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THE

NATURALIST:

A
MONTHLY JOURNAL OF

NATURAL HISTORY FOR THE NORTH OF ENGLAND

EDITED BY

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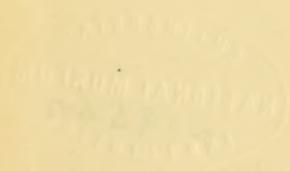
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THE NATURALIST

FOR 1911.

THE JURASSIC FLORA OF YORKSHIRE.*

A. C. SEWARD, M.A., F.R.S., ETC.

FROM the point of view of their fossil contents, the estuarine beds of East Yorkshire are among the most famous and important strata in the world. Since the publication in 1822 of 'A Geological Survey of the Yorkshire Coast,' by Young and Bird, much attention has been paid to the Jurassic plants of Yorkshire by British and Foreign students of ancient floras. During the first half of the nineteenth century a considerable amount of work was done by such pioneers as William Bean, his nephew John Williamson, his great-nephew William Crawford Williamson, by John Phillips and others. The 'Illustrations of the Geology of Yorkshire,' is dedicated by 'an affectionate nephew and grateful pupil' to William Smith, who was spoken of by Professor Adam Sedgwick (when Mr. Smith received from him as President of the Geological Society of London the first Wollaston medal) as 'the first in this country to discover and to teach the identification of strata, and to determine their succession by means of the imbedded fossils.' Professor Williamson, in his fascinating Reminiscences of a Yorkshire naturalist, tells us how 'in 1826 Dr. Smith and his eccentric wife,' established themselves in his father's house at Scarborough, 'where they dwelt for a considerable time.' The association of William Smith with Scarborough connects the plant-beds of the Yorkshire coast with the dawn of stratigraphical geology.

It is not my intention to deal with the history of our knowledge of the plant records of British Jurassic rocks, but rather to give a general sketch of the flora which the labours of enthusiastic Yorkshire naturalists have enabled us to investigate. Before attempting this, I should like to emphasise as strongly as I can the importance of doing our utmost to take advantage of the exceptional opportunities afforded by the geological structure of the Yorkshire cliffs for obtaining a fuller knowledge of the vegetation which flourished in western Europe during the Jurassic era. The notes by Messrs. G. F. Lane and T. Saunders† recently published in 'The Naturalist,' illustrate the importance of searching for records in exposures of Oolitic Strata in inland as well as in coastal localities.

* The Presidential Address to the Yorkshire Naturalists' Union, delivered at Middlesborough, December 17th, 1910.

† 'The Naturalist,' March, 1909, and January, 1910.

My friend Professor Nathorst has more than once invaded these shores, and recently a portion of our island has been transported to Sweden by his pupil Mr. Halle to enrich the famous palæobotanical museum of Stockholm. By establishing a department devoted to the floras of the past, the Swedish Academy has set an example which the Trustees of our National collections would do well to follow. Palæobotany is still without a representative in the British Museum. All of us, whose aim is to advance scientific research, welcome the foreigner who is attracted by our unrivalled natural museums accessible in the Yorkshire cliffs; we feel that the important thing is to extract from the records of the rocks all the facts we can, either by our own efforts or by assisting those of others. I would appeal to that spirit of sportsman-like rivalry which we profess to foster as a race, and ask the members of the Naturalists' Union to do their best to demonstrate to our friends across the sea that we do not underrate the value of the means to our hands of making a more intimate acquaintance with the stores of fossil plants still available in local strata.

I may mention that, with the assistance of a small grant from a fund administered by the University of Cambridge, one of my colleagues in the Botany School, Mr. Hamshaw Thomas, is devoting such time as he can spare to collecting material from the plant-bearing strata of the Yorkshire coast; and it is my intention to do as much as I can to show that we do not intend to be backward in the investigation of the Jurassic flora. It is hardly necessary to point out that my words are not in any sense the expression of an insular or narrow view. Professor Nathorst is a generous and broad-minded student of Nature, ever ready to co-operate with others in dividing the labour of scientific enquiry and in furthering research by every means in his power. There is ample room for us all, and the more competition there is, the more likely we shall be to emulate the devotion of the earlier naturalists to whom allusion has already been made.

Those who have had any experience of deciphering the imperfect remains of ancient floras fully appreciate the difficulties of the task, and realise how necessary it is to avoid dogmatic statements in regard to conclusions founded on meagre data. A complete list of the species recorded from the plant-beds of Yorkshire looks imposing, but those who have had a hand in its compilation are fully aware that we have still much to learn as to the precise systematic position of many of the types. What we want is more perfect material, and, if possible, petrified specimens, from which we may be able to confirm or to correct identifications based on the uncertain and often misleading evidence of external characters.

In the brief account of a few of the Jurassic species which

follows, I have refrained from giving reference to the scattered literature on Mesozoic palaeobotany. I may, however, refer to two volumes published by the Trustees of the British Museum, in which figures of British species will be found together with a general survey of the literature up to the year 1904.* In 1903 I read a paper before the Geological Society of London,† in which an interesting addition to the British flora was described from material discovered by the Rev. John Hawell in a bed of ironstone near Marske-by-the-sea. Further additions to our knowledge of the Jurassic flora have since been made by Mr. Lane and Mr. Saunders as the result of their careful examination of the Marske strata. In reference to the Marske species, *Dictyozamites Hawelli*, founded on the net-veined leaflets of a Cycadean frond, I may add that the geographical distribution of the genus *Dictyozamites*, which in 1903 was represented by Jurassic species recorded from Japan, India, Bornholm, and Yorkshire, has recently been extended, so Dr. Nathorst tells me, to the Falkland Islands.

ALGÆ AND FUNGI. The few examples of Jurassic fossils identified as algæ are not of sufficient botanical interest to be considered in a general sketch of the Yorkshire flora. It has been customary to refer to this class specimens which simulate some of the many forms assumed by recent seaweeds, but in the great majority of cases the algal nature of the fossils has not been demonstrated. Trustworthy examples of fungi are not likely to be discovered except in the petrified tissues of higher plants.

BRYOPHYTA (Mosses and Liverworts). The single species referred to in this group is *Marchantites erectus* Leckenby, represented by sterile specimens only. Until better material is forthcoming it would be rash to speak with confidence as to the correctness of the determination, though the impressions described by Leckenby bear a striking resemblance to recent species of *Marchantia* and similar Liverworts.

EQUISETALES. (*Equisetites columnaris* Brongn, etc.), The genus *Equisetites* is represented by casts of stems hardly distinguishable except in their larger diameter from those of existing Horsetails. More than one type is no doubt represented, but this is a question of detail which need not be considered here. The interesting facts are that Equisetaceous plants grew in abundance in Jurassic soils, and that they exceeded in size even the largest species which now exist in extra-

* Seward, A. C., Catalogue of the Mesozoic Plants in the Department of Geology, British Museum. The Jurassic Flora: Pt. I. The Yorkshire Coast, 1900; Pt. II., Liassic and Oolitic floras of England (excluding the Inferior Oolite plants of the Yorkshire Coast), 1904.

† Seward, On the occurrence of *Dictyozamites* in England, etc. Quart. Journ. Geol. Soc., Vol. LIX., p. 217, 1903.

European regions. It is almost certain that the Jurassic species differed also in structure from their modern descendants, but this is one of the many questions which can be settled only with the help of petrified specimens.

LYCOPODIALES. (*Lycopodites falcatus* Lind. and Hutt.). The species *Lycopodites falcatus*, though represented by sterile fragments only, may be regarded as closely related to the recent Lycopods and Selaginellas, plants still met with in many



FIG. 1.—*Cladophlebis denticulata* Brongn. From a specimen in the British Museum, from the Inferior Oolite of Yorkshire. Slightly reduced.*

parts of Britain, but more abundant and much richer in species in warmer countries.

FILICALES. I.—FERNS OF UNCERTAIN POSITION. The three species, *Cladophlebis denticulata* Brongn., *C. haiburnensis* Lind. and Hutt., and *C. lobifolia* Phillips, are referred to Brongniart's genus because we have as yet no very satisfactory evidence as to the precise nature of the fertile specimens of any of them. The name *Cladophlebis* is essentially a provisional title which implies ignorance as to the family position of the species so-

* Block lent by the Syndics of the Cambridge University Press.

named; it denotes ferns characterised by entire or slightly lobed leaflets like those of many recent species, such as the Male fern and other British types. It is highly probable, however, that the very widely-spread species *Cladophlebis denticulata* (fig. 1) characterised by its falcate and often finely denticulate pinnales, is a member of the *Osmundaceae*, a family still represented in Britain by the royal fern *Osmunda regalis*. The evidence for the correctness of this opinion is perhaps not sufficiently strong to justify the employment of a generic title which would definitely denote inclusion in the *Osmundaceae*.

The great need in regard to fossil ferns is the discovery of specimens of fertile fronds, which would enable us to determine the nature of the sporangia, or of petrified examples throwing light on the anatomical characters of stems and leaves.

The common Jurassic species *Taeniopteris vittata* Brongn. closely resembles, in the form of the leaf, the familiar Hart's tongue fern, but hitherto no fertile specimens have been found, and we are in the dark as to the family position of this type. Recent work on the fern-like plants from Palaeozoic rocks has shewn that the fern-type of frond is in itself a very uncertain guide as to systematic position; many of the supposed fern fronds from the Coal Measures are now known to have been borne by seed-producing plants distinguished by important features from true ferns. We are not justified in assuming that such leaves as those of *Taeniopteris* bore sori and sporangia identical with the spore-forming organs of recent genera; they may be leaves of cycadean plants, or even of species belonging to the extinct group of Pteridosperms. Specimens of another plant, *Nilssonia tenuinervis* Nath., or, as it has recently been rechristened by Nathorst, *Nilssoniopteris tenuinervis*, are frequently found in the Yorkshire plant-beds; the leaves of this Cycad are almost identical with those of *Taeniopteris*, from which they differ in the absence or rare occurrence of forking veins, and in the continuation of the leaf lamina over the midrib. *Sphenopteris*.—The employment of this name also implies lack of information in regard to the relationship of the fronds so named to recent ferns, and it should remind us that more material is needed before we can regard species characterised by the lobed *Sphenopteris* leaflets as plants possessing any real botanical value.

