillare* Con.
Fraxinus excelsior L.	*Phyllocoptes fraxini* Nal.
Betula alba L.	*Eriophyes lionotus* Nal.
Quercus Robur L.	*Macrodiplosis dryobia* F. Low
,, ,,	*Andricus testaceipes* Htg.
,, *pedunculata*	*Aphilothrix quadrilineatus* Htg.
,, ,, (on male catkins)	*Neuroterus baccarum* L.
,, ,,	*Andricus curvator* Htg.

In Memoriam.

DR. E. O. CROFT.

WITH deep regret we record the death of Edward Octavius Croft, of Leeds, on August 7th. Dr. Croft was in his seventieth year, and was active and vigorous, and his decease will come as a shock to many of his friends and associates. He was the eighth son of Dr. Charles Ilderton Croft, of St. Laurence

Pountney, London, and was educated at Epsom College. His medical education was received at the University College and Hospital, London. In 1883 he took his M.R.C.S., and the next year the L.R.C.P., and he obtained the M.D. at Durham in 1898. Although at first in general practice, he soon became a consultant in Obstetrics and Gynæcology, in which he acquired a great reputation.

In London he held the posts of Resident Obstetrical Assistant to the University College Hospital, and afterwards Resident Medical Officer to the General Lying-in Hospital. Croft came to Leeds in 1885 and became the Resident Obstetrical Officer at the General Infirmary, and later (1890)

took up a positon on the honorary staff of the Women and Children's Hospital, which he retained until his death. He was a demonstrator and lecturer in Obstetrics, and later Professor in the Leeds University.

The writer has on several occasions seen his excellently set and preserved collections of British Macro-Lepidoptera collected in the Leeds district and during his holidays to well-known collecting centres. Further, he had a good collection of European Lepidoptera, obtained during his various visits to the Continent, which are remarkable for the excellent preservation and full data. His library of rare old Lepidoptera books and other natural history works was well selected and contained some choice items ; the present writer calls to mind a nice copy of Dr. Drury's well-known work.

Dr. Croft was a quiet and unassuming man, though excellent company with his friends, having a fund of ready humour and anecdote concerning his collecting trips which made him liked and much respected by all.

He was always very helpful to the young collector, and the present writer remembers gratefully many kindnesses received at his hands, and recalls the several occasions, some years ago, when in company with two other young collectors he has visited Dr. Croft and received to his great and lasting joy large numbers of Lepidoptera duplicates, a boon which only a young collector can fully appreciate.

Soon after he came to Leeds Croft joined the Naturalists' Club and Scientific Association, and attended the meetings with regularity up to his death. On several occasions he was President of the Society, and again this year, when his death leaves the presidential chair unoccupied.

He attended the meetings of the Yorkshire Naturalists' Union frequently, and was a familiar and popular figure at the meetings of the Entomological Section, where he took the chair on several occasions. Present at a meeting of the Entomological Section last October, he largely contributed to the success of the meeting by his excellent exhibits and comments.

Croft joined the Entomological Society in 1907.

He wrote very little, though several notes from his pen have appeared in the Entomological magazines.

Yorkshire entomology loses by his death one of its most valued workers, and many of our members lose an intimate and honoured friend. Dr. Croft's kindness and good fellowship will be remembered by all, he was singularly free from the 'side ' which one so frequently sees in the more successful medical man.

We tender to his bereaved family our sincere regrets and sympathy—W. D. Hincks.

YORKSHIRE NATURALISTS' UNION.

VERTEBRATE SECTION.

President of the Section : R. CHISLETT, Rotherham.

Meetings will be held in the Library of the CHURCH INSTITUTE, Albion Street, Leeds, on Saturday, October 26th, 1929.

At 3-15 p.m., to consider and pass (*a*) Sectional Reports for 1929, and to elect Officers for 1930 ; (*b*) the General and Financial Reports of the Yorkshire Wild Birds and Eggs Protection Acts' Committee for 1929, and to recommend this Committee for 1930 ; (*c*) the Report of the Yorkshire Mammals, Amphibians, Reptiles and Fishes Committee for 1929, and to recommend this Committee for 1930.

At 6-30 p.m., The following papers will be given :—

'Cycles in Numbers of Rodents,' by A. D. Middleton.

'Some Yorkshire Marine Vertebrates,' by W. J. Clarke, F.Z.S. (illustrated).

Members or Associates are invited to attend and bring notes, specimens and lantern slides. Will Officials of Affiliated Societies kindly notify their members?

E. WILFRED TAYLOR, *Hon. Secretary*,
10 Telford Terrace, York.

BOTANICAL SECTION.

A Meeting of the Botanical Section will be held on October 12th, at 3-0 p.m., in the Botanical Department of the University of Leeds, for the consideration of the Annual Report and the Election ef Officers.

Papers will be read, and members desiring to contribute should communicate with the Secretary.

C. A. CHEETHAM.

Wheatfield,
Old Farnley, Leeds.

ENTOMOLOGICAL AND PLANT GALLS SECTION.

The Annual Meeting will be held on Saturday, October 19th, at the Leeds Y.M.C.A., Albion Place, at 3 p.m. prompt. Members and Visitors are invited to bring Exhibits and Papers.

W. D. HINCKS, *Hon. Sec.*,
9 Grange Avenue,
Chapeltown, Leeds.

11th OCTOBER, 1929

FURNITURE SALE ROOMS, HUNTINGDON.

DILLEY, THEAKSTON & READ have received instructions to include in their Sale on Friday, 11th October, 1929,

A valuable Collection of about 240 cases of Stuffed British Birds, collected by the late BENJ. WELSTEAD, ESQ., and the late EDWARD WELSTEAD, ESQ., of Stonley, Kimbolton, Hunts. Sale at 12 o'clock.

Catalogues of the Auctioneers, Market Hill, Huntingdon.

Printed by A. BROWN & SONS, Ltd., 40 George Street, Hull, and published by A. BROWN & SONS, Ltd., at 5 Farringdon Avenue, in the City of London.
Oct., 1929.

NOV., 1929.

No. 874
No. 648 of current Series

THE NATURALIST

A MONTHLY ILLUSTRATED JOURNAL

PRINCIPALLY FOR THE NORTH OF ENGLAND.

EDITED BY

THOMAS SHEPPARD, M.Sc., F.G.S.,
F.S.A.Scot., F.R.A.I., M.B.O.U.,
The Museums, Hull;

and T. W. WOODHEAD, Ph.D., M.Sc., F.L.S.,
Tolson Memorial Museum, Huddersfield,

WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF
JOHN W. TAYLOR, M.Sc. RILEY FORTUNE, F.Z.S.

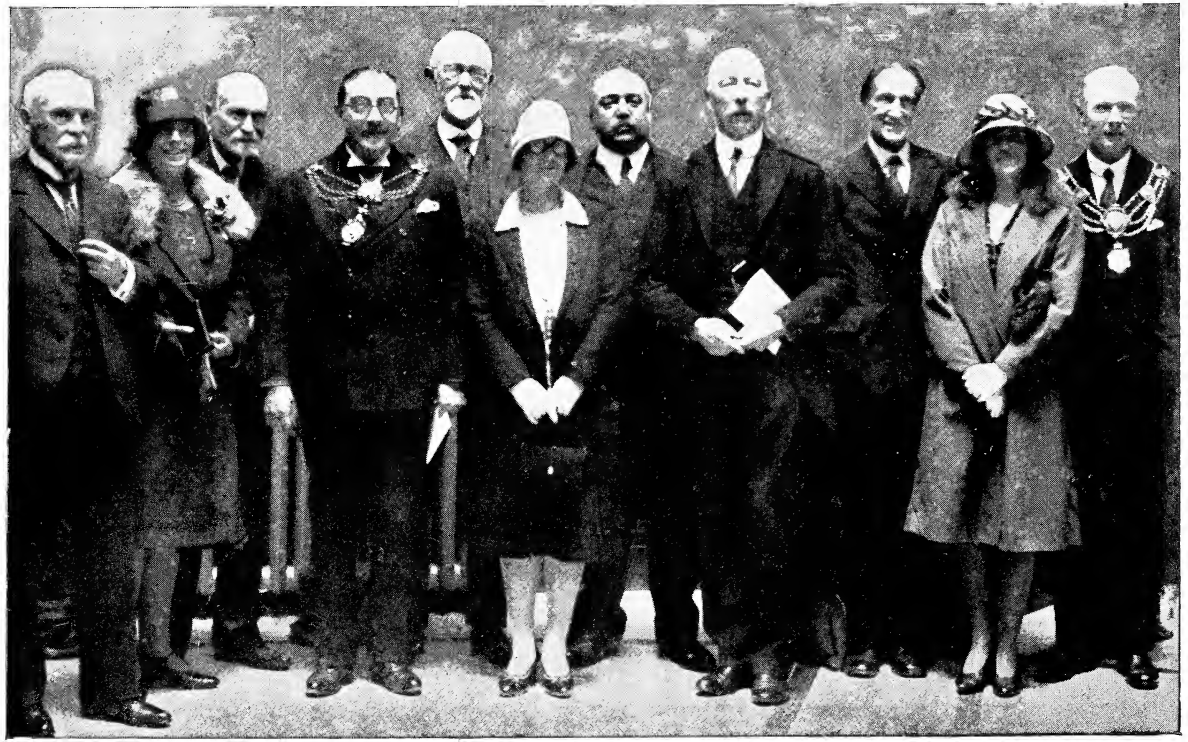
Contents :—

LONDON:

A. BROWN & SONS, LIMITED, 5 FARRINGDON AVENUE, E.C. 4.
And at HULL and YORK.

Printers and Publishers to the Y.N.U.

Price 1/6 net. Prepaid Subscription 15/- per annum.



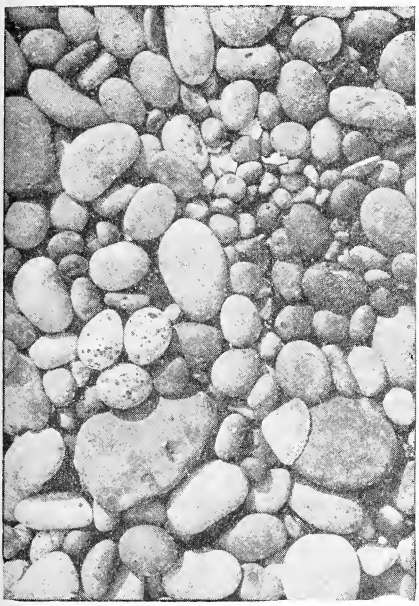
OPENING OF THE MORTIMER COLLECTION.

From left to right:—Colonel G. H. Clarke, J.P., V.D.; Mrs. Ingleby; Alderman P. T. Crook, J.P.; The Lord Mayor (Councillor Benno Pearlman); Rt. Hon. T. R. Ferens, J.P.; The Lady Mayoress; T. Sheppard; Sir Frederic G. Kenyon, K.C.B.; Sir Frank Benson; Mrs. Capron; The Sheriff (Dr. T. Ritchie Rodgers).

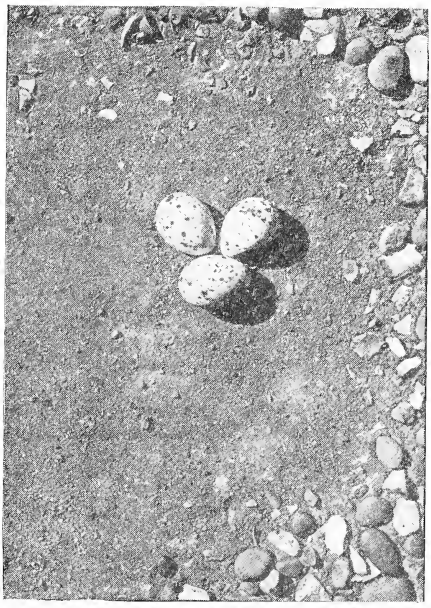
NOTES AND COMMENTS.

MEMOIRS OF A FIELD NATURALIST.*

The author gives a series of generally readable articles dealing with nature study from one point or another. There is a ' humorous prologue ' and several articles dealing with



Eggs of Lesser Tern in Original position on Pebbles.



The same eggs removed to a patch of sand.

various aspects of natural history. As a fair sample of the illustrations included in the volume, we reproduce herewith two by the publishers' permission, showing the nidification of the lesser tern, a species familiar to all Yorkshire naturalists.

FAUNA OF A STREAM BED.

Among the many contributions to the *Journal of Ecology* for August is one on ' A Quantitative Study of the Fauna of some Types of Stream Bed,' by E. Percival and H. Whitehead. The streams examined are chiefly in the West Riding of Yorkshire. For the first time an attempt has been made to estimate the density of the animal population of a stream bed, and the methods of quantitative sampling were invented by the authors. About eighty samples were analysed. On

* by F. Howard Lancum. London: The Burlington Publishing Co., Ltd. 184 pp. 6/- net.

stream beds consisting of stones with a covering of only unicellular algæ and diatoms, the average population numbered from 33 to 46 per square decimetre. Where filamentous algæ were present the number rose to 443, whilst an equal area covered with loose moss had about 800 animals. Where the moss was thick, the number rose to 4,000. The paper deals also with the percentage composition of the fauna. On stony beds the commonest animals were various species of caddis fly. The presence of filamentous algæ and mosses favoured the increase of larvæ of midges (chiefly Chironomidæ) ; but in many cases there was also a large percentage of small Oligochætes. A section of the paper deals with the food relations of the more common aquatic invertebrates. The chief food of many animals is given. The basic food of stream organisms is various forms of unicellular plants, including diatoms. Animal and vegetable detritus is frequently eaten. Mosses and phanerogams furnish only a small fraction of the food : their chief importance seems to be the provision of shelter and surface on which epiphytic algæ may flourish. Chironomids, aquatic worms (Oligochætes) and nymphs of caddis and mayflies play an important part in converting vegetable matter into animal food. They are the "cattle" which graze on extensive algal pastures.

EFFECT OF PEATY WATER.

'The presence of peaty water is noticed especially during heavy rains. In spite of this contribution of softer water the general reaction of the rivers in slightly alkaline. A comparison of the fauna of the upper Aire which does not receive peaty water with that of the Wharfe, which drains extensive areas of peat, shows that the animal life, so far as we have examined it, is apparently unaffected by the periodic heavy downpourings of water from peat. As a matter of fact, there is a very considerable amount of limestone present in the various stream beds, which is derived from glacial "drift," and this will tend to correct any undue acidity due to the influx of acid waters.'

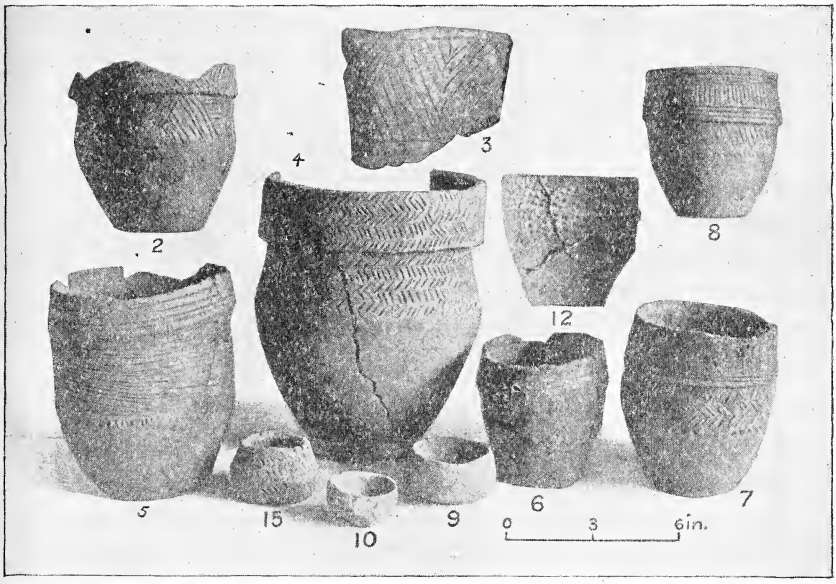
A GREAT AUK.

We learn from *The Journal of the Manx Museum* for September that on 11th June, at the sale at 2 Cedars Road, Clapham, of the well-known and extensive collection of birds formed by the late J. B. Nichols, F.Z.S., a fine stuffed specimen of the extinct Great Auk (*Alca impennis*) was purchased for £660 by Mr. W. F. H. Rosenberg, the naturalist. The bird came from the collection of Robert Champley, of Scarborough, and was bought by him, along with an egg, direct from

Mecklenburg about 1860. There is reason for believing that both skin and egg came originally from Iceland. The egg has been separated from the skin, for which the late owner paid £315.

DERBYSHIRE NATURALISTS.

The Derbyshire Archæological and Natural History Society is one of the few which continues to print substantial reports



Bronze-age Pottery from Stanton Moor.

on its activities, and Vol. XLIX. of its *Journal* contains over 250 pages of valuable articles, principally on the historical side, but there are useful papers on local Lepidoptera, Ornithology, etc., and Dr. Eric Drabble writes on Derbyshire Pansies, and also on the Flora of Derbyshire. Mr. W. Stores Fox describes some Bronze-age Pottery from Stanton Moor which is illustrated by a number of photographs, one of which we are kindly permitted to reproduce. It shows typical cinerary urns and incense cups, etc.

A 'BOTTOMLESS' CHASM.

The press for September 10th contains an article with the following headings in fine large type, double column lines: 'Underground Lake Discovery. "Bottomless" Chasm in

Pennine Range. Wonderful Canyon.' We then learn that : ' A subterranean lake of tremendous depth has been discovered in the heart of the Ingleborough mountain, Yorks., one of the highest peaks in the Pennine Range. It lies six hundred feet below the surface, and is three hundred yards long. *So far it has been impossible to find its depth. Plumb lines have been dropped from a raft, but none touched the bottom.* It is believed that the lake is a huge chasm in earth caused by a volcanic upheaval ages ago which has filled up with water. A river runs through it and continues along a wonderful underground canyon, finally cascading over a rock, and disappearing to a still lower level. The canyon itself is one of nature's wonder houses. It has columns of glittering stalagmite which have been formed by drops of water through millions of years. They form at the rate of one inch in one thousand years, and some are ten feet high.'

IMAGINATION AND FOSSILS.

In his Presidential Address given to the South-western Naturalists' Union, delivered at Torquay, and printed in the Union's *Proceedings*, Dr. F. A. Bather gives the following speech of Theseus to Hippolyta :

> Lovers and madmen have such seething brains,
> Such shaping fantasies, that apprehend
> More than cool reason ever comprehends.
> The lunatic, the lover, and the poet
> Are of imagination all compact :
> One sees more devils than vast hell can hold,
> That is the madman ; the lover, all as frantic,
> Sees Helen's beauty in a brow of Egypt ;
> The poet's eye, in a fine frenzy rolling,
> Doth glance from heaven to earth, from earth to heaven,
> And as imagination bodies forth
> The forms of things unknown, the poet's pen
> Turns them to shapes and gives to airy nothing
> A local habitation and a name.

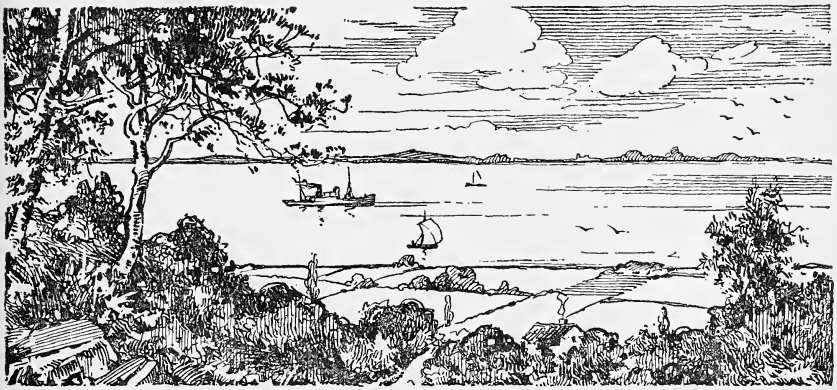
TUNNY AT SCARBOROUGH.

We learn from *The Yorkshire Post* that a fine tunny fish was landed at Scarborough on the 7th of September. It was caught at 8 a.m., fourteen miles from Scarborough, by a harpoon while it was being fed with herring. It measured 9 ft. 9 in. in length. Mr. W. J. Clarke states that, to his knowledge, there are only three records of the tunny being landed in Yorkshire. One, now in the Whitby Museum, is about 3 feet in length ; one was landed at Bridlington, and one at the Tees mouth ; the last weighing about 480 lb. Mr. Clarke is satisfied that tunny are more plentiful in the North Sea

than has previously been realised. Later, *The Yorkshire Weekly Post* records : 'Since the above mentioned monster was landed, the steam drifter, "Ascendant," has brought into Scarborough two other tunny of respectively 8 ft. and 8 ft. 3in. in length, to the order of a showman. The engineer of the "Ascendant" states that eight or nine others were captured, but were not brought ashore as there is nosale for them. They are being killed because they break up the shoals of herrings and thus spoil the fishing.'

HUMBERSIDE.

Humberside, the magazine of the Hull Literary Club, dated October, 1929, has just been issued (90 pp., 1/-). The



cover is decorated with a charming typical Humberside view, and among the varied contents is a series of lyrics on 'Standing Waters,' by J. Redwood Anderson. From this we make the following extract :—

Sir So-and-so, lord of the manor,
Had cut the entail and sold a goodly share
Of his ancestral acres—while the town
Reached out its scabrous wilderness of soot,
Its petty dwellings, the jangle of its trams,
Its forlorn filthiness of half-built street,
Nearer and nearer. But the lake still lay
Unconscious of the fate half-way upon it :
With its small island and its rustic bridge,
Its boat-house and decrepit pier, the seats
Of ornamental stone, that here and there,
Stood on the weed-grown paths that bordered it,
And, at one end, an arbour. 'Twas a spot
Chosen of lovers who, when day was done,
Came out from town—from stool and bench and shop—
To let old Nature have its way with them.

JUST ACROSS THE ROAD.*

It matters not whether Mr. Calvert is describing how birds fly, or dealing with a countryman's belief that a hairy worm will cure whooping cough; he holds the reader with his fascinating facts, and delights him with his well-phrased sentences. It has been said that the author 'makes vivid the unknown and endows the commonplace with magic.' No better remark could be applied to him in connection with 'Just Across the Road.' It is a book to delight country dwellers or close-confined in city streets. There never has been a time when the interest in wild life and living creatures was so strong as it is to-day. In simple, straight-forward language it tells of many creatures—birds and beasts and insects—that are to be found, as the title indicates, just across the road; some, even, at the very doorstep, others in the house itself. And that in busy, bustling towns as well as in the quiet countryside. There is the wonderful history of the burying beetle which acts as sexton to the Wild; the amazing incident of the butterflies that hissed; the equally astounding, but none the less veracious, story of the lobster that feared the shrimp, and the record of the grub that ate the bedroom furniture.

MARINE ZOOLOGY

Tubfish at Whitby.—There was caught in Salmon nets between Whitby East Pier and the rock edge a fine specimen of the Tubfish (*Trigla hirundo*); weight, 5 lb. 6½ oz.; length, 24 in.—F. M. SUTCLIFFE, July 4th, 1929.

ORNITHOLOGY

Little Grebe, etc., at Wetherby.—On September 1st a Kingfisher was found in the saloon here, a large room opening by a door on to the garden terrace, about 200 yards from the River Nidd, and could not be got out. It died the next day. To-day, September 12th, I found a young half-grown Little Grebe on the path leading to my butler's cottage, about 100 yards from a pond where they breed. It allowed me to pick it up and take it back to the pond and its parents and another young one.—JOHN W. DENT, Ribston Hall, Yorks.

* by W. R. Calvert. London: Skeffington & Son. 288 pp. 12/6 net.

THE MORTIMER MUSEUM.*

On October 1st, Sir Frederic G. Kenyon, K.C.B., LL.D., D.Litt., Director of the British Museum, opened at Hull the Mortimer Collection of Prehistoric Antiquities, which was presented to the Corporation by Colonel G. H. Clarke, of Kirk Ella, and has now been given a permanent home in the Old Art Gallery of the City Hall.

Sir Frederic was accompanied at the ceremony by Alderman Crook, Chairman of the Museums Committee ; the Lord Mayor and Lady Mayoress (Councillor and Mrs. Pearlman), the Right Hon. T. R. Ferens, High Steward of Hull, the Sheriff of Hull (Dr. Ritchie Rodger) and the Lady Sheriff, Principal Morgan (Hull University College), Mr. Thomas Sheppard (Director of Hull Museums), and Major Peter Robson. A large number of guests included Mr. A. J. W. Baggaley (Curator of the Sheffield Museum), and Mr. Ricketts (Curator of the Leeds City Museum). The party were entertained to luncheon in the City Hall by Col. Clarke.

Alderman Crook, introducing Sir Frederic Kenyon, said in Hull they had long waited for this event, which had been made possible by the generous benefaction of Colonel Clarke, who had served his countrymen well as a Sheriff of Hull, a city councillor, and an officer of the old Volunteer Force. The founder of the collection, the late J. R. Mortimer, laboured all his life for no pecuniary reward, but for the love of science and research, and he had handed down a collection of surpassing interest. In the presence of the Director of the British Museum he (Alderman Crook) confidently said it was the best collection of its kind in the country.

Sir Frederic Kenyon said it was not his intention to say so much about this specific exhibition as of the value of such museums to the people. He held that the study of the past should be made easy and attractive, not only to the student and the expert, but also to the general public. Museums, while offering visual education, could not give the thorough and sound knowledge which was obtained by deep study from books ; but they could stimulate curiosity, and curiosity was the first stage on the way to knowledge.

Some years ago the Hull Curator (Mr. Sheppard), in his presidential address to a national conference, described Hull as a place of small museums, and he was able to demonstrate by practical example what a small museum could do and how valuable it could be as an element of education.

Here was no hotch-potch of objects gathered from anywhere ; everything was made easy ; they could understand

* We are indebted to the Yorkshire Post for this report.

why certain things were collected; and what they meant. There were few museums which put the people so closely in touch with prehistoric man as the Mortimer Museum. The objects were clearly recorded and admirably displayed, and he congratulated the city upon the possession of a collection which appealed so strongly to anthropologists and antiquarians. In a local museum everything depended upon the Curator, and in Hull they had a live museum because they had a live Curator.

It was, therefore, up to local authorities to see that their museums were rendering the services they were formed to render, and if they did so they were well worthy of support. If Hull were to be a University town, it could not afford to neglect such instruments of education as public libraries and museums.

Mr. Sheppard then briefly described the collection, which is divided into six main sections. There are the Neolithic objects found unassociated with burials in various parts of the wolds, such as spears, barbed arrows, and daggers; and the Bronze Age objects, mainly flanged and socketed axes.

Up to the early Bronze Age there had not been recovered a single vestige of man, but in this period were the tumuli, containing human remains. Mr. Mortimer excavated about 350 burial mounds and preserved every object found in them, and they were associated in some cases with the people of four thousand years ago.

Speaking of the burials of the Iron Age, Mr. Sheppard said the so-called ' Danes' Graves ' near Driffield yielded such interesting things as chariots. In fact, there were more chariots found in Yorkshire tumuli than in any other area in Great Britain.

Coming to Roman remains, he said the excavations had yielded various forms of jewellery, brooches, rings, bracelets, and other articles of female adornment, as well as domestic utensils, coins, and funeral vases; and in the cemeteries of the Saxon Period were found skeletons, with swords and spears, and occasionally chatelaines, rings and brooches.

A vote of thanks to Sir Frederic Kenyon was proposed by the Sheriff, and to Colonel G. H. Clarke by Major P. Robson, and heartily carried.

From the Haworth Ramblers' programme for Ilkley and Bramsley Beacon, we notice Mr. Bradley quotes the Walking Parson's remedy for sore feet. The Rev. A. N. Cooper says, ' I have a remedy which I borrowed of a Scotch professor. He taught me to pour whisky into my socks instead of down my throat, making the foot, shoe and sock yielding and pliable. I give this as a sovereign preventative of sore feet.' We presume the same remedy is suitable for sore throats.

THE POSITION A MUSEUM SHOULD HOLD IN THE LIFE OF A COMMUNITY?

BY SIR FREDERIC G. KENYON, K.C.B., LL.D., D.LITT.,
Director of the British Museum.

Is it true that 'Men never begin to study antiquities till they are saturated with civilisation'? It is true that museums are a relatively modern development, traceable back at earliest to the Renaissance; but does it follow that they are a sign of degeneracy, of an exhaustion of the spirit of progress, which leads us to play with the things of the past, instead of pressing forward to build up the future?

If I thought so, I should not be here to-day to congratulate you on the addition of another museum to those that Hull already possesses. Unless a museum is to be a living element in a living civilisation, I have no use for it; neither, I imagine, have you. I would rather take as the text of my sermon the words of that eminently wise, common-sense man, Samuel Johnson: 'Whatever withdraws us from the power of our senses, whatever makes the past, the distant, or the future, predominate over the present, advances us in the dignity of thinking beings.'

An educated man is one who has his mind equipped for understanding and taking his part in the life of the community in which he is to pass his days. To do this, he should understand the world of natural life in which he is placed, and the nature of mankind with which he has to deal. The more he knows of natural history, of the physical sciences, of the mind of man and how it reacts to its surroundings, of the action of men in the past, of the play of political and economic forces, the better he is able to understand and sympathise with his fellow creatures, the better he is able to guide his own life and that of others—in short, the better citizen will he be.

The personal experience of each one of us is a small and limited thing, a matter of a few years and of contact with a few hundreds of people. Knowledge of the past is a widening of our experience a hundredfold and a thousandfold; and the wider our experience, the sounder our judgment is likely to be. The general who has studied war, the statesman who has studied history, adds to his own little experience the experience of scores of other soldiers and other statesmen; and the people which knows its own past history, and the history of other peoples, is less likely to be led astray by plausible short-cuts and illusory remedies for the evils they have to deal with.

There is, at bottom, the justification for museums. The Natural History museum widens your knowledge of the world in which you live. The historical or antiquarian museum

widens your knowledge of the life of man. Neither will take the place of the sound and thorough knowledge that comes from books, and for which you have provision in your public and private libraries; but both provide the illustrations to the knowledge that comes from books. They stimulate curiosity, and lay the foundations of knowledge. Are we not daily realising more and more the power and value of visual education? They minister, too, to that sense of beauty, which is one of the most refreshing influences in life.

Now what can a museum be in a city like Hull, or in places less populous and active than Hull? Only the very largest towns can have universal museums on a national scale; but it is not only such museums that are useful. The Curator of your own museums once, in an address to the Museums Association, described Hull as 'the Place of the Small Museums'; and he has shown you in practice what he means by that. Not a miscellaneous hotch-potch of unrelated objects, trying to do everything and doing nothing well; not a chance accumulation of curiosities disgorged by people who wish to clear their houses of things that do not interest them; but a series of exhibitions, each of which embodies a definite thought and has a definite purpose, which the visitor can see without fatigue and from which he can carry away some clear ideas, without confusion through being forced into contact with objects of a totally different order of interest.

This Museum, for instance, which we are inaugurating to-day, and which you owe to the lifelong enthusiasm of Mr. Mortimer, the enlightened munificence and public spirit of Colonel Clarke, and the skilful and persevering guidance of Mr. Sheppard, is an object-lesson in the lives of your predecessors in the county which you know as Yorkshire, hundreds and thousands of years ago. I cannot speak to you, as a specialist could, of the details distinguishing age from age and civilisation from civilisation which you have before you in this great and admirably-arranged collection; but I know this—that few museums, if any, offer such an opportunity for the study of primitive man in these islands, and that the whole landscape of the county round about you will take on a new aspect for those who take the trouble to make themselves acquainted with the species of flowers or the notes of birds, so the whole countryside has a different meaning for those who can interpret the camps, the barrows, the marks of habitation and cultivation left behind by previous generations of men.

There are three elements that go to make up the success of museums. The first is the collections themselves and those who collected them—in the present case, Mr. Mortimer, to whose lifelong devotion to the cause we do honour to-day.

The second is the human element in the handling of them, and to this, too great importance cannot be attached. I am not speaking of the great national museums, whose interest, by reason of the value of their contents, is so great that it maintains itself whatever their curators do, though even here they may do something to help or hinder. But if a local museum is a live thing, it is entirely due to those who administer it. The growth of museums, as of public libraries, and their assertion of themselves as an element in our national civilisation, has been wholly due to the devoted labours of a number of individual men and women, who, with little recompense either in pay or in fame, with little encouragement and not a little opposition and detraction, have forced a rather unwilling public to believe that they are not merely rubbish heaps or old curiosity shops. It is not sufficient to take an old building and fill a number of cases with miscellaneous objects, and leave it to the public to find out their interest. The public must be lured into coming in, and everything must be done to stimulate their interest. A museum depends almost wholly on such things as arrangement, labelling, guide-books, lectures, articles in the public press, and other forms of propaganda. There must be a purpose behind it and a mind, and that mind is the mind of the Curator.

The life of a museum lies in variety, in bringing new things, and new aspects of things, before the public, and letting them know that there is something new to be seen and learnt. Special exhibitions bearing upon subjects of topical or temporary interest, a rearrangement so as to bring into special temporary prominence some particular aspect of history or art or science or form of life, temporary loan exhibitions, and so on—these are the means by which the public can be beguiled within your doors and trained to the habit of museum attendance. I do not need to emphasise these points here, for all these things have been done in Hull ; and that is because you have been fortunate enough to have a live Curator in Mr. Sheppard.

The Museum movement has reached a crisis in its development, which is marked by the Report of Sir Henry Miers to the Carnegie Trustees. That Report shows what can be done, and how little has been done. The public museums stand at the parting of the ways. They can be, what they are here and in some few other places, real centres of enlightenment and intellectual progress ; but if so, they must be taken seriously. The local authorities must do more for them and develop their great potentialities for good, or else, in many cases, they might as well set a match to them. Here in Hull you aspire to become a University town, and in due course I hope that aspiration will be fulfilled ; but to be worthy of it you must

not neglect such potent factors in the education of the adult, as well as of the young, as the Public Library and the Museum.

Finally, there is a third element about which I wish to say a word. The Collector, the Curator, and, lastly, the Donor. Do we always realise what we owe to our benefactors in the past? Every city, every village, every institution ought, like our Universities, to have an annual commemoration of Founders and Benefactors. Our cathedrals, our churches, the endowments of our parishes, the buildings of which we are proud, are the creation of our benefactors in the past. In the Middle Ages the tradition of wise giving was strong. Among the landed class the tradition of public service and of local obligation was well established. But in the nineteenth century I think we lost something of it. I am not sure it was not in part due to the scientific political economy, which encouraged a selfish and material outlook on life. Anyhow, that tradition needs to be cultivated again. Wealth changes hands, and those who once accumulated collections and made gifts are compelled to disperse their collections and to sell. It is for those into whose hands the new wealth has come to learn its responsibilities and to cultivate the habit of giving back to the nation some part of the wealth which the nation has given them the opportunity of acquiring. There are many, I am glad to say, who have set a noble example. Here in Hull you have had some striking examples of it ; and to-day we have to render our thanks to one of them, Colonel Clarke. Generosity is twice blessed, and I trust he will have his full share of the blessing.

You have invited me to declare this Museum open. I will end, as I began, with Dr. Johnson. You will remember how, at the sale of Thrale's brewery, he declared : ' We are not here to sell a parcel of casks and vats, but the potentiality of wealth beyond the dreams of avarice.' So to-day we offer you, not a collection of pots and pans of primeval natives, but the potentiality of enlarging your mind, of multiplying your interests, and of enabling the rising generation to make themselves more fit to be citizens of England to-day.

The death is announced of M. R. Oldfield Thomas, F.R.S., the zoologist. He described more than 2,000 new species and defined more than 200 new genera of mammals.

R. W. Butcher favours us with a copy of his memoir on ' Biological Changes brought about by Sewage Effluents in Small Streams,' read at the Annual Meeting of the Association of Managers of Sewage Disposal Works.

We have received a publication from a museum, not in England, dealing with parrots, which has a plate illustrating the methods of exhibiting the different species represented therein. We must say it is one of the poorest exhibits in the way of taxidermy that we have seen.

The Naturalist

THE MORTIMER COLLECTION OF EAST YORKSHIRE ANTIQUITES.

THOMAS SHEPPARD, M.Sc., F.G.S.

A REFERENCE to the early edition of the Ordnance Survey Map of East Yorkshire will show that a district on the High Wolds with Driffield as a centre was very thickly populated in Prehistoric times, and while there are innumerable references to tumuli and ancient earthworks, these are comparatively few when it is borne in mind the enormous number of relics of Prehistoric Man which the district has yielded. Fortunately, early in the last century the brothers Robert and J. R. Mortimer, Corn Merchants, of Driffield, took a keen interest in the Prehistoric objects found in the area, and had an exhibition case in their office at Fimber, which contained typical Neolithic knives, arrows, scrapers, and other objects found in the neighbourhood. Being almost the first in the field, they had great advantages over subsequent collectors in being able to induce farm labourers to scour the fields in search of relics. We possess a handbill they issued offering prizes of various descriptions for the greatest quantity of implements received, the chief prize being a free trip to the Leeds Art Exhibition, in 1868. The late J. R. Mortimer assured me that in those days the farm servants spent their Sundays in traversing the fields in different parts of the area and frequently bushels of implements were brought to him.

When this source of collecting had been well nigh exhausted, the Mortimers devoted their attention to opening the barrows or tumuli which in those days were easily detected as they had not been levelled by the steam plough and other operations, as is the case to-day. In my own time I remember fields which showed quite a number of barrows, whereas now not a trace of anything of the kind can be seen. To Messrs. Mortimer, therefore, we are greatly indebted for the care they exercised during half a century of work and the expense to which they were put in thoroughly investigating the barrows, principally of the Bronze Age, but also some of the Iron Age ; Roman sites and various Anglo-Saxon cemeteries. There are also sites possibly earlier than any of these.

In some cases the mounds of earth erected over the ancient British chiefs were so enormous that they had actually been charted by the Ordnance Surveyors as natural hills. The cost of excavating these and other more serious operations was met by assistance from Sir Tatton and other members of the Sykes family of Sledmere.

The growth of the collections resulted in a special building

being erected for their reception at Driffield. This had a gallery round it, and in 1899 I spent the week-ends during the summer in preparing an illustrated catalogue, in which all the important finds were enumerated, and while the edition was an extensive one, it was soon out of print. The catalogue, however, contained a record of the actual number of important objects in the then Driffield Museum, and has been useful in checking them over to-day.

J. R. Mortimer long survived his brother, and for many years I assisted him in his excavations of barrows, and obtained practical experience in the work. I was much impressed by the care he exercised, not only in excavating, but in making notes of what were found. Late in life Mr. Mortimer persuaded me to edit and see through the press his various notes and observations, and these appeared in the well-known work, ' Forty Years' Researches in British and Anglo-Saxon Burial Mounds.' which was published in Hull at £2 10s., and is recognised as the standard work on the subject. Mr. Mortimer long had a wish that the specimens should remain in the district, and in his will suggested that an effort should be made to keep them in Driffield, and twelve months were allowed in order that this might be carried out. Failing that, Hull had a year's opportunity of purchasing the collection from the Trustees, failing which they were to be offered for public sale, and unquestionably had that happened, every specimen would have gone to America, where objects of this sort seem to be much more appreciated, by people who have money, than is the case in this country.

Driffield having failed to conform to the conditions, Hull had an opportunity, and by means of lectures and press articles a strenuous effort was made to secure the collection for Hull. At first a difficulty arose with regard to valuing the collections, £3000 being looked upon as a reasonable figure, but eventually on condition that the collection should be exhibited in a building, intact, and not mixed with general collections, and called ' The Mortimer Collection,' the trustees agreed to take the comparatively low figure of £1000. On this being known, Colonel G. H. Clarke handsomely came forward and provided the necessary money, the Corporation accepted it with grateful thanks together with the condition that the objects should be exhibited as ' The Mortimer Collection, the gift of Colonel Clarke.'

Soon after the purchase was completed came the outbreak of war, and as the Driffield Museum was likely to be used for military purposes, the collections had somewhat hurriedly to be packed up and transferred to Hull, the work being accomplished by the Museums staff, with the assistance of road vehicles belonging to the Hull Corporation.

The new Ferens Art Gallery, the gift of the Right Hon. T. R. Ferens, on releasing the old Art Gallery at the City Hall, enabled the rooms there to be available and with a further generous grant from Colonel Clarke towards the cost of the cases, these have been provided and are fixed round the walls of three of the large rooms. The cases are in walnut and plate glass, and as they are no higher than six feet and are two feet six inches from the floor, it means that practically every specimen is easily examined. Considerable care has been taken in preparing suitable labels, without technicalities, the information being reprinted in the catalogue.

The Mortimer Collection is in six main sections, viz. :—

(1) The Neolithic Objects found unassociated with burials in various parts of the area. These consist of spears, barbed arrows, leaf-shaped arrows, daggers, knives, saws and large numbers of disc-shaped objects usually known as 'scrapers.' There are many others of less definite shape known as borers, arrow straighteners, and so on. Of this early period we have no human remains, though a Long Barrow at Hanging Grimston has been attributed to the Neolithic period.

(2) The Bronze Age Burials, which occur usually in tumuli or barrows, of varying size. These were erected over ordinary interments, or cremated burials, and with them are various forms of grave furniture which were so keenly sought for in the early days of archæology. Over 300 mounds have been opened in the Driffield district, and the contents restored, and are now the property of the Hull Corporation. With a burial might be found beakers or drinking cups, usually highly decorated ; food vessels more or less conical in shape ; incense cups, particularly small earthenware vessels which may have been lamps or used in other ways. Also cinerary urns, which sometimes attained enormous proportions. With the burials also were bronze daggers, knives, jet beads, rings, buttons, bracelets, stone hammer heads, flint daggers, bone tools and various other relics. In these unquestionably Bronze Age deposits, objects of stone are frequently found, though they are generally of a much more elaborate type than the Neolithic implements found on the fields. Long after the introduction of bronze, stone played its part in ceremonies. The famous Duggleby Howe has yielded stone implements of an exceptional character, including a thin polished flint knife, said by the late Sir John Evans to be the finest object of its kind ever found.

(3) The Later Bronze Age Objects found unassociated with human remains in various parts of the area. These consist of flanged and socketed celts or axes, spears, knives, swords and more rarely chisels, gouges, etc. In a number of

instances they have been founders' hoards, and large quantities have occurred in association, many being broken ready for the melting pot.

(4) Burials of the Iron Age ; for example, the so-called ' Danes' Grave ' and others near Driffield, which frequently include chariot-burials. In these cases the mounds are exceptionally small and crowded together ; iron is introduced among the grave furniture for the first time, the pottery has lost its character and reverted to crude basin-shaped vessels, each of which usually contained the shoulder bone of a pig.

(5) Roman Remains. Many important sites and occasionally burials of this period have been excavated by Mr. Mortimer and these entirely occupy one of the rooms in the Museum. Among them are various forms of jewellery, brooches, rings, bracelets, etc., objects of iron which are more or less in a state of decay, enormous numbers of coins which enable their dates to be accurately gauged, and funeral vases, drinking vessels, basins, dishes, amphoræ, and other pottery, domestic or ornamental.

(6) Saxon Period. Considerable communities of Anglo-Saxons occupied the Wold Area, and their cemeteries frequently were placed on the sites of British tumuli or in the entrenchments of Bronze Age earthworks. As with previous people, the Saxons practiced burial in the ordinary way as well as by cremation, and the Saxon room contains an exceptionally large number of cinerary urns of Saxon date owing to the fact that one or two urn-cemeteries have been excavated. Generally speaking, burial in coffins or graves was the favourite method of interment, and with the skeletons were found swords, spears, bucklers of iron, and occasionally even chatelaines, rings, bracelets, elaborate brooches and other objects of bronze ; beads of glass and amber, cooking pots and other earthenware of various forms.

With regard to the question of the dates of these different periods, it is of course difficult definitely to state their precise age. Generally speaking, however, according to authoritative sources, the Neolithic or New Stone Age implements were used in these parts up to 2500 B.C. ; the Bronze Age burials are from 4000 to 3000 years old, that is to say 2000 to 1000 B.C. ; the bronze palstaves, socketed axes, spear heads, etc., unaccompanied by interments, a little later : the Iron Age objects date from about 200 B.C. to the Roman occupation ; the Roman objects, of course, date from the first, second and third centuries A.D., and the Anglo-Saxon principally during the sixth, seventh and eighth centuries.

Prof. E. B. Poulton writes on ' British Insectivorous Bats and their Prey ' in the *Proceedings of the Zoological Society* for August.

BRONZE-AGE BEAKER FROM BROUGH, E. YORKS.

T. SHEPPARD, M.Sc.

During excavations for gravel at Mill Hill at Elloughton, near Brough, some Bronze-Age beakers were found in a very

Bronze-age Beaker From Brough, E. Yorks.

fragmentary condition. Some of these, much broken, were handed over to the Hull Corporation by the Literary and Philosophical Society some years ago, others have been found since*.

Recently an opportunity has occurred of restoring one of

* See *Transactions East Riding Antiquarian Society*, Vol. XXV., and *Hull Museum Publication*, No. 141.

these, the whole of the vessel practically being preserved. The scores of pieces have very carefully been placed together, and a typical drinking cup or beaker of about 2000 B.C. is the result. The beaker is $5\frac{1}{2}$ in. high, is 4 in. wide across the top and at the bulge. The upper portion is decorated by two zones each containing a row of lozenge-shaped impressions joined at the extremities between, belts of similar decoration, but only half lozenges. There is a plain band at the waist, and a similar one at the base. The vase had been buried with a human skeleton, which, however, was in a fragmentary condition due to the loose nature of the gravel at this point.

ORNITHOLOGY

Motorists and the Fauna.—When cycling abroad, the large number of dead birds ' squashed ' on the macadam is remarkable. I never travel a few miles along our main roads without seeing several, mostly small birds like Yellow-hammers, Chaffinches, Thrushes, etc. Last Friday I counted four in about six miles. This does not include a fine rat which was ' flattened.' If the same thing prevails in other districts, the bird mortality must be great.—JAS. MURRAY, Gretna, Oct. 10th, 1929.

It is surprising that many more birds are not killed by motors. The mortality among wild mammals, domestic fowls and ducks, reptiles and amphibians is very heavy.—ED.

Grey Squirrel near Selby.—Mr. James Kendall informs me that an American Grey Squirrel was shot at Wistow on August 31st, 1929. The species was also noted during the summer at Holme and at Everingham.—SYDNEY H. SMITH, York.

Nesting of the Raven.—During the Spring of 1929, I kept under observation the nesting operations of a pair of Ravens. The first egg was laid on March 3rd. On March 10th, the nest contained four eggs, but these, unfortunately, were taken on this date by some local youths. My next visit to the nest was on March 31st, and it contained two young only, just out of the shell, the empty shells being in the nest. As all the eggs were taken on March 10th, the further two eggs could hardly have been laid before March 12th. On this assumption the incubation period was nineteen days. The young on May 5th seemed to be as large as the parent birds, and gave the impression that they would shortly be able to leave the nest. From this date, with the co-operation of the farmer, who lives within 300 yards of the nest, a careful watch was kept on the young birds, which first took the wing on May 28th, the fledgling period being 58 days.—RALPH HOWARTH, Peel, Isle of Man.

MYCOLOGISTS AT MASHAM.

A. E. Peck.
Hon. Sec., Mycological Committee, Y.N.U.

The 351st Meeting of the Yorkshire Naturalists' Union was held at Masham from September 14th to September 19th, 1929, for the Annual Fungus Foray of the Mycological Committee.

The following attended for varying periods :—

A. A. Pearson (Tunbridge Wells), J. W. Haigh Johnson, M.Sc., R. Fowler Jones, F. A. Mason, Greevz Fysher, S.D.P. Fisher, Mrs. M. Fysher, Miss D. Hilary, B.Sc., Miss M. Hewlett, M.Sc., and A. E. Peck, Hon. Secretary, members of the Committee ; and the following members of the Union and friends :— W. G. Bramley, T. Throup, J. Grainger, B.Sc., Miss J. Grainger Miss M. Shaw, Miss H. Allison, B.Sc., and Mr. W. A. Thwaites, (Masham). Dr. Harold Wager, F.R.S., Chairman of the Committee, was unable to be present owing to illness.

Mrs. C. F. Bruce, of Silverdale House, Masham, provided accommodation, including work and exhibition room, to the satisfaction of all. Mr. Thwaites, as upon the previous visit, rendered the party valuable assistance and co-operation.

Mr. F. A. Mason dealt with a number of the Discomycetes, Hyphomycetes and other micro-fungi, and he also annotated the list of records.

The summer months of 1929 furnished delightful weather, but the long continued absence of rain had rendered the ground hard and dry, and fungus-hunters had no easy task. Mr. Pearson reported that the French Mycological Society had abandoned its Annual Foray owing to the prolonged drought, and the present writer has recently walked a mile through the wood at Hackness without discovering a single fungus.

Notwithstanding all this, our members, by intensive search, gradually added to our list of records until it reached 233 species and varieties. Included in the list, due to Mr. Pearson's knowledge of this group, is a goodly number of resupinate fungi, among which was Mr. Pearson's own species of *Sebacina subhyalina*. *Laccaria laccata* furnished unusual specimens ; usually growing singly and rosy in colour, examples were here found devoid of colour and white, both singly and in dense clusters.

Amanita muscaria was only discovered during the last hour of our search, and then due to Mr. Thwaites' knowledge of an old habitat. He brought in a Bird's Nest fungus, *Crucibulum vulgare*, also by knowing where it might occur.

Lepiota acutesquamosa. This record depended upon one fine specimen found in Swinton Park under trees. Mr. Pearson

regards this species and *Lepiota friesii* as one. *Lepiota cepaestipes* var. *cretacea* was pointed out by a gardener. It was growing from a crevice in a hot-house.

Tricholoma vaccinum was by some regarded as an *Inocybe* at first, but was promptly recognised as an old acquaintance by one who knew the species.

Pleurotus sapidus almost covered a fallen tree. The fine trumpet-shaped, dried up specimens, with gills and reticulations running down the stem almost or quite to their base, appeared to Mr. Mason and the writer to belong to the genus *Panus,* in which the pileus is described as fleshy-coriacious ; in Massee's words, ' Entire fungus leathery and tough, drying up and not decaying quickly.' Mr. Pearson, however, was familiar with the species and was able to put us right.

The spores of this species are of lilac colour in the mass. The present writer will not be surprised if one day it is transferred to the genus *Panus.*

The delicately coloured and attractive *Hygrophorus calyptræformis* was a pleasing record. It was found at the previous Masham Meeting also. In the genus *Russula* it was observed that *Russula pectinata* and *Russula foetens* bear a strong superficial resemblance when the latter has lost its vicidity and adhering dirt.

Passing to the pink-spored agarics, *Leptonia euchroa* was found at Hackfall, with gills of a wonderful vivid blue, ultramarine, ' as rich as the commercial blue used for laundry purposes.' *Leptonia incana* is another fungus of colour, the cap, gills, stem and flesh being green in the main.

Rozites caperatus is a showy fungus of intense yellow colour, with ferruginous spores, and rather suggestive, at first, of the genus *Cortinarius.* Formerly called *Pholiota caperata,* it now has a genus all to itself because it possesses rough spores, and all species of *Pholiota* have smooth spores.

Pholiota flammans is a very charming plant, with its bright sulphur yellow cap, gills and stem and flesh, the cap and stem covered with squarrose scales.

Naucoria cucumis is a well-distinguished species, with chestnut-brown or blackish stem, and with a strong odour variously described by the books and the curious as of fish, cod-liver oil or cucumber.

Naucoria escharoides was found in a swamp by the banks of the Burn, near to alder trees, an almost invariable association.

Psilocybe uda. Mr. Pearson remarked that many existing records of *Tubaria stagnina* could more properly be ascribed to this species.

Gomphidius maculatus var. *cookei.* In view of my recent note in *The Naturalist* upon this fungus, I was interested upon turning up two specimens in moist ground at the foot of a

ghyll, near East Witton. Mr. Pearson thinks this and *Gomphidius gracilis* may be identical; they certainly are very near relations if not one.

The Polypores furnished a few things of interest.

Boletus luridus. Our specimens were indeed the real thing. The massive stems, reticulated with blood-red veins, bold and distinct, render this plant a remarkable one. Massee never differentiated this plant from *Boletus erythropus* and many of our records of *Boletus luridus* are undoutedly *Boletus erythropus.*

Fistulina hepatica. Only one very poor specimen seen at Hackfall.

Polyporus varius were excellent specimens with pilei of rich chestnut colour.

Polyporus giganteus grew round the ground-level stump of a large tree which had been felled, while *Ganoderma applanatum,* a big, hard solid specimen, grew from the sawn surface of the same. In *Ganoderma* the surface of the pileus is covered by a resinous, laccate crust.

Phallus impudicus was common in the woods of the fells near East Witton, and its odour permeated the atmosphere, but its smaller relation, the Dog-Stinkhorn, was not seen anywhere.

Scleroderma verrucosum was found in large numbers in the ballast by the railway side.

A brown-capped Tricholoma with thick, broad and distant gills, not recognized in the field except as an unusual type, was soon named *Tricholoma crassifolium* Berk. at headquarters.

Under Mr. Rea's new classification, this fungus has now become *Collybia crassifolia* (Berk.) Bresadola, but with the additional description that its spores are 'globose.' Herein comes a 'snag,' as our specimens bore apiculate spores. That 'Prince of Mycologists,' the Rev. M. J. Berkeley, in his 'Outlines of British Fungology,' 1860, pays no attention to the spores of any of the agarics, nor do Cooke, Worthington G. Smith nor Massee help us with any description of the spores under notice in any of their works.

Mr. Pearson says the spores are characteristic of *Collybia semitalis* and Mr. Rea (who has seen our specimens) would refer them to *Collybia fumata.*

In *Collybia fumata* the gills are described by Rea as 'gills somewhat crowded,' while the great feature of our specimens is in the thick, broad and *distant* gills, and this must be the character which warranted Berkeley naming his plant *crassifolium.*

Berkeley's plant may have had apiculate spores, for none of the writers mentioned above apparently knew anything to the contrary.

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Our specimens fitted exactly with all recorded descriptions of *Tricholoma crassifolium* Berk. as so named, in which, as stated, the spores are ignored.

Our specimens, bearing apiculate spores, do not fit in with *Collybia crassifolia* (Berk.) Bres. as described by Rea. I cannot therefore record them under that name.

Neither will *Collybia infumata* fit, as that species is not noteworthy for thick, broad and *distant* gills.

If Mr. Pearson has a leaning towards *Collybia semitalis* as a solution, because of the spores, one may answer that many species of fungi possess apiculate spores, and that our Stamford Bridge specimens of that species bore no resemblance to those under notice.

The safe course is to record our specimens as *Tricholoma crassifolium* Berk. and to add that they had apiculate spores. Further discoveries may follow.

An account of the foray would not be complete without reference to two agarics of yellow colour in every part, from which no spores could be obtained, and therefore no true classification attempted. Pilei about 2 in. diameter, gills broad and thin, stem, say, 3 in. long by $\frac{1}{8}$ in. thick.

I am inclined to think that these specimens were similar to those which are the subject of Cooke's Plate, No. 180 (t. 127), under the name of *Clitocybe sadleri* Berk. In them also the colour is wholly yellow. Emile Boudier criticised this plate as follows :—' Est *Hypholoma fasciculare* resté stérile,' to which Mordecai Cubitt Cooke agreeably replied :—' I always protested to Rev. M. J. Berkeley that this was only a sterile form of *Hypholoma fasciculare*.' This view has been generally accepted ever since (See Massee, p. 194 and Rea, p. 290). As Berkeley does not appear to have used the microscope, inasmuch as he never describes the spores of agarics, he would not be aware that his ' *Clitocybe sadleri* ' was destitute of spores. I think that our two unlisted and unfruitful specimens may be relegated to ' *Clitocybe sadleri*.'

Craterellus cornucopioides, the ' Horn of Plenty,' was found at Hackfall, as upon the occasion of the visit of 1923. It was remarked that the numerous spathulate lobes of a specimen of *Polyporus intybaceus* (with their bases hidden) strongly resembled so many ' horns of plenty.' This little reference may enable one to carry in mind the general appearance of the polypore named. The ' Horn ' is a well known esculent fungus, and Rea says of the polypore, ' Edible, but rather tough.'

(*To be continued*).

SOME RARE ICHNEUMON FLIES IN YORKSHIRE.

WM. J. FORDHAM, M.R.C.S., L.R.C.P., D.P.H.

Mr. Claude Morley has recently very kindly looked over a large number of Ichneumons taken by me in Yorkshire during the last ten years. Among them are forty-five species previously unrecorded for Yorkshire, and of these several are worth putting on record forthwith.

One insect is possibly new to Britain—a species of *Porizon* from Battersby, Cleveland, 6/5/22, and Allerthorpe on alder, 10/10/28 (both females).

Another is the second British specimen and the first female of *Notopygus emarginatus* Hlgr., which has only previously been taken in Scotland at Kingussie by Cameron, and the specimen is now in the British Museum.

Species characterised by Mr. Morley as 'rare' are *Amblyteles castanopygus* Steph. (which preys on the moth *Dasypolia templi*), taken at Sandsend, 9/21 (♂), and Allerthorpe, 30/8/27 (♂), and *Pimpla ovivora* Boh. (which preys on spiders' eggs), from Fyling Hall, near Robin Hood's Bay, 6/28 (♂).

Other rare species characterised as 'good' are *Polyblastus cothurnatus* Gr., Allerthorpe, 4/7/28 (♀). *Cremastus spectator* Gr., Ruswarp, 9/9/20 (♀), and *Trichomma enecator* Rossi. (a parasite of Tortrices), Allerthorpe, 8/25 (♀).

'Uncommon' species are *Stenichneumon pistorius* Gr., Allerthorpe, 6/26 (♀), and Ramsdale, Robin Hood's Bay, 30/6/29 (♂). *Cratichneumon coruscator* L. (probably a southern species), Allerthorpe, 27/8/27 (♂). *Amblytelis glaucatorius* F., Allerthorpe, 17/8/25 (♂). *Platylabus nigricollis* Wesm., Fyling Hall, 6/28 (♂). *Bassus multicolor* Gr., Thorp, Robin Hood's Bay, 24/6/24 (♀), and Bubwith Ings, 25/6/19 (♂). *Acrotomus flavilabris*, Halton, Leeds, 7/6/26 (♂), and *Olesicampa sericea* Hlgr., Allerthorpe, 31/7/28 (♂).

BIRDS.

Bar-headed Geese in Yorks.—On June 8th, 1929, about 7-15 a.m., I saw five geese flying very low. They settled in a field near, and I got within thirty yards and watched them with glasses. Upon sending a description to the British Museum, Mr. P. R. Lowe identified them as the Bar-headed Goose, *Anser indicus*. Two were afterwards shot and proved rather dry eating. Full winged geese of this species are kept at Woburn, Kew, St. James and Regent Park.—W. G. Bramley, Bolton Percy.

FIELD NOTES.

ENTOMOLOGY

Homoptera near Wigton.—The following list of Cumberland Homoptera includes everything I have satisfactorily determined. *Aphrophora alni* local, Kelsick, Oulton Moss. *Philænus spumarius* common and variable, the following varieties being noted : *gibbus, leucophthalmus, leucocephalus, lateralis, lineatus, biguttatus, marginellus* and *populi*. *P. exclamationis*, Oulton Moss. *P. lineatus*, common. *Tettigonia viridis*, Oulton Moss. *Euacanthus interruptus* common, Kelsick, Aikshaw, etc. *E. acuminatus*, Kelsick, rather rare. *Batracomorphus lanio* locally common. *Oncopsis alni, Idiocerus adustus, I. confusus, Agallia puncticeps, Acocephalus nervosus, Thamnotettix prasinus* and *Empoasca smaragdula* are all common at their proper time and habitat. *Macropsis cerea* rare on Sallow, Kelsick. *Athysanus grisescens*, Kelsick and Salta Moss. *Limotettix aurantipes*, Oulton Moss, not common. *Eupteryx signatipennis*, rare at Kelsick, but *E. pulchella, E. urticæ* and *E. auratus* were common. *Typhlocyba geometrica* locally common on Alders. *T. ulmi* and *T. rosæ* common. *Zygæna flammigera*, Kelsick, occasionally on Oak. *Cixius pilosus*, Kelsick, generally on Oak. *C. nervosus*, Oulton Moss. *Dicranotropis hamata*, Kelsick, common. *Stiroma bicarinata*, rare. *Conomelus limbatus*, Oulton Moss, very common on Heather in August. *Delphax discolor*, Kelsick, in June. *Psyllopsis fraxini*, Kelsick. *Psylla costalis, P. peregrina, P. alni, P. forsteri*, locally common, Kelsick and Dundraw. *Arytæna genistæ*, Aikshaw Moss and Abbeytown. *Trioza urticæ*, Kelsick.—Jas. Murray, Gertna.