II.—FERNS WHICH IT IS POSSIBLE TO REFER TO A FAMILY-POSITION. [*Laccopteris polypodioides* Brongn. and *Matonidium Goepfertii* Ett.]. The two genera *Laccopteris* and *Matonidium* are generally recognised as closely related to the Matonineae, a recent family of ferns now represented by two species in the Malay Archipelago. The comparison of fertile pinnae of *Matonidium Goepfertii* (fig. 2), such as may be obtained from Hayburn

Wyke and elsewhere, with those of the recent fern *Matonia pectinata* leaves no doubt as to their close relationship. Similarly, the genus *Lacopteris*, the fronds of which, like those of *Matonidium* and *Matonia*, are characterised by a long stalk terminating in long and narrow pinnate branches, bearing linear falcate leaflets, is almost certainly another member of the *Matonineae*. This family affords one of several instances of plants which, in the Jurassic era, were widely distributed in the northern hemisphere and are now confined to a remote area in the southern tropics.



FIG. 2. *Matonidium Goepperti* (Ett.). From specimens in the British Museum, from the Inferior Oolite of Yorkshire. A, B, $\frac{1}{2}$ natural size.*

Coniopteris hymenophylloides Brongn., etc. The genus *Coniopteris* stands for ferns which, in their sori and sporangia, closely resemble some members of the *Cyatheaceae*, a family which includes the tree ferns of tropical and sub-tropical regions. The *Cyatheaceae* are no longer represented in the floras of Europe.

In *Klukia exilis* Phill. we have a representative of another family, the *Schizæaceae*, which has disappeared from Europe, but exists in North America, India, South Africa, the Malay region and elsewhere.

* Block lent by the Syndics of the Cambridge University Press.

Todites Williamsoni Brongn. (and *Cladophlebis denticulata*?). *Todites Williamsoni*, which occurs fairly often in a fertile state, is undoubtedly a member of the Osmundaceae, the existing species which most nearly resembles the fossil being *Todea barbara* of South Africa and Australia. *Cladophlebis denticulata*, though not hitherto found with well-preserved sporangia, is probably another member of the same family, an opinion which has recently received additional support from the association of sterile fronds of *C. denticulata* in New Zealand Jurassic rocks with well-preserved petrified stems described by Dr. Kidston and Professor Gwynne-Vaughan in their admirable monograph of fossil Osmundaceae as *Osmundites Dunlopi*.

GYMNOSPERMAE. A *Cycadophyta*. The Jurassic flora of East Yorkshire is rich in the remains of Cycadean plants, a group which it is impossible to deal with adequately in the space at my disposal. The Cycads, or as they are sometimes called the Sago Palms—a misleading name, as it implies near relationship to the Palms—constitute a small sub-division of the great group of Gymnosperms, and are now represented by a comparatively small number of species characteristic of tropical regions. The genus *Cycas* which occurs in India and the Far East is the best known example of the class: a well-grown plant has a long columnar stem, not infrequently branched in an irregular candelabra-like style, bearing one or more crowns of leaves similar in form to those of some Palms. The reproductive shoots of recent Cycads are in the form of cones, with the exception of the fertile organs of *Cycas*, which are produced from time to time at the apex of the stem as a cluster of tawny yellow modified foliage leaves bearing laterally placed seeds often attaining the size of a large hen's egg. In all other Cycads the fertile shoots, including the male shoots of *Cycas*, are compact cones which may reach a length of more than a foot, and consist of a strong axis bearing crowded female or male appendages. A few genera of Cycads are peculiar to the Australian region; others are confined to South Africa, while South America also has its peculiar types. Like some recent tropical ferns, the Cycads may be regarded as links between the Mesozoic era and existing floras. The pinnate fronds of the Jurassic species known as *Zamites* or *Williamsonia gigas*, bear a close resemblance to those of recent species of the American *Zamia* and other existing genera, but, as the late Professor Williamson showed, the plants which bore the *Zamia*-like fronds possessed reproductive shoots differing in several important respects from those of any recent genera. Without attempting a description of the fossil cycadean fronds, brief reference may be made to a point of considerable botanical interest.

It has been abundantly proved that during the Jurassic

period and in the earlier days of the Cretaceous epoch there existed in many parts of the world, more especially in North America, numerous species of Cycadean plants which, in the form of the leaves and in anatomical characters, agreed closely with recent Cycads. But, despite the striking likeness between the vegetative organs of the fossil and recent plants, the great majority of the former possessed reproductive organs differing widely from those of existing Cycads. The stems bore lateral fertile branches ending in oval flowers characterised by a conical receptacle on which were borne numerous slender stalks, some terminating in single seeds, while others, known as interseminal scales, were sterile and extended beyond the seeds which they partially enclosed by their distally expanded ends. The researches of Mr. Wieland in America have demonstrated that at least in many instances, the flowers of these extinct plants were bisexual, the male organs having the form of pinnate leaves clustered round the base of the conical receptacle to which the female organs were attached. The male reproductive cells were contained in sacs comparable to the sporangia of certain recent tropical ferns, whereas the female organs have the structure of complex seed-bearing flowers. The important point is that in their reproductive organs the majority of the Mesozoic Cycads differed enormously from any recent species. As yet we have not obtained a single specimen of a petrified Cycad from the Yorkshire beds, but casts and impressions of portions of flowers are by no means uncommon. Specimens of such casts were figured by Young and Bird in 1822, and spoken of by them as specimens of the true Artichoke (*Cynara integrifolia*). A comprehensive account of these fossils was published by Williamson in 1870 in which he expressed the opinion, now generally accepted, that the specimens described by Young and Bird, and subsequently named by Carruthers *Williamsonia*, are the flowering shoots of a Cycadean plant, the leaves of which are represented by the pinnate fronds called by Lindley and Hutton *Zamites gigas*. Though Williamson believed that the Yorkshire examples of *Williamsonia* included both male and female flowers, the occurrence of undoubted male flowers was not proved until last year when Dr. Nathorst succeeded in finding in the Whitby beds portions of spore-bearing organs. My object is not, however, to discuss the structure of the fertile shoots of *Williamsonia*, but to draw attention to the need for further search, which may enable us to decide to what extent the Yorkshire specimens agree with those of the closely-allied genus *Bennettites*, instituted by Carruthers for a remarkable stem from Lower Cretaceous beds in the Isle of Wight, bearing flowers sufficiently well preserved to show the structure of the small embryos in the seeds.

(*To be continued*).

ON THE EQUIVALENCE OF THE YOREDALE AND PENDLESIDE SERIES.

COSMO JOHNS, M.I.MECH.E., F.G.S.

THE term 'Yoredale Series' was first used by Phillips,* and defined to include the series of shales, sandstones and limestones which intervene between the top of the limestone *massif*, or Great Scar, and the Millstone Grit; the type section being described from Upper Wensleydale. The Main, Upper Scar, or Cam Limestone, formed the summit of the series as thus defined, for Phillips considered the grits, sandstones and shales with a few included thin limestones which come in above the Cam Limestone, to be more closely related to the Millstone Grit above than the Yoredale rocks below. When the Geological Survey mapped the Yoredale country, it was found expedient to draw the dividing line at the base of the Ingleborough Grit, and thus to include in the Yoredale Series all the beds that intervene between the base of that massive grit and the top of the Great Scar Limestone. It is as thus defined by the Geological Survey that the term is used in this paper. It has generally been accepted that the Ingleborough Grit is the Kinderscout Grit of the country to the south, and it is at the base of this grit that Dr. Kidston† has demonstrated that the plant-break, which divides the Upper from the Lower Carboniferous, occurs.

This is in complete agreement with the stratigraphical evidence, for it can be shewn that the massive grit which can be traced from Wensleydale through Upper Wharfedale to Greenhow Hill, oversteps first the beds above the Cam Limestone, then the Cam and Underset Limestones, until it ultimately rests, with a few feet of shales intervening, on the Limestone *massif* of Greenhow Hill, thus cutting out the whole of the Upper Yoredale Limestones. As Phillips was careful to point out the *massif* of Greenhow Hill, when traced northward, divided up into the middle, Simonstone and Hardra Limestones of the Yoredale Series of Wensleydale. Nowhere can the Upper Yoredale Limestones be demonstrated to be split off from the *massif* of the south; on the contrary, a distinction between an Upper and a Lower Series of Yoredale Limestones can be made with an important series of flagstones and shales, which thicken considerably towards the north-west, dividing the two. Again, it is only towards the south-east that the Lower Yoredale Limestones can be seen to fuse

* Illustrations of the Geology of Yorkshire. Part II. The Mountain Limestone District.

† For references see Mem. Geol. Surv. Derby and Notts. Coalfield, 1908, p. 9.

with the *massif*. As traced eastwards through Fountains Fell, Penyghent and Ingleborough the distinction between the Upper and Lower Yoredale Limestones with the Flagstone Series that divide them can be made out easily.

On Ingleborough the Cam or Main Limestone is a conspicuous feature, the Flagstone Series below is of great thickness, while the Lower Yoredale Limestones below, though somewhat thin, are to be distinguished, and the whole series is of considerable thickness, though less than that of Wensleydale. It is important to note that on Ingleborough there is no tendency for the Lower Yoredale Limestones to fuse with the *massif*; they are, however, reduced in thickness and, having regard to the thickness of the intervening shales, they might with propriety, be termed "shales with Limestones."