Yorkshire Hemiptera for 1928.—Owing to an oversight of mine, three important records made by Mr. W. J. Fordham were omitted from the lists I gave of last year's captures (*The Naturalist*, 1929, pp. 309-310). They are the following :—*Rhacognathus punctatus* L., a second specimen taken under heather, Allerthorpe. This habitat agrees with the record noted for Sandburn Wood (*The Naturalist*, 1929, p. 349). *Coranus subapterus* Deg. This rare Yorkshire insect was again taken at Allerthorpe. *Onychumenus decolor* Fall. on grasses, Allerthorpe. This species accords closely in colour with that of dry grass, among which I have taken it in numbers in the south, but Mr. Fordham's capture constitutes a new county record.—James M. Brown, Sheffield., 4th October, 1929.

ORNITHOLOGY

White-beaked Dolphin at Whitby.—On 19th June,

1928, a large cetacean was stranded on the beach near Lector Nab, about half a mile north of Whitby. It had been buried more than once by the Local Authority, and disinterred by the action of the sea, and came under the notice of Lieut. F. C. Graves, R.N., the officer in charge of H.M. Coastguard of the Whitby District, who forwarded the upper jaw to the Natural History Department of the British Museum. Lieut-Graves received a request from Mr. W. P. Pycraft, that the lower jaw should also be forwarded. When this was dispatched he was informed that the cetacean was a White-beaked Dolphin (*Delphinus albirostris*) and asked to send on the whole carcase. By this time it had reached an advanced state of decomposition and the task of dealing with it was a very unpleasant one, but the remains were packed and sent to London. The specimen was a male, approximately 8 feet in length. Another Dolphin was captured on 27th July, 1928, by the crew of the salmon-fishing coble owned by Mr. Chris. Eglon, of Whitby, when their nets were down at the Rock Edge, about half a mile from the shore between the Rock Buoy and the mouth of Whitby Harbour. It was landed at Whitby and exhibited on the West Pier, where it attracted much notice. This was found to be a female White-beaked Dolphin, measuring 8 ft. 7 in. in length and 5 ft. 2 in. in girth : tail 26 in. across the flukes : length from middle of the base of the back-fin to the middle of the tail, 4 ft. 4 in. : height of back-fin, 15 in. : length from tip of snout to blowhole, 13 in. : length of flipper, 13 in. : number of teeth on each side of upper and lower jaw, twenty-four. This fine specimen, which was in perfect condition, was also packed and dispatched to the British Museum under the superintendance of Lieut. Graves. Full particulars and confirmation of the identity of this Dolphin have recently been obtained from Mr. Pycraft by Mr. W. J. Clarke. So far as can be ascertained there is no previous record of the occurrence of the White-beaked Dolphin at Whitby.—F. Snowdon.

Marsh-Harrier near Robin Hood's Bay.—An immature Marsh-Harrier was taken in a trap on Fylingdales Moor, near Robin Hood's Bay, on 10th May, 1926. The skin was preserved locally and later remodelled at the Rowland Ward Studios and is now in the collection of Sir J. H. Harrowing, Low Stakesby, Whitby.—F. Snowdon.

Quail near Selby.—Mr. James Kendall informs me that a nest of the Quail, containing eleven eggs, was found on Selby Common on July 26th, 1929. Mr. Ben Hanley, of Barlby, who found the nest, has retained one egg for the purpose of identification ; the remainder duly hatched out.—Sydney H. Smith, York.

YORKSHIRE NATURALISTS AT MARR.

F. A. MASON, F.R.M.S., AND W. H. PEARSALL, D.Sc., F.L.S.

On Saturday, July 6th, the Union held its 349th Meeting at Doncaster for the investigation of the woods in the neighbourhood of Marr. Surrounded within a few miles in each direction by already large and rapidly growing mining and industrial centres like Brodsworth, Goldthorpe and Woodlands, in addition to the close proximity of Doncaster, Marr, with its Park, Wood and ' Thick,' has retained a quiet seclusion which, we fear, cannot be much longer maintained. Indeed, the writing is already on the wall. A large quarry, long disused, the well-worked faces showing the durable character of the vast quantities of stone yielded to a past generation, which nature has since had time to redress ; where the Tway blade and Vipers Bugloss flourish, and where Wood Warbler, Spotted Flycatcher, Turtle Dove and many other birds find a congenial haunt, has recently become a ' tip ' for domestic refuse. The nauseating banks of rubbish, in every stage of microbial decay, have developed a breeding ground for rats and pestilential flies, and that any public authority can be found capable of perpetrating such an outrage on the principles of sanitary science and the spoliation of the countryside at the same time is amazing, and calls for the severest condemnation.

Under the leadership of Mr. A. A. Dallman and Mr. E. W. Pettifer, of Doncaster, the party proceeded by 'bus from Doncaster to Marr, where, through the courtesy of the Vicar, we were able to make a very thorough inspection of the Church. In this we had the advantage of the able guidance of Mr. E. H. Large, who has devoted much study to the archæology of the district.

Built in the thirteenth century by William de Hamilton, the two lower stories of the tower, the north wall and the chancel of the first Church at Marr still remain. About the year 1400 an upper story and spire were added to the tower, and the chancel arch rebuilt. An aisle was also added, this being built on the south side. There are fine twin lancets, low side windows, and other features, brasses, etc., of great archæological interest ; the Font is a very fine example, and, according to Mr. Large, would be in use when the Church was first built. Of its three bells one is dated 1617 and another 1632.

The botanical aspects of the excursion were disappointing, and except for one or two less commonly-occurring plants, Vipers Bugloss and the Squinancy Wort, for instance, there was nothing unusual to record. Equally unfruitful was the search for mosses, and dispite the fact that there were three bryologists in the field nothing noteworthy was reported. Few fungi were seen, and those only of common occurrence. The only abundant species was the Jews-ear, on Elder.

The entomologists might have been better repaid had the weather been more favourable for the net. Commenting upon the work of the entomologists, Mr. J. M. Brown says :—' Beating and sweeping were practically impossible, and none of the more conspicuous insects was on the wing. Lepidoptera were almost entirely invisible, Lacewings were very scarce, few Psocids were found, and no interesting Hemiptera were recorded. Most of the beetles taken were obtained by Mr. E. G. Bayford from decaying fungus and tree stumps by the roadside.'

Mr. Brown further reports as follows :—

Lacewing Flies.

Chrysopa flavifrons Br. *Boriomyia subnebulosa* Steph.

Psocoptera.

Lœnsia fasciata Fab. *Mesopsocus unipunctatus* Müll.

HEMIPTERA.

Anthocoris confusus Reut.
Calocoris norvegicus Gmel.
Plesiocoris rugicollis Fall.
Lygus pabulinus L.
L. contaminatus Fall.
Dicyphus stachydis Reut.
Psallus betuleti Fall.
P. variabilis Fall.
Eupteryx stachydearum Hdy.
E. atropunctatus Goeze.
Typhlocyba ulmi L.
T. douglasi Edw.
Delphax discolor Boh.
Psylla ambigua Forst.

COLEOPTERA.

Homalium rivulare Payk.
Amphicyllis globus F.
Rhizophagus dispar Payk.
Dacne rufifrons F.
Pseudotriphyllus saturalis F.
Mycetophagus quadripustulatus L.
Malthinus frontalis Marsh.
Cryptocephalus labiatus L.
Chrysomela polita L.

PLANT GALLS.—Mr. J. M. Brown and Miss E. M. Pilkington secured a number of galls, and Miss Pilkington furnishes the list given below :—

Plant galled.	Gall producer.
Quercus robur L.	*Macrodiplosis dryobia* F. Low.
Fraxinus excelsior L.	*Psyllopsis fraxini* L.
Cratægus monogyna Jacq.	*Perrisia cratægi* Winn.
Acer pseudo-platanus L.	*Eriophyes macrorrhynchus* Nal.
Rosa canina L.	*Rhodites rosæ* L.
Buxus sempervirens L.	*Psylla buxi* L.
Nepeta hederacea Trev.	*Oliogotrophus bursarius* Bremi.
Veronica chamædrys L.	*Perrisia veronicæ* Vallot.
Tilia europæa L.	*Contarinia tiliarum* Kieffer.
Sambucus nigra L.	*Epitrimerus trilobus* Nal.
Urtica dioica L.	*Perrisia urticæ* Perris.

MOLLUSCA.—Mr. T. W. Saunders reports the following species from—

Near the Church :—*Hygromia hispida* and *Pyramidula rotundata, Cochlicopa lubrica.*

Near the Quarry by the roadside :—*Vitrea cellaria* and *V. rogersi.*

Arriving at the Quarry, Brodsworth :—Slugs—*Limax maximus, Agriolimax agrestis, Arion ater, A. hortensis, A. fasciatus* ; *Vitrea crystallina,* several ; *V. lucida,* the second record for this area worked by the Doncaster Scientific Society—3 alive and 2 dead ; *V. cellaria,* several specimens ; *V. cellaria* var. *albina* ; *V. rogersi,* several ; *V. alliaria* ; *V. nitidula* ; *V. pura* ; *Pyramidula rotundata,* common ; *Hygromia hispida* ; *Vallonia pulchella,* 1 empty shell ; *Cepæa nemoralis,* Type ; *C. nemoralis* var. (00300 *libellula*) ; *C. nemoralis* var. 12034 ; *Cochlicopa lubrica,* several specimens ; *Clausilia bidentata,* several.

Near the Lodge Gates at entrance to Marr Wood, *Limax maximus* was found.

A general meeting was held at Doncaster in the evening, under the chairmanship of Mr. M. H. Stiles. Reports were received from Messrs. A. A. Dallman, T. W. Saunders, T. M. Fowler and J. M. Brown. Mr. F. A. Mason, after welcoming on behalf of members the presence of Mr. Stiles, who has been a member of the Union for forty-five years, proposed a vote of thanks to Messrs. E. W. Pettifer, E. H. Large and A. A. Dallman for their services. This was seconded by Mr. J. M. Brown, and carried unanimously.

' Is the Great Auk still living ' is discussed by H. A. A. Dombrain in the Autumn issue of *Bird Notes and News.*

A photograph of a rat stealing a hen's egg, with the consent of the owner of the egg, is given in *The Animal World* for October.

SUSSEX v. YORKS.

At a recent conference of scientists, the present writer had the opportunity of comparing the extraordinary similarity between Yorkshire and Sussex so far as both the geology and archæology of the areas are concerned : a similarity which does not exist with any other counties. A Report of this Address is appearing in *The Museums Journal*. Since then we have received one or two volumes which confirm this resemblance.

In ' Prehistoric Sussex '* Dr. E. Cecil Curwin gives the results of seventeen years' work in Sussex archæology. Naturally, with Cissbury, Chanctonbury, Piltdown, and the Weald within his area, the author has had an opportunity shared by few. In addition, the new method of archæological research by the aid of air photographs is here illustrated to the full, and there is no doubt that in the future this micro-telescopic method of demonstrating the work of our ancestors in the field will play a very prominent part. The Sussex earthworks, tumuli and early burials as described by Dr. Curwen will be particularly interesting to those having a knowledge of Yorkshire archæology.

A volume similar in character, but dealing with a more definitely prescribed area, is ' The Early History of Worthing,' by the energetic librarian and curator of Worthing.† A cursory glance at the illustrations, dug-out canoe, bronze axes, British coins, Roman pottery and Saxon remains, makes it difficult to realise that one is not perusing a list of the contents of some important Yorkshire Museum. Worthing is particularly fortunate in possessing Cissbury—the centre of the flint tool industry of late Neolithic times—a wealth of Roman remains—some found on the site of the museum itself, and the wonderful collection of Saxon relics, remarkable for its glass vessels, from Highdown. The book is written without ostentation, in readable English, and while the author evidently claims only to have given a summary of the work of other people, there is evidence of a discretion in such selection which is very commendable. As an appendix is a memoir on the Geological Literature of Sussex, with a reproduction of W. Smith's geological map of the county.

Dealing with the same area, but from a more recent angle, Barclay Wills writes on ' Downland Treasure.'‡ The author has made a careful study of the Sussex shepherds and their craft. He is probably as familiar with the work of the shepherd and with the weapons and tools he uses as is anybody. His written articles have a fascinating freshness, and the illustration of bills, crooks, and other ' by-gones ' will appeal to the growing number of collectors of relics of other days. Incidentally we may record that the Hull Museum has purchased from the author various old-time farm implements, ranging from a primitive Sussex plough to a fine series of old sheep bells.

' A Description of the High Stream of Arundel, the heads and risings thereof ; the sundry kinds of fishes therein in their several haunts ; the fishermen and their care and service in preserving the fish in roading time ; the swans and eyries, and other fowl in their several limits ; the water-bailiff of the aforesaid high stream in Arundel Rape, his fees, dues and duties, being the titles of a manuscript written by, and for, the water-bailiff of Thomas Howard, 24th Earl of Arundel, about the year 1637, and preserved in the muniment room at Old Norfolk House, 31a St. James' Square, S.W. Edited, with introduction, notes, map, and index, by Joseph Fowler, M.A., 71 pp., sold at the Museum, Littlehampton. price. This is issued as ' Nature and Archæology Circle, Littlehampton. Extra Publication, No. 1.' We must leave our readers to judge the nature of this well-printed book from the title given.

* 172 p.p. London. The Homeland Association.
† Miss M. Frost, F.L.A., published by Combridges, Hove, Sussex. VIII+100 pp. 3/6 net.
‡ Methuen & Co. 180 p.p. 6/- net.

'Sussex' by S. P. B. Mais. The Richard Press Ltd., 272 pp. 6/-. There is no doubt the author loves his Sussex. He was not born there but hopes to die there. He knows it so well and it as pleased him so much that it is a hardship to leave the county. The volume is a record of tramps on the Coast, Downs and Weald, written by an enthusiast. The illustrations are many and excellent, and castles, humble cottages, churches, bridges and crosses are here beautifully protrayed. Mr. Mais makes a good case.

Professor J. Arthur Thomson writes on 'The Reduction of Natural Shelter and its Influence on Wild Fauna' in *The Journal of the Ministry of Agriculture* for October.

'Some Aspects of the Love of Art,' by Sir Robert Witt; and 'Remarkable Features in the Ulverscroft Valley,' by F. W. Bennett, appear in the *Transactions of the Leicester Literary and Philosophical Society*, Vol. 30.

Writing to *Nature* (No. 3122), Dr. W. E. Collinge states 'my own investigations, embracing more than one hundred and fifty species of wild birds and upwards of twelve thousand post-mortems, lend no support to the contention that butterflies are part of the normal food of birds.'

Among the contents of *The Essex Naturalist*, Vol. XXII., Part V., just to hand, we notice 'Water-Surface Plants and Animals,' by D. J. Scourfield; 'Some Sunken Track-ways near Saffron Walden,' by Miller Christy; 'River Development in Essex,' by Miss B. R. Saner and S. W. Woodridge, together with reports of the Meetings of the Essex Field Club.

In the *Entomologist's Monthly Magazine* for September is a note on the 'Large Copper, *Chrysophanus dispar* Haw., and its Recent Establishment in the British Islands,' which is accompanied by an excellent plate provided by the Entomological Society of London showing the under and upper surfaces of the three races, namely, British (*dispar*), Dutch (*batavus*), and Continental (*rutilus*).

Reprinted from *The Quarterly Journal of the Royal Meteorological Society*, we have received a 'Report on the Phenological Observations in the British Isles from December, 1927, to November, 1928,' by J. Edmund Clark, Ivan D. Margary, Richard Marshall, and C. J. P. Cave. This report increases in volume and interest annually, and besides numerous statistics and tables, there are maps and charts.

The London Naturalist, the journal of the London Natural History Society for 1928, has recently been issued (Hall 40, Winchester House, Old Broad Street, E.C.2., 94 pp., 3/-). It contains W. E. Clegg's Presidential Address on 'The Thames as a Bird Migration Route.' There is a record of a Mediterranean Birthwort in Surrey, J. C. Robbins writes on the 'Larva and Food Plants of the Saw-fly, *Emphytes carpini*,' R. W. Robbins describes a variety of *Epinephele jurtina* in which the whole of the usual brown coloration has disappeared and is replaced by a very light pinkish yellow tint, W. Watson describes the Brambles of Kent and Surrey, there is a remarkable preliminary list of birds observed within 20 miles of St. Paul's Cathedral, L. B. Hall records numerous examples of the rare British smooth snake (*Coronella austriaca*) on the Dorset Heath, H. J. Burkill records a Cut-leaved Hornbeam in Surrey, and also reviews the records of 'British Butterflies in 1928.' There are also various sectional reports, a list of 'interesting records' and a continuation of the 'Botanical Records of London Area.' Altogether a very creditable publication.

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YORKSHIRE BRYOLOGISTS AT HEBDEN BRIDGE.

On March 16th a party of bryologists spent an enjoyable day at Hebden Bridge. From the station the party proceeded to the Hardcastle Crags end of Crimsworth Dene, this being then followed as far as Lumb Falls, whence a return to Hebden Bridge was made *via* the old Haworth Road and Peckett Well.

Vegetation was much restricted by the late frosts. There appeared to be quantities of *Hypnum ochraceum* in the stream, but it was too weathered to identify.

Such mosses as *Rhacomitrium aciculare* and *Hyocomium flagellare* were general, with local associations of *Hypnum commutatum* and *Weisia rupestris*, indicating local pockets of calcareous rock in the general Millstone Grit area. Some soil mixed with a gathering of *Weisia rupestris* effervesced briskly with acetic acid.

In all 30 species of mosses were seen and 15 species of hepatics, from which the following are selected as typical :—

Mosses.

Tetraphis pellucida.
Catharinea crispa.
Polytrichum aloides.
Dicranella cerviculata c.f.
Blindia acuta c.f.
Fontinalis squamosa c.f.
Hyocomium flagellare.
Eurhynchium confertum c.f.
Orthodontium gracile var. *heterocarpum.*

Hepatics.

Aplozia sphaerocarpa.
Lophozia floerkii.
Calypogeia arguta.
Lepidozia reptans.
Scapania dentata.
S. undulata.

Opportunity is taken here to tender the thanks of the party to representatives of the local society who both suggested the route and proved very helpful conductors.

F. E. Milsom, B.Sc.

NORTHERN NEWS.

A well illustrated handbook on ' Principles and Practice of Mosquito Control,' by J. F. Marshall, with over fifty illustrations, has been issued by the British Mosquito Control Institute, Hayling Island, Hampshire, for half-a-crown.

We give the following as it appears in the Press :—' Rare Bird Found Near Elgin ' : A fine specimen of the pine marten—the first seen in the district for over 50 years—was discovered by quarrymen in a rabbit snare in the Oak Wood, near Elgin. Efforts to capture it alive failed owing to its fierce resistance. The bird measured 31 in. from tip to tail, and had already assumed its winter coat ' ! ! Birds in winter coats are rara aves.

When we heard that Mr. L. Armstrong was visiting South Africa with the British Association, we felt sure that good would result. Our hopes have been confirmed. From the *Daily News* we learn, under the headings of ' A Cave-Man Find,' ' Frieze in a Stone-Age Dwelling,' that important finds have been made by a party of archæologists in a cave in the Matoppo Hills, Rhodesia. Mr. Leslie Armstrong states that the cave is a treasure house of discovery. It has a magnificent frieze over the whole circumference of the interior. The party is convinced that the cave was occupied prior to the last Ice-Age in Europe. The occupation, in fact, dates from the earliest Stone Age in South Africa, and the cave has apparently been occupied in succession by various races of men, down to within a few centuries ago.

REVIEWS AND BOOK NOTICES.

Aids to Zoology, by **Harry Lister.** London : Bailliere, Tindall & Cox, viii.+214 pp., 3/6 net. In this work the lecturer in charge of zoology at the University of Nottingham has endeavoured to meet a demand for an introduction to the study of zoology suitable for a first year student of zoology. We think he has succeeded. There are several useful diagrams.

Animals Looking at You, by **Paul Eipper.** London : G. P. Putnam's Sons, 187 pp., 10/6 net. Over thirty fine photographs of typical ' Zoo ' animals, by Hedda Walther, admirably form a basis for a series of articles on typical mammals and birds to be found in a Zoo. The work has been translated by Patrick Kirwan and will be a useful present to anyone who loves wild animals.

Field Book of Marine Fishes of the Atlantic Coast, by **Charles M. Breder, Jnr.** London : G. P. Putnam's Sons, xxxvii.+332 pp., 15/- net. This is specially prepared easily to fit the pocket, and we must say that for those interested in the particular area dealt with it is admirable. The author is thoroughly familiar with his subject, and the illustrations, both diagramatic and from photographs (there are over 400), as well as the coloured plates, are excellent.

The Blameless Sport : some piscatory excursions in prose and verse, by **W. W. Morris.** London : Methuen & Co., xii.+208 pp., 6/- net. Most educated fisher-folk know W. W. Morris and his poems and essays. For years various English and Scottish Reviews have benefited by his pen. It was a happy thought to reprint these articles. ' The contents of this volume are presented to anglers, by an angler. . . He has chiefly written of thoughts inspired at the riverside, when in pursuit of sport.' To one who has spent many pleasant hours waiting ' for a sign ' this book particularly appeals.

Rock Gardens : How to plan and plant them, by **A. Edwards.** London : Ward, Lock & Co., 320 pp. Knowing, to our sorrow, the cost of printing in these days, and still more the cost of good coloured plates, it seems difficult to understand how the publishers have been able to issue so substantial and artistic a book for so small a price as three half-crowns. The new era of the possibility of living at some distance from a town or city made possible by the aid of petrol, has resulted in thousands of acres of land being transformed into gardens. We all love gardens. To make the best of them this book will help..

Nature in Wood and Forest, by **W. Percival Westell.** London : The Sheldon Press, 119 pp., 2/6 net. This appears to contain the usual matter we expect from the pen of this author—perhaps rather differently arranged and with a different title. The chapters are now ' of the wood and forest ' in each case and he refers to the trees, large and small wild flowers, mammals, larger and smaller birds. There is also a seventh chapter on Insect Life and Miscellaneous. There is a note of optimism in ' first published in 1929.' The illustrations are presumably the author's, and poor. The cuckoo on page 57 seems to be trying to appear to be a peacock ! Possibly this is a case of symbolism.

The Field-book of a Jungle-Wallah, by **Charles Hose.** London : H. F. & G. Witherby, viii.+216 pp., 12/6 net. Borneo has always been a paradise for the naturalist and the student of the human race. In the present well-written and scholarly volume the author introduces us to the life to be met with on shore and in river and forest. Here are described such strange objects as the flying frog, gibbon, pen-tailed shrew, long-billed francolin, etc., and yet, on the other hand, some species are remarkably familiar ; the view of the ' Peregrine Falcon and Young,' for example, might easily have been from a Yorkshire photograph. The finding of a nest of this species, by the way, ' transformed the author from a collector to a naturalist,' and he left the eggs to be hatched.

The Naturalist in La Plata, by **W. H. Hudson.** London : J. M. Dent & Sons, x.+394 pp., 6/- net. Hudson's writings are quickly becoming classical. The present work was first issued in February, 1892, and by June of the same year it had to be reprinted, and a third edition was issued in 1895. The publishers are to be congratulated on the production of an attractive new issue, at a reasonable price. There are several excellent illustrations by J. Smit. Of this work Edward Garnett wrote :—' Hudson's nature writings appeal to the mind, to the heart, and the senses together. In his intense appreciation of beauty in nature, however, he far outstrips all his fellow naturalists. . . His observations of bird life are unique for the intensity of sympathy and delight with which he cast himself into their world and mirrored their kingdom for us through the glass of his passionate joy in their shining loveliness.'

NORTHERN NEWS.

Dr. A. Raistrick has been appointed lecturer on Geology at the Armstrong College, Newcastle-on-Tyne.

The Ellesmere Museum, Shropshire, has been closed, and the ' most important ' objects transferred to the Shrewsbury Museum. What about the others ?

The National Trust is appealing for funds to preserve Longshaw Moor, near Sheffield. Sheffield has raised £10,000 for the purpose, and another £4,000 is required.

Dr. F. A. Bather, F.R.S., editor of *The Museums Journal,* has been elected an honorary member of the Museums Association in recognition of his distinguished museum work.

We have received from the City of Riobamba a copy of a paper on ' Estudios Geologicos en la Region de Riobamba-Ecuador con especial referencia a la conservacion y distribucion de agua,' by Dr. George Sheppard, B.Sc., Geologo del Estado.

Five feet long and weighing nearly two tons, a stone believed to be a relic of the Ice Age, 25,000 years ago, has been unearthed by grave-diggers at Wallasey cemetery. It was embedded in clay six feet below the surface. The curator of Liverpool Museum, who has seen a sample of the stone, suggests it was deposited during the ice flow, and was probably of North Wales or Lake District origin.

The Secretary of State for Scotland and the Minister of Agriculture and Fisheries have appointed a Committee ' To investigate the origin, predisposing causes and mode of dissemination of furunculosis and similar infectious diseases among salmon, trout and other freshwater fish in England and Scotland, and to conduct experiments with a view to ascertaining methods of combating the diseases, and to report the results of their proceedings.'

At a recent meeting of the Leeds Philosophical Society Prof. W. Garstang read a paper on ' The Dextricolic Condition in Tunicates.' He republishes two figures from Barrois which establish the dextricolic condition of the *Anchinia* buds, recently disputed by Van Wijhe. Their ' neural cord ' is a ' neurogenital cord,' comparable with that of *Aplidium* (Brien), but lying in a dextral instead of a sinistral loop of the gut—a complete *situs inversus.* The key to this condition is sought in the origin of salps and daliolids from colonial (pyrosomatoid) ancestors, and in the part played by subsequent rearrangements of the gut in balancing the body of free zooids for a locomotive career.

The Naturalist

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Printed by A. BROWN & SONS, Ltd., 40 George Street, Hull, and published by A. BROWN & SONS, Ltd., at 5 Farringdon Avenue, in the City of London.
Nov., 1929.

DEC., 1929.

No. 875
No. 649 of current Series

THE NATURALIST

A MONTHLY ILLUSTRATED JOURNAL

PRINCIPALLY FOR THE NORTH OF ENGLAND.

EDITED BY

THOMAS SHEPPARD, M.Sc., F.G.S.,
F.S.A.Scot., F.R.A.I., M.B.O.U.,
The Museums, Hull;

and T. W. WOODHEAD, Ph.D., M.Sc., F.L.S.,
Tolson Memorial Museum, Huddersfield,

WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF

JOHN W. TAYLOR, M.Sc. RILEY FORTUNE, F.Z.S.

Contents :—

LONDON:

A. BROWN & SONS, LIMITED, 5 FARRINGDON AVENUE, E.C. 4.
And at HULL and YORK.

Printers and Publishers to the Y.N.U.

DOUBLE NUMBER

Price 2/6 net. Prepaid Subscription 15/- per annum.

NOTES AND COMMENTS.

THE SELBY MUSEUM.

The following letter is taken from *The Selby Times* for November 1st :—' It is difficult to understand why a town the size of Selby with important adjacent villages should be without a Public Library and an up-to-date Museum, both of which are important educational institutions. We are actually deficient of the former, and have a poor apology for the latter. The subject of the present state of the Museum came under discussion at a recent Council Meeting, and, as a result, a Committee was appointed to go fully into the question, together with certain appointed members of the Selby Scientific Club. I venture to suggest that this Committee might, with advantage, co-opt the services of a Museum expert. . . . . In the report to the Carnegie Trust, after visiting the different Museums in the country, Sir Henry Miers made the following observations with regard to Selby :—Selby, which was also initiated by Sir Jonathan Hutchinson, has fallen into neglect, and is one of *the worst examples in the country of a decayed institution,* though it still bears the word " educational " on its front. It is surely time this stigma was removed.'

CENTENARY CELEBRATIONS AT NEWCASTLE.*

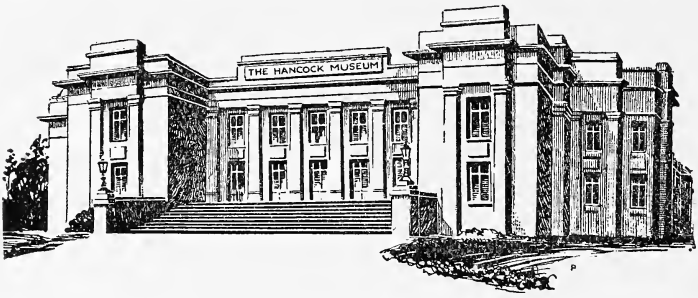
The centenary celebrations of the Natural History Society of Northumberland, Durham and Newcastle-upon-Tyne took place at the Hancock Museum at Newcastle. The President (Viscount Grey of Fallodon) was supported by Lord Armstrong, Lord Joicey, and a number of representatives from the Universities and kindred societies, many of whom tendered addresses of congratulation to the Society, and paid tribute to the founder of the Hancock Museum. Viscount Grey mentioned that he was representing the British Museum, of which he was a Trustee. None could read the account of the history of the Northumberland, Durham and Newcastle Society, and of the unique Museum, without realising that most admirable work had been done by the Society. The Museum was worthy of a visit from all points of view, and especially from those who were interested in scientific research, or who wanted to know something of the beauties of the world and of nature.

HANCOCK AND BEWICK.

Lord Joicey referred particularly to Hancock, to whom the

* We are indebted to the report in the *Yorkshire Post* for these extracts.

Museum was dedicated, and said those who knew him described him as the most modest and gentlest of men. Lord Armstrong briefly sketched the history of the Society, and drew attention to some of the features of the Museum, mentioning the collection of woodcuts by Thomas Bewick and the case of birds,



which were some of the birds from which Bewick drew the pictures for his great book on British birds. Among congratulatory addresses tendered were those from the British Museum Trustees, the University of Oxford, the University of St. Andrews, the Universities of Glasgow, Aberdeen, London, and Leeds, Armstrong College, the Royal Society of Edinburgh, the Royal Society for the Protection of Birds, the Royal Anthropological Institute, the National Trust, the British Museum of Natural History, the Yorkshire Philosophical Society, the Yorkshire Geological Society, and the Yorkshire Naturalists' Union.

FOREIGN WATER-FOWL AT FALLODON.

Viscount Grey, speaking at a conversazione in connexion with the celebrations in the evening, gave a delightful address on birds. For many years he had a collection of water-fowl, some of them British species and some of them foreign, and he used to pen them because they were valuable and he did not want to lose them, but in later years he had come to feel that a bird which was penned was always unsatisfactory. Even at the risk of losing many birds which he would have liked to keep, he thought it was better to have them unpenned, to see them on the wing, and to feel that they stayed, not because they were obliged to stay, but from choice. Of all the species of foreign water-fowl which had come under his observation, he thought there were only two which would establish themselves in this country in a wild state if they had the choice. That was if they were not shot. The first was the mandarin duck, which was one of the most remarkable and beautiful species of water-fowl in the world.