Mr. Tiddeman, whose intimate knowledge of the region gives considerable weight to the opinions he expressed, was struck with the difference between the succession he observed north and south of the Craven Faults in the two areas which Phillips had previously indicated as northern and southern types. Phillips himself was by no means clear when comparing the two areas, and Mr. Tiddeman suggested that the Craven Faults, the great East and West Series of fractures dividing the two, were moving in Carboniferous times, and suggested* the following correlation:—

SOUTHERN OR BOWLAND TYPE.	.. .. .	NORTHERN OR YOREDALE TYPE.
Millstone Grit	.. .. .	Millstone Grit
Bowland Shales		} Yoredale Series.
Pendleside Grit (inconstant)	.. .	
Pendleside Limestone (with reefs)		} Carboniferous Limestone
Shales with Limestones	.. .. .
Clitheroe Limestone (with reefs)		

Against this view Dr. J. E. Marr in an important paper,† brought much evidence forward to prove that orogenic movements, acting subsequently to the deposition of the strata, were responsible for the differences in the apparent succession of the two areas, and put forward a correlation table, differing from that of Mr. Tiddeman, which is given here again:—

SOUTH SIDE.	.. .. .	NORTH SIDE.
Millstone Grit	.. .. .	Millstone Grit.
Bowland Shales	.. .. .	Shales above Upper Scar (Main) Limestone.
Pendleside Limestone	.. .. .	Upper Scar (Main) Limestone.
Shales with Limestones	.. .. .	Yoredale Shales with Limestones.
Clitheroe Limestone	.. .. .	Lower Scar Limestone.

* Report, British Association, 1899, p. 600 et seq.

† Q.J.G.S., 1899, p. 327 et seq.

Dr. Wheelton Hind* attacked the problem from the palaeontological side. He proposed the name Pendleside Series for the shales with limestones that intervene between the limestone *massif* of the southern area and the Millstone Grit, and had previously† considered that the upper portion of the *massif*, split up as it was, traced towards the north, and was represented by the Yoredale Series of Wensleydale. This indefatigable worker has also demonstrated that the fauna of his Pendleside Series characterised the Lower Culm of Devonshire and the Continent, and that this fauna was essentially different from that of the massive limestone below. In several communications he called attention to the absence of the fauna in the area north of Settle; that is in the typical Yoredale country.

There were, therefore, three very different opinions as to the equivalents of the Great Scar and Yoredale Series in the southern area. The differences might be expressed briefly by referring to the position of the Pendleside Limestone in the three correlations put forward, and so strenuously upheld. Mr. Tiddeman considered it to be equivalent to the top of the Great Scar Limestone; Dr. Marr suggested that it corresponded with the Upper Scar (Cam or Main of the Yoredales) Limestone, while Dr. Hind considered it to be a mere local development occurring at a higher level than the true Yoredales, and included it in the Upper Carboniferous. It might now be mentioned that at this time there had been already published‡ a short but striking paper by De Koninck and Lohest, after a visit to Ingleborough under the guidance of Prof. McKenny Hughes, of Cambridge. Lohest recognised in the Great Scar Limestone the zones of *P. giganteus* and *P. cora*. In a later communication§ Lohest correlated the British sequence with that of Belgium, and refers again to the Ingleborough sections. The Upper Scar or Main Limestone was excluded (*vide* Prof. Hughes) by the authors from their correlation with the Viséan of Belgium. These two papers, having regard to their date, represent a considerable advance in our knowledge of the Carboniferous Limestone of Yorkshire, and deserved more attention than they received.

The present writer has recently|| expressed his opinion that the Pendleside Limestone was the equivalent of the Main Limestone of Ingleborough. This opinion was based on the assumption that, as mapped, this limestone is separated from

* Q.J.G.S., 1901, p. 347 et seq.

† Geol. Mag. 1897, p. 159.

‡ Notice sur le parallélisme entre le calcaire carbonifère du Nord-Ouest de l'Angleterre et celui de la Belgique. Bull. de l'Académie Royale de Belgique 3^{me} série, tome XI. No. 6, 1886.

§ Sur le parallélisme entre le carbonifère des environs de Bristol et celui de la Belgique. Annales de la Soc. Geol. Belg., Tome XXII., 1894.

|| Q.J.G.S., 1910, p. 584.

the *massif* by several hundreds of feet of shales. An investigation of the ground between Hooks Cliff of Pendle Hill and the knolls of White or Clitheroe Limestone gave an apparent succession from the knoll through platy limestones (probably faulted) with *Prolecanites compressus* through a considerable thickness of shales to the Pendleside Limestone, in which occurred a grey limestone with brachiopods and a coral. It was understood that the *Posidonomya becheri* beds were at the base of the shales, but the fossil was not seen. If this be the true succession, and the position of the *becheri* beds as stated, then the correlation first suggested by Dr. Marr and since by the writer would be correct, and the equivalence of Yoredales and Pendlesides would be demonstrated. Further consideration suggests that in such a disturbed area as that near Pendle Hill, the observed succession might only be apparent, and as the exact relation of the Pendleside fauna to the Pendleside Limestone is not clear, no insistence on the correlation of Ingleborough and Pendle Hill will be made in this present paper, nor will Pendle Hill be accepted, for the same reasons, as a type section of the Pendleside Series. An appeal will be made instead to evidence within the Yoredale area, and to notices of such other evidence as throws any light upon the problem.

In the important Yoredale section of Mill Gill it has been shewn by Dr. Hind and the author that *Posidonomya becheri* occurs abundantly in the shales at the base. The top of the Great Scar Limestone here is a *Cythaxonia* phase as is common in most areas at the top of the Visean. The Cephalopod fauna generally associated with the Pendleside Series, has not been observed but the sequence of *Cythaxonia* beds and shales with *P. becheri* is the usual one. As a solitary occurrence, this sequence might lose its significance if the time value of *P. becheri* was questioned. Another Pendleside form, *P. membranacea*, has never been questioned, and in the shales above the *massif* at Moor Close Gill, south of Seagate House, about two miles east of Gordale, near Malham, it was found associated with other important Pendleside fossils as follows:—

Posidonomya membranacea, *Pterinopecten papyraceus*, *Glyphioceras diadema*, and *Glyphioceras reticulatum*.

Here we have two characteristic Pendleside cephalopods, and the objection suggested above has been met. These shales rest on the *massif* at the top of which *Campophyllum derbiense*, *Koninckophyllum* cf. *intemusepta*, and *Amplexi zaphrentes* occur. The shales themselves are unquestionably of Yoredale age, and the section is north of the outer Craven Fault. Further in the shales of Black Hill, immediately south of Fountains Fell, and again north of the outer Craven Fault, *P. membranacea* occurs. The shales are of Yoredale age, and rest upon the Great Scar limestone. Above them comes the pebbly grit of

Ingleborough. Here, therefore, are three sections in the Yoredale area where the Pendleside fauna occurs in beds of Yoredale age. To confine the discussion to areas that can or have been correlated with the succession in north-west Yorkshire, it might be mentioned that Prof. Lebour, and later Mr. Stanley Smith, has noted the occurrence of *P. becheri* in Northumberland in beds again of Yoredale age below the level of the Great (Main of Ingleboro') Limestone, while in Scotland *P. becheri* has been found* in the Lower Limestone Series. The evidence is therefore always consistent, and it would appear that the establishment of *P. becheri* has a definite time value. There is, however, negative evidence which cannot be overlooked in this discussion. Despite persistent search, no indication of the occurrence of the Pendleside fauna from beds that can be demonstrated to lie above the Main or Cam Limestone has ever been found. Dr. Hind has himself more than once called attention to this, and the importance of the failure must be insisted upon.

The faunal evidence is therefore clear; the Pendleside fauna has been found in rocks of Lower Yoredale age. It has never been found in beds above the Main Limestone. Therefore, even if Phillips' restricted definition of the Yoredale series be employed, the evidence points to the equivalence of Yoredales and Pendlesides. If the definition of the Geological Survey be accepted, as it is in this paper, then the Pendleside Series must of necessity be the time equivalent of some parts of the Yoredales, unless it is suggested that there is a non-sequence at this important level throughout an area covering hundreds of square miles, which would be unthinkable. The view that the Pendleside Series is younger than the Yoredales is full of difficulties. That it succeeds the Visean which commonly has a *Cyathaxonia* phase at the summit, is the experience of most workers. There is throughout the Yoredale area a *Cyathaxonia* phase at the top of the Great Scar Limestone. The Upper Yoredale Limestones contain a coral fauna which is higher in development than the D_2 of Bristol; yet this D_2 represents the top of the Visean in that typical area. It will be remembered that the Belgian geologists who visited Ingleborough declined to include the Main (Upper Yoredale) Limestone in their zone of *P. giganteus*, though their reasons were perhaps not very convincing at the time.

It was on these grounds that the writer proposed† a new classification of the Lower Carboniferous Rocks which would give due weight to this evidence, and at the same time do justice to the many workers who have contributed to our knowledge.

* The evidence has not yet been published.

† Geol. Mag., 1910, p. 562.

This table is reproduced below, but reference should be made to the original paper for the reasons that suggested the nomenclature employed. It is, perhaps, sufficient to point out that

Upper Carboniferous.	Level of the Plant break.			
Lower Carboniferous.	AVONIAN.	Yoredalian	Upper Lower	Upper Yoredale Coral Fauna. Entrance of Lower Culm or Pendleside fauna (<i>Posidonomya becheri</i>).
		Viséan	Entrance of C-S fauna (<i>Caninia patula</i> , <i>Clisio-phyllum ingletonense</i>).	
	Tournaisian			

Dr. Wheelton Hind's correlation of the Lower Culm and the Pendleside Series is duly recognised, and that the claims of priority, to say nothing of the great work of Phillips in Yorkshire, leaves Yoredalian as the only acceptable name for the Upper Division of the Avonian.

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NEWS FROM THE MAGAZINES.

'The Lost Towns of Holderness; a Glimpse of a fast vanishing Land' is the title of an illustrated article in *The Tramp* by Mr. A. L. Armstrong.

The 'Museums Journal' (Vol. X., No. 5) includes a paper by Mr. A. J. Caddie, on 'The Board of Education and Provincial Museums,' and Mr. E. E. Lowe writes on the Plymouth Museum and Art Gallery.

The floods have been very bad in the Midlands lately, but they seem to have been most severe at Barnsley, where, according to the *Barnsley Chronicle*, 'the rains have been so heavy that the roads have been covered with water to a depth of over *two miles* in places.'

Writing in 'The Annals and Magazine of Scottish Natural History' (No. 76), Her Grace the Duchess of Bedford, in describing visits paid to the Island of N. Rona, says:—'The horrible modern tombstone erected to the memory of the late two inhabitants who died there in 1887, and placed in the little chapel-yard amongst the old locally-carved stone crosses, had been re-whitewashed. If ever I commit sacrilege, it will be here!' In the same journal Mr. W. Eagle Clarke records that six Scottish Eggs of the Golden Eagle found in a shop in Inverness, were forfeited to the Crown, and sent to the Edinburgh Museum. Three were retained in Edinburgh, the remainder being sent to the Inverness Museum.

MUTILATION OF BEES.

J. A. HARVIE-BROWN, F.R.S.E.

Larbert.

REFERRING to Mr. J. W. Carter's note on 'The Mutilation of Bees,' in 'The Naturalist' for Dec. (pp. 426-427), some years ago I recorded a somewhat similar, if not identical phenomenon. Under a lime tree in full flower, which overhangs our avenue, my wood-forester found hundreds of bees mutilated in a similar manner to that which Mr. Carter describes, and brought me to the spot to witness it. Under that lime tree the ground was strewn so thickly with dead and dying bees, that one could not put down one's foot without crushing many at a time. The mutilation consisted in the complete removal of the abdomen, but I *did not observe that the thorax had been attacked.*

Desirous to find out the cause, my man went up the tree. He did not report that any wasps were seen, but he found the whole branches and foliage covered with innumerable large red ants, known as 'Soldier Ants.' Rightly or wrongly, we put down the serious mutilation of the bees to the attacks of these big red ants, and it is worthy of notice at the same time, that other lime trees, both upon the line of the avenue, and close to the house, though also in full flower and 'humming' with innumerable bees, appeared to be perfectly immune—or untouched at least—by those ants. It was only on the one tree where the phenomenon was observed.

In Mr. Carter's communication the mystery was certainly cleared up, and the agents discovered in the wasps; but in the case I reported at the time, and repeat now, the agent *appeared* to be the large red Soldier Ants. At first we thought it must have been some bird, but no birds were seen on the tree.

The question now arises, are both Wasps and Soldier Ants inimical to bees under similar circumstances?

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MUTILATED BEES.

MARY L. ARMITT,

Rydal, Westmorland.

MR. CARTER'S notes upon the death of Bumble Bees under lime trees is of very great interest, as establishing the fact conclusively that wasps are the cause of it in many instances, if not in all. Conviction of this came to me on slighter grounds (See 'Naturalist,' 1900, p. 270, following a previous note) from the sight, on July 19th, 1889, of numbers of bees that lay

beneath a flowering lime in the garden, most of them being neatly decapitated. The few whole ones were torpid, though living. Two wasps were hovering attentively about them, and one was detected in the very act of detaching itself from a bee, carrying off something (for it) of considerable size—no doubt part of its victim, though we did not see the very act of mutilation. The other, though it visited many bees, did not happen upon a live one while we watched. Later, a wasp settled on the window pane with a similar burden.

As the weather had been remarkably cold, I came to the (perhaps erroneous) conclusion that the bees were benumbed by it, as one often sees them in late summer, and so fell an easy prey.

On July 30th, 1891, I noticed the same thing, and again the weather was stormy, with a north wind. Out of thirteen dead bees; twelve were mutilated; but this time I saw no wasps.



YORKSHIRE NATURALISTS AT MIDDLESBOROUGH.

THE forty-ninth annual meeting of the Yorkshire Naturalists' Union was held at Middlesborough on Saturday, December 17th, 1910. Notwithstanding the many inconveniences as regards the train service, and the wretched weather, there was a good attendance of members and delegates from all parts of the county.

The meeting was preceded by an excursion to the Marske quarry, where a quantity of the rock was specially blasted for the benefit of the visitors, and numerous interesting fossil-plants were gathered, including *Dictyoza-mites hawelli*.

In the afternoon, the General Committee met in the Girls' High School, Albert Road, and the report, appearing on pages 33-79, was discussed. In it will be found the excursion, etc., arrangements for 1911.

In the evening the Annual General Meeting was held, and Professor A. C. Seward, F.R.S. delivered his presidential address entitled 'The Jurassic Flora of the East of Yorkshire in Relation to the Jurassic Flora of the world' (see pages 1-8), which was illustrated by lantern slides. He was supported by Mr. J. E. Stead, F.R.S., Mr. T. A. Lothouse, Mr. J. J. Burton and others. One pleasing result of the Middlesborough meeting was the formation of a Committee for the investigation of the Yorkshire Jurassic Flora, particulars of which will be found in the Annual Report.

It was announced that, on the invitation of the Executive, Dr. Alfred Harker, F.R.S., had accepted the presidency of the Union for 1911.

After the address an enjoyable conversazione was held on the invitation of the Cleveland Naturalists' Field Club. At this were several exhibits of local interest, including a series of specimens from the Marske quarry; rare local birds, mollusca, lepidoptera, coleoptera, and objects under microscopes, etc. Most of the members also took the opportunity of seeing the Middlesborough Museum where Mr. F. Elgee is getting an interesting natural history collection together.

T. S.

Naturalist.



John Handley, J.P.

In Memoriam.

JOHN HANDLEY (1836-1910)

(PLATE I.).

ONE of the great advantages of a visit to the charming district of Sedbergh, whether as an individual, or collectively as a Society, has been the presence of John Handley. Amongst many others, the Yorkshire Naturalists' Union and its members are particularly indebted to him. He had a great fund of local anecdote, a keen sense of humour, and a remarkably thorough knowledge of the natural history features of his district. In future, our visits to Sedbergh will not have quite the same interest; the evenings will seem much longer; we shall miss a true guide, philosopher and friend. John Handley is dead. The fells and the fields will know him no more; and we, in common with everybody in Sedbergh, and for miles around, shall find it difficult, if not impossible, to get anyone to take his place.

On our excursions he has always taken a leading part; the botanists particularly having greatly benefitted from his acquaintance with the flora of his neighbourhood. The pages of 'The Naturalist,' too, have been enriched by his pen. In 1898 he published a 'Catalogue of Plants growing in the Sedbergh District, including the Lune Basin, from Middleton to Tebay.' This contained 48 pages, and has been the companion of every botanist visiting the district. Mr. Handley did not shew everybody where the rare plants grew, as some 'collectors' found out to their sorrow! In his list also we learn that 'the exact habitat of many flowers is not given from the fear of extermination.'

John Handley was also a leading authority on sheep-farming, and organised and commenced the 'Flock-Book' of the Wensleydale blue-faced sheep. He took a keen interest in public affairs. He was a Poor Law Guardian since 1871; a Charity Trustee since the foundation of that body; Chairman of the District Council; Chairman of the District Education Committee, and a Justice of the Peace. He was also a member of the Society of Friends, and 'a mainstay of Quakerism in the valleys of north-west Yorkshire.' Of him 'F. G. P.' in 'The Sedbergian,' writes:—

'The flowers in summer hue had all nigh gone,
The wind had stripped the leaves from hedge and tree,
When he, who knew them all and loved each one,
Put out to sea.'

T. S.

TWO NEOLITHIC AXE-HEADS FROM HOLDERNESS.

T. SHEPPARD, F.G.S., F.S.A. (Scot.).

(PLATE II.).

THE specimen figured in Plate II., figs. 1 and 2, has recently been found on the cliffs near Garton, on the Holderness coast, by Mr. A. S. Harvey. It is a Neolithic axe-head, and is remarkable for the excellency of its workmanship, and the delicate way in which it has been finished. The specimen is of green volcanic ash, such as occurs in Borrowdale, which was the favourite material for making these early axes. Quite a large percentage of the East Yorkshire specimens are made from it. The Garton axe, however, is of much finer workmanship than is exhibited on any celt of this type hitherto found in this district. It is exceedingly symmetrical, and the cutting edge is unusually sharp, and well made. The specimen is $6\frac{1}{2}$ inches in length, $2\frac{1}{4}$ inches in its greatest width, and 1 inch in thickness. The cutting edge is about $2\frac{1}{2}$ inches across, the opposite end being slightly blunted.

The specimen shewn in Plate II., figs. 3 and 4, is a fine polished flint axe head. It was found on the shore at Withernsea so long as 1864, and has the appearance of having been buried in peat, a bed of which material occurs near the remains of the pier at that place.

Flint, being an exceedingly hard and tough material, is difficult to work, and consequently polished flint axes are not frequently met with. The Withernsea example is made from the dark foreign flint which occurs in the drift beds. There are a number of flakes which have been struck off since the axe was made. Judging from the patination, some of these were made before the axe was lost, whilst some of the smaller flakes are evidently comparatively recent. The specimen is 4 inches long, $2\frac{1}{4}$ inches wide, and 1 inch in thickness. The two sides have been rubbed down leaving a square edge. Both specimens are now in the museum at Hull.



In the 'Yorkshire Archæological Journal' (Part 80), Mr. J. R. Mortimer has a short article on the 'Opening of a Barrow near "Barrow Nook," Driffield.'