The Naturalist

THE MANDARIN DUCK.

'The mandarin duck is one of the ducks which breed in holes in trees,' said Lord Grey. 'At Fallodon we did not have enough holes in trees, so I put out some barrels. There were not enough barrels, and the mandarin ducks took to coming down the chimneys, and when a mandarin duck comes down a chimney, and then tries what the chairs and dressing-table are like, he becomes very unpopular in the household. One came down the chimney when I was in the room. I was awakened by the sound as of the chimney being swept, and presently the mandarin duck appeared in the grate. It was put out of the window and flew away before it had done much damage to the room, and now the chimneys have to be wired over.'

CANADIAN WOOD DUCK.

The Canadian wood duck also nested in trees, and it often happened that the wood duck and the mandarin duck would lay eggs in the same barrel. 'This year, for instance,' said Lord Grey, 'a wood duck and a mandarin duck laid 15 eggs between them in the same barrel, and then abandoned it. That was not always what happened. Sometimes one bird took possession, and in his experience it was the female wood duck. It might be thought that the wood duck had got the best of the situation, but in the last two or three years he had hardly had an instance of where a wood duck had brought off a brood which was entirely her own. There were usually two or three mandarins in that brood and she did not recognise them.'

ARCHÆOLOGY FROM THE AIR.

As No. 12 of a New Series of Ordnance Survey Professional Papers, Mr. O. G. S. Crawford, Archæology Officer to the Survey, has issued *Air-Photography for Archæologists* (London : H.M. Stationery Office, 45 pp., 4s. 6d. net). This contains reproductions of some of the more important air photographs taken in diffierent parts of the British Isles, which certainly have advanced the science of archæology in a way little dreamt of formerly. By securing photographs at various heights and taking care that the lighting and other conditions are suitable, it is amazing what the eye of the camera can reveal in the way of hidden camps, earthworks, etc., where an ordinary observer on the field would be unable to see anything at all. Mr. Crawford shows that even the air photographs in some conditions show very little, whereas under more favourable circumstances the archæological features are wonderfully clear and distinct.

DEER, DEER !

The Evening Standard informs us, in large typed headings, etc., as under : ' First Animal in England—40,000-year-old Antlers Found. A fossilised antler found during excavations at Cheshunt is believed to be 40,000 years old. It was discovered by Mr. G. F. Squire, of Milton, Berkshire. Part of the skull was attached to the antler, and careful work is now in progress to recover the remainder of the skeleton. *If this is found it will be the earliest trace of animal life found in England.* It is thought that the animal was of a species which came from the interior of Europe before the Channel separated England from France. The discovery is considered important by experts at South Kensington Museum.' It would be difficult to find a more absurd report.

OPTIMISM AT DONCASTER.

The Yorkshire Post informs its readers that ' Mr. R. Tompkins, a well-known water diviner, was at work on Doncaster racecourse, on instructions from a firm of artesian well borers. The borers have been engaged by the Doncaster Corporation to sink bore holes on the race common to provide the large supply which is necessary for watering the racecourse. Some weeks ago the Corporation decided on this work, the principal object being to ensure that, particularly in times of drought, the town's domestic supply shall not be interfered with. After about an hour and a half's work with the divining twig, Mr. Tompkins located what he considered will prove an excellent supply.' But surely our contemporary is a little optimistic in its large-type heading to the paragraph : ' " Find " on Doncaster Racecourse.' Personally we thought fairies and witchcraft found no place in our borough corporations.

SCIENCE A CENTURY AGO.

In his address to the Yorkshire Naturalists' Union, in the University, Leeds, in 1914, the President reviewed the scientific progress in Yorkshire.* Naturally he referred to the foundation of the various Literary and Scientific Societies which took place early in the nineteenth century. These, then, were literary and scientific ; their members read papers, discussed and printed them. Museums were founded in connexion with several of them. As years have gone on times have changed. Few of these societies now undertake original work ; in most cases their museums have been handed over to the town in which they were placed, and generally speaking

* Subsequently enlarged and published as " Yorkshire's Contribution to Science." 233 pages.

their publications have ceased. In some cases the societies, as such, still 'carry on,' but cater for popular lecturers or concerts; and one of them at least keeps its head above the financial waters by having a reception and dance which is a great social event in the city.

The Hull Society celebrated its centenary in 1922 by issuing a medal, which the present writer had the privilege of

designing; the head of Minerva being copied from an ancient Greek gold coin lent by the British Museum.

The Leeds and Newcastle Societies, however, have each issued a volume containing a history of the principal events in its career.

THE LEEDS SOCIETY.

In 1924, Lt.-Col. E. Kitson Clark, the Hon. Secretary, wrote an attractive volume: "The History of 100 Years of Life of the Leeds Philosophical and Literary Society" (250 pp.). This contains a digest of the various reports issued by the Society, as well as illustrations of the more interesting specimens in the Society's museum: illustrations from busts of its prominent members, etc. There is also a list of the lectures delivered to the Society, and a record of important events. Quite recently the Society has handed its collection over to the Leeds Corporation, though the old-fashioned charge of admission, albeit small, still obtains. As an experiment, quite recently the museum was thrown open free for a few hours, and the resulting attendance should surely be a hint to those who now govern.

THE NEWCASTLE SOCIETY.

Quite recently Mr. T. Russell Goddard has produced a 'History of the Natural History Society of Northumberland, Durham and Newcastle-upon-Tyne, 1829-1929' (A. Reid

& Co., Newcastle, xvi.+210 pp., 7/6). Here is a wonderful record of the struggle this Society has had—and is still having —to remain an independent scientific institute. It has been fortunate in having among its present members scientific men of first rank and world-wide reputation. With the aid of various benefactors, it has amassed a natural history collection of great importance, particularly to northern naturalists. Notwithstanding its difficulties, mainly financial, it has succeeded in producing a series of monographs and transactions which will long be a monument to its achievements. Perhaps the best indication of the scientific accomplishments of the Society is the list headed: 'New Order, Family, Genera, and Species described in Transactions.' This is a mere list, but it occupies eight pages. There are reproductions of portraits of prominent members, including the present President, the Viscount Grey of Fallodon.

MR. L. E. HOPE.

Many friends and admirers of Mr. L. E. Hope, F.L.S., the retired Curator of Tullie House Museum, Carlisle, gathered in the County Hotel, Carlisle, on the afternoon of October 23rd, to do him honour. The gathering was representative of the Scientific, Literary, Artistic, Historical, Natural History, and Municipal life and work of Carlisle and its neighbourhood. Mr. W. Atkinson, Chairman of the Museum Committee, presided, and Sir Henry Miers, President of the Museums Association, on behalf of his admirers, handed over to Mr. Hope a cheque as a token of their regard. Sir Henry gave a short address upon the work of museums and the part they ought to play in the life of a municipality. He paid a tribute to Mr. Hope and his work in Carlisle. Mr. Hope, in replying, spoke of the willing help he had received from local Scientific and Literary Society members, and from many others who had proved themselves good friends to the Institution and to himself. He also spoke of the help and inspiration he had gained from meeting men like Sir Henry Miers at the meetings of the Museums Association. Other speakers paid a tribute to Mr. Hope's successful work and deplored the fact that, through a red tape regulation, the City should allow itself to be deprived of the services and ripe experience of a man like Mr. Hope while he was yet, in all but years, a vigorous and healthy man. The Chairman of the Museums Committee afterwards entertained those present to tea. On the evening of the following day, Mr. Hope was the guest at a meeting of the Carlisle Natural History Society, of which he has for thirty years been a mainstay, and was, last session, as several times before, President. The Society presented him with

a suitably engraved gold watch and elected him its first honorary life member.

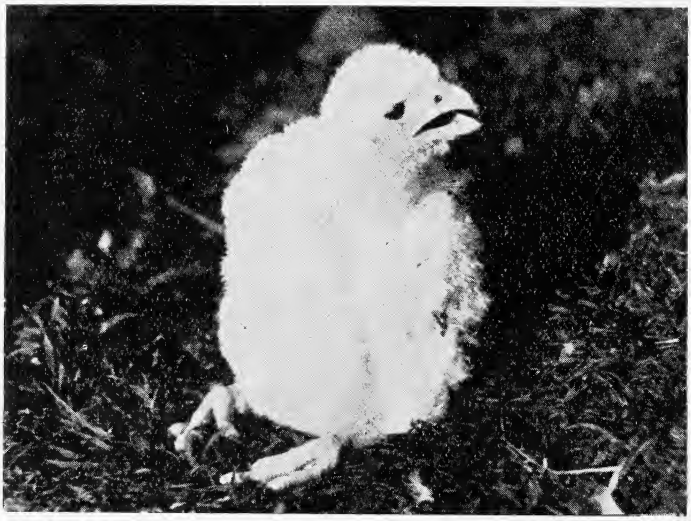
BRITISH FOSSILS.

The Department of Geology of the British Museum has recently acquired the Buckman collection of fossil brachiopoda and ammonites. This numbers about 25,000 specimens, mostly brachiopods, and nearly all from the English Jurassic rocks. It is the bulk of the material collected by the late Prof. James Buckman and his son, the late Sidney Savory Buckman. The former had unique opportunities for collecting since he lived in the south-west of England when the early railways were being made, and this involved not only the openings of the railway cuttings, but also the quarrying of local stone for bridges, etc.

Brown Hydra Infested with Ciliates.—Brown Hydra, *H. vulgaris*, infested with two species of Ciliates—*Trichodina pediculus*, moving by a circle of cilia in close contact with the body of the host ; and *Kerona pediculus*, one of the Oxytrichidæ. The Hydra was in a life-cell. In four days the number of parasites was more than doubled : over a hundred of both kinds were counted : and in the surrounding water there was a swarm of free-swimming *Trichodina*. Treated with chloroform, the Hydra contracted with violent spasms : the parasites were scarcely affected but a minute application of spirits of wine killed the Ciliates immediately. From a pond near Rhosneigr, in Anglesey, a Green Hydra was taken, with fourteen tentacles, one ovary, and four spermaries. A Brown Hydra, taken in May, showed four buds : one a mere excrescence, two more developed and with the beginnings of tentacles, and one with tentacles well developed : the creature was well supplied with Daphnia. In three days the most developed bud broke away : two days later another bud started a separate existence : while of the remaining two, one showed fairly well developed tentacles, and the other the beginnings of tentacles : two new buds appeared on the parent Hydra. The next day one of the buds started life on its own account, and two days after the next in development followed its example : leavin gthe parent with two small but perfectly developed buds.

The colouring matter in Hydra varies from a light yellowish red to a deep reddish brown ; and is more diffuse at the lower end of the stalk. Reddish pigment may be seen in some Green Hydra—but only in the upper part of the body.—W. Lawrence Schroeder.

Falcon Finds a Mate.—A local sportsman shot a female Peregrine Falcon on February 27th, this year, near Peel. As the pair had nested annually in the locality for a number of years, we were rather anxious about the remaining



Young Peregrine, Isle of Man.

bird, but hoped he would quickly secure a mate, particularly as the time was perilously near the nesting season. Fortunately, a partner did arrive from somewhere, and the newly mated pair selected and utilised an old site. Three eggs were laid and three young successfully reared. The young first left the nest on June 24th, 1929. The photograph is of one of the young, about 8 days old, taken on May 25th.—RALPH HOWARTH, Peel, I.O.M.

White Variety of the Thornback Ray at Scarborough.—A beautiful variety of *Raia clavata* was landed on the fish market at Scarborough on September 13th. It had been caught 8 miles off, and measured 31 inches in length. It was a female, the colour of the back being white, with a faint rosy hue over it, deepest towards the margins of the pectoral fins. The eyes were the usual dark colour—not pink.—W. J. CLARKE.

Part XX. of C. Davies Sherborn's *Index Animalium*, containing the species 'phyllochroma' to 'pratincola,' has been issued (British Museum (Natural History), 10s. net). This wonderful work has now occupied over 5000 closely-printed pages.

THE EARLIEST KNOWN GEOLOGICAL SECTION ACROSS ENGLAND.

CHARLES DAVIES SHERBORN.

THERE has lately come into my possession a remarkable document which appears to be the earliest Geological Section across England. It measures nine feet by six inches and is drawn in water-colours. The inscription reads: 'To the Right Honourable Sir Joseph Banks, President of the Royal Society, this / SECTION of the principal STRATA of ENGLAND, / As the same crop out and appear, between Trusthorpe, near Sutton on the Eastern Coast in Lincolnshire, passing his seat at / Revesby, the Towns of Tattershall, Sleaford and Ancaster in that County; Newark. Hockerton & Mansfield in Nottinghamshire; / Pleasley, Temple-Normanton & Ashover in Derbyshire, & extending to Sir Joseph's Seat at Overton, in the last mentioned Parish. / Compiled from materials collected during an extensive Tour, undertaken at the instance of the worthy President in the Autumn of 1807, / in prosecution of the discoveries made and taught by Mr. William Smith, on the arrangement of the British Strata, / is most respectfully inscribed / by his obedient and very humble Servant / John Farey Senr / Land and Mineralogical Surveyor / 12 Upper Crown Street Westminster. / 17th February 1808. / '

So far as I can gather, this section, which was in a roll form, has remained in the Banksian Estate Office until recent times and probably has not been seen since the early date at which it was made; it is therefore of first-rate importance to the history of Geology in England.

In the able and complete account of William Smith, which was printed by my friend Thomas Sheppard in the *Proceedings of the Yorkshire Geological Society* (Vol. XIX., 1917), a sketch is given of the early attempts at maps and sections, but with the exception of John Strachey's Section of Coal, etc., near Bath, 1719, there is nothing earlier than Smith's Sections of 1819. White Watson's 'Delineation of the Strata of Derbyshire,' 1811, with its sections and its Tablet (in the original rocks) is not mentioned by Mr. Sheppard. But Watson only mentions 'Mr. Werner' and 'Mr. Martin,' and though it is difficult of belief, does not seem to have known of Smith's work at this time.

This section will ultimately find a home in the British Museum (Natural History).

As regards John Farey, who died in 1826, W. Jerome Harrison, writing in the Dictionary of National Biography, says 'He drew up a large number of geological sections and maps, intended to illustrate the relative position of the

strata throughout Britain. These he desired to publish, but the project was frustrated by his death.' Boase, however, in the life of John Farey *filius* (died 1851) in the same volume says, ' His residence, 67 Great Guildford Street, Russell Square, London, was burnt down in 1850, when considerable portions of his library and documents were injured or destroyed,' so possibly this is not only the only manuscript section of Farey's remaining, but is really the earliest geological section of England in existence.

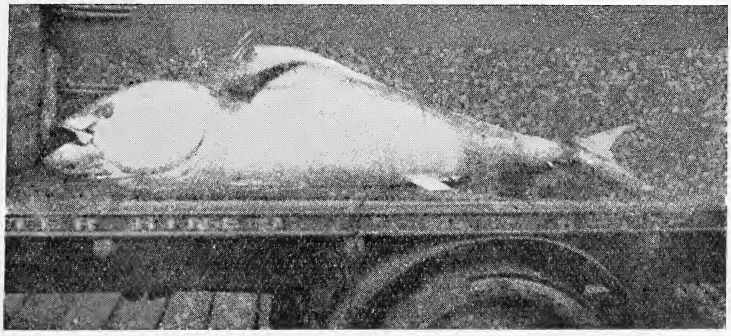
Food of the Peregrine Falcon.—Visits to the nesting site of a pair of Peregrine Falcons, after the young were on the wing, showed that preference was given to two places for feeding, both of which were about six yards away from the nest. The remains at each place could best be described as a collection of cleanly-picked skeletons, and there were many odd remains lying about in adjacent places. All remains examined were those of birds. There were very few small feathers about ; these had either been dispersed by the wind or removed by the parent bird prior to bringing the food to the nest. The only feathers conspicuously present were the complete primary section of the wings. No tail feathers were found. Closer examination showed the vertebrae in all cases broken, and all the flesh cleanly picked off, without any more bones being broken or dislodged to any great extent, eventually leaving two halves of the skeleton practically intact. Usually the head and outer portion of wing, with primary feathers intact, are separated from the body, but this is not invariably the case. Of the remains I saw, three were of the Domestic Pigeon, one Moorhen, one Redshank, and 27 Rooks. There are three rookeries in the locality, each one, to one and a half miles away from the Falcon's nest. Though the above nest is in the centre of a large colony of Herring Gulls, the Falcon did not take the Gulls for food. One Herring Gull's nest was immediately under that of the Falcon, and the food and part skeletons actually fell upon the young in this nest.—R. Howarth, Peel, 23/10/29.

Mr. Howarth sent me the above notes, together with a parcel of the remains of breast bones, backbones (all broken), primaries (attached to bone), leg and foot, etc., all of the Rook, and collected as stated above, with a request that I should read—and exhibit—them at the Vertebrate Section meeting at Leeds on October 26th, 1929. In the discussion that followed, each speaker expressed surprise, and wished that all other Peregrine Falcons would follow the example of this Manx family !—H.B.B.

RED TUNNY AS A YORKSHIRE FISH.

W. J. CLARKE, F.Z.S.

The Red Tunny, so called from the bright red colour of its flesh, which distinguishes it from its near relative, the Albacore, or White Tunny, the flesh of which is much paler in colour, has been known as a British fish of rare occurrence ever since 1761, when Pennant records that he saw one killed at Inverary, which weighed 460 lbs. and was 7 feet 10 inches in length. For the most part, the records since that date have been of single fish, occurring at various places on the British coasts. Yarrell refers to it as ' rare—almost accidental,' while Travis-Jenkins says it ' occasionally wanders into British waters.' The ' Handbook of Yorkshire Vertebrata ' calls it ' an acci-



Tunny at Scarborough.

dental visitant of extremely rare occurrence,' and mentions only two Yorkshire specimens—one 7 or 8 feet long at Bridlington about 1840 or 1841, and one stranded at Teesmouth in 1853 or 1854, which was said to be about 480 lbs. in weight. This work was published in 1881, and since then, until this year, only one other Yorkshire record has come to my notice. A small example, 2 feet 4 inches in length, was caught in the herring nets about 5 miles off Whitby on September 9th, 1882, and is preserved in the museum at that place.

In more recent years there has been evidence which seemed to prove that this fish—the largest of the Mackerel family, has visited Yorkshire waters in some numbers. It was in the summer of 1914 that I first began to receive from the local fishermen reports of strange fish, the like of which they had not seen before, swimming round the boats while the nets were being hauled, feeding upon the dead fish which fell from them, a well-known habit of the Tunny ; and in the light of

what has occurred more recently there does not appear to be any doubt that these fish were really Tunnies.

The intervention of the War, and the consequent virtual suspension of fishing, put an end to any chance of further information, and I had almost forgotten the incident until the summer of 1926, when similar reports again came to hand. Enquiries made each summer since convinced me that Tunnies were visiting Yorkshire waters in some numbers during August and September each year. The reports received from reliable men showed that each summer the fish were present in increasing numbers, until this year they became so numerous that complaints were made that they were breaking up the herring shoals by their attacks upon them, and so were interfering with the fishing operations. The Tunnies were very tame and came fearlessly close to the boat side, and many were killed by the fishermen, some being shot, others harpooned. The fish were not brought ashore, as there was no sale for them. Eventually, in view of the interest created, and scenting a good business deal, a showman offered 50/- for a Tunny, and within twenty-four hours, on September 7th, 1929, the steam drifter *Ascendant* landed on the pier at Scarborough a fine example of the Red Tunny, which had been harpooned fourteen miles east of Scarborough. The fish measured 9 feet 9 inches in length, but was unfortunately not weighed. When struck by the harpoon the Tunny, in its efforts to escape, took out no fewer than 70 fathoms of rope 3 inches in circumference, and resisted capture for an hour before being hauled to the side of the boat.

Two days later, on September 9th, 1929, the same boat landed two more Tunnies, which had been harpooned 18 miles E.N.E. of Scarborough, and reported that during that week-end they had killed other nine which were not brought ashore. The two landed measured 8 feet 3 inches, and 8 feet respectively. The skeleton of the larger one is being prepared for the Hull University* ; the smaller one was cut up and eaten, and everyone who tasted it pronounced it very good.

During August and September of this year the Tunnies were very numerous off Scarborough, examples being seen several times within one and a half miles of the pier. In some instances very large shoals of them were seen breaking the water in pursuit of the herrings, and numerous boats reported as many as twenty of the fish congregated round them at one time while their nets were being hauled.

During the last three years Tunnies have occurred in numbers off the Norwegian and Danish coasts, and large numbers have been captured. A canning factory has been started in Norway to deal with the fish commercially.

* There is a particularly fine skeleton in the Hull Museum of Fisheries and Shipping.

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RECENT GEOLOGICAL WORK.

Edited by Mr. H. E. Wroot, *The Proceedings of the Yorkshire Geological Society*, 1929, contains 150 pages, with plates, tables and illustrations. J. W. Stather's Presidential Address on ' Vertical Distribution of East Yorkshire Erratics ' is the result of many years' field work among the ice-transported blocks found in the different glacial beds in the area. This, we consider, is a reliable record of the principal local ice-movements during the Great Ice Age. Among his ' references ' should have been included ' The Yorkshire Boulder Committee and its work : a Retrospect,' which appeared in *The Naturalist*, 1902, pp. 217-222. R. G. S. Hudson

(Upper Peat and Forest Bed), at Dove Point, Leasowe ; view looking north-east.

describes a Carboniferous Lagoon Deposit with sponges, and gives illustrations of a new species, *Erythrospongia lithodes*. D. A. Wray refers to the Carboniferous Succession in the Central Pennine area, and describes the Millstone Grit (including the sub-Kinderscout Grit, the Kinderscout and Middle Grits, and the Rough Rock), the Lower Coal Measures, and the boundary between the Lower and Middle Coal Measures. F. M. Trotter refers to the Tertiary Uplift and Resultant Drainage of the Alston Block and Adjacent Areas ; H. C. Versey describes the Tectonic Structure of the Howardian Hills and District, and T. Sheppard provides a ' Bibliography of Yorkshire Geology ' for the years 1927 and 1928. The publication ' can be bought of the librarian of the Society at the University, Leeds,' but the price is not stated.

The Transactions of the Hull Geological Society, Vol. VII., Pt. 2, are edited by T. Sheppard. Here the record of the Society's work is published for the years 1927-8 (A. Brown & Sons, price 5/-). By the aid of elaborate tables, C. Thompson refers to ' The Speeton Clays and Their Equivalent.' W. C. Ennis, also assisted by a table, describes the Zones of the Yorkshire Chalk, and their characteristic fossils.

C. B. Travis is responsible for the appearance of *The Proceedings of the Liverpool Geological Society* for 1928-9 ; another Society which still is

able to publish original work. Dr. E. Neaverson's Presidential Address refers to the Faunal Horizon in the Carboniferous Limestone of the Vale of Clwyd. Dr. G. Slater describes the Dawpool [Glacial] Section of the Dee Estuary, Cheshire E. Montag describes erratics from the boulder clay of Pen-y-Coed, Abergele ; T. A. Jones refers to a well-boring at Garston ; J. Wilding to the [Building] Stones of a City ; and C. B. Travis describes the Peat and Forrest Beds of Leasowe, Cheshire. The author gives lists of plant remains from this deposit. There are several illustrations, one of which we are kindly permitted to reproduce (p. 397).

Our Prehistoric Ancestors, by **H. F. Cleland.** London : Williams & Norgate, xvi.+379 pp., 21/- net. The literature relating to our prehistoric ancestors, their arts, method of living, distribution, etc., has in recent years grown to a tremendous extent. Quite a number of important volumes have been published, and in one case two massive books by different authors were issued by the same house. We have before us a volume containing nearly 400 pages with something like 200 illustrations, including some admirably coloured plates. There is also a bibliography selected for the benefit of the general reader, but as this does not contain any reference to Mortimer's well-known ' Forty Years' Researches in British and Saxon Burial Mounds,' nor to Greenwell's ' British Barrows,' we cannot assume that it has been very carefully compiled. The author stresses the Neolithic period, as in it ' Man made the great fundamental inventions, compared with which the greatest achievements of to-day, though more spectacular, are relatively unimportant.' This, of course, is a matter of opinion ! The chapters refer to The contributions of the Men of the Old Stone Age ; The Epipaleolithic ; The Neolithic or New Stone Age ; The Remarkable Neolithic Civilisation of Scandinavia ; The Pile Dwellers ; Megalithic Monuments ; The Bronze Age ; The Hallstatt; First Age of Iron ; The La Tene Epoch : The Second Age of Iron ; and ' In Retrospect.' We do not like the coloured frontispiece ' Life in the Bronze Age in Germany.'

A History of Science and its Relations with Philosophy and Religion, by **W. C. D. Dampier-Whetham,** M.A., F.R.S. Cambridge University Press, 514 pp., 18/- net. ' An attempt to tell the general story of science, to present, not a detailed study of any one period, but a complete outline of the development of scientific thought.' We should not have thought it possible for any one man to have covered the enormous area prescribed by this volume. Yet the author, whose opportunity for reading and ability to remember what he had read, has presented a scholarly treatise. He refers to Science in the Ancient World, the Middle Ages, the Renaissance, and the Newtonian Epoch ; there are three chapters on Physics, Biology, and Science and Philosophic Thought in the Nineteenth Century ; Recent Development in Biology and Anthropology, the New Era in Physics, and Scientific Philosophy and its Outlook. As the author truly says, ' the vast and imposing structure of modern science is perhaps the greatest triumph of the human mind. But the story of its origin, its development and its achievements is one of the least known parts of history, and has hardly yet found its way into general literature. Historians treat of war, of politics, of economics ; but of the growth of those activities which have revealed the individual atom, and opened to our vision the depths of space, which have revolutionised philosophic thought and given us the means of advancing our material welfare to a level beyond the dream of former ages, most of them tell us little or nothing.' We consider the present volume does much to fill up the gap referred to by the author, albeit it was written chiefly for his own satisfaction and amusement.

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MYCOLOGISTS AT MASHAM.

(*Continued from p.* 374.)

AGARICINEÆ.

Amanita muscaria.
,, *rubescens.*
Amanitopsis vaginata.
,, *fulva.*
Lepiota acutesquamosa.
,, *cristata.*
,, *amianthina.*
* ,, *cepæstipes* var. *cretacea* (Bull.) Fr. in hot house.
Armillaria mellea.
Tricholoma fulvum.
† ,, *crassifolium* Berk.
† ,, *rutilans.*
† ,, *imbricatum.*
† ,, *vaccinum.*
,, *terreum.*
,, *cuneifolium.*
Clitocybe infundibuliformis.
,, *aurantiaca.*
,, *suaveolens.*
Laccaria laccata.
† ,, *laccata* var. *amethystina.*
Collybia radicata.
† ,, *fusipes.*
,, *butyracea.*
,, *maculata.*
† ,, *confluens.*
Mycena pura.
† ,, *iris.*
,, *acicula.*
,, *galericulata.*
† ,, *flavo-alba.*
† ,, *stylobates.*
,, *sanguinolenta.*
,, *ammoniaca*
,, *galopus.*
† ,, *filopes.*
† ,, *vitilis.*
† *Omphalia umbilicata.*
,, *fibula.*
† *Pleurotus sapidus* Schulz.
Hygrophorus pratensis.
,, *niveus.*
,, *ovinus.*
,, *coccineus.*
,, *puniceus.*
,, *obrusseus.*
,, *conicus.*
,, *calyptræformis.*
,, *chlorophanus.*
,, *psittacinus.*
Lactarius turpis.
,, *blennius.*
Lactarius pyrogalus.
,, *piperatus.*
,, *vellereus.*
,, *quietus.*
† ,, *vietus.*
,, *subdulcis.*
,, *rufus.*
† ,, *lignyotus.*
† ,, *fuliginosus.*
† ,, *pallidus.*
Russula nigricans.
,, *chloroides.*
,, *depallens.*
,, *fœtens.*
,, *fragilis.*
* ,, *cœrulea.*
† ,, *lepida.*
,, *emetica.*
,, *adusta.*
,, *vesca.*
† ,, *pectinata.*
† ,, *cutefracta* Cke.
Nyctalis parasitica (on *Russula fœtens*).
Marasmius peronatus.
,, *oreades.*
Marasmius ramealis.
Androsaceus rotula.
† *Pluteus nanus* var. *lutescens.*
,, *cervinus.*
Entoloma jubatum.
† ,, *rhodopolium* Fr.
† ,, *sericeum.*
Clitopilus prunulus.
† *Leptonia euchroa* (Pers.) Fr.
† ,, *incana* Fr.
,, *sericella* (Fr.) Quel. (= *Entoloma sericellum* Fr.)
† *Nolanea papillata.*
* ,, *cetrata* (Fr.) Schroet.
† ,, *proletaria* Fr.
* *Rozites caperatus* (Pers.) Karst. (= *Pholiota caperata* (Pers.) Fr.).
† *Pholiota togularis.*
,, *squarrosa.*
,, *flammans.*
,, *mutabilis.*
,, *marginata.*
† *Inocybe corydalina.*
,, *pyriodora.*
† ,, *perlata.*
,, *fastigiata.*

† *Inocybe cookei.*
† ,, *obscura.*
* *Astrosporina lanuginella* Schroet.
,, *asterospora.*
† *Hebeloma glutinosum.*
† ,, *crustuliniforme* var. *minus* Cke.
† ,, *crustuliniforme* (Bull.) Fr.
* ,, *subcollariatum.*
,, *mesophæum.*
† ,, *fastibile.*
Flammula sapinea.
† ,, *carbonaria.*
† *Naucoria cucumis.*
,, *escharoides.*
† *Pluteolus aleuriatus.*
Galera tenera.
Tubaria furfuracea.
,, *inquilina.*
† *Cortinarius* (Derm.) *semisanguineus.*
† ,, (,,) *anomalus.*
,, (Tel.) *hinnuleus.*
Paxillus involutus.
Psalliota campestris.
Stropharia æruginosa.
† ,, *squamosa.*
,, *semiglobata.*
† *Hypholoma capnoides.*
,, *fasciculare.*
† ,, *velutinum.*
,, *leucotephrum.*
† ,, *hydrophilum.*
,, *pyrotrichum.*
† *Psilocybe uda.*
,, ,, var. *Polytrichi* Fr.
† ,, *semilanceata.*
† *Bolbitius fragilis.*
† *Psathyra fibrillosa.*
Coprinus atramentarius.
,, *plicatilis.*
† ,, *cinereus* (Schaeff.) Cke.
Panæolus campanulatus.
,, *sphinctrinus.*
,, *papilionaceus.*
Anellaria separata.
Psathyrella gracilis.
Gomphidius viscidus.
† ,, *maculatus* var. *cookei* Mass.