In 'The Proceedings of the Society of Antiquaries of London' (Vol. XXIII., No. 1), some curiously striated neolithic flint flakes are figured and described. It is suggested that the striations are due to ice action, and the various interglacial periods of James Geikie, as propounded in the primitive days of glacial geology, are quoted. We are glad to see that Mr. Clement Reid referred to the absurdity of assuming that the scratches on the surfaces of the neolithic flakes could be in any way connected with the Ice Age.

THE PUPATION OF A WATER BEETLE.

LLEWELLYN LLOYD.

FEW insects are more frequently kept by the amateur naturalist in his aquarium than the *Dytiscus* larva. Its rapacious appetite and robust health in captivity make it a most interesting pet, and one species, *Dytiscus marginalis*, is easily procurable in various stages throughout the summer in most of the ponds of Yorkshire. As a rule, the insect dies in captivity, without undergoing its metamorphosis, but if it is properly treated, all its stages may be readily observed.

It requires a plentiful supply of food, such as tadpoles or small fishes, but the writer has reared his specimens almost entirely on centipedes and earthworms. One instance of its rapacious habits may be cited: a specimen almost mature was placed in a small vessel with eighteen large frog tadpoles and two sticklebacks. In twenty-four hours it had destroyed them all.

When the larva is about two and a half inches in length, and has commenced to refuse food actually placed within its jaws, it should be removed from the aquarium, and given an opportunity to burrow. The following method has been used, and has met with considerable success. A round shallow pot was filled with moss and water to the brim, and the larva was placed in it with a supply of food in case it required another meal. The vessel was then placed in a plant pot nearly full of moist soil, and was pressed in until the earth was level with its edge. The plant pot should be covered to prevent the insect escaping, as it is now in a peripatetic mood. It soon leaves the water, and wanders about looking for a suitable place in which to burrow. The burrowing is done mainly with the legs, but the flat head is used as a shovel, throwing the earth backwards between the legs. The burrow is only about an inch in depth and at the bottom a flat oval chamber is formed.

By a simple device the formation of the chamber may be observed. The surface of the soil is made very firm by pressure, and a hole is made with the finger at the side of the vessel containing the grub. The hole should pass close to the vessel and to some extent underneath it. In the writer's experience, the larva has always taken advantage of such a hole. If the vessel is now carefully lifted out of the soil, a good view of the little workman may be obtained as often as desirable. The grub at its work is a most decrepit object, its back and head are caked with mud, its antennæ and palpi are dragged, and its anal cerci are no longer turned upwards as in life, but downwards, so as to keep the soil out of the stigmata. The white colour of the pupa is seen through the skin, and a couple of

untidy grooves run along the lower side of the body. It places its head and tail firmly against the ends of the chamber, and with backwardly directed jerky blows of its body, causes the sides of the burrow to take on the smooth consistency of kneaded clay. The work of completing the chamber occupies about four days, and at the end of eight more days the larval skin is cast, and the insect remains as a milk-white pupa, in strange contrast to its former state. It gradually becomes darker in colour; the eyes, as usual, developing the pigment first, and in about twelve more days it casts its pupal sheath and becomes a beetle. It was disappointing that at this stage the insects, unable to inflate their wings, used to die. The reason for this was that while one observed them, small particles of soil unavoidably used to fall into the burrows. These particles stick on to the moist new skin, and prevent the inflation of the wings and elytra. The difficulty may be surmounted by carefully lifting the white pupa from its chamber and laying it on damp grass in a vessel from which there can be no evaporation. The insect then hardens its skin, and takes happily to the water, where it is as interesting as the larva.

This method has been found to be successful with other water beetles, and, with modifications, would probably be so with most.

FIELD NOTES.

BIRDS.

Little Auks in Yorkshire.—In November 1910 one of the periodically great immigrations of Little Auks occurred. Mr. Nelson informs me that on the 19th hundreds were passing Redcar in flocks. There was a strong N.E. wind, with heavy sleet and hail showers at the time. Mr. W. J. Clarke writes that a few were seen at Scarborough on the 19th, more on the 20th, and on the 21st they were passing in hundreds; some of the flocks would contain between two hundred and three hundred birds. There was a moderate N.E. wind on this date, with a rough sea, and a strange fact is that all the flocks were going north. On the 24th Mr. Booth tells me that one was obtained inland in the Aire drainage area at Mountain, Queensbury. On the 27th one was picked up alive on the reservoir at Bullcroft Colliery, near Doncaster. This bird was taken to Major Anne of Burghwallis Hall, who sent it to the Zoo. It would be interesting to know if any other specimens have been observed inland in the county; several have been recorded in the south of England. Two specimens were obtained inland, in the North Riding, one was shot at Kirby Wiske and another was captured alive near Osmotherley,—R. FORTUNE.



Fig. 1.

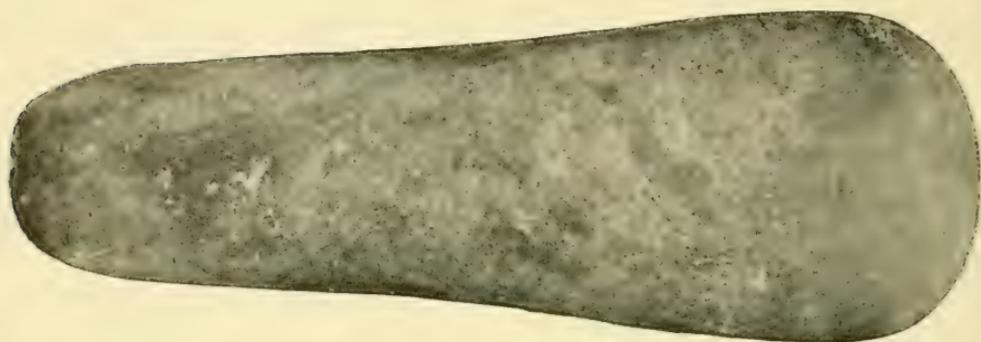


Fig. 2.



Fig. 3.



Fig. 4.

Neolithic Axe-heads from Holderness.

FUNGUS FORAY AT SANDSEND.

C. CROSSLAND, F.L.S.
Halifax.

THE twenty-third Fungus Foray held under the auspices of the Yorkshire Naturalists' Union, opened at Sandsend, on September 17th, and was continued to the 22nd. Permission to investigate the extensive Mulgrave woodlands was again kindly granted by the Marquis of Normanby. Eighteen members of the Union and a friend met at Normanby House, Sandsend, on the Saturday. One of the great advantages attending the investigation of these woods is that meeting and workrooms are close at hand, as well as a most suitable house for headquarters. From Monday morning onward, the double-roomed well-lighted old schoolhouse was placed at our disposal by the Vicar of Lythe, the Rev. W. G. Harland. This afforded plenty of room to spread out the material collected on long tables, specially put up for our purpose, while a handy work-table was placed opposite each of the four windows. Part of each day was given to collecting, and part to identifying the finds.

The woods are stocked with well-grown native timber trees and shrubs, while quantities of exotic shrubs grow luxuriantly in all parts. The paths are well kept, and easy to traverse throughout this wide woodland domain. It was a great pleasure and privilege to wander about in the woods for five days, picking up one fungus here, and another there, and to dip into path-side recesses or scan the banks for others as we went along. Often half an hour or more would be spent in a suitable spot within a couple of square yards, looking carefully for micro material, where ten or a dozen species, often more, might be found.

Though collecting was general all round by each one, Mr. Cheesman paid special attention to the Mycetoza, Mr. Philip to the Uredines, Mr. Needham and Mr. Malone to micro-species of all kinds, and so on.

One of the finds of special interest was *Mycea flavipes*. It was here Mr. Masee found it for the first time in Britain about twenty-five years ago, and from which the figures of the pretty little group in Cooke's Illustrations, Pl. 951 B, were made. It was recorded for Whitby at the time, and has not been seen elsewhere in Britain. In France it is not uncommon. The following six met with during the five days' search are new to the British Flora:—

Clitopilus angustus (Pers.). Very different in appearance from any of our other species of *Clitopilus*. Closely resembling in size and build *Entoloma prunuloides* from which it is distinguished by the decurrent gills. The gills remain pallid for a long time, and finally only become slightly tinged pink.

Omphalia bibula Quel. Only previously recorded from France.

Inocybe Cookei Bresad. Superficially resembles *I. fastigiata*, which differs in the whitish stem and olive gills. Previously only known from Austria.

Hypopholoma melantinum Fr. Previously only known from Sweden.

Lactarius tabidus Fr. A pretty little, light-built *Lactarius*, with submembranaceous, striate pileus. It is somewhat remarkable that this species has not previously been recorded for Britain, as it is not uncommon in most European countries.

Marasmius xerotoides Post. Superficially resembling a small specimen of *M. fetidus*, differing in being entirely devoid of smell. Hitherto only known from Sweden.

Masse's 'European Agaricineæ' was found extremely useful. It was the means of detecting the above six additions to our Flora.

Another rarity was *Verticillium Marquandii* Masee ('Trans. Brit. Myc. Soc.', 1896-7, p. 24). A bright lilac-purple mould parasitic on the gills of *Hygrophorus virgineus*. It was first known and described from Guernsey specimens, and has not been recorded from elsewhere until a fine example growing on the same host was found at Mulgrave.

Choiromyces meandriformis, one of the *Tuberaceae* much resembling a "demicked" potato, was brought in. On examination it proved to be the above. This is its first discovery in our county. More of it was sought for, and found on the following day.

A very beautiful specimen of *Hypomyces aurantius* shewing both conidial and ascigerous stages, was found on *Soppitticella crustacea*, a somewhat unusual host; it generally grows on agarics.

About a dozen *Clavarias* were collected and sent on to Mr. A. D. Cotton, Kew. Mr. Cotton is making a critical study of this somewhat difficult, and not by any means clearly understood, little group.