Polyporeæ.

† *Boletus elegans.*
,, *badius.*
,, *chrysenteron.*
† ,, *subtomentosus.*
,, *luridus.*
,, *viscidus* (Linn.) Fr. (= *B. laricinus* Berk.).
† ,, *flavidus.*
Fistulina hepatica.
Polyporus squamosus.
,, *melanopus.*
,, *chioneus.*
† ,, *fragilis.*
,, *varius.*
† ,, *intybaceus.*
,, *giganteus.*
,, *adiposus.*
,, *betulinus.*
,, *cæsius.*
,, *radiatus.*
,, *hispidus.*
Fomes annosus.
Ganoderma applanatum.
Polystictus versicolor.
,, *abietinus.*
† *Poria hymenocystis* B. and Br.
† *Dædalea biennis* (Bull.) Quel. (= *Polyporus rufescens* Fr.).
Odontia fimbriata.
Craterellus cornucopioides.
Stereum hirsutum.
† ,, *rugosum.*
Corticium comedens.
† ,, *botryosum.*
† ,, *læve.*
† *Hypochnus fumosus* Fr. (= *Phlebia vaga* Fr.).
† ,, *fuscus.*
† *Peniophora velutina.*
† ,, *hydnoides.*
† ,, *setigera* (Fr.) Bres. (= *Kneiffia setigera* Fr.).
Cyphella capula.
Clavaria vermicularis.
† ,, *persimilis* Cotton.
,, *inæqualis* (Mull.) Quel. (= *C. dissipabilis* (Britz.) Cotton.).
,, *cinerea.*
,, *cristata.*
Calocera viscosa.
,, *cornea.*
Hirneola auricula-judæ.
Tremella mesenterica.
Dacryomyces deliquescens.
† *Sebacina subhyalina* Pearson.

Hydnum repandum.
Irpex obliquus.

Phallus impudicus.
Crucibulum vulgare.

**Grandinia mutabilis* (Pers.) Bourd. and Galz.
* ,, *brinkmannii* (Bres.) Bour. and Galzd.
Scleroderma aurantium.
,, *verrucosum.*
Lycoperdon echinatum.

PYRENOMYCETES.

Nectria cinnabarina.
Xylaria hypoxylon.

DISCOMYCETES.

Disciotis venosa (Pers.) Boud.
Galactinia pustulata (Hedw.) Boud.
Pachyella depressa (Phill.) Boud.
† *Lachnea hemisphærica* (Wigg.) Gill.
Ciliaria scutellata (Linn.) Quel.
† *Cheilymenia theleboloides* (Alb. et Schw.) Boud.
,, *stercorea* (Pers.) Boud.
Coprobia granulata (Bull.) Boud.
Ascobolus stercorarius (Bull.) Schrœt.
Helotium herbarum (Pers.) Fr.
,, *fructigenum* (Bull.) Fuck.
Chlorosplenium æruginosum (Oeder) De Not.
Calycella citrinum.
† *Cadoniella acicularis* (Bull.) Schroet.
Coryne sarcoides (Jacq.) Tul.
Bulgaria inquinans (Pers.) Fr.
Trichoscypha calycina (Schum.) Boud.
Hyaloscypha hyalina (Pers.) Boud.
Rhytisma acerinum (Pers.) Fr.
Stegia ilicis Fr.

SPHAEROPSIDEÆ.

* *Cytospora jasmini* Cooke on Jasmina.

HYPHOMYCETES.

Penicillium expansum Thom, on Craterellus.
Trichoderma lignorum.
Isaria farinosa.

*=New to Yorks. †=New to N.W. Div.

Y.N.U. BOTANICAL SECTION.

THE Annual Meeting of this section was held on October 12th in the Botanical Department of Leeds University, by the kind invitation of Prof. Priestley.

In the afternoon the various reports were considered and suggestions made for the officers and committees of the Section. In the evening a series of papers were read, which we hope will appear later in *The Naturalist*.

Dr. Woodhead described a section in the Aire Valley at Kirkstall, exposing a succession of laminated clays and muds, sands, gravels and silts, with deposits of plant remains, including trees up to three feet in diameter.

Mr. J. Grainger showed specimens and outlined the problems of Virus diseases of plants, caused by ultra-microscopic bodies capable of multiplying in the host and yielding a fluid of definite concentration, which can by inoculation, reproduce the disease in healthy plants.

Mr. R. W. Butcher explained the River Tees investigation, now progressing under the Ministry of Agriculture and Fisheries. Laboratories have been established at Barnard Castle and Middlesbrough, and samples are collected from Widdybank to the Estuary.

Dr. Pearsall reported the results of a survey of Esthwaite Water in August last, showing considerable changes since a similar survey in 1914.

CHRIS. A. CHEETHAM.

FIELD NOTES.

Isopods and Pond Life.—From Rhosneigr, in Anglesey, came, in August, a gathering of Isopods—*Asellus aquaticus*—the backs of which were covered with a species of Closterium. During a severe night frost, jars containing *Elodea*—the Canadian pond weed—*Vallisneria spiralis* and *Ceratophyllum* showed formation of ice-slabs ; but in the jars of filamentous algæ, and in two in which *Nitella* alone was, there was no sign of ice. All the jars were on a window-ledge where the temperature was constant—10 degrees F. In a large bell-jar aquarium, in which were *Vallisneria*, Hornwort, *Ranunculus aquatilis* and *Myriophyllum*, there was at the beginning of March a remarkable ' florescence ' of Vorticella—the Bell animalculum—which covered all the plants in the jar. The whitish fluffy covering remained for nearly five weeks, after which almost as suddenly, it died, but colonies of the Vorticella were found here and there. In the egg-laying of *Ancylus fluviatilis*—in May—clusters of one to four occurred : but the clusters of two predominated—W. L. SCHROEDER, Leeds.

Male Kestrel unable to feed young.—Towards the end of June, 1929, I visited a Kestrel's nest, which contained five healthy young a few days old. Three days later, June 27th, a local poultry-keeper caught the female parent in a rat trap which he placed at the side of the nest, his excuse being that the Kestrels were responsible for the loss of some of his chickens. The nest on July 1st contained complete carcasses of five half-grown rats, seven mice, two frogs and the remains of two birds, five mice and two half-grown rats. As the nest was quite clean on June 27th, all the above had been brought in by the male bird during the intervening four days. The male bird, though securing ample food, did not attempt to prepare it in any way to make it suitable for consumption by young birds of this age. I watched the young endeavouring to tear the carcasses, but they were quite unequal to the task, and on July 5th all five were dead in the nest.—RALPH HOWARTH, Peel, I.O.M., October, 1929.

Hawk Moth Larvæ at Scarborough.—On August 31st I saw a full fed larva of the Large Elephant Hawk Moth, which had been found feeding on willow herb near the mere. A few days later, a friend brought me four others which were discovered on a fuchsia bush in a garden in the Valley Road at Scarborough. On October 4th a fine larva of the Death's Head Moth was brought to me from Scalby Nab, near Scarborough. It was full fed, and measured more than four inches in length.—W. J. CLARKE.

PLECOPTERA (STONE-FLIES) OF YORKSHIRE.

H. WHITEHEAD, B.Sc.

The Stoneflies of Yorkshire were studied by the late G. T. Porritt, who recorded his captures in the pages of *The Naturalist*. In 1897 he published in *The Naturalist* a 'Preliminary List of the Neuroptera and Trichoptera of Yorkshire,' in which the Stone-flies were included under the heading Perlidæ. This was followed in 1907 by a list on p. 207 of Vol. I. of the *Victoria History of the County of York*, in which 18 species are recorded.

During the last six years, Prof. E. Percival and I have been studying the fauna of some of the Yorkshire streams, and we have carefully noted the occurrence and distribution of the Plecoptera. The editor agreed that it would be more useful if Porritt's records were incorporated with our own, with the result that an up-to-date list follows. Where no references are given in this list, the specimens were found either by Percival or myself.

An attempt has been made to show the distribution of the species within the county by entering records under the Watsonian Vice-Counties. This indicates that the species are fairly well distributed, with the exception of the East Riding (Vice-County 61), where the streams are comparatively slow and the stream beds muddy. Two of the species recorded are new to Britain. About 34 British species are known, and of these 25 have been found in Yorkshire.

The writer wishes to express his thanks to K. J. Morton, Esq., for revising the nomenclature and for identifying some of the more difficult forms.

Abbreviations, etc., used.

E.M.M. = *Entomologist's Monthly Magazine.*
P. = G. T. Porritt.
Nat. = *The Naturalist.*
(n) = Indicates that the species was identified from a nymph. In all other cases imagoes were captured.
V.H. = *Victoria History of the County of York*, Vol. I., 1907, p. 207.
V.C. = Watsonian Vice-County—the numbers 61-65 follow.
* = Species new to Britain.

Perlodes mortoni Klp. (=*Dictyopteryx microcephaela* of British lists).
V.Cs. 61, 63 and 65. No records.
V.C. 62. Ruswarp, nr. Whitby; Mill Beck, Robin Hood's Bay; Stainton Dale; Ramsdale, near Kirkby Moorside; Grain Beck; Bilsdale Beck; R. Leven, Crathorne, Cleveland.
V.C. 64. Nr. Austwick (n.); R. Nidd—Ripley, Grimbald's Crag,

Walshford Bridge (n.); R. Wharfe—Bolton Woods (P., *Nat.*, 1897), Arthington, E. Keswick, Boston Spa; R. Skirfare—Arncliffe (nymphal skin); R. Aire—Ellerbeck, Skipton (nymphal skin), Meanwood Beck, Leeds.

Imagoes from 8/iv. to 6/vi.

Perla cephalotes Curt.

V.C. 61. No records.

V.C. 62. Ramsdale, Kirkby Moorside; Pickering (P., *Nat.*, 1897).

V.C. 63. Harden Clough, Huddersfield (P., *V.H.*).

V.C. 64. Austwick (common); R. Wharfe—common from Beckermonds to Boston Spa, Thorner (P., *Nat.*, 1927); R. Skirfare—Halton Gill; R. Aire—Malham Cove (n.); Tin Brigg, Linton Falls, nr. Skipton (P., *Nat.*, 1897).

V.C. 65. Between Redmire and Aysgarth (P., *Nat.*, 1897); Cautley Spout, Sedbergh.

Imagoes from 18/v. to 5/vi.

P. carlukiana Klp. (=*maxima* of British Lists).

V.Cs. 61 and 63. No records.

V.C. 62. Pickering (P., *V.H.*).

V.C. 64. Austwick (n.); R. Laver, nr. Ripon (n.); R. Wharfe—Grassington (n.), Bolton Br. (n.), Pool (n.), Collingham Br. (n.), Boston Spa (n.), Deerstones Beck (n.), Burnsall (P., *Nat.*, 1913); R. Aire—Skipton.

V.C. 65. Tanfield (P., *Nat.*, 1912).

Chloroperla grammatica Poda.

V.C. 61. Driffield Beck.

V.C. 62. R. Esk, Glaisdale (P., *E.M.M.*, xlv., 188); Ramsgill, Kirkby Moorside; Mill Beck, Robin Hood's Bay; Bilsdale Beck; R. Leven, Crathorne.

V.C. 63. Huddersfield (P., *Nat.*, 1897); Hebden Bridge (P., *Nat.*, 1904); Dunford Bridge (P., *Nat.*, 1897).

V.C. 64. Austwick. A very common species in the Nidd, Wharfe and Aire and their tributaries.

V.C. 65. Aysgarth (P., *Nat.*, 1897); Tanfield (P., *Nat.*, 1912); Hebblethwaite Gill, Sedbergh.

Imagoes from 5/vi. to 2/ix.

Isopteryx torrentium Pict.

V.C. 61. No record.

V.C. 62. R. Esk, Glaisdale (P., *E.M.M.*, xlv., 188); Ramsgill, Kirkby Moorside; Mill Beck, Robin Hood's Bay.

V.C. 63. Hebden Bridge (P., *Nat.*, 1904); nr. Fulneck, Pudsey.

V.C. 64. Austwick; R. Nidd—Ripley; R. Wharfe—Swarthgill; Etchills, Thorner; R. Aire—common from Malham and Gordale to near Skipton.

V.C. 65. Near Sedbergh.

Imagoes from 1/vi. to 16/viii.

I. tripunctata Scop.

V.C. 61. No record.

V.C. 62. R. Esk, Glaisdale (P., *E.M.M.*, xlv., 188); Mill Beck, Robin Hood's Bay; Bilsdale Beck, Cleveland (n.).

V.C. 63. Hebden Bridge (P., *Nat.*, 1904); Dunford Bridge and Wharncliffe Woods (P., *Nat.*, 1897)'

V.C. 64. Austwick; R. Nidd—Ripley; R. Wharfe—Buckden (P., *Nat.*, 1904), Bolton Woods (P., *Nat.*, 1897); Burnsall (P., *Nat.*, 1913), Grassington; R. Aire—Malham and Gordale, above Gargrave.

V.C. 65. Near Sedbergh.

Imagoes from 5/vi. to 16/vi.

Capnia nigra Pict.

V.Cs. 61, 63 and 65. No records.
V.C. 62. Stainton Dale; Mill Beck, Robin Hood's Bay; Grain Beck, Baysdale Beck and Bilsdale, Cleveland.
V.C. 64. R. Laver, Galphey; Meanwood Beck, Leeds.
Imagoes from 2/iv. to 16/iv.

**C. vidua* Klp.

V.Cs. 61-64. No records.
V.C. 65. Maize Beck, Upper Teesdale. Imagoes taken by E. Percival, 17/iv./1928, and the species confirmed by K. J. Morton. The species has been described by E. Schœnemund in "Die Tierwelt Mitteleuropas," iv. Bd., 2 Lief., Insekt. I., p. v. 7.

Tæniopteryx putata Newman.

V.Cs. 61, 62, 63 and 65. No records.
V.C. 64. R. Nidd, Knaresborough (P., *E.M.M.*, li., 45). This species was recorded under the name *T. trifasciata* Pict. See *Entomologist*, xliv. (1911), p. 81.

T. risi Mort.

V.Cs. 61 and 65. No records.
V.C. 62. Stainton Dale; Mill Beck, Robin Hood's Bay.
V.C. 63. Harden Clough, Huddersfield and Hebden Bridge (P., *V.H.*); Dunford Bridge (P., *Nat.*, 1897).
V.C. 64. R. Wharfe—Buckden (P., *Nat.*, 1911), Arthington.
Imagoes from 8/iv. to 31/v.

**Rhabdiopteryx neglecta* Alb.

V.Cs. 61, 63, 64 and 65. No records.
V.C. 62. Harwood Dale, Jugger Beck. Taken by E. Percival, 10/iv./1927. This species is described by Klapálek in 'Die Süsswasserfauna Deutschlands,' Heft. 8, p. 60, fig. 92.

Nephelopteryx nebulosa L.

V.Cs. 61, 63 and 65. No records.
V.C. 62. Pickering (P., *Nat.*, 1897); Bubwith (P., *E.M.M.*, lvi., 20); Langdale End, R. Derwent.
V.C. 64. R. Nidd—Walshford Bridge; R. Wharfe—Grassington, Pool, Ulleskelf; Meanwood Beck, Leeds.
Imagoes from 16/ii. to 25/iii.

Leuctra geniculata Steph.

V.Cs. 61, 63 and 65. No records.
V.C. 62. Pickering; Scalby Beck, Scarborough (P., *Nat.*, 1897).
V.C. 64. R. Wharfe—Grassington, Ilkley, Harewood Bridge, Collingham Bridge.
Imagoes from 2/ix. to 16/ix.

L. klapáleki Kmpny.

V.C. 61. No record.
V.C. 62. Falling Foss, nr. Whitby; Mill Beck, Robin Hood's Bay: Gt. Ayton (P., *Nat.*, 1913).
V.C. 63. Harden Moss, Huddersfield (P., *Nat.*, 1911).
V.C. 64. Clapham (P., *Nat.*, 1908); Ingleton (P., *Nat.*, 1911); Fen Beck, Austwick; widely distributed in Wharfedale from Oughtershaw and Beckermonds to Collingham; R. Aire—Wedber Woods; Gordale Beck; Meanwood Beck, nr. Leeds.
V.C. 65. Cronkley, nr. Middleton-in-Teesdale (P., *Nat.*, 1925); nr. Sedbergh.
Imagoes from 9/vi. to 20/x.

L. nigra Pict.
V.Cs. 61 and 65. No records.
V.C. 62. Mill Beck, Robin Hood's Bay.
V.C. 63. Bill o' Jacks, Huddersfield (P., *V.H.*).
V.C. 64. R. Wharfe—Dibb Scar, Grassington; R. Aire—Wedber Woods, Malham.
Imagoes from 21/v. to 5/vi.

L. inermis Kmpny.
V.C. 61. No record.
V.C. 62. Stainton Dale, Scarborough; Mill Beck, Robin Hood's Bay: Kettleness.
V.C. 63. Harden Clough, Huddersfield (P., *V.H.*).
V.C. 64. Horton-in-Ribblesdale (P., *V.H.*). Austwick; R. Nidd—above Lofthouse; R. Wharfe—Swarth Gill, Oughtershaw Beck (1500 ft.), Beckermonds, Upper Hebden Beck, Grassington, Ilkley; R. Aire—above Gordale Scar (1250 ft.), Wedber Woods, Bell Busk, above Skipton; Meanwood Beck, Leeds.
V.C. 65. Near Sedbergh; Baugh Fell, Hawes Junction.
Imagoes from 17/iv. to 1/viii.

L. hippopus Kmpny.
V.C. 61. No record.
V.C. 62. Bloody Beck; Mill Beck, Robin Hood's Bay; Stainton Dale, nr. Scarborough: Black Beck, Cleveland.
V.C. 63. Harden Clough, Huddersfield (P., *V.H.*).
V.C. 64. R. Laver—Galphey Br.; R. Nidd—Grimbald's Crag, Knaresboro'; R. Wharfe—above Halton Gill; Littondale (1800 ft.), Upper Hebden Beck, Bolton Abbey, Harewood Br., Barwick-in-Elmet; R. Aire—above Skipton; Meanwood Beck, Leeds.
V.C. 65. Maize Beck, U. Teesdale.
Imagoes from 12/iii. to 6/vi.

Protonemura meyeri Pict.
V.C. 61. No record.
V.C. 62. Stainton Dale, Scarborough; Mill Beck, Robin Hood's Bay; Grain Beck, Cleveland.
V.C. 63. Harden Clough, Huddersfield (P., *E.M.M.*, xlvi., 119); Hebden Bridge (P., *Nat.*, 1904).
V.C. 64. Horton-in-Ribblesdale (P., *Nat.*, 1897); Austwick; R. Wharfe—U. Littondale, Hebden Beck, Grassington, Bolton Abbey; R. Aire—Malham, Gordale, Bell Busk, nr. Skipton; Meanwood Beck, Leeds.
V.C. 65. Cronkley, Middleton-in-Teesdale (P., *Nat.*, 1925).
Imagoes from 12/iii. to 1/viii.

P. præcox Mort.
V.Cs. 61, 62, 64 and 65. No records.
V.C. 63. Harden Clough, Huddersfield (P., *E.M.M.*, xlvi., 119).

Amphinemura cinerea Oliv.
V.C. 61. No record.
V.C. 62. R. Esk, Glaisdale (P., *E.M.M.*, xlv., 188): Langdale End; Grain Beck (n.), Baysdale Beck (n.), Bilsdale Beck (n.).
V.C. 63. Huddersfield (P., *Nat.*, 1897): Hebden Bridge (P., *Nat.*, 1904).
V.C. 64. R. Laver, Galphey (n.); above Ripley; R. Wharfe—widely distributed from Oughtershaw (1500 ft.) to Harewood Bridge; R. Skirfare—Arncliffe; R. Aire—widely distributed from Malham and Gordale to Skipton; Austwick; Gaping Gill, Ingleborough.
V.C. 65. Cronkley, Middleton-in-Teesdale (P., *Nat.*, 1925).
Imagoes from 3/vi. to 25/vi.

Nemura variegata Oliv.
V.C. 61. N. Grimston (P., *Nat.*, 1902); Filey (P., *Nat.*, 1914); Hornsea (P., *Nat.*, 1908); Castle Howard (P., *Nat.*, 1897).
V.C. 62. Black Beck, Cleveland.
V.C. 63. Huddersfield; Wharncliffe Woods (P., *Nat.*, 1897).
V.C. 64. Pool near Pannal; Bolton Woods (P., *Nat.*, 1897); Bishop's Wood, nr. Selby (P., *Nat.*, 1897); Meanwood Beck, Leeds.
V.C. 65. Baugh Fell (1500 ft.).
Imagoes from 7/iv. to 6/vi.

N. avicularis Mort.
V.Cs. 61 and 65. No records.
V.C. 62. Stainton Dale.
V.C. 63. Harden Clough, Huddersfield (P., *V.H.*).
V.C. 64. Etchill's Crag, Thorner; Sugarwell Hill, Leeds.
Imagoes from 18/iii. to 19/vi.

N. marginata Pict.
V.Cs. 61, 62 and 65. No records.
V.C. 63. Dunford Bridge; nr. Huddersfield; Wharncliffe Wood (P., *Nat.*, 1897).
V.C. 64. Horton-in-Ribblesdale (P., *Nat.*, 1897).

N. cambrica Steph.
V.C. 61. No record.
V.C. 62. Stainton Dale; Kettleness.
V.C. 63. Huddersfield (P., *Nat.*, 1897); Dunford Bridge and Wharncliffe Woods (P., *V.H.*).
V.C. 64. Horton-in-Ribblesdale (P., *V.H.*); Dibb Scar, Grassington; Etchills, Thorner; Barwick-in-Elmet; above Skipton; Meanwood Beck, Leeds.
V.C. 65. Nr. Sedbergh.
Imagoes from 23/iv. to 10/viii.

Nemurella inconspicua Pict., Mort. (=*pictetii* Klp.).
V.Cs. 62 and 63. No records.
V.C. 61. Filey (P., *E.M.M.*, li., 45).
V.C. 64. R. Laver, Galphey Bridge; Ripley; Meanwood Beck, Leeds.
V.C. 65. Sedbergh.
Imagoes from 1/v. to 29/vii.

Chemistry in the Home, by **J. B. Firth.** London: Constable & Co., 246 pp., 5/- net. The Senior Lecturer in Chemistry at the University College, Nottingham, deals with Chemistry from an altogether unusual angle, but one which is none the less useful and valuable. Air, water, fuels, heating, lighting, ventilation, cleaning, etc., are referred to in the first section of the work, while the chemistry of foods and the constituents of flour, vegetables, fruits, beverages, etc., are each placed under review.

Biology by Discovery, by **E. Green** and **E. A. Potter.** London: J. M. Dent & Sons, vii.+361 pp., 5/- net. In this volume two well-known Biology mistresses give exceedingly practical essays on the study of animal and plant life, which, from the fascinating way in which they are written and the wealth of illustration, will appeal to the student much more readily than does the average text-book. How plants and animals are classified; How to keep an Aquarium; How to avoid disease; How to grow plants for experiment, etc., are samples of the types of chapters dealt with. We should like to congratulate the General Editor, Dr. E. J. Holmyard, and the publishers, on producing a volume at so low a rate.

VERTEBRATE ZOOLOGY IN YORKSHIRE.

E. WILFRED TAYLOR.

A MEETING of the Vertebrate Section of the Yorkshire Naturalists' Union was held in the Church Institute, Leeds, on Saturday, October 26th, Mr. R. Chislett presiding.

Mr. H. B. Booth exhibited the remains of Rooks found in the eyrie of a Peregrine Falcon in the Isle of Man, and forwarded by Mr. Ralph Howarth.

Mr. W. J. Clarke gave an illustrated paper on ' Some Yorkshire Marine Vertebrates,' and dealt with the fishes, mammals and birds of the Yorkshire coast. The first slides showed the Common Rorqual, which is the most frequently met of the large Cetaceans in Yorkshire waters. The singular striations of the under surface of these mammals were clearly shown, and also examples of the Baleen, or Whalebone, characteristic of the whales belonging to this group.

The toothed Whales were represented by the White Whale, or Beluga, a beautiful milk-white creature, the hide of which furnishes the ' porpoise hide ' boot-laces of commerce. A specimen was seen by the lecturer swimming close to the Spa wall at Scarborough.

The Killer Whale also belongs to this class, and a photograph was shown of a newly-born example stranded on the Yorkshire coast. It bore the stiff bristles only found during the early life, which relate to a period when the land mammals, from which the Whales are derived, were protected by hair. This species is very voracious and feeds largely on Porpoises and Seals. The lecturer once observed a family party of three Killer Whales from Filey Brig, and they at once turned in his direction and caused him to beat a strategic retreat.

The Common Seal is the only species found at all frequently on the Yorkshire coast, and slides of this species were shown ; the Walrus, which is now an extinct Yorkshire species, and the Sea Lion. The two latter belong to the group of Eared Seals.

Many species of fish were dealt with, and the brilliantly coloured Streaked Gurnard was taken as representative of that family.

For several years Red Tunney have been reported off the Yorkshire coast in increasing numbers ; they haunt the herring boats and prey on the herrings that fall from the nets. Although many have been destroyed by the fisherman, who regard them as a menace, it is only this year that specimens have been brought back to Scarborough. They grow to an immense size and belong to the Mackerel family. The flesh is good to eat, and commercial developments might be practicable.

Photographs were shown of the Oceanic Giant Squid, and of Ray's Bream, both Atlantic forms which have appeared along the coast more frequently of late years. The lecturer suggested that possibly a common cause, such as an alteration in the course of the Gulf Stream drift, was responsible for these visits.

The rare Northern Wolf Fish, *Anarrhichas latifrons* was described and illustrated, and was only the third recorded occurrence from the North Sea ; photographs of the two other British species were also shown.

A slide of the dangerous Sting Ray, which is rare in British waters, with details of the poisonous spine, borne upon the tail, with which it can inflict very serious injuries, was shown. A 12ft. Thresher Shark, caught last year at Filey, and a beautiful white variety of the Thornback Ray, recently taken off Scarborough, were other species dealt with.

Dragonets, Pipefish, Garfish, Herring, Pilchard and Sun Fish were described, and the lecturer concluded with a series of photographs of Sea Birds.

The address was illustrated by a remarkable series of slides, mostly

in colour, which the lecturer had patiently collected during a long residence on the Yorkshire coast.

Mr. F. Stubbs called attention to the absence of the call of the Corncrake on the Pennine Boundary this year, and urged that a census should be taken to determine the status of the species in Yorkshire. Reports from various parts of the County seemed to indicate a general decline in numbers, unless, for some unknown reason, the birds had recently become less vocal. Mr. Stubbs thought this explanation possible, and referred to an instance when the birds had nested but had not been heard to call.

Mr. R. Chislett gave an illustrated paper on 'The Slavonian Grebe,' and showed photographs of a northern loch, where several pairs nest annually. This loch, which is, perhaps, the only British nesting haunt, is also used for fishing, and it was thought that the Grebes were detrimental to the riperian interests. As a number, when shot and examined, furnished negative evidence, they are now allowed to nest in peace !

In habits and appearance this species closely resembles the Great Crested Grebe, but differs in its smaller size, in the lemon-yellow head tufts worn during the breeding season, and in the bright red orbital ring The nest was in a reed bed at one end of the loch, and no difficulty was experienced in obtaining a remarkably fine series of photographs.

Mr. Jasper Atkinson showed a series of photographs of the Black Tailed Godwit, obtained in Holland, and described various interesting episodes witnessed at the nest.

A coloured plate of 'Coleoptera new to the British List' appears in *The Entomologist's Monthly Magazine.*

Mituyo Okada writes on Electrophobotaxis of Fishes in a Group; and A. Terao and T. Tanaka on Anæthesia of the Water-flea, *Moina macrocopa* in relation to Age, in the *Journal of the Imperial Fisheries Institute*, published in Tokyo in August.

The Vasculum for November contains 'Tracking the Starling,' by J. E. Hull; 'Vegetation of Hell Kettles,' by J. B. Nicholson; 'Charters,' by J. E. Hull; 'Flint Work-sites in North-east Durham,' by H. Preston; 'A North-east Durham Bird Resort,' by C. N. Rollin; and 'The Variation of *Aricia medon*,' by J. W. H. Harrison and W. Carter.

The Hymerian, the magazine of Hymers College, Hull, has the following two notes on the River Humber, signed by G.E.T.: (1) 'What a magnificent stretch of water ! The rays of the golden sun, just risen, glance and glance on the sparkling wavelets. The stillness of the morning, broken only by the continual lapping of the waters on the forbidding piles, adds to the feeling that the beauties of nature are far superior to any that man can produce. And the gentle breeze, fanning one's cheeks, exhilarates with the life of nature. The only sign of man's intrusion on this quiet scene is five or six small barges, with huge square sails out of all proportion with the size of the boats, moving across the river in a picturesque line almost reaching the opposite bank. But even these quaint vessels add to the beauty of the scene, since their unusual build and their lazy movement are quite in harmony with their surroundings. There is a serenity in the air too peaceful to be expressed by words.' (2) 'The dark dirty tide, laden with refuse, flows swiftly by the ugly coastal steamers lined against a monstrously straight quay. A quarter of a mile away an ugly dredger, enveloped in smoke, with many groans and squeals heaves out of the river huge bucketfuls of filthy mud, and shoots it into a rusty hopper with a sickening crash. The atmosphere is laded with smoke, while a grimy paddle steamer churns up the muddy river in its attempt to reach the opposite shore, and belches out a column of black smoke into the oppressive air. Towards the east, the shore is lined with old hulks, which gave up their active life years ago. There they stand, a rotting mass, each containing a stagnant pool of foul water; a breeding place of flies and vermin. Which of these two is our real River Humber ? '

NEWS FROM THE MAGAZINES.

Professor H. H. Swinnerton has a paper on ' The Physiographic Sub-Divisions of the East Midlands ' in *Geography* for September.

The Mill-Stone for October, the house magazine of the British Oil and Cake Mills, Ltd., has an illustrated article on Oil Mills of the Past at Hull.

Hans Schlesch sends us a reprint from *Archiv fur Molluskenkunde*, entitled Kleine Mitteilungen V. Beitrag zur Molluskenfauna des nördlichen Trondelag, Norwegen.