It is known that groups of agarics vary much each year, but the reason still remains unfathomed. In some seasons, certain families will come up in abundance, while in others they come only sparingly. In 1908 no fewer than thirty-four species of *Mycena* were noticed at Mulgrave; this year (1910) only eighteen were seen, and four of these were not met with in 1908. No fewer than ten *Entolomas* were collected. Varying quantity from year to year, in the case of all but the commonest agarics, appears to be one of their peculiarities.

There was an abundance of *Lactarius deliciosus* in one part of the woods; later, this was seen under a more savoury aspect on the dinner table. *Hygrophorus* and *Russula* were much in

evidence; twenty species of the former and thirty of the latter were seen. *Armillaria mellea* was absent, but perhaps only 'biding its time.' *Boletus flavus* was the commonest of the *Boleti*.

It was on the programme to visit Arncliffe Woods on the Tuesday but rain fell so heavily during the previous night and early morning, that it was thought advisable to cancel these arrangements.

Curiosity led a few residents at this little seaside retreat to ask permission to come into the workroom to look at the specimens laid on the tables. This, of course, was granted. Bright colours and pretty forms naturally attracted most attention. The never-failing question—'which is edible?' was put. After explaining that it was not our mission to study that side of the subject particularly, a few of the commoner and more easily recognised edible species were pointed out.

Consignments of fungi were sent from Meanwood Woods, and from Arncliffe Woods near Littondale, by Mr. W. Denison Roebuck. They were attended to immediately on arrival.

The evenings were pleasantly and profitably occupied, listening to addresses on mycological topics, viz., :—

Mr. Masee: 'Abstract and Practical Mycology.'

Mr. Clarke: 'Mycological Puzzles.'

Mr. Gibbs: 'Relative Frequency of the Species of Agarics.'

Mr. H. Wager: 'The Life History of an Agaric.'

Abstracts of three of these are appended.

Sir H. C. Hawley was unable to be present, but consented to examine any *Pyrenomycete* material that might be sent him from Mulgrave, after his return home in October. This he has done, and added about a dozen species. Mr. Gibbs has developed ten or a dozen coprophiles from pieces of matrix taken back with him.

When all the material had been worked through as far as could be, the results of which will be seen below. It was found that 563 species had been identified, of which 145 and 5 varieties are additions to the known flora of Mulgrave district.

Messrs. Cheesman, Clarke, Peck, and the writer visited the woods May 28th-30th last. Some fungi are only to be seen in the spring months. Of the fifty-three species collected, ten or twelve were of this class, including *Tricholoma gambosum*—St. George's mushroom, *Morchella esculenta*, *Peziza reticulata*, and others. *Geopyxis coccinea* was reported to us by the head woodman, who collects this most beautiful fungus in early spring for the Hall, for ornamental purposes. The results of the May visit are added to those obtained at the ordinary foray.

On the Wednesday evening Mr. Cheesman exhibited a

number of Myxomycetes, many of which he collected in the Canadian Rockies, during his visit in connection with the British Association, 1909. He also gave an interesting sketch of the life history of this group of animal-plant borderland organisms.

By permission of the noble owner, another season's investigations is to be given to these woods and pastures, then to analyse and tabulate the results of previous visits. This will bring the work more into line with present-day ideas of field investigation—to work one clearly defined area well, and find out approximately what it can produce.

At the business meeting the thanks of the Committee were unanimously accorded to the Marquis of Normanby for allowing us the run of the estate; to A. B. Foster, Esq., J.P., for his kind permission to visit Arncliffe Woods although we could not avail ourselves of it: and to the Rev. W. G. Harland, for granting the use of the schoolrooms, which very much facilitated the work.

The following list are the additions to the flora of Mulgrave Woods, parks, and pastures, made during this foray. Those marked * are new to the British flora, 6; † new to Yorkshire, 14; and ‡ new to V. County, N.E., 29. The different groups are separated by a short line.

<i>Amanitopsis fulva.</i>	‡ <i>Naucoria cucumis.</i>
<i>Lepiota excoriata.</i>	† <i>Crepidotus calolepis.</i>
<i>Tricholoma resplendens.</i>	‡ <i>C. Rubi.</i>
<i>T. scalpturatum.</i>	<i>Cort. (Phleg.) russus.</i>
<i>T. imbricatum.</i>	<i>C. („ glaucopus.</i>
<i>T. argyraceum.</i>	‡ <i>C. („) scaurus.</i>
<i>T. sulphureum.</i>	<i>C. („) porphyropus.</i>
<i>T. terreum</i> var. <i>atrosquamosum.</i>	† <i>C. (Tela.) quadricolor.</i>
<i>T. saevum.</i>	‡ <i>C. („) injucundus.</i>
<i>T. melaleucum.</i>	<i>C. (Hygr.) Reedii.</i>
‡ var. <i>porphyroleucum.</i>	<i>Agaricus xanthodermus.</i>
† <i>Clitocybe splendens.</i>	‡ <i>A. compestris</i> var. <i>rufescens.</i>
<i>Collybia tylicolor.</i>	<i>Psathyra bifrons.</i>
<i>C. tenacella.</i>	‡ <i>P. gossipina.</i>
† var. <i>stolonifera.</i>	* <i>Hypholoma melantinum.</i>
<i>Mycena pelianthina.</i>	<i>Panaeolus fimicola.</i>
<i>M. flavipes.</i> Though first found here, it was recorded under Whitby.	<i>Gomphidius glutinosus</i> var. <i>roseus.</i>
* <i>Omphalia bibula.</i>	‡ <i>Paxillus lividus.</i>
<i>O. bullula.</i>	‡ <i>P. panuoides.</i>
<i>Pleurotus applicatus.</i>	<i>Hygrophorus hypothejus.</i>
‡ <i>Entoloma griseocyanea.</i>	† <i>H. clivalis.</i>
* <i>Clitopilus angustus.</i>	† <i>H. irrigatus.</i>
<i>Nolanea nigripes.</i>	† <i>Lactarius zonarius.</i>
‡ <i>Pholiota aurea.</i>	* <i>L. tabidus.</i>
<i>P. præcox.</i>	‡ <i>Russula olivascens.</i>
† <i>P. sphaleromorpha.</i>	<i>R. sardonina.</i>
† <i>P. pumila.</i>	‡ <i>R. serotina.</i>
* <i>Inocybe Cookei.</i>	<i>R. vesca</i> var. <i>lilacea.</i>
	<i>R. azurea.</i>
	‡ <i>R. Queletii</i> and var. <i>purpurea.</i>

R. fragilis var. *violacea*.
R. alutacea.
 † *Marasmius scorteus*.
M. foetidus.
 * *M. xerotoides*.
 † *M. sclerotipes*.

Fistulina hepatica.
 † *Polyporus lentus*.
P. melanopus.
P. mollis.
P. fumosus.
Fomes applanatus.
F. igniarius.
 † *F. fraxineus*.
Poria terrestris.
Dædalea confragosa.
 † *Merulius tremellosus*.
M. molluscus.

† *Hydum ochraceum*.
H. aureum.
 † *H. argutum*.
 † *H. stipatum*.
Phlebia merismoides.

Cyphella Pimii.
 † *C. fulva*.
Corticium lacteum.
C. arachnoideum.
C. sanguineum.
C. roseolum.
Peniophora hydnoides.
P. phyllophila.
 † *Thelephora palmata*.
T. caryophyllea.
T. cristata.

Clavaria fastigiata.
C. persimilis.
C. stricta.
 † *C. fistulosa*.

Exidia glandulosa.

Melampsora helioscopiæ.
M. farinosa.
M. pinitorqua.
M. belulina.
Coleosporium euphrasiæ.
 † *Puccinia epilobii*.
P. circææ.
Urocystis anemones.

Hypomyces lateritius.
H. rosellus.

Dialonectria sanguinea.
Hypoxyton coccineum.
 † *H. crustaceum*.
 † *Hypospila pustula*.
 † *Nitschkia cupularis*.
 † *Byssosphæria phæostroma*.
L. hispida.
Psilosphæria spermoides.
P. moriformis.
 † *Sordaria decipiens*.
Pleospora herbarum.
Sphærella punctiformis.
Dichæna quercina.

Choiromyces meandriiformis.

Morchella esculenta.
Vibrissia truncorum.
Geopyxis coccinea.
 † *Peziza reticulata*.
 † *P. lividula*.
Humaria violacea.
Lachnea setosa.
L. umbrorum.
Dasyscypha acutipila.
 † *Erinella Nylanderii*.
Helotium lutescens.
 † *H. sublenticulare*.
 † *Pseudopeziza albella*.
Ascophanus microsporus.
Saccobolus depauperatus.
Ombrophila clavus.
Orybilia vinosa.

Peronospora parasitica.

† *Phoma longissima*.
Ceuthospora lauri.

Monilia aurea.
Penicillium glaucum.
Botrytis vulgaris.
Verticillium Marquandii.
 † *Trichothecium roseum*.

Arcyria ferruginosa.
A. clavata.
Trichia abrupta.
T. scabra.
Chondrioderma difforme.
Didymium farinaceum.
D. effusum.
Physarum sinousum.
Tilmadoche mutabilis.
Leocarpus fragilis.
Ceratiomyxa mucida.

Abstract and Practical Mycology.

(ABSTRACT).

G. MASSEE, F.L.S., V.M.H., ETC.

THE primary object the members of the Mycological Section of the Yorkshire Naturalists' Union had in view, when the annual fungus forays were established, was to compile as complete a fungus-flora of the county as possible, under the circumstances. Such a flora can, perhaps, never be all embracing, but the results embodied in the 'Fungus Flora of Yorkshire,' represent practically as much work as would be justified on the part of the members, in considering it as the primary object of the forays. Additions will still continue to be made as opportunity offers, but other branches of mycology also claim attention. Several members who have now attended the forays for many years, and have also worked at the subject more or less throughout the year, possess a good general knowledge of the fungi as a group. But the time has gone by when a person can know all that *is known* respecting any one group of organisms. Therefore, backed up by a broad general knowledge, a point that is absolutely essential, it becomes desirable to specialise, and my advice is, confine yourself to one special group of the fungi, nay, confine yourself to one genus, and by degrees you will not only learn *all that is known*, but will learn many things *that were previously unknown*. From such a method of procedure you would certainly derive a greater amount of pleasure and interest than by simply expending energy on solely endeavouring, often in vain, to interpret other people's ideas respecting species promiscuously culled from any of the many families included in the fungi. The first-hand knowledge gained by the specialisation method will likewise be of the greatest value to every other mycologist.

In addition to the systematic side of the subject, the distribution of fungi, or what should perhaps be styled the ecological study, is practically unbroken ground. Why have we during a certain season, such a wave of certain genera or species, and an almost entire absence of others, usually equally common? or why are certain species or genera absent from one part of the country, and present in other parts? Neither climatic differences nor absence of the host-plant can account for such conditions, yet they exist; and we are very desirous of knowing exactly why.

Economic mycology also claims our attention. The hundreds of millions of pounds sterling that are annually lost owing to the injury caused to cultivated plants throughout the world, could, to a great extent, be prevented, if we knew more about the life histories of parasitic fungi.

This is a subject that could well be taken in hand by the field mycologist to whom the work appealed; and every item of information gained, although perhaps not leading to immediate results, would eventually dovetail in, and result in a complete knowledge not only as to how particular parasites attack their host-plants, how they survive during the period when their host-plant is not present (as in the case of many annuals, cereals, etc.,) and also indicate the most vulnerable point in their development.

Finally, now that the county flora is published, the necessity for selecting a new site for each foray no longer exists. On the other hand, it is considered highly desirable that the fungus flora of some particular district should be exhaustively worked, and as the Mulgrave Woods have proved to be so eminently suitable for the carrying out of this idea, it has been decided to devote at least one more foray to the investigation of the Mulgrave area, which is so extensive and varied that, from our special point of view, it is practically independent of seasonal vicissitudes, which, to a greater or less extent, determine the presence or absence of fungi in less favoured districts.

The Structure and Life History of an Agaric.

(ABSTRACT).

HAROLD WAGER, F.R.S.

THE fruit body arises from the mycelium as an oval or spherical mass of filaments matted together, in which the differentiation of the hymenium begins at an early stage, and usually before any external differentiation into pileus and stipe can be seen. In *Pholiota squarrosa*, however, the difference between pileus and stipe can be seen before the hymenium is developed, in the direction in which the scales of the universal veil begin to peel off.

The cells of the hymenium regularly, so far as can be seen, contain two nuclei, but, whether these divide by conjugate division, as has been suggested, is doubtful. The basidium at an early stage in its development is found to contain two nuclei. The presence of more than two appears to be an abnormal occurrence. These two nuclei fuse, and the single nucleus thus formed gives rise by two successive divisions to four nuclei which then pass through the narrow sterigmata into the spores. The origin of the binucleate condition of the cells of the hymenium has not been definitely traced, but it is found in all parts of the fungus body, and it does not appear probable that it arises by cell fusion, or by the passage of the nucleus from one cell into another. It is an interesting

fact in this connection that the spores in some species become binucleate before they are removed from the basidium.

The absence of a true morphological sexual fusion or anything corresponding to cross-fertilization may possibly have some connection with the variation of the Fungus body.

The Relative Frequency of the Species of Agarics.

(ABSTRACT).

T. GIBBS.

THE author gave the results of a comparison of the lists published for twenty-one forays, sixteen being held in Yorkshire by members of the Yorkshire Naturalists' Union, and five in the South of England by the British Mycological Society.

The study of the distribution of Fungi is difficult, owing to the uncertain appearance of species from one year to another, thus we may work a district for many years, and yet constantly meet with additional species each year. A comparison of the foray lists illustrates this fact even in regard to the commonest species, thus only two species *Paxillus involutus* and *Marasmius peronatus* appear in the whole of the twenty-one lists, while at almost every foray, certain universally common species are 'conspicuous by their absence.' Some species are particularly liable to be under-represented in foray lists, owing to their periods of maximum abundance not coinciding with the dates of the forays; the most striking example of this is *Tricholoma gambosum*, a fairly frequent species, but which on account of its usually appearing in spring has only been recorded at two of the Yorkshire forays. This cause also accounts for the sparse appearance at forays of such late autumn species as *Clitocybe cyathiformis*, *Collybia velutipes*, *Tubaria purpuracea*, and *Pleurotus ostreatus*.

Certain species appear to be commoner in the South than in Yorkshire. Among these may be mentioned *Amanita muscaria*, and *mappa*, *Armillaria mucida*, *Clitopilus prunulus*, *Cantharellus cibarius* and *tubaformis*, *Marasmius erythropus* and *epiphyllus*, and many species of *Cortinarius*. On the other hand, *Lepiota acutesquamosa*, *Mycena acicula*, *Omphalia umbellifera*, *Bolbitius titubans*, *Hygrophorus eburneus* and *Lactarius volemus*, all well marked, and frequent Yorkshire species, do not appear in any of the Southern lists.

It must, however, be admitted that the data are at present insufficient for any certain conclusions.

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Mr. W. Bagshaw has offered to furnish a room in the park mansion at Batley as a Museum.



Bittern (*Botaurus stellaris*).

YORKSHIRE NATURALISTS' UNION.

MEETINGS OF THE VERTEBRATE ZOOLOGY SECTION.

Two meetings were held at the Leeds Institute on November 19th, Professor C. J. Patten, M.A., M.D., Sc.D., the President of the Section, being in the chair. About forty members and associates were present in the afternoon, and sixty at the evening meeting.

Mr. Arthur Whitaker exhibited and described specimens of all the species of Yorkshire Bats, together with the *Barbastelle* from Cambridge, and the Greater Horse-shoe and Serotine Bats from the south of England. These represent all the known British species, excepting the extremely rare *Bechstein's* Bat.

Comparing an extremely large female Long-eared Bat from Christchurch, Hants., with the much smaller and darker Yorkshire specimens, Mr. Whitaker suggested there might be almost sub-specific differences, as all the Hampshire Long-eared Bats that he had seen were considerably larger and much greyer in colour than their Yorkshire representatives.

Mr. Oxley Grabham described and shewed by the lantern, a charming series of photographic pictures, which he had taken during 1910, chiefly in the North Riding. These included Nightjars in all stages of breeding—an instance being recorded where a most reliable gamekeeper had marked a pair of Nightjars' eggs which were removed half-a-mile away by the birds, and incubation continued. Mr. Grabham also pointed out how the Nightjar always shuffled backwards on to its eggs. A series of the Stone Curlew shewed the way the bird gradually lined its nest with small pebbles, etc., after the eggs were laid, and during incubation. A Corncrake was shewn feigning death when wounded; and, as the result of floods on their nesting grounds, deserted Lapwing's eggs were firmly embedded in the mud, and young Lapwings killed by the quantity of mud adhering to their legs. A Viper which was endeavouring to swallow a Curlew chick, was illustrated, as well as a beautiful series of Great Crested Grebes (birds, nests and eggs) taken on the lake at Castle Howard, where three pairs nested last season. There were numerous slides of Woodcock and Golden Plover, at and upon their nests. Pisces were represented by freshly-caught Garfish and Tope taken by the lecturer. On behalf of Mr. W. J. Clarke, fine slides were exhibited of the two large Common Rorquals, which had been stranded near Scarborough in 1910. Mr. Grabham also shewed some amusing pictures of the futile attempts of a liberated Barbary Dove to incubate a Peafowl's egg on the top of the wall of St. Mary's Abbey, in the grounds of the Museum at York.

Mr. Riley Fortune dealt in detail with 'The Life History of the Gannet.' He pointed out most of the chief phases in its nesting economy and life history, and illustrated his remarks with excellent limelight pictures of the different stages of the bird's life, chiefly on the Bass Rock, which is probably the oldest known breeding place of this species, and from which its specific name was derived. Besides his own notes and personal observations, Mr. Fortune acknowledged indebtedness to Mr. Campbell, the head keeper of the Bass Light, and also to Mr. J. H. Gurney, who is at present preparing a monograph of this species. The Gannet, or Solan Goose, has closed nostrils, practically no tongue, and its body is covered with sub-cutaneous air-cells which communicate directly with the lungs. These air-cells can be filled or emptied at pleasure, and are supposed to act as an air-cushion to break the bird's impact with the water when diving from a great height for food. The bird weighs about 8½ lbs., and has an expanse of wings of about 6 feet. The breeding colonies were all enumerated. They are not numerous, but at most of them vast numbers of the birds congregate to nest. The situation and the composition of the nests were explained, and the birds were described as even greater thieves than Rooks in stealing building material from each others nests. A single egg is laid, but should this be taken, the birds will lay a second—

and even a third in a season. The composition of the shell of the egg was explained, and it was stated that Mr. Drane, of the Cardiff Naturalists' Society, had demonstrated that it only required the lime derived from 1 lb. of fish to form a Gannet's egg. The earliest eggs were laid by the end of March, but April was the usual month for general laying. Incubation lasted forty-two to forty-four days. Mr. Campbell had marked an egg laid on April 22nd, which hatched on June 5th, or in forty-four days. Gannets were said to cover the egg with their foot when incubating; and the absence of a 'hatching-spot' on their breast tended to confirm this; but against this theory is the fact that Cormorants and Shags of the same family, and which lay four to six eggs, have no 'hatching-spot' either. The young when first hatched are blind, naked and helpless, and are slaty-black in colour. May 10th was the earliest date for hatching, the normal period being the end of June. Both sexes assist in incubating. The eyes of the nestling open on the eighth day, and by the tenth day they are clothed in a dense white down. The wing feathers begin to appear on the twentieth day, and the birds commence to grow very fat about the thirtieth day. About a month later they are considered to be in the right condition for killing—that is where they are still used for human food, as on the island of St. Kilda. Two months after hatching, the old birds cease to feed the young. This is necessary, as otherwise they would be so heavy and unweildy as to be unable to leave the rock. About ten days after this the young birds leave the nesting ledges and fly on to the sea below, where they remain drifting about for between two and three weeks, still unable to feed themselves, and still existing upon their accumulated store of fat. Towards the end of this period, their wings having grown strong enough, they commence fishing for themselves. Their plumage is now greyish, or blackish-brown, spotted with white triangular spots at the end of each feather. Nearly three months elapse from hatching before the young birds leave the nesting ledges, and about four months before they are fully able to fish for themselves.