Mr. Alan L. Ford has an illustrated paper on Machine Mining in Faulted Ground, dealing with Durham and Northumberland, in *The Colliery Guardian* for October 25th.

V. C. Wynne-Edwards refers to ' The Behaviour of Starlings in Winter,' and H. F. Witherby and F. C. R. Jourdain give a report on the severe weather in 1929 on Bird Life, in *British Birds* for November.

The Irish Naturalists' Journal for September contains illustrations of the new Belfast Museum, from which it would appear that the Curator, Mr. Deane, is in the enviable position of having ample case accommodation, enabling him to display his specimens without overcrowding and, in fact, in some instances the cases are empty, though doubtless he has specimens ready to fill them.

From Vienna we have received *Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien* : *Herausgegeben von der Gesellschaft*, which contains evidence of great scientific activities. The papers and monographs deal with various sections of botany and zoology, and they are illustrated by plates and about 140 blocks in the text. The publication can be obtained at Verlagesund der Redaktion, Mechelg 2, Wien III (Vienna).

Among the contents of *The Natural History Magazine* for October, issued by the British Museum (Natural History), are ' The Re-establishment of the Large Copper Butterfly in England,' by N. D. Riley ; ' Fur Rabbits,' by J. G. Dolman ; ' Resemblance and Diversity among Insects,' by D. Aubertin ; ' The Mountain Shrimp of Tasmania,' by G. E. Nicholls ; ' A New Pekingese Dog,' by Q. Verrity-Steele ; ' An Egyptian Cave-Dwelling Insect,' by D. E. Kimmins ; ' Some Record and other fine ungulate heads in the Museum Collection,' by J. G. Dollman ; and ' An Echo of the Great Exhibition,' by W. D. Lang.

We have received Parts III. and IV. of Volume XIV. of *The Transactions of the British Mycological Society*, edited by Carleton Rea and J. Ramsbottom (pp. 181-336, 15s. net), which contain records of the Oxford and Littlehampton Forays, the Presidential Address of Dame Helen Gwynne-Vaughan, and a large number of valuable and well-illustrated monographs as under :—' The development in culture of *Ascochyta gossypii* Syd.' by H. G. Chippindale ; ' The fungus causing leaf rot of the Carnation,' by W. Buddin and E. M. Wakefield ; ' A leaf-spot of *Arctostaphylos manzanita*,' by A. K. Briant and E. B. Martyn ; ' A New Species of *Hemitrichia* from Japan,' by G. Lister ; ' Some Observations on Mycetozoa of the genus *Didymium*,' by C. M. Carley ; ' *Phytophthora parasitica* Dast. causing " damping off " disease of cotton seedlings and " fruit-rot " of Guava in India,' by M. Mitra ; ' The production of Sexual Organs in Paired Cultures of Species and Strains of *Phytophthora*,' and ' The Production of Sexual Organs in Pure Cultures of *Phytophthora cinnamomi* Rands and *Blepharospora cambivora* Petri,' by S. F. Ashby ; ' Studies in the Morphology of Discomycetes,' by E. J. H. Corner ; ' A New Species of *Oidium*,' by A. Chaston Chapman ; ' Some Fungus Forays in America,' by Carleton Rea and J. Ramsbottom ; ' Notes on Basidiomycetes grown in Culture,' by K. St. G. Cartwright ; and *Armillaria* in a Mine-working.'

THE ZONES OF THE WHITE CHALK OF LINCOLNSHIRE.

By the late Arthur Walton Rowe, M.S.

(Edited from his note books by Charles Davies Sherborn and Thomas Henry Withers.)

CONTENTS.

Dr. Rowe, whose lamented death occurred on 17th September, 1926, left behind him a number of note books in which he was accustomed to write down on the spot his field observations and records for future use.

These note books he bequeathed to his secretary, Miss G. M. Tansley, who has kindly allowed us to borrow them and to use such as are sufficiently advanced to be of service. Of them, that of Lincolnshire is complete from the Humber to Claxby, and it is here reproduced in almost his own words, with such slight alterations necessary to elucidate the rough memoranda. Enough material was noted by Dr. Rowe to enable one to understand the structure and succession of the Chalk in the county, and to form the basis of a zonal survey such as was presented in the earlier papers on Kent and Sussex, Dorset, Devon, Yorkshire and the Isle of Wight.

The original numbers assigned by Dr. Rowe to the pits are retained, because they are so marked on his maps and on his specimens (his collection is in the Geological Department of the British Museum); but the pits have been placed in

areal groups from north to south for the convenience of those who desire to follow up his work.

The fossils are arranged as in Dr. Rowe's previous papers, and except in one or two instances the names are those used by him.

I.—BARTON-ON-HUMBER, SOUTH TO THE GRIMSBY—BRIGG RAILWAY.

* Barton Pits (South Ferriby Pits *R.c.* Zone.
Shows 20 ft. of flintless, marly and greyish chalk.

Conulus (small with flat base)
Conulus castanea Brongn.
Rhynchonella cuvieri d'Orb. c.
Terebratula semiglobosa Sby.
Inoceramus labiatus Schlot. c.
Inoceramus lamarcki Park. c.

The Barton Pit. *T.g.* Zone.

Digitate flints in base of this chalk.

Cyphosoma radiatum Sorig. (very small)
Rhynchonella cuvieri d'Orb.
Terebratulina gracilis, var. *lata* Eth.
Inoceramus lamarcki Park. c.

In the second pit it is difficult to get a good face of *R.c.* chalk in working order, as there is so much grey chalk at base, *R.c.* chalk is often out of reach. there is, however, only 10 ft. of *R.c.* chalk to work instead of 20 ft. as in South Ferriby Pit.

A third pit is called the New Pit. We did not work this as we had proved our zones.

[The above remarks on the 2 unnumbered Barton Pits were subsequently found in Rowe's "Yorkshire" notebook].

91. East side of Barton, opposite Cemetery. *H.p.* Zone.
Pit with chalk hard and very dirty, spurious grey tabulars, and some globular flints of considerable size. A 2-in. buff-coloured marl seam, not the ferruginous marl of Fotherby, intersects the face. I have not seen another marl seam of this colour in the whole county. The colour is due to a weak admixture with iron.

Echinocorys (fragment).
Holaster planus Mant.
Rhynchonella reedensis Eth.
Terebratula carnea Sby. (small).
Inoceramus sp. (not *costellatus* Woods, and not *brongniarti* Sby.
Ostrea vesicularis Lam.

92. Barton, in field 400 yards north of Barton—Horkstow Road. *T.g.* Zone.
Very small pit with 3 ft. of rather platy, white chalk, showing above chalk talus. Flints mostly finger-shaped and small nodules.

Terebratula semiglobosa Sby. (large). *Inoceramus brongniarti* Sby.

93. Barton, on north side of Barton—Horkstow Road. *T.g.* Zone.
Grass-grown section with a few feet of chalk showing here and there through turf. Chalk smooth and white. Fossils very scarce; two fragments of an *Inoceramus* alone seen, and these almost certainly *I. brongniarti* and not *I. mytiloides*. Flints in fair sized nodules of pinkish grey with one or two finger-shaped forms.

* The Ferriby and Barton sections were described in the Proceedings of the Geologists' Association (London) XVIII (4) Feb. 1904, p. 202.

94.
Omitted by mistake in numbering by Dr. Rowe.

95. Barton Hill Farm. *T.g.* Zone.
Small pit showing 20 ft. of smooth, white, hard chalk, with manganese in joints and much interstitial slickensiding. Occasionally worked for roads.

Rhynchonella reedensis Eth. *Inoceramus brongniarti* Sby.
Terebratulina gracilis var. *lata* Eth.

Note that in several undoubted *gracilis* pits *I. brongniarti* is as rare as it is common in others. Only two seen here in good surface and on good talus. Flints in grey pseudo-tabulars, some as much as 4 in. thick. Also nodulars and finger-shaped flints, both of fair size. A marl band 1 in. thick.

97. Calthorpe Farm (near), at Horkstow, overlooking the Humber (3 miles south-west of Barton). *T.g.* Zone.
Fair sized pit with excellent worked and weathered surfaces. Chalk white, smooth, veined with calcite, manganese in joints, and interstitial slickensiding. Flints in large nodules and fingers ; mostly darkish grey, but some ranging from pink to almost purple (from manganese). One small paramoudra-like mass.
Terebratulina gracilis var. *lata* not seen on weathered surface. Is it actually rare at this horizon? It would seem to be so, and its absence not due to inability to find it.

Conulus subrotundus Ag. (small). *Inoceramus brongniarti* Sby., fairly common.
Rhynchonella cuvieri d'Orb.
Terebratula carnea Sby. (small).

96. Barton, in field 300 yards from south side of Barton—Horkstow Road. *T.g.* Zone.
Small pit with few feet of chalk showing, but a fine talus. Flints in nodulars and fingers, both of large size. One $\frac{1}{2}$-in. marl band. *Inoceramus brongniarti* as common here as it is rare in Pit 95.

Holaster planus Mant. *Terebratula carnea* Sby.
Rhynchonella cuvieri d'Orb.

86. In field on west side of road at Beacon Hill, on the Brigg—Barton Road. *H.p.* Zone.
Small disused pit with well-weathered surface, chalk white and free from manganese, and large grey tabulars (true.)

Porosphæra globularis Phill. *Terebratulina gracilis* var. *lata* Eth.
Holaster planus Mant. *Kingena lima* Defr.
Asteroid. *Inoceramus costellatus* Woods.
Rhynchonella cuvieri d'Orb. *Inoceramus cuvieri* Sby.
Rhynchonella reedensis Eth. *Serpula ampullacea* Sby.
Terebratula semiglobosa Sby. (small)

87. At cross roads, White Mill Hill Bottom, behind cottage ($2\frac{1}{2}$ miles south of Barton). *T.g.* Zone.
Medium sized pit, fine exposure. Chalk and flints same as Pits 83,

84. No nodular chalk. Even in this good surface *Terebratulina gracilis* var. *lata* is notably rare. The flints are larger than in Pit 83, and there is a 2-in. marl seam.

Conulus subrotundus Ag. *Terebratula carnea* Sby.
Rhynchonella limbata Schlot. *Inoceramus brongniarti* Sby.(abund.)
Rhynchonella reedensis Eth. *Ostrea vesicularis* Lam.

83. Beaumont Farm (2¾ miles south of Barton). *T.g.* Zone.
Small pit, occasionally used, showing 10 ft. of white, hard chalk, much slickensided and veined with calcite. No flint courses, but small cylindrical flints like *Belemnites*. A 1-in. marl band.

Terebratulina gracilis var. *lata* Eth.
Inoceramus brongniarti Sby.(abund.)
Inoceramus mytiloides Schlot. (not seen)

88. Between Barton and Elsham, on north side of road leading off at Ls on west side of Barton—Brigg Road (3 miles south of Barton). *T.g.* Zone.
Small pit, with surface poor from downwash from soil-cap. Chalk and flints almost the same as in Pit 87, except that the former is more laminar and the latter, though showing finger-shaped forms, is more generally in medium-sized nodules. A 1-in. marl seam. A piece of grey tabular flint found on talus, but this must be from soil-cap, as no similar bed can be found in the section itself. Manganese and interstitial slickensiding. Pit worked for roads occasionally. *Inoceramus brongniarti* abundant.

77. ¼ mile north of Barrow Hall (2½ miles south-east of Barton). *H.p.* Zone.
Large abandoned working, chalk very hard, iron-stained in parts, with manganese in joints. Flints mostly in grey nodulars, but two rather thin and discontinuous tabulars, the lower with a thin marl seam resting on it.
Oysters quite as large as at Ulceby, but not so abundant. There is no continuous bed for 5 feet, but the distribution is more concentrated at upper and lower limits.

Ventriculites mammillaris T. Smith.
Echinocorys (fragment)
Holaster planus Mant.
Micraster corbovis Forbes.
Rhynchonella reedensis Eth.
Terebratula semiglobosa Sby. (large)
Inoceramus cuvieri Sby.

78. Barrow, opposite gate of Barrow Hall (3 miles south-east of Barton). *H.p.* Zone.
Very large pit, now worked at north end only, with two kilns, the southern one abandoned. Fine surface both worked and weathered, but very barren. Many grey tabulars and some nodulars. No manganese. Chalk very hard, with two marl bands, 1 in. thick and 5 ft. apart.

Holaster planus Mant.
Rhynchonella cuvieri d'Orb.
Terebratula semiglobosa Sby.
Inoceramus cuvieri Sby.
Ostrea vesicularis Lam.
Fish vertebræ.

Both Hill and Burnet record *Echinocorys*, and the latter, in addition, records *Terebratulina gracilis* var. *lata*, *Kingena lima*, *Rhynchonella reedensis*, and *Holaster placenta*.

79. Barrow, at cross roads ¾ mile south-west of Barrow Hall, on road from Barton to Bonby. *H.p.* Zone.
Abandoned pit with a few feet of chalk shewing under roots of a tree. A thin tabular *in situ*, as well as an *Ostrea* bed, but nothing else found.

80. At sign post 2 miles south-west of Barrow on same road, and 300 yards on north side of Ford's Farm. *H.p.* Zone.

Holaster planus Mant.
Asteroid.
Terebratula semiglogosa Sby. (small)

81. Opposite Pit 80.

Holaster planus Mant.
Rhynchonella cuvieri d'Orb.
Terebratula semiglobosa Sby. (small)

Both pits small, poor sections, and not worked. Rather thick grey semi-tabulars, and one 1-in. marl seam in Pit 81.

82. DEEPDALE, south side of road ¼ mile south-west of Pit 81 (3 miles south-south-east of Barton). *H.p.* Zone.

Small disused pit, deeply talused. A few feet of platy chalk above talus, one semi-tabular, and a second marl band.

Holaster planus Mant.
Rhynchonella reedensis Eth.
Terebratula carnea Sby.
Inoceramus cuvieri Sby.
Ostrea vesicularis Lam.

85. Dee's Farm, BARTON VALE, east side of road (2 miles south-east of Barton). ? *H.p.* Zone.

Good sized pit with 30 ft. of chalk exposed. Many grey tabulars, some 6 in. thick, and several thin marl seams. Much manganese. Fossils very rare. Chalk discoloured with iron, bad surface.

Porosphæra globularis Phill.
Holaster planus Mant.
Rhynchonella reedensis Eth.
Rhynchonella cuvieri d'Orb.

70. THORNTON CURTIS, north-west of Church (4 miles south-east of Barton.) ? Base of *H.p.* zone.

An abandoned quarry smothered in drifts. Some thick tabulars at top and nodular flint lines at base. Rest obscured. The only fossil found was *Echinocorys gibbus* on talus from extreme top of pit. In all probability we have the junction of *T.g.* and *H.p.* Zones.

71. THORNTON CURTIS, on Goxhill Road (left), due north of Church. ? Lower part of *H.p.* Zone.

Section obscured by drifts. One thick tabular near top, and several small pseudo-tabulars below. Two marl-bands at bottom of pit, each 1 in. thick, the upper being ferruginous and about 6 in. below a thin tabular. The lower marl is grey, and the two are 2 ft. 11 in. apart. From the top of the section, *in situ*, I collected *Echinocorys gibbus* ; from lower part *Kingena lima* only. From the talus was obtained :—

Serpula plana S. Woodw.
Membranipora
on *Echinocorys*
Rhynchonella cuvieri d'Orb.
Inoceramus cuvieri Sby.

72. THORNTON CURTIS, north-west of Church. *H.p.* Zone.

An abandoned pit with very poor surface. Shows 5 ft. of chalk under an overhanging hedge, with one 3 in. tabular at base.

Bourgueticrinus.
Echinocorys (fragment).
Holaster planus Mant.
Micraster corbovis Forbes (large).
Cyphosoma radiatum Sorig.
Inoceramus cuvieri Sby.

73. ¾ mile west of THORNTON CURTIS. *H.p.* Zone.

Very large abandoned working, surface very poor and grey with age. Pit seamed with tabulars and pseudo-tabulars, one 10 in. thick. Three paramoudras in a group, one 3 ft. across by 4 ft. high. The same curving of the chalk as shown in the paramoudra in Pit 50 is seen. The tabulars above and below being thick, were practically horizontal. They are comminuted just like that in Pit 50.

Vincularia indistincta Marss.
Bourgueticrinus.
Holaster planus Mant.
Micraster corbovis Forbes.
Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth.
Terebratula carnea Sby.
Terebratulina gracilis var. *lata* Eth.
Inoceramus cuvieri Sby.
Serpula ilium Goldf.
Serpula plana S. Woodw.

74. Thornton Curtis, $1\frac{1}{8}$ mile west-south-west of Church, and $\frac{3}{4}$ mile west of Burnham. *H.p.* Zone.

Large pit with good surface, chalk very hard. A big tabular has the same banded condition as in Pit 63, and there are many tabulars and semi-tabulars.

Infulaster excentricus S. Woodw. ex. Rose MS.
Rhynchonella cuvieri d'Orb.
Terebratula carnea Sby. (very sm.)
Inoceramus brongniarti Sby.
Inoceramus cuvieri Sby., c.
Plicatula sigillina Woodw.
Serpula plana S. Woodw.

75. $\frac{1}{4}$ mile south of Burnham, $1\frac{3}{4}$ mile west-south-west of Thornton Curtis. ? Top of *T.g.* Zone.

Medium pit with fair surface. One semi-tabular at base, and the remainder nodular flints. Lithologically this has all the appearance of upper *T.g.* Zone. No *Echinocorys* or *Micraster*. Had no time to break up chalk to see if *Terebratulina gracilis* var. *lata* was common.

Chalk	6	0	top
Marl band, ferruginous		1	
Chalk	1	3	
Semi-tabular	0	3	
Chalk	1	3	
Large nodular flints		6	
Chalk		6	
Large flint nodular...		6	
Chalk	3	6	
Marl band, ferruginous		2	
Chalk	5	0	
Large nodular flints		6	
Chalk		9	
Tabular		3	
Chalk	3	3	

Holaster planus Mant.
Infulaster excentricus S. Wood. ex Rose MS.
Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth.
Terebratula carnea Sby.
Inoceramus brongniarti Sby.
Inoceramus cuvieri Sby.

76. Wooton, opposite Lodge Gate of Wooton Hall (5 miles south-east of Barton). *H.p.* Zone.

Large pit, used in one corner only. Many tabulars and spurious tabulars.

Holaster planus Mant.
Rhynchonella cuvieri d'Orb.
Inoceramus cuvieri Sby.
Heteroceras.

(October, 1908). The point to determine is where to draw the line between *H.p.* and *T.g.* Zones. Is it quite certain that the appearance of nodular flints marks the in-coming of the *T.g.* Zone. Note that in Pit 75 there was a 3-in. tabular below several lines of nodular flints. There are barren areas in Lincolnshire *H.p.* Zone, just as there are in *A. quadratus* Zone in the south. All echinoderms tend to run in bands, and where these are common, such as *M. corbovis*, at Boswell, other things are common. The same applies to the oyster band (or bands) in *H.p.* Zone, for here we get abundance of other fossils.

102. At Dunkirk Farm ($5\frac{1}{2}$ miles south-south-east of Barton). *H.p.* Zone (base).

Small disused pit with only scattered chalk on talus showing on west side of Dunkirk Cover. Flints in grey tabulars. Platy chalk of *planus* character.

Holaster planus Mant.
Inoceramus brongniarti Sby.
Terebratula carnea Sby.

103. At Dunkirk Farm, in field on east side. *H.p.* Zone (base).
Small pit with hardly any chalk showing, but a fair talus. Grey tabulars and pseudo-tabulars.

Holaster planus Mant. *Inoceramus brongniarti* Sby.
Terebratulina gracilis var. *lata* Eth.

104. How Hill (just north of 103). *H.p.* Zone (base).
This little hill is quite a landmark as it is crowned with a small tumulus planted with a clump of trees. Quite close to it is a little pit with 1-in. platy chalk showing under soil-cap, and loose chalk on talus. Flints in grey pseudo-tabulars.

Holaster planus Mant. *Inoceramus cuvieri* Sby.
Inoceramus brongniarti Sby.

98. On hillside above Worlaby at cross roads (5½ miles south of Barton). *H.s.* Zone.
Pit rather small and occasionally worked for farm roads. No flints. The chalk breaks out in great blocks, and though nodular with yellow inclusions as in *cuvieri* zone, it can, I think, be referred only to *H. subglobosus* Zone.
Only fossils seen were the reverse of ? *Lima orbicularis* and a fragment of *Inoceramus*.

84. Worlaby Top, by roadside (W) (5 miles south of Barton). *T.g.* Zone.
Old pit with practically no surface. Chalk and flints identical with Pit 83, except that there is one discontinuous course of rather small and almost white nodular flints.

Terebratula semiglobosa Sby. (large) *Inoceramus brongniarti* Sby.

99. Top of Worlaby Hill (6 miles south of Barton). *T.g.* zone.
Very large abandoned pit, formerly worked at two levels. This old quarry does not appear on Sheet 86, and it is difficult to fix exact locality. A danger post for cyclists is just below it. A narrow excavation, now quite overgrown, is on opposite side of the road.
Massive white chalk for, say, 40 ft., with a few marl seams, grey nodular flints, and some finger-shaped ones throughout. The lowest exposure is in smooth chalk and yields *Inoceramus brongniarti*, though it is rare. In the upper levels the same fossil was found in larger, but still small numbers, as well as one example of *I.* cf. *undulatus* Mant. The upper surface is yellow and nodular like that described in Pit 89, and it yielded *Cidaris hirudo* (spine), *Onchotrochus*, *Terebratula carnea*, *Rhynchonella cuvieri*, and *Ostrea vesicularis*.
The yellowish nodular chalk in Pit 89 may therefore not indicate the top of *cuvieri* zone, and probably does not. It is clear, however, that the base of the present pit yields no evidence of *Inoceramus mytiloides*, and that it is cut in characteristic *gracilis* chalk. In this county it seems to be almost useless to look for *cuvieri* zone except in association with that of *Holaster subglobosus* Zone.

89. Elsham (6 miles south of Barton). *T.g.* and *R.c.* Zones.
Medium sized pit recently worked, with good fresh and weathered surfaces. Chalk massive, smooth and white, very hard, seamed with calcite, much manganese in joints, and with interstitial slickensiding. Flints mostly nodular, often of moderate size, but a few finger-shaped; very thick white cortices, and grey or pinkish nucleus. The pit is about 30 ft. deep, and steeply talused. The upper part of section corre-

sponds to description given above. No *Terebratulina gracilis* var. *lata* found even after minute search on weathered surfaces.

Rhynchonella cuvieri d'Orb. *Terebratula carnea* Sby.

The base of the section as exposed above the grass talus is different. The chalk is yellowish and markedly nodular,* and there is one thin (½ in.) marl seam. The flints get notably smaller, are often quite pink in colour, and one or two small globular flints were found (see Claxby, No. 38). At this level *Rhynchonella cuvieri* is by no means rare, but no sign of *Inoceramus mytiloides* can be found. But for the grass talus the section would be very interesting, as obviously *cuvieri* chalk should be found. It is possible that we have the junction of *gracilis* and *cuvieri*. The profusion of *Inoceramus brongniarti* so characteristic in the preceding pits now fails entirely. I did not see a single determinable fragment of *Inoceramus* in either bed, and indeed all fragments of it are notably rare.

90. Between Elsham and Worlaby. *H.s.* Zone.

Large pit, occasionally worked at north end. Chalk massive, yellowish and nodular, with a 1½-in. marl seam 4 ft. from base, and soft shaly lines between the nodular masses. The same hard nodular chalk, with hard yellow masses included, is seen in Pit 98. This part of the rock looks like *cuvieri* zone, but the presence of *Pecten beaveri* settles the matter.

Plocoscyphia convoluta T. Smith.
Terebratula carnea Sby.
Terebratula semiglobosa Sby.
Pecten beaveri Sby.
Spondylus dutempleanus d'Orb.
Serpula cf. *ampullacea* Sby.

17. Pit 1 mile west of Ulceby (6½ m. south-east of Barton) (parish stone pit and refuse tip). *C.t.* and *H.p.* Zones.

Chalk hard, with many courses (not true tabulars) of grey flints with practically no cortices. *Holaster planus* and the *Micraster* occurred both below level of road in pit. One *Echinocorys* at base of pit and the other above talus.

Lituola nautiloidea Rss.
Diastopora.
Eschara acis d'Orb.
Meliceritites semiclausa d'Orb.
Membranipora.
Cliona cretacea Portl.
Guettardia stellata Mich.
Plocoscyphia convoluta T. Smith, 4.
Porosphæra globularis Phill.
Ventriculites impressus T. Smith.
Ventriculites mammillaris T. Smith.
Onchotrochus.
Bourgueticrinus.
Echinocorys (two, thin tested).
Holaster planus Mant. (common even at top of pit).
Micraster cortestudinarium Goldf. (A. Burnet coll.).
Micraster præcursor Rowe (from well of pit).
Cidaris serrifera Forbes.
Cyphosoma radiatum Sorig.
Serpula ampullacea Sby.
Serpula fluctuata Sby.
Serpula ilium Goldf.
Serpula plana S. Woodw.
Rhynchonella cuvieri d'Orb.
Rhynchonella plicatilis Sby.
Rhynchonella reedensis Eth., c.
Crania egnabergensis Retz.
Terebratula carnea Sby., 6.
Terebratula semiglobosa Sby. (large and common).
Terebratulina striata Wahlenb.
Kingena lima Defr., 4.
Inoceramus brongniarti Sby.
Inoceramus cuvieri Sby., c.
Plicatula sigillina S. Woodw.
Ostrea hippopodium Nilss.
Ostrea vesicularis Lam. Band of large specimens, with *Terebratula semiglobosa* Sby.
Teredo amphisbæna Goldf.
Lamna appendiculata Ag.
Scapanorhynchus subulatus Ag.

* For remarks on the yellowish nodular chalk, see Pit 99.

Holaster planus is found in the *Ostrea vesicularis* band together with many *Terebratula carnea* and *T. semiglobosa* of large size, as at Wyham.

18. Large pit at Ulceby, near railway. *H.p.* Zone.
Many courses of flints, and one thick semi-tabular at top. Flints grey with thin cortices. Chalk very hard, containing much calcite. Good surface and large pit, but fossils very scarce. A thin marl band in the centre of pit. Band of *Ostrea vesicularis* Lam.

Eschara lamarcki Hag.
Plocoscyphia convoluta T. Smith.
Porosphæra globularis Phill.
Bourgueticrinus.
Echinocorys (thin tested), or *Holaster placenta* Ag.
Echinocorys (thick tested).
Holaster planus Mant.
Rhynchonella reedensis Eth.
Terebratula carnea Sby.
Terebratulina gracilis var. *lata* Eth.
Crania egnabergensis Retz.
Inoceramus cuvieri Sby.
Ostrea hippopodium Nilss.

105. East side of road (Race Lane) ½ mile north of Melton High Wood (7 miles south-south-east of Barton). *T.g.* Zone.
Small pit with hard, smooth, white chalk and large grey nodulars. *Inoceramus brongniarti* Sby (two), *Ostrea vesicularis* Lam.
Another instance of rarity of *I. brongniarti* in *gracilis* chalk. *Terebratulina gracilis* var. *lata* Eth., not seen.

107. Croxton, in field between it and Yarborough Camp (7 miles south-south-east of Barton). *T.g.* Zone.
Small pit with flaggy, passing lower down to smooth, white, massive chalk. Flints grey nodulars and fingers of fair size. A 1-in. marl seam. Quite a good surface, but *Terebratulina gracilis* var. *lata* not found. The usual slickensiding and manganese.

Holaster planus Mant.
Rhynchonella cuvieri d'Orb.
Inoceramus brongniarti Sby.
Ostrea vesicularis Lam.

108. Croxton, in next field to Pit 107, and on same level. *T.g.* Zone.
Chalk and flints identical with Pit 107, also a good surface. Actually found *Terebratulina gracilis* var. *lata* (two). Both in this and Pit 107 *Inoceramus brongniarti* quite rare.

Terebratula carnea Sby. (small)
Inoceramus brongniarti Sby.
Ostrea vesicularis Lam.

109. Croxton—Barton Road, east side, on Parsonage Farm land. *H.p.* Zone (base).
Pit with very small exposure and scanty surface. Chalk more like *planus* than *gracilis*, but not markedly so. Flints in thick milky semi-tabulars.

Holaster planus Mant.
Inoceramus brongniarti Sby.
Inoceramus cuvieri Sby.

110. Croxton, also on Parsonage Farm, but 400 yards east of Pit 109. *H.p.* Zone.
No exposure, but chalk on grass slopes. One massive grey tabular under soil cap. Note that at Ulceby Parish Pit, close by here, massive grey tabulars extend to floor of pit.

Holaster planus Mant.
Rhynchonella cuvieri d'Orb.
Terebratula carnea Sby. (small).
Terebratulina gracilis var. *lata* Eth.
Terebratulina striata Wahlenb.
Kingena lima Defr.

100. Melton Ross, in field ¼ mile west of Melton Ross quarry (8 miles south-south-east of Barton). *T.g.* Zone.
Small pit with numerous courses of grey nodular flints. No fossils found. Fragments of *Inoceramus* too small for precise determination, but probably *I. brongniarti*. Only a rapid inspection in the rain.

101. Melton Ross, the great pit by railway. *T.g.* Zone.
Section, excluding gravelly cap, about 50 ft. high, with grey nodular courses down to the very floor. A fair number of *Inoceramus brongniarti* found on talus. It is certain that the whole section is in the *gracilis* chalk. Search for *I. mytiloides* entirely without result. Only a hurried visit in the rain ; no light.

106. ¼ mile north of Melton Ross, on west side of road (Race Lane). *T.g.* Zone.
Rather small pit with excellent surface, recently worked. Massive, smooth, white chalk, with much manganese in joints, and interstitial slickensiding ; also calcite. Flints in large nodulars of pinkish grey colour.
Here *Inoceramus brongniarti* not really common, and *Terebratulina gracilis* var. *lata* specially was searched for without result.

Conulus subrotundus Ag. *Rhynchonella reedensis* Eth.
Rhynchonella cuvieri d'Orb. *Ostrea vesicularis* Lam.

II.—GRIMSBY—BRIGG RAILWAY SOUTH TO LOUTH AREA.*

111. Kirmington Vale Farm (1½ miles south-west of Croxton). *T.g.* Zone,
Small pit (worked in field. Chalk heavily stained with manganese. and slickensiding. Chalk much broken up as pit is only on surface. Flints rather large in pinkish grey nodulars. Note that *Inoceramus brongniarti* is again rare (one specimen).
Rhynchonella cuvieri d'Orb.

112. Glebe Farm, near Kirmington (not on map), on Ross—Caistor Road (2½ miles south-west of Croxton). ? *R.c.* Zone.
Small pit recently worked. Several thin wavy bands of marl. Although not hard and nodular, the chalk has a suggestively *cuvieri* appearance. Fossils very rare. Flints in medium sized grey and pinkish nodulars.

Terebratulina striata Wahlenb. *Inoceramus* ? *mytiloides* Schlot.

The piece of *Inoceramus* was not large enough for accurate determination. Other fragments found but nothing which could be determined as *I. brongniarti*. On the whole the evidence points in the direction of *cuvieri* zone, as the chalk is not white and blocky, but veined throughout with marl and with shaly lines in it. It certainly did not suggest grey chalk.

* This area for 12 miles south is very inaccessible except by motor car.

113. By roadside at cross roads, ¼ mile south-east of Barnetby Mill (3 miles south-west of Croxton). *H.s.* Zone.
Large disused pit with no flints.

Inoceramus sulcatus? Park. *Ammonites rhotomagensis*? Defr.

114. Green Lane, ¼ mile south-west of Barnetby Mill (3 miles south-west of Croxton). Chalk Marl.
Small pit.

Turrilites costatus? Lamk. *Lima globosa* Sby.

115. Pit by roadside to immediate north of Bigby (3½ miles south-west of Croxton). *H.s.* Zone.
No fossils found, but clearly in *subglobosus* zone.

116. Somerby Doulter (near) (3½ miles south-west of Croxton). *R.c.* Zone.
This is not the pit marked on Sheet 86, but is on the hill leading east from Bigby by the mile-iron marked 'Brigg 4 miles.' Chalk, yellowish and nodular, with characteristic buff coloured inclusion and shaly partings. No flints. The pit mentioned by Clement Reid had pinkish nodular flints, and is therefore in *Terebratulina* Zone.

Rhynchonella cuvieri d'Orb. *Inoceramus mytiloides* Schlot.
Terebratula semiglobosa Sby.

57. Kermington (2 miles south-east of Croxton). *H.p.* Zone.
Rather large pit with good but barren surface. Usual grey tabulars and no marl bands.

Plocoscyphia convoluta T. Smith.
Echinocorys scutatus Leske.
Holaster planus Mant.
Infulaster excentricus S. Woodw. ex Rose MS.
Serpula plana S. Woodw.
Rhynchonella cuvieri d'Orb.
Terebratula carnea Sby.
Terebratulina gracilis var. *lata* Eth.
Inoceramus brongniarti Sby.
Inoceramus cuvieri Sby., c.
Inoceramus lamarcki Park.
Ostrea vesicularis Lam.

58. Great Limber, west of Church (3½ miles south-east of Croxton). *H.p.* Zone.
An abandoned pit with turnip crop in it. Surface very small and bad. The usual grey tabulars and one thin marl seam.

Discocavea cenomana Mich.
Holaster planus Mant.
Micraster corbovis Forbes (C. S. Carter Coll.).
Serpula plana S. Woodw.
Kingena lima Defr.
Inoceramus brongniarti Sby., r.c.
Inoceramus cuvieri Sby., c.
Ostrea hippopodium Nilss.
Pleurotomaria.

59. Great Limber, 2 miles south-east of Church (5 miles south-east of Croxton). *H.p.* Zone.
Pit by cross roads and sign post, clean, of medium size, and worth working. The usual grey tabulars, and no marl seams.

Homolostega.
Bourgueticrinus.
Echinocorys scutatus Leske.
Holaster planus Mant., c.
Cardiaster cotteauanus d'Orb. (C. S. Carter Coll.)
Micraster corbovis Forbes.
Cidaris serrifera Forbes.
Serpula ?ampullacea Sby.
Rhynchonella plicatilis Sby.
Terebratula carnea Sby.
Inoceramus brongniarti Sby., c.
Spondylus latus Sby.

37. Irby Dale, Rush Hill, north-west of Church (7 miles south-east of Croxton). *T.g.* Zone.

An extensive section in fair condition, and chalk very hard. This section largely resembles Acthorpe (No. 3), but is not quite the same. The large flint nodules are here wanting. No *Echinocorys* or *Micraster* seen.

Chalk	7	6	top
Nodular flints		3	
Chalk	2	9	
Scattered nodular flints		2	
Chalk	1	6	
Thin marl		0½	
Chalk	1	0	
Very scattered nodular flints		2	
Chalk	1	6	
Thin tabular		0½	
Chalk	2	0	
Scattered nodular flints		2	
Chalk	3	6	
Marl band (grey)		2	
Chalk	5	6	
Nodular flint		2½	
Chalk		9	
Semi-tabular		3	
Chalk	7	0	
Very scattered nodular extending over	1	0	
Chalk	2	6	

Cristellaria rotulata.
Bourgueticrinus.
Cyphosoma radiatum Sorig.
Infulaster excentricus S. Woodw. ex Rose MS., 6 Asteroid.
Rhynchonella reedensis Eth.
Terebratulina gracilis var. *lata* Eth. v.c.
Kingena lima Defr.
Inoceramus brongniarti Sby.
Inoceramus cuvieri Sby.
Ostrea vesicularis Lam.
Teredo amphisboena Goldf.

37a. Irby Dale, on opposite side of valley, further on. *T.g.* Zone.

Section behind trees. Chalk very hard and much obscured. Impossible to get a fauna from it.

Broken chalk	3	0	
Dark grey tabular		6	
Chalk	2	4	
Thin dark grey tabular		1½	
Chalk.	3	9	
Almost continuous sheet of nodular flints ...		4	
Chalk	1	10	
Scattered nodular flints		4	
Chalk	2	3	
Scattered nodular flints		3	
Chalk	1	3	
Marl band		0½	
Chalk	1	3	
Scattered nodular flints		4	
Chalk	3	0	
Scattered nodular flints		3	
Chalk	1	10	

Rhynchonella cuvieri d'Orb.
Inoceramus cuvieri Sby.

37b. Irby Dale. *H.p.* Zone.

Important, but small section at head of valley, in that we here get *H.p.* Zone. Very hard chalk.

Chalk	4	0 top
Irregular tabular		4
Chalk	1	10
Irregular tabular		3 to 6
Chalk	1	8
Dark grey tabular		6
Chalk	1	6

Porosphæra globularis Phill.
Echinocorys (fragment).
Holaster planus Mant.
Hemiaster minimus Ag.
Cyphosoma radiatum Sorig.
Serpula ilium Goldf.
Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth.
Terebratula carnea Sby.
Terebratulina gracilis var. *lata* Eth.
Inoceramus brongniarti Sby.
Inoceramus cuvieri Sby., r.c.
Ostrea vesicularis Lam.

61. Irby, north-west of Church. ? *T.g.* Zone.

Abandoned pit with very hard platy chalk. This is back to back with Pit 37, but mearer the church and at a rather higher level.

Rhynchonella cuvieri d'Orb. *Terebratula carnea* Sby.

Chalk	2	0 top
Imperfect tabular		2
Scattered nodular flints		3
Chalk	1	6
Tabular		8
Chalk	2	4

Impossible to correlate with Pit 37. The measurements taken on right-hand side of the pit on entering. It is probably in base of *H.p.*

62. Irby, old pit south-west of Wesleyan Chapel. *H.p.* Zone.

Tabulars and pseudo-tabulars from top to bottom of pit. Chalk very hard and grey with age.

Echinocorys (top and bottom of pit).
Holaster placenta Ag.
Holaster planus Mant., c.
Asteroid.
Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth.
Terebratula carnea Sby.
Terebratulina gracilis var. *lata* Eth.
Kingena lima Defr.
Inoceramus brongniarti Sby.
Inoceramus cuvieri Sby.
Inoceramus lamarcki Park.
Pollicipes glaber Rœmer.

63. Irby, by Irby Dale Farm. ? Base of *H.p.*

Many tabulars and pseudo-tabulars from top to bottom. One nearly continuous line of large flint nodules at base. Big tabular is a mass of banded lines at surfaces, owing to secondary deposition of chalcedony.

No *Echinocorys* or *Micraster*.
Holaster planus Mant., c.
Hemiaster minimus Ag., 3.
Infulaster excentricus S. Woodw. ex Rose MS.
Asteroid.
Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth.
Terebratulina gracilis var. *lata* Eth.
Kingena lima Defr.
Inoceramus brongniarti Sby.
Inoceramus cuvieri Sby. (one yard across).
Inoceramus lamarcki Park.
Ostrea vesicularis Lam.

64. Irby, by Walk Farm. *H.p.* Zone.

Disused and grass-grown quarry with platy chalk and tabulars and

pseudo-tabulars. No nodular flints. Not worth working. No *Echinocorys*, but clearly *H.p.* Zone.

Asteroid.
Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth.
Terebratula carnea Sby.
Terebratulina gracilis var. *lata* Eth.
Terebratulina striata Wahlenb.
Kingena lima Defr.
Inoceramus cuvieri Sby.
Ostrea vesicularis Lam.

65. Swallow, pit by Public House ($7\frac{1}{2}$ miles south-east of Croxton). *R.c.* Zone.

Chalk clean, intensely hard and seamed with calcits. Much interstitial slickensiding.

Inoceramus mytiloides rare even on the clean talus. No evidence of *Terebratulina gracilis* even in the highest part of the section, although special search was made for it.

An interesting section in flinty *cuvieri* zone. Compare Claxby, Pit 38. No grit bed; no *plenus* marls shown; no limiting marl between *R.c.* and *T.g.* as at Claxby. No bed of small spherical flints.

Even if we take the marl seam above talus as the R.*c.*, *T.g.* marl at Claxby, and the remainder of section as belonging to *T.g.*, it is more than strange that we could not find *T.g.* itself in such a clean and well-weatherd surface. The section here is incomplete in the downward direction on account of talus.

Broken rubble chalk	4	0	top
Chalk	6	0	
Flint nodular		3	
Chalk	4	6	
Flint nodular		2	
Chalk	1	6	
Marly parting		1	
Chalk	2	0	

Inoceramus mytiloides Schlot.
Cyphosoma radiatum Sorig.
Terebratula carnea Sby.
Inoceramus lamarcki Park.
Rhynchonella cuvieri d'Orb.

69. Beelsby, by Church (3 miles north of Thorganby). *H.p.* Zone.

Old and grey surface. Only a flying visit here. Tabulars and pseudo-tabulars with a few nodular flints at base and one thin marl seam. Probably lower part of *H.p.* Zone. No Echinoids.

Porosphæra patelliformis Hinde.
Cyphosoma radiatum Sorig.
Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth.
Terebratula carnea Sby.
Terebratulina gracilis var. *lata* Eth.
Inoceramus cuvieri Sby.
Ostrea vesicularis Lam.

55. Hatcliffe Water Mill (2 miles north of Thorganby). *H.p.* Zone.

The usual tabulars and pseudo-tabulars (grey), and one thin $\frac{1}{2}$-in. marl band 6 ft. above bottom of pit. Highest part of section must be 50 ft. from floor. No means of correlating this section with others; looks like Ashby Hill, Pit 36.

Stomatopora gracilis M.Edw.
Cliona cretacea Portl.
Plocoscyphia convoluta T. Smith.
Echinocorys.
Holaster planus Mant.
Micraster corbovis Forbes.
Cidaris serrifera Forbes.
Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth.
Terebratula carnea Sby.
Terebratula semiglobosa Sby.
Terebratulina gracilis var. *lata* Eth.
Terebratulina striata Wahlenb.
Kingena lima Defr.
Inoceramus brongniarti Sby.
Inoceramus cuvieri Sby.
Inoceramus lamarcki Park.
Ostrea hippopodium Nilss.
Ostrea normaniana d'Orb.
Ostrea vesicularis Lam. (band of).

66. Beelsby, 1 mile south-east of, opposite a farm (2 miles north of Thorganby). *H.p.* Zone.

Old pit with loose surface of platy chalk, dark with age, not worth working again. Four tabulars, two thick ones. No irregular Echinoderms seen.

Cyphosoma radiatum Sorig.
Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth.
Terebratula carnea Sby.
Terebratulina gracilis var. *lata* Eth.
Kingena lima Defr.
Inoceramus brongniarti Sby.
Inoceramus cuvieri Sby.

67. Small pit on top of hill on west side of road into Thorganby from Swallow. *T.g.* Zone.

Clean surface. Lenticular masses of flint at base, and nodular flints above.

Holaster planus Mant.
Terebratulina gracilis var. *lata* Eth., c.
Inoceramus brongniarti Sby.
Inoceramus cuvieri Sby.
Inoceramus lamarcki Park.
Ostrea vesicularis Lam.

68. Thorganby, on Mr. Manby's Estate. *T.g.* Zone.

Small pit with good surface, in private grounds. Two marl-bands and several courses of scattered grey nodular flints. Chalk fairly soft.

Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth.
Terebratulina gracilis var. *lata* Eth., c.
Inoceramus brongniarti Sby., c.
Inoceramus cuvieri Sby.
Ostrea vesicularis Lam.

54. ¾ mile south-east of Hatcliffe Mill, east side of Barton Street (3 miles north-east of Thorganby). *H.p.* Zone.

Semi-tabulars, but no marl bands.

Ventriculites mammillaris T. Smith.
Echinocorys (large dome-shaped form).
Holaster planus Mant.
Infulaster excentricus S. Woodw. ex Rose MS. (large).
Cidaris serrifera Forbes.
Cyphosoma radiatum Sorig.
Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth.
Terebratulina gracilis var. *lata* Eth.
Inoceramus cuvieri Sby.
Ostrea vesicularis Lam.

36. Ashby Hill (3 miles north-east of Thorganby). *H.p.* Zone.

Large and well-worked pit, 36½ feet deep, with two thin marl bands near base and tabulars about every 3 ft. There is a band of *Echinocorys* (ordinary *gibbus* type) at top of pit; over a dozen collected in one day. Two *Micraster corbovis* also at top of pit, and two *Echinocorys* at bottom, so that the whole of the chalk is in *H.p.* Zone. This is the thickest section seen in this zone. A paramoudra seen three-quarters the distance up.

Ramulina.
Webbina.
Diastopora ? *glomerata.*
Berenicea papillosa Rss.
Meliceritites globulosa.
Membranipora.
Proboscina.
Stomatopora.
Porosphæra globularis Phill.
Echinocorys scutatus Leske., c.
Holaster planus Mant.
Holaster placenta Ag.
Infulaster excentricus S. Woodw. ex Rose MS. (large).
Micraster corbovis Forbes.
Cidaris serrifera Forbes.
Cyphosoma (spine).
Serpula cincta Goldf.
Serpula gordialis var. *serpentinus* Schlot.
Serpula ilium Goldf.
Serpula plana S. Woodw.
Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth.
Terebratula carnea Sby.
Terebratula semiglobosa Sby.
Crania egnabergensis Retz.
Inoceramus brongniarti Sby., c.
Plicatula sigillina S. Woodw.

53. Hawerby Hall, in farmyard (3 miles east of Thorganby). *H.p.* Zone.

Cristellaria rotulata Lam.
Stomatopora.
Bourgueticrinus.
Echinocorys scutatus Leske.
Cidaris serrifera Forbes.
Serpula fluctuata Sby.
Terebratula carnea Sby.
Terebratulina gracilis var. *lata* Eth.
Terebratulina striata Wahlenb.
Kingena lima Defr.
Inoceramus cuvieri Sby.
Scapanorhynchus.

35. Beesby ($3\frac{1}{2}$ miles east of Thorganby). *H.p.* Zone.

Pit of medium size and fair surface. Flints grey, with thick or thin milky cortices. A curious tabular with lacunæ of flint and very much hardened chalk included, as if the chalk were partly silicified. No ferruginous marl seen.

Chalk	1	0	top
Tabular		4	
Chalk	1	3	
Marl		1	
Chalk	3	6	
Marl		1	
Chalk	3	3	
Tabular		5	
Chalk	3	0	
Marl		1	
Chalk	1	4	
Tabular (imperfectly silicified)		4	
Chalk	3	2	
Nodular flints		3	
Chalk	3	6	
Tabular (interrupted)		4	
Chalk	2	3	
Tabular		2	
Chalk	1	6	

Membranipora.
Porosphæra globularis Phill.
Echinocorys (three fragments).
Holaster planus Mant.
Infulaster excentricus S. Woodw. ex Rose MS. (one at top).
Holaster placenta Ag.
Cidaris serrifera Forbes.
Asteroid.
Serpula ampullacea Sby.
Terebratula sp.
Terebratulina striata Wahlenb.
Inoceramus brongniarti Sby.
Plicatula sigillina S. Woodw.

47. Beesby Top. *H.p.* Zone.

Chalk	2	0	top
Scattered tabular		3	
Chalk	2	3	
Marl		1	
Chalk	2	6	
Marl		1	
Chalk		6	
Tabular (interrupted?)		5	
Chalk	1	3	
Tabular		2	
Chalk		6	
Marl		$0\frac{1}{2}$	
Chalk	1	9	

Holaster planus Mant.
Terebratula.

45. Wold Newton, in wood ($2\frac{1}{2}$ miles south-east of Thorganby).
Holaster planus Mant.

46. Wold Newton, north of village (4 miles east of Thorganby). ? Junction of *H.p.* and *T.g.* Zones.

Two thick tabulars of imperfect nature, sometimes lenticular, and several smaller ones. At the base there is a line of large lenticular flints. It is difficult to place the section on the scanty fossils, but it seems to be near the junction of the two zones.

Holaster planus Mant.
Cyphosoma radiatum Sorig.
Asteroid.
Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth.
Terebratula carnea Sby.
Inoceramus brongniarti Sby.
Inoceramus cuvieri Sby.

48. Cadeby Hill and Valley Pit (6 miles north-west of Louth). *H.p.* Zone.

Chalk hard and somewhat nodular. Several bands of grey tabulars, and two thin marl bands.

Chalk	2	0	top
Marl		1	
Chalk	2	6	
Tabular		4	
Chalk	3	3	
Marl		1	
Chalk	1	6	
Tabular		5	
Chalk	2	6	
Tabular		4	
Chalk	3	3	

exposed, remainder talus equalling half of pit.

Onychocella.
Holaster planus Mant.
Rhynchonella plicatilis Sby.
Terebratulina gracilis var. *lata* Eth.
Plicatula sigillina S. Woodw.
Ostrea hippopodium Nilss.

42. The Smithy Pit, Cadeby Avenue. *H.p.* Zone.

Bands of grey tabulars, and two thin grey marls.

Chalk	1	3	top
Tabular		4	
Chalk	3	0	
Tabular		2	
Chalk		8	
Marl		0½	
Chalk	2	9	
Tabular		7	
Chalk	1	0	
Tabular		3	
Chalk		9	
Tabular		0½	
Chalk	2	9	
Scattered flint tabular		3	
Chalk	1	10	

Diastopora.
Onchotrochus serpentinus Dunc.
Bourgueticrinus.
Echinocorys (thin test).
Holaster planus Mant.
Holaster placenta Ag.
Micraster præcursor Rowe (sutured).
Cidaris serrifera Forbes.
Serpula fluctuata Sby.
Serpula plana S. Woodw.
Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth.
Terebratula carnea Sby.
Terebratulina striata Wahlenb.
Inoceramus brongniarti Sby.
Plicatula sigillina S. Woodw.
Ostrea hippopodium Nilss.
Ostrea vesicularis Lam. (several little colonies, but no band).
Scapanorhynchus.

43. Lambercroft, about 100 yards north of Pit 23 (5 miles north-west of Louth). ? *H.p.* Zone.
Not seen by me.*

Membranipora.
Bourgueticrinus.
Micraster præcursor Rowe (passage from *M. corbovis*).
Helicodiadema fragile Wiltsh.
Rhynchonella cuvieri d'Orb.
Terebratulina gracilis var. *lata* Eth.
Ostrea hippopodium Nilss.
Ostrea vesicularis Lam.

44. Binbrook House, 1 mile north-west of Lambercroft.
Not seen by me.*

Holaster planus Mant.
Rhynchonella cuvieri d'Orb.
Terebratula semiglobosa Sby.
Terebratulina gracilis var. *lata* Eth.
Inoceramus cuvieri Sby.

23. Old pit at Lambercroft. *H.p.* Zone.
Surface loose and dirty. Spurious tabulars.

Diastopora.
Elea.
Membranipora.
Stomatopora.
Ventriculites cribosus Phill.
Holaster planus Mant.
Micraster corbovis Forbes.
Micraster leskei Desm.
Serpula plana S. Woodw.
Kingena lima Defr.
Inoceramus brongniarti Sby.
Inoceramus lamarcki Park.
Ostrea hippopodium Nilss.
Cytherella ovata Roem.
Lamna appendiculata Ag.

52. Near Kelston ($3\frac{1}{2}$ miles north-west of Louth).
Small pit with about 8 ft. of chalk showing. A thin marl seam, and large nodular flints. No fossils.

III.—LOUTH AREA NORTH.

49. Wyham H[? ouse] (6 miles north-north-west of Louth.) *H.p.* Zone.

Very small pit in white and comparatively soft chalk breaking with a ready fracture. Band of *Ostrea vesicularis* about 10 ins. thick, and most of the fossils were associated with it. Flints grey, in semi-tabulars, and one paramoudra-like mass.

Cristellaria rotulata Lam.
Frondicularia cordai Rss.
Webbina.
Berenicea.
Diastopora cf. *glomerata* d'Orb.
Eschara cf. *galeata* Hag.
Hippothoa simplex d'Orb.
Clausa globulosa d'Orb.
Membranipora.
Proboscina.
Stomatopora.
Semicytis rugosa d'Orb.
Isid coral.
Bourgueticrinus.
Pentacrinus klœdeni Hag., c.
Holaster planus Mant.
Holaster placenta Ag.
Micraster præcursor Rowe.
Cidaris clavigera König.
Cidaris subvesiculosa d'Orb.
Cidaris hirudo Sorig.
Helicodiadema fragile Wiltsh.
Cyphosoma radiatum Sorig.
Serpula fluctuata Sby., r.c.
Serpula plana S. Woodw.
Serpula pusilla Sby., c.
Serpula cf. *gordialis* Schlot.
Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth.
Rhynchonella plicatilis Sby. (6, good size).
Terebratula carnea Sby., r.c.

* Local collections inspected by A. W. Rowe.

Terebratula semiglobosa Sby., r.c.
Kingena lima Defr., r.c.
Crania egnabergensis Retz.
Crania parisiensis Defr.
Inoceramus brongniarti Sby.
Plicatula barroisi Peron.
Plicatula sigillina S. Woodw.
Ostrea hippopodium Nilss. (ribbed form of upper valve).
Ostrea normaniana d'Orb.
Lima hoperi Mant. (45×35 mm.)
Pecten cretosus Defr.
Spondylus latus Sby.
Bairdia subdeltoidea Muenst.
Enoploclytia leachi Mant.
Fish remains.

19. Large pit west-south-west of Ludborough. *H.p.* Zone.

This shows same section as in Pits Nos. 4, 9, and 11. The big tabular is 6½ ft. below the ferruginous marl, and the white pseudo-tabular is about 3 ft. above the marl band.

Five *Echinocorys* were found above the marl band and two below. *Infulaster* was found below big tabular.

Pit very large, and with good surface, but fossils rare and chalk very hard.

Diastopora.
Eschara lamarcki.
Cliona cretacea Portl.
Porosphæra globularis Phill.
Bourgueticrinus.
Echinocorys, 7.
Holaster planus Mant., 3,
Hemiaster minimus Ag.
Infulaster excentricus S. Woodw. ex Rose MS. One above, and one just below big tabular.
Cidaris hirudo Sorig.
Cidaris serrifera Forbes.
Cyphosoma (spine).
Asteroidea.
Asteroid sp. Refers to an ossicle found by Bower, and having some resemblance to a new species found in Yorkshire.
Serpula gordialis Schlot.
Serpula ilium Goldf.
Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth., c.
Terebratula carnea Sby., 4.
Terebratulina gracilis var. *lata* Eth., common below big tabular.
Terebratulina striata Wahlenb.
Kingena lima Defr.
Inoceramus cuvieri Sby.
Ostrea hippopodium Nilss.
Plicatulina sigillina S. Woodw.

9. North Ormsby. Old pit much overgrown, with small but good exposure. Big tabular at base and iron-stained marl band at top, and above that a course of very large white flints. Several spurious tabulars.

Bourgueticrinus.
Echinocorys (one just below marl band, two above top line of flints at extreme top of pit).
Holaster planus Mantell.
Infulaster excentricus S. Woodw., ex Rose MS. (three examples at top of pit, two at bottom).
Cidaris serrifera Forbes.
Cyphosoma (spine).
Asteroidea.
Serpula ampullacea Sby.
Serpula ilium Goldf.
Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth., c.
Terebratula carnea Sby.
Terebratula semiglobosa Sby.
Terebratulina gracilis var. *lata* Eth., c.
Kingena lima Defr.
Inoceramus cuvieri Sby.
Inoceramus lamarcki Park.
Plicatula sigillina S. Woodw.
Ostrea vesicularis Lam.
Bairdea subdeltoidea Muenst.

10. North Ormsby. *H.p.* Zone.

Old pit with small fresh surface, and lines of spurious tabular flints (grey).

Ventriculites impressus T. Smith.
Holaster planus Mant., 11.
Micraster corbovis Forbes., 3.
Cyphosoma (spine).
Mass of Asteroidea.
Serpula ampullacea Sby

Rhynchonella reedensis Eth.
Terebratulina gracilis var. *lata* Eth.
Inoceramus brongniarti Sby.
Heteroceras (*Hyphantoceras*) *reussianum* d'Orb., ex C. R. Bower coll., Brit. Mus., C. 12118.*

11. North Ormsby. *H.p.* Zone.

Pit of moderate size with fair surface. A big tabular 2 ft. above talus, a red marl band about 7 ft. above it, and a course of very large white flints about 3 ft. above the marl band. A line of thin tested urchins (*Holaster planus* and *Infulaster*) above a thin flint line 2 ft. 6 in. above the big tabular. Same level as No. 10, and ? same marl band as at Fotherby Top. *Echinocorys* above big tabular. Milky tabulars—base of zone, and milky nodulars top of *T.g.* Zone ?

Echinocorys.
Holaster planus Mant., 3.
Infulaster excentricus S. Woodw., ex Rose MS.
Cidaris hirudo Sorig.
Asteroidea.
Serpula ampullacea Sby.
Serpula plana S. Woodw.
Serpula ?turbinella Sby.
Rhynchonella cuvieri d'Orb., r.c.
Rhynchonella reedensis Eth., c.
Terebratula carnea Sby.
Terebratulina gracilis var. *lata* Eth., c.
Kingena lima Defr.
Inoceramus cuvieri Sby.
Inoceramus lamarcki Park.
Plicatula sigillina S. Woodw.
Ostrea vesicularis Lam.

20. South-east of North Ormsby, and south-east of Pit 11. *H.p.* Zone.

Small pit with pseudo-tabulars, but none of the features noted in Pits Nos. 4, 9, 11 and 19. Surface loose and green with age.

Membranipora.
Stomatopora.
Holaster placenta Ag. (very large).
Cidaris hirudo Sorig.
Asteroidea.
Serpula plana S. Woodw.
Rhynchonella reedensis Eth.
Terebratula carnea Sby.
Terebratulina gracilis var. *lata* Eth.
Crania parisiensis Defr.
Kingena lima Defr.
Plicatula sigillina S. Woodw.
Ostrea hippopodium Nilss.
Inoceramus cuvieri Sby.

21. Fotherby New Pit (3 miles north of Louth) (Fotherby & Grimsby Lime & Whiting Co.). *H.p.* Zone.

Shows the ferruginous marl band, but pit not deep enough to show deep tabular. Now 42 ft. (1906).

Echinocorys (found above the marl band).
Cyphosoma radiatum Sorig., 3.
Metopaster parkinsoni Forbes.
Serpula ampullacea Sby.
Serpula gordialis var. *serpentinus* Schlot.
Serpula plana S. Woodw.
Pollicipes glaber Roemer.

Same section here as at Fotherby Top Pit (No. 4), only greater thickness in upper part, viz., 6 ft. chalk above the pale grey irregular tabular, then a 4 in. tabular, and finally at top 6 ft. more chalk ($3\frac{1}{2}$ ft. chalk between grey tabular, and the ferruginous marl, and 7 ft. between marl and the darker 6-in. tabular).

Cristellaria rotulata Lam.
Placopsilina.
Webbina.
Discocavea cenomana Mich., r.c.
Diastopora.
Entalophora proboscidea d'Orb.
Hippothoa.
Stomatopora gracilis Bronn.
Onychocella.
Plocoscyphia convoluta T. Smith.
Porosphæra globularis Phill.
Echinocorys.
Cardiaster cotteauanus d'Orb.
Infulaster excentricus S. Woodw., ex Rose MS., c.
Cidaris serrifera Forbes.

* Figd., Crick, *Geol. Mag.*, 1910, p. 347.

Cyphosoma radiatum Sorig.
Helicodiadema fragile Wiltsh.
Asteroid.
Serpula ampullacea Sby.
Serpula cincta Goldf.
Serpula gordialis Schlot.
Serpula ilium Goldf.
Serpula plana S. Woodw.
Serpula pusilla Sby.
Serpula proteus Sby.
Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth., r.c.
Terebratula carnea Sby.
Terebratula semiglobosa Sby.
Terebratulina gracilis var. *lata* Eth., r.c.
Kingena lima Defr.
Inoceramus brongniarti Sby.
Inoceramus cuvieri Sby.
Spondylus latus Sby.
Hipponyx (strong ridges), c.
Bairdia subdeltoidea Muenst.

4. Fotherby Top Pit. *H.p.* Zone.

Large quarry. Massive chalk with many grey flint tabulars (thick), and one strong iron-stained marl band towards top. Good surface.

Ferruginous marl to top of pit	4	0
From top of 7-in. tabular to ferruginous marl (3 in.)	6	10
From top of irregular tabular to base of 7-in. tabular	7	6
To irregular tabular averaging 3 in., with bosses springing from it		9
Thin marl at base of pit, ½ in.		

Hippothoa.
Idmonea.
Cephalites.
Cliona cretacea Portl.
Plocoscyphia labrosa T. Smith.
Onchotrochus serpentinus Dunc.
Bourgueticrinus.
Echinocorys (has been found here, but did not see it).
Holaster planus Mant., 4.
Cardiaster cotteauanus d'Orb.
Hemiaster minimus Ag.
Infulaster excentricus S. Woodw., ex Rose MS., c.
Cidaris hirudo Sorig., 2.
Cidaris serrifera Forbes.
Cyphosoma radiatum Sorig.
Cyphosoma spine.
Helicodiadema fragile Wiltsh.
Asteroidea, 4.
Serpula ampullacea Sby.
Serpula ilium Goldf., 3.
Serpula plana S. Woodw., 3.
Rhynchonella cuvieri d'Orb., 5.
Rhynchonella limbata Schloth.
Rhynchonella reedensis Eth., c.
Terebratula carnea Sby., 6.
Terebratulina gracilis var. *lata* Eth., c.
Terebratulina striata Wahlenb.
Kingena lima Defr.
Inoceramus brongniarti Sby., r.c.
Inoceramus cuvieri Sby., c. (often 2 ft. to 3 ft. across, and covered with *Hippothoa*).
Inoceramus lamarcki Park., 2.
Ostrea vesicularis Lam.
Ammonites peramplus Mant.
Pollicipes glaber Roem.

8. Boswell Farm Pit (3½ miles north-west of Louth) *H.p.* Zone.

Between five and six flint courses from bottom :—

Frondicularia.
Entalophora.
Porosphæra globularis Phill.
Porosphæra pileolus Phill.
Onchotrochus.
Bourgueticrinus.
Holaster planus Mant.
Holaster placenta Ag.
Micraster corbovis Forbes.
Cidaris hirudo Sorig.
Asteroidea.
Serpula ampullacea Sby.
Serpula plana S. Woodw.
Serpula turbinella Sby.
Rhynchonella cuvieri d'Orb.
Terebratula carnea Sby.
Terebratulina gracilis var. *lata* Eth.
Terebratulina striata Wahlenb.
Crania egnabergensis Retz.
Inoceramus brongniarti Sby.
Inoceramus cuvieri Sby.
Inoceramus lamarcki Park.
Plicatula sigillina S. Woodw.
Ostrea normaniana d'Orb.
Ostrea vesicularis Lam.
Spondylus dutempleanus d'Orb.

Carter has a fragment of thick *Micraster* which is fairly strongly granulated and is therefore either *M. leskei* or *M. praecursor*.

Between band 1 and 2 from bottom (1 the thick tabular) :—

Plocoscyphia convoluta T. Smith.
Bourgueticrinus.
Echinocorys recorded, but we did not find it.
Holaster planus Mant., r.c.
Infulaster excentricus S. Woodw., ex Rose MS. (in same line as three examples of *M. corbovis* above the thick tabular at base of pit. Specimen has spines on it).
Micraster corbovis Forbes (four, including two passage forms).
Cidaris serrifera Forbes.
Asteroidea.
Pycinaster angustatus Forbes.
Serpula turbinella Sby.
Kingena lima Defr.
Spondylus latus Sby.
Terebella? *lewesiensis* Mant.

Very small *Infulaster* found by Burnet. Flint course probably in middle of pit.

Between flint course 6 and marl band at top of pit :—

Diastopora.
Elea.
Entalophora.
Clausa globulosa.
Onychocella.
Membranipora (two forms).
Stomatopora.
Axogaster cretacea Lonsd.
Bourgueticrinus.
Micraster leskei Desm.
Cyphosoma (spine of).
Asteroidea.
Serpula gordialis Schlot.
Rhynchonella reedensis Eth.
Terebratulina gracilis var. *lata* Eth.
Kingena lima Defr.
Inoceramus brongniarti Sby.
Ostrea hippopodium Nilss.
Ostrea semiplana Sby.
Ostrea vesicularis Lam.
Fish scales.

Springing from 6 tabular from bottom is an imperfect paramoudra.

Large dome-shaped *Echinocorys* found by J. R. Farmery, not seen at this horizon before.
Crania parisiensis Defr.

On the large *Echinocorys* is a crested *Serpula* (shaped like *S. ampullacea*) with a single blunt ridge down the back.

Bryozoan like *Homalostega*.

Acropora sp.
Isocrinus sp. c.
Serpula n. sp.
Inoceramus undulatus? Mant.
Pseudojacobites farmeryi Crick* (ex Farmery coll.), Brit. Mus., C. 12220.

24. Boswell Cross Roads. *H.p.* Zone.

This pit is on the 400 line, and it is probable that the marl band is the same as that at the extreme top of Boswell pit. Small pit with thin reddish marl-band at base, and with very thick ($3\frac{1}{2}$ in.) tabular above it.

Plocoscyphia convoluta T. Smith.
Bourgueticrinus.
Holaster planus Mant.
Infulaster excentricus S. Woodw., ex Rose M.S.
Cidaris (plate).
Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth.
Terebratula carnea Sby.
Terebratulina gracilis var. *lata* Eth.
Kingena lima Defr.
Inoceramus brongniarti Sby.
Inoceramus cuvieri Sby.
Inoceramus lamarcki Park.

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* Holotype. Crick, 1910, *Geol. Mag.*, p. 345, pl. xxvii., figs. 1, 2 ; Spath, 1922, *Trans. Roy. Soc. S. Afr.*, X., pt. III., p 121.

22. North Elkington Grange (3 miles north-west of Louth).
? *T.g.* Zone.

Small disused pit with few feet of chalk exposed at the bottom. Flints grey.

Holaster planus Mant. *Rhynchonella reedensis* Eth.

50. Church Top Farm, Elkington (between north and south).
H.p. Zone.

Small and shallow pit with four grey tabulars above talus. On left-hand side of pit is a true paramoudra extending obliquely between highest and third tabulars. Paramoudra is 7 ft. high, $3\frac{1}{4}$ ft. at top, and $2\frac{3}{4}$ ft. at bottom. The chalk and the two upper tabulars are curved to it. The flint of the paramoudra is shattered, and the outer layers are like an onion.

Tabular		2	imperfect
Chalk	3	3	
Tabular		2	imperfect
Chalk	2	10	
Tabular		7	
Chalk	1	9	
Tabular		3	imperfect

Cristellaria rotulata Lam.
Frondicularia.
Webbina.
Acropora.
Berenicea cenomana.
Eschara acis d'Orb.
Diastopora.
Entalophora.
Hippothoa elegans d'Orb.
Hippothoa, v.c.
Proboscina cornucopiæ d'Orb.
Meliceritites globulosa.
Meliceritites semiclausa d'Orb.
Stomatopora.
Idmonea cretacea M. Edw.
Semicytis rugosa d'Orb.
Membranipora.
Procoscina.
Ventriculites radiatus Mant.
Ventriculites decurrens T. Smith.
Ventriculites mammilaris T. Smith.
Plocoscyphia convoluta T. Smith.
Cliona cretacea Portl.
Onchotrochus serpentinus Dunc.
Isocrinus (C. S. Carter coll.).
Isocrinus kloedeni Hag.
Bourgueticrinus, c.
Holaster planus Mant.
Holaster placenta Ag.
Micraster corbovis Forbes.
Micraster leskei Desm.
Conulus sp. (size of *globulus*).
Infulaster excentricus S. Woodw., ex Rose MS.
Hemiaster minimus Ag.
Cyphosoma radiatum Sorig.
Helicodiadema fragile Wiltsh.
Cidaris perornata Forbes.
Asteroid.
Pentagonaster ?lunatus S. Woodw.
Stauranderaster argus Spencer.
Pycinaster angustatus Forbes.
Serpula ampullacea Sby.
Serpula cincta Goldf.
Serpula fluctuata Sby.
Serpula plana S. Woodw.
Serpula pusilla Sby.
Serpula n. sp.
Serpula sp.
Serpula sp. 5-angled.
Rhynchonella reedensis Eth.
Terebratulina gracilis var. *lata* Eth., r.c.
Terebratulina striata Wahlenb.
Kingena lima Defr.
Crania egnabergensis Retz.
Crania parisiensis Defr., c.
Thecidium n. sp., r.c.
Inoceramus cuvieri Sby.
Inoceramus brongniarti Sby.
Pecten cretosus Defr.
Ostrea hippopodium Nilss., c.
Spondylus latus Sby.
Ostrea vesicularis Lam.
Plicatula barroisi Peron.
Heteroceras (*Hyphantoceras*) *reussianum* d'Orb.
Bairdia subdeltoidea Muenst.
Cytherella truncata Bosq.
Fish scales.
Pollicipes glaber Roem.
Lamna.
Protosphyraena.

5?. Louth, ½ mile north of Church Top Farm. *H.p.* Zone.
A very small unused pit in centre of field. Only two grey tabulars above talus.

Plocoscyphia convoluta T. Smith.
Onchotrochus serpentinus Dunc.
Bourgueticrinus.
Holaster planus Mant.
Infulaster excentricus S. Woodw., ex Rose MS.
Micraster corbovis Forbes.
Cidaris serrifera Forbes.
Serpula gordialis Schlot.
Serpula ilium Goldf.
Terebratula carnea Sby.
Terebratulina gracilis var. *lata* Eth.
Inoceramus brongniarti Sby.
Ostrea hippopodium Nilss.
Ostrea vesicularis Lam.

1. Paddison's Pit, Grimsby Road, Louth. *R.c.* and *T.g.* Zones.
Louth pink band at base of pit. *Holaster subglobosus*—Black band—*Rhynchonella cuvieri*. Black band to marl band 1 ft. 9 in., below first line of flints is 10 ft. 9 in. About 2 ft. broken chalk with flints (=*Terebratulina* zone).

R. cuvieri Zone.
Conulus castanea Brongn., 13.
Conulus subrotundus Mant.
Rhynchonella cuvieri d'Orb.
Terebratula carnea Sby.
Terebratula semiglobosa Sby.
Inoceramus mytiloides Schlot.
Lamna appendiculata Ag.

Terebratulina Zone.
Cardiaster cretaceus Sorig. 56 mm. long, broken, no breadth.
Rhynchonella cuvieri d'Orb.
Terebratula semiglobosa Sby.
Inoceramus brongniarti Sby., 2.

Flints are compact, small and grey. White chalk very inaccessible.

1a. Louth Glebe Farm. *T.g.* Zone.
Small and poor pit, with courses of grey nodular flints of moderate size.

Stomatopora gracilis Bronn.
Cliona cretacea Portl.
Holaster planus Mant.
Cyphosoma radiatum Sorig.
Serpula.
Rhynchonella reedensis Eth.
Terebratula carnea Sby.
Terebratulina striata Wahlenb.
Inoceramus brongniarti Sby.
Ostrea vesicularis Lam.

2. Fanthorpe Pit. *T.g.* Zone.
A very small recent surface in an abandoned pit. A few scattered small milky flints.

Onchotrochus.
Holaster planus Mant.
Cidaris serrifera Forbes.
Rhynchonella cuvieri d'Orb.
Terebratula carnea Sby.
Terebratulina gracilis var. *lata* Eth., 3.
Inoceramus brongniarti Sby., c.
Inoceramus cuvieri Sby.

3. Achthorpe Pit. *T.g.* Zone.
Tabular bands at top of pit and large scattered nodules below. One thin marl band. Pit of medium size, and exposure good. This is the pit on p. 69, ' Geol. E. Lincs.', where Jukes-Brown records *Rhynchonella limbata, Echinoconus globulus* and *Infulaster excentricus*. I have seen these, and the determinations are correct, save that the *Echinoconus* is a *subrotundus* of *gracilis* form. A band of *Infulaster* 3 ft. under thick tabular at top of pit and above thin tabular ; tabulars not constant.

Cristellaria rotulata Lam.
Frondicularia cordai, Rss.
Hippothoa, c.
Diastopora.
Cliona cretacea Portl.
Onchotrochus serpentinus Dunc.

Holaster planus Mant.
Infulaster excentricus S. Woodw., ex Rose MS., c.
Hemiaster minimus Ag.
Cidaris hirudo Sorig.
Cidaris serrifera Forbes (unusual form).
Cyphosoma königi Mant.
Pycinaster angustatus Forbes.
Serpula plana S. Woodw.
Serpula sp.
Terebratula carnea Sby.
Terebratulina gracilis var. *lata* Eth.
Terebratulina striata Wahlenb.
Kingena lima Defr.
Inoceramus cuvieri Sby.
Inoceramus brongniarti Sby.
Inoceramus undulatus Mant.
Plicatula sigillina S. Woodw.
Ostrea hippopodium Nilss.
Ostrea vesicularis Lam.
Spondylus latus Sby.
Scapanorhynchus.

5. Daeghton Close, very small pit by. *T.g.* Zone.
Scattered grey nodular flints. Recently worked, chalk broken and re-cemented.

Membranipora.
Rhynchonella cuvieri d'Orb.
Terebratula semiglobosa Sby.
Inoceramus brongniarti Sby.
Lamna appendiculata Ag.

6. South Elkington Cowpastures, pit. *R.c.* and *T.g.* Zones.
Pit of moderate size, with good surface, shewing 4 feet of *Holaster subglobosus* Zone, black band, 12 ft. 9 in. of *Rhynchonella cuvieri* Zone, and 2 ft. of *Terebratulina* Zone with small nodular flints.

Pentagonaster lunatus S. Woodw.
Conulus castanea Brongn., r.c. (small Dover form)
Conulus subrotundus Ag.
Discoidea dixoni Forbes.
Cardiaster cretaceus Sorig., in base of *T.g.*, measures 48 mm. by 47 mm. (C. R. Bower).
Cidaris hirudo Sorig.
Rhynchonella cuvieri d'Orb., c.
Terebratula carnea Sby., c.
Terebratula semiglobosa Sby., c.
Terebratulina striata Wahlenb.
Inoceramus mytiloides Schlot., c.
Ammonites peramplus Mant.

R. cuvieri Zone measures 12 ft. 9 in. from black band to marl band below flints. Marl band to first line of flints, 2 ft. 6 in.

7. South Elkington Pit, Market Rasen Road. *T.g.* Zone.
Small pit with scattered grey nodules. Dusty surface, no use.

Cidaris hirudo Sorig.
Rhynchonella cuvieri d'Orb.
Terebratulina gracilis var. *lata* Eth.
Inoceramus brongniarti Sby.

41. Louth Rifle Butts. *T.g.* Zone.
Not seen by me. Small nodular flints.

Rhynchonella reedensis Eth.
Terebratula semiglobosa Sby.
Terebratulina striata Wahlenb.
Inoceramus.

IV.—LOUTH AREA SOUTH TO CLAXBY.

33a. Raithby, ¼ mile north-east [2 miles south-west of Louth]. *T.g.* Zone.
Large overgrown pit, only about 2 ft. of section.

Terebratula semiglobosa Sby.
Inoceramus brongniarti Sby.

34. Stanmore Hill [2 miles south-west of Louth]. *T.g.* Zone.

Small pit with very small exposure under turf. Many flints, grey, with thick white cortices.

Holaster planus Mant.
Cardiaster cretaceus Sorig. (C. S. Carter coll.).
Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth.
Terebratula carnea Sby.
Terebratula semiglobosa Sby.
Inoceramus lamarcki Park.

12. Saturday Pit [2 miles south-east of Louth]. *T.g.* Zone.
Pit about 60—70 ft. deep, with a few lines of scattered flints, and some marl bands. No trace of *R. cuvieri* at base or of tabulars at top. Obviously all in *T.g.* zone. They have a well here 90 ft. deep, all in chalk of same nature; foreman quite definite on that point.

Membranipora.
Stomatopora.
Bourgueticrinus.
Holaster planus Mant.
Conulus subrotundus Ag., 6.
Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth., 6.
Terebratula carnea Sby.
Terebratulina striata Wahlenb.
Kingena lima Defr.
Inoceramus brongniarti Sby, r.c.
Inoceramus cuvieri Sby.
Inoceramus lamarcki Park., c.
Ostrea hippopodium Nilss.
Ostrea vesicularis Lam.
Bairdea subdeltoidea Muenst.
Ptychodus mammillaris Ag.

13. Pit south of Kenwick Bar, on London Road [2 miles south-east of Louth]. *T.g.* Zone.
Old pit with small and poor surface. Flints in lines of scattered nodules. Flints, as in Saturday pit, grey with thick white cortices.

Bourgueticrinus.
Holaster planus Mantell.
Conulus subrotundus Ag.
Cidaris hirudo Sorig.
Cidaris serrifera Forbes.
Cyphosoma (spine).
Asteroid.
Rhynchonella cuvieri d'Orb., small and flat, c.
Rhynchonella limbata Schlot.
Rhynchonella reedensis Eth.
Terebratula carnea Sby.
Serpula ampullacea Sby.
Serpula ilium Goldf.
Inoceramus brongniarti Sby.
Inoceramus lamarcki Park.
Ostrea vesicularis Lam.
Oxyrhina mantelli Ag.

14. } Julian Bower, by Louth Cemetery. *T.g.* and *R.c.* Zones.
15. }
Flints in scattered lines. On opposite sides of road is a large old pit with same section as No. 1 (Paddison's Pit). Has small and wretched surface, no fossils, but obviously in *T.g.*

Conulus sp. (J.R. Farmery Coll.).

16. Wood's Pit, London Road, Louth. *R.c.* and *T.g.* Zones.
This shows same section as No. 1 (Paddison's Pit), with *plenus* marls splendidly shown right round the pit (many examples of *A. plenus* found). These three pits are all in the London Road, Louth. White chalk out of reach.

From *T.g.* Zone.
Onchotrochus.
Holaster planus Mant.
Terebratula semiglobosa Sby.
Inoceramus lamarcki Park.
Fish-vertebræ.

From *R.c.* Zone.
Conulus castanea Brongn.
Rhynchonella cuvieri d'Orb.
Terebratula carnea Sby.
Terebratula semiglobosa Sby.
Inoceramus mytiloides Schlot.

56. Bunker Hill pit [3 miles west of Louth]. *T.g.* Zone.
Small pit, with fair surface. Hard chalk with a few rather small

nodules of flint, grey, with thick white cortices. Two thin marl bands, 4 ft. 9 in. apart. *Inoceramus* common, and other fossils rare.

Discocavea cenomana Mich.
Diastopora.
Hippothoa.
Meliceritites semiclausa d'Orb.
Holaster planus Mant.
Serpula ilium Goldf.
Rhynchonella reedensis Eth.
Crania egnabergensis Retz.
Inoceramus brongniarti Sby.
Inoceramus cuvieri Sby., c.
Inoceramus undulatus Mant.
Inoceramus lamarcki Park.
Plicatula sigillina S. Woodw.
Ostrea hippopodium Nilss.
Ostrea vesicularis Lam.

33. Maltby Springs pit [3 miles south-west of Louth]. *T.g.* Zone.

Small pit, with small and fair surface at top. Chalk and flints like Pit 32.

Porosphæra globularis Phill.
Cidaris serrifera Forbes.
Rhynchonella reedensis Eth.
Terebratula carnea Sby.
Inoceramus brongniarti Sby.

32. Tattwell Pit [3½ miles south of Louth]. *T.g.*, *R.c.*, *A.p.* and *H.s.* Zones.

One small *Actinocamax plenus* from the *plenus* marls.

From *R.c.* Zone.

Rhynchonella cuvieri d'Orb.
Terebratula carnea Sby., r.c.
Terebratula semiglobosa Sby., r.
Inoceramus mytiloides Schlot., c.
Ostrea vesicularis Lam.
Ammonites peramplus Mant.

From *T.g.* Zone.

Conulus subrotundus Ag.
Cardiaster cretaceus Sorig. (C. S. Carter Coll.).
Salenia granulosa Forbes (C. S. Carter Coll., *cf. R.c.* Zone, Yorks.).

31. Well at Tattwell (Davy's Farm). *R.c.*, *T.g.*, and deep in grey chalk.

Holaster planus Mant., (20 ft. down).
Conulus subrotundus Ag. (60 ft. down; the large *R.c.* form).
Conulus subrotundus Ag. (20 ft. down; the small *T.g.* form).
Rhynchonella cuvieri d'Orb.
Terebratula carnea Sby.
Inoceramus brongniarti Sby.
Inoceramus lamarcki Park.
Inoceramus mytiloides Schlot.
Plicatula sigillina S. Woodw. (20 ft. down).
Avicular end of Saurian or Chelonian bone.

T.g. Conulus has a very flat base, and round marginal anus, probably traumatic, round base 29×27×21. Annulus of depressed *vulgaris* shape. One large one from *R.c.* with contracted base, and oral marginal anus.

60. Dorendale, 2 miles west-south-west of Tathwell (right side of Horncastle Road, before fourth mile-iron south-west from Louth). *R.c.* Zone.

Rhynchonella cuvieri Sby.
Terebratula carnea Sby.
Inoceramus mytiloides Schlot.
Ostrea normaniana d'Orb.
Teredo amphisbaena Goldf.
Scapanorhynchus.

Very small and poor section, with *plenus* marls showing at the bottom.

27. ½ mile south of Cawthorpe Church [3½ miles south-east of Louth]. *T.g.* Zone.

Small old pit in a field. Surface very small and poor, with nodular flint courses.

Rhynchonella reedensis Eth.
Terebratula carnea Sby.
Terebratulina gracilis var. *lata* Eth.
Inoceramus lamarcki Park.
Ostrea vesicularis Lam.
Terebratulina striata Wahlenb.

28. Cawthorpe. *R.c.* and *T.g.* Zones.
Very large abandoned pit.

Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth.
Terebratula carnea Sby.

29. Cawthorpe, Johnson's Farm, Cawthorpe Lane.
? T.g. and *R.c.* Zones.
Not examined by me. Seen by Sherborn, Carter and Farmery, Whit Monday, 1910. A thin yellowish marl band, above which is a small exposure of white, rather soft, broken chalk, with small scattered flint nodules, but no fossils. Below the marl band the chalk is rather grey and compact, with no flints. On the talus, in a lump of chalk presumably from above, *Terebratulina gracilis* var. *lata* was found.

Rhynchonella cuvieri d'Orb.
Terebratula.
Inoceramus mytiloides Schlot.

30. Haugham Pasture (near Cawthorpe). *T.g.* Zone.
Pit in a wood, and section very poor. Chalk rather soft and often quite yellow. A few grey nodular and finger-shaped flints only. Chalk a mass of *Inoceramus* fragments, and *I. brongniarti* very common.

Conulus subrotundus Ag. (J. R. Farmery).
Cidaris serrifera Forbes.
Rhynchonella cuvieri d'Orb.
Rhynchonella reedensis Eth.
Terebratula carnea Sby.
Inoceramus brongniarti Sby.
Inoceramus cuvieri Sby.
Inoceramus undulatus Mant.
Ostrea vesicularis Lam. (small).
Ptychodus mammillaris Ag.

26. Mackton [4 miles south-east of Louth]. *T.g.* Zone.
Pit of moderate size, about 60 ft. deep. Dip of 5° to . . . *Holaster planus* Mant. found both at top and bottom, lowest level at which we have yet found it. Nodular flint courses and marl bands, but no tabulars. *Conulus* found by Mr. C. R. Bower.

Holaster planus Mant.
Conulus subrotundus Ag.
Rhynchonella reedensis Eth.
Terebratula carnea Sby.
Terebratulina gracilis var. *lata* Eth.
Inoceramus brongniarti Sby.
Inoceramus lamarcki Park.

25. 1 mile west-south-west of Authorpe (Burwell) Station [6 miles south-east of Louth]. *R.c.* Zone.
Old pit with grey chalk, *plenus* marls, and an imperfect section of *R. cuvieri* chalk. *Plenus* marls very red, section of *R. cuvieri* chalk not worth visiting.

Rhynchonella cuvieri d'Orb.
Terebratula carnea Sby.
Inoceramus mytiloides Schlot.

38. Claxby [12 miles south-east of Louth, 1 mile west of Willoughby Station]. *R.c.* and *T.g.* Zones.
Grey black flints in both zones, some with thick pink cortices. Unique little globular flints even in *R.c.* Zone. One tabular at base of *R.c.* Zone. No Grit bed.

R.c. Zone.
Porosphæra globularis Phill.
Microbacia?
Conulus castanea Al. Brongn. (small, like Dover form)
Conulus subrotundus Ag.
Cyphosoma (spine).
Salenia granulosa Forbes (very small).
Asteroid.
Serpula granulata Sby.
Serpula plana S. Woodw.
Rhynchonella cuvieri d'Orb., r.c.
Terebratula carnea Sby.

Terebratulina gracilis var. *lata* Eth. *T.g.* Zone.
Terebratulina striata Wahlenb. *Holaster planus* Mant.
Inoceramus mytiloides Schlot., r.r. *Rhynchonella cuvieri* d'Orb.
Oxyrhina mantelli Ag. *Pleurotomaria.*

39. Drings Pit, north side of Welton Wood [2 miles south-west of Willoughby Station]. *T.g.* Zone.

Pit of fair size, not worked. Flints grey, mostly with thick grey or pink cortices, some very pink like those in Pit 38.

Holaster planus Mant. *Terebratula carnea* Sby., r.c.
Rhynchonella reedensis Eth. *Inoceramus brongniarti* Sby. r.c.

40. Pit in Welton Wood. *T.g.* Zone.

Abandoned working of good size in the wood. No surface worth working. No flints.

Inoceramus brongniarti Sby. *Ostrea vesicularis* Lam.
Terebratula carnea Sby.

Previous literature on the county is but slight, the more important works being :—

G.B.I., Geol. Surv., Sheet Memoirs 84 and 86. 8vo London, 1887 and 1890.

——, Memoirs, The Cretaceous Rocks of Britain, Vol. II., Lower and Middle Chalk of England ; Vol. III., Upper Chalk . . . 8vo London. 1903, 1904.

Burnet, A. : ' The Upper Chalk of North Lincolnshire.' *Geol. Mag.*, 1904, pp. 172-176.

Bower, C. R., and Farmery, J. R. : ' The Zones of the Lower Chalk of Lincolnshire.' *Proc. Geol. Assoc.*, Vol. XXI. (6), 1910, pp. 333-359.

Maps, Ordnance Surv. (Geol.), 1-in. sheets 83, 84, 86.

The comparative barrenness of the chalk in fossils, and the often meagre lists given by Rowe, is due largely to the hardness of the rock (in some cases almost a marble), Dr. Rowe's extraordinary knowledge of the fauna, especially from fragments, allows one to regard his lists with confidence and satisfaction, and he carefully examined and collated with his notes the collections made by Mr. C. S. Carter, Mr. J. R. Farmery, and the Rev. C. R. Bower, all three of Louth (1906-8). Of these Mr. Bower's collection is now divided between the British Museum and that of Hull, and Mr. J. R. Farmery's collection is now in the British Museum.

Mr. Burnet's paper was of great value and ably advanced our knowledge of Lincolnshire. His work was the fruit of Rowe's earlier papers, but Rowe has greatly supplemented and extended our knowledge, and his observations are the result of many holidays extending over a number of years (1906-1912). Bower and Farmery dealt mainly with the Lower (Grey) Chalk, and they worked in conjunction with Rowe and Sherborn.

The Report of the Natural History Society of Northumberland, Durham and Newcastle-upon-Tyne, just received, records the gift of the Abel Chapman Collection of Big Game Trophies, etc., and also £500 for their proper housing.

The Annual Report of the Woolwich Council of Social Service, and *The Archway*, a Journal of Social Service in Woolwich, shows what a wonderful amount of good can be done with enthusiastic work. Mr. C. H. Grinling, is the Hon. Secretary, and is to be congratulated on his efforts and its success.

FIELD NOTES.

Nesting of the Reed Warbler at Scarborough in 1929.—Several species of the Warbler family are fairly common in the Scarborough district, but of the Reed Warbler our records tell us very little indeed. When compiling the recently published ' List of the Birds of Scarborough,' I could find

Nest of Reed Warbler at Scarborough.

only one mention of the bird's former status in the district in an old Scarborough guide, published about the year 1865, which read : ' Reed Warbler, used to breed at the Scarborough Mere before it was drained.' Nelson, in his ' Birds of Yorkshire,' says 'This Warbler's northern range was like that of the Nightingale, until recently considered to be bounded by the line dividing the West and East Ridings of Yorkshire from the North.'' On June 18th of this year I saw in a bed of reeds a pair of Warblers with which at the time I was unacquainted. On making a careful search I was rewarded by finding a nearly

finished nest, fastened, as is the custom of the species, to three reed stems. Ten days afterwards the finished nest contained three eggs. I searched other reed beds, and on July 17th found a second nest with three eggs, but, unfortunately, no young ones were reared. Afterwards Mr. E. A. Wallis found one more nest, making three recorded nests of the Reed Warbler for the past season.—T. N. Roberts.

Mollusca at Masham.—On a former Foray at Masham, some *Pisidia* taken from the River Ure proved of great interest to Mr. Stelfox, of Dublin, who has specialised on this genus. On the recent excursion, time and care were given to a number of sandy beaches of this river. Among the gatherings were a couple of immature mussels. Mr. Stelfox, on seeing them, wrote 'The little river form of *Anadonta*—I suppose some would call this a good species, but the more I see of genus the more I think there is only one species with two races—one for hard water, *Anatina*, and one for soft water, *Cygnea*—with innumerable varieties due to local conditions. The circumstances during the prevailing drought were unfavourable to terrestrial mollusca, but a few were obtained, and the following is the complete list :—

Helix hortensis. One (23)(45). A dead shell.
Hyalinia helvetica. One living specimen.
Clausilia laminata. One dead shell.
Hygromia rufescens (*striolata*). One young.
Pyramidula rotundata. Two shells.
Ancylus fluviatilis. Two shells.
Limnea peregra. Several well grown, many very young.
Valvata piscinalis. Several.
Bythinia tentaculata. Some old, many young.
Anodonta sp. Very young shell.
Sphærium corneum. Abundant.
Pisidium amnicum and *P. casertanum.* About a dozen of each.
P. personatum. One specimen.
P. nitidum. Many, including var. *crassa.*
P. subtruncatum. Several.
P. henslowanum. Two young.
P. supiscum. Many ; beautiful shells, and the first really typical *supiscum* I have seen from north of England.

Greevz Fysher.

We are much obliged to our numerous correspondents for pointing out that a dolphin is not a bird. While *The Naturalist* was going to the press our printers migrated to the outskirts of the city, and during the process some of the fauna seems to have become unclassified. We take consolation from the fact that one reader could not find a 'laughing jackass' in any list of mammals!

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COMPILED BY W. E. L. WATTAM.

It is not an index in the strictest sense of that term, but it is a classified summary of the contents of the volume, arranged so as to be of assistance to active scientific investigators; the actual titles of papers not always being regarded so much as the essential nature of their contents.

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YORKSHIRE—*continued.*

YORKSHIRE—*continued.*

YORKSHIRE—*continued.*

YORKSHIRE—*continued.*

MISCELLANEA.

MISCELLANEA—*continued.*

CORRIGENDA.

Page 76, bottom line, *for* ' R. T. Flintoff ' *read* ' R. J. Flintoff.'

PLATES.

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