The operation of the old birds feeding the young has been witnessed by very few persons, and it evidently takes place very early in the morning. Mr. Campbell has, however, recently been able to obtain a photograph of a Gannet feeding a young one. Full plumage is not attained until after the fifth moult, and the birds never breed until they have assumed the adult attire; although birds in the last garb of immaturity may frequently be seen carrying nesting materials about in their beaks. Variation from type is rare amongst Gannets, but an adult bird was photographed on the Bass Rock this summer which varied considerably in colour. It was nesting, and was paired to one of the normal type. Mr. Fortune stated that in damp weather it is necessary to exercise great care in photographing Gannets at their breeding haunts, owing to the precipitous and foul surroundings. On a wet day the young birds were in a miserable and bedraggled state, yet if the following day should be fine, they would be just as clean and white as ever. He remarked that the Gannets had not yet acquired the habit of dropping on to the skull of the photographer with their powerful beaks, as individual Terns and Gulls occasionally do; or photographs of Gannets nesting would be very scarce!

Mr. George Parkin exhibited a finely mounted and excellent specimen of an immature partially albino Starling, and of a Green Sandpiper, both from the neighbourhood of Wakefield.

A keen discussion arose after a paper by Mr. Thos. M. Fowler, on 'Recent Notes on a Young Cuckoo,' and was partly the outcome of a paper read at the previous meeting of the Section (*vide* 'The Naturalist,' 1910, pp. 133-134). Last summer Mr. Fowler carefully watched, day by day, a Hedge Sparrow's nest in which a Cuckoo's egg had been deposited, and had taken photographs from time to time, which were shewn.

It seems that on June 10th, the nest contained one egg; on June 11th two eggs; June 13th, three eggs of the Hedge-Sparrow and an egg of the Cuckoo; on June 14th four Hedge-Sparrows' eggs and that of the Cuckoo.

At twelve noon on June 24th, the five eggs were still intact in the nest, but at 5-10 p.m., one young Hedge-Sparrow was out of the shell, and at 11 p.m. on the same day another Hedge-Sparrow and the young Cuckoo had hatched, and were quite dry. Another Hedge-Sparrow hatched out in the afternoon of the following day, and there were no further development that day, the remaining egg not being fertile. The next morning (June 26th), the egg had disappeared, and a very careful search in the vicinity of the nest failed to discover any trace of it. The same evening the young Cuckoo became very restless, and made several unsuccessful attempts to eject the young Hedge Sparrows; but it only succeeded in working its victim to the level of the top of the nest, when both fell forward. Arriving at 7 a.m. on June 27th, Mr. Fowler was greatly disappointed to find the three young Hedge Sparrows hanging on the outside of the nest. Two, however, not being dead, were revived by the warmth of his hands, and were put back into the nest, when the mother-bird returned, fed them and brooded them, and actually walked over the dead young one on her way. One of the youngsters that had been returned to the nest, died, and throughout that day, during the intervals when the mother-bird was away from the nest, the Cuckoo was constantly endeavouring to throw out the living young Hedge Sparrow. On several occasions the Cuckoo got its foster-brother to the top of the nest, when the strugglings of the latter caused it to fall back again.

On arriving at 6-45 a.m. the following day, the young Hedge Sparrow was out of the nest, but still alive, and was returned once more to its rightful home. The young Cuckoo (whose body was now of a blue-black colour, having changed from the pale flesh colour when first hatched), was very businesslike in its methods, and wriggled its head about from side to side in a remarkable manner for a young bird. It worked its young foster-brother on to its back (which Mr. Fowler considered to be flat and broad, and without any perceptible hollow), walked up the nest side backwards with its immature wings outstretched, 'and threw the youngster right clear of the nest into my hands, which were waiting to receive it.' After this operation the young Cuckoo remained for a minute or so at the top of the nest, its embryo pinions outstretched, jerking its body backwards and forwards in a most energetic way. Mr. Fowler saw the young Hedge Sparrow ejected quite a dozen times during that day, but the following morning (June 29th), at half-past six it was lying cold and dead below the nest. Neither the young Cuckoo nor the old birds attempted to remove the nestling that had died within the nest, and after three days, when it had got somewhat flattened, and was smelling, Mr. Fowler threw it out.

During the whole of these protracted observations Mr. Fowler never saw any adult Cuckoo near to the nesting site.

Mr. Fowler also shewed a charming series of lantern slide views of the nesting of the Ringed Plover. One very fine picture shewed that the mother-bird, rather than face the camera too closely, had called away, and was contentedly brooding a newly-hatched young one a yard from the three eggs, some of which were already 'chipped,' and a young chick could be distinctly heard by Mr. Fowler calling within the shell.

Professor Patten exhibited about a dozen glass-phials, each containing sections of a large Earthworm in spirits. These had all been obtained from Song-Thrushes whilst in the act of dividing them. Prof. Patten shewed that even in this simple and everyday action the Thrushes had method. Each worm was divided into four almost equal sections, or was bitten nearly through into four almost equal portions. In one or two of the examples shown where the bird had not fully completed the operation before the worm was taken away, there were only three sections, consisting of two quarters and one half. Prof. Patten also threw upon the screen a series of lantern views of shore birds and cliff birds, taken by instantaneous telephotography on the Irish coast. Although lacking the beauty and clear outline of the ordinary photograph, they had the merit of show-

ing the birds' natural attitudes and habits, which the ordinary camera often loses because of its too near approach to the birds.

Mr. Walter Wilson exhibited a fine series of lantern slides of a pair of Grey Wagtails feeding their young at the nest. Both birds brought food, and one photograph shewed both the parents at the nest at the same time.

Mr. Walter Greaves passed round for exhibition a specimen of the Spotted Sandpiper (*Totanus macularius*) supposed to have been obtained in the neighbourhood of Hebden Bridge a few years ago.

The next meeting of this Section will be held in the same room at the Leeds Institute, on Saturday afternoon and evening, February 18th, 1911.

H.B.B.

GUIDE TO THE BIRDS IN THE HULL MUNICIPAL MUSEUM.

(PLATES III. and IV.).

THE Committee who have the management of the Hull Municipal Museum are to be congratulated upon getting together a very fine collection of Birds, and thus filling a very noticeable gap which has existed in the Museums' exhibits, and which has hitherto been a standing reproach to them.

Mr. Sheppard has, in his usual thorough manner, compiled a most excellent and interesting catalogue of about 122 pages, giving a short description of every species.

Altogether there are 420 cases, containing something like 900 specimens of 274 British and 45 Foreign species, and as the photograph of the Bird Room (frontispiece) shows, they are exhibited under the best conditions.

Under each species is a short and interesting account of its distribution, and the information given is very trustworthy and accurate. It is in no spirits of fault finding that we should suggest that when a second edition becomes necessary, it would be advisable to give more consideration, after the account of its general distribution, to its status as a Yorkshire species, as in a few instances the particulars given are not sufficient.

The only reference to the Pied Flycatcher as a Yorkshire bird is that it has been recorded breeding near Beverley; to the Grasshopper Warbler that it is the rarest warbler in E. Yorks.

We are told that the Eagle Owl is 'a rare visitor to the northern portion of Britain. Examples have occurred in Orkney and Shetland.' It would have been as well to mention that it had been obtained on several occasions in Yorkshire.

The Kite is said to be 'now practically exterminated in Britain.' It is, however, gratifying to know that it is increasing in numbers in Wales. The Common Buzzard is not so rare as we are given to understand.

The White-winged Crossbill and the Spotted Sandpiper are stated to have no claim to a place in the British List; both species, however, have well established claims. The first mentioned has several times been shot in the County, and a specimen of the latter was obtained quite recently in the Hebden Bridge district.

Under Brunnich's Guillemot the fact of Mr. Oxley Grabham recently recognising a specimen in the cliffs at Bempton during the breeding season is well worthy of mention, and it might also be recorded that the Levantine Shearwater in the collection, was the first recognised specimen of what has since proved to be a not altogether uncommon visitor to the Yorkshire coast. It is also worthy of note that the Pectoral Sandpiper in the Museum has been made historical by the fact that it is the bird figured in Lord Lilford's magnificent work on British Birds.

These are interesting notes which might be incorporated in a future edition. The Catalogue is a model for any Museum to follow, not only for its interesting information, but also for its general 'get up.' The printing is in bold and clear type, and the illustrations are both numerous and good. Those of the Golden and White-tailed Eagles, Bee-Eaters, Hoopoes, Pallas's Sand Grouse, Bittern, and that of the Bird Room are particularly good (see Plate III. and IV.). At the price at which it is issued (3d.) it is exceedingly cheap.

R. F.

Naturalist,



Bee Eater (*Merops apiaster*).

A YEAR'S SCIENTIFIC WORK IN YORKSHIRE :
BEING
THE YORKSHIRE NATURALISTS' UNION'S
FORTY-NINTH ANNUAL REPORT, FOR 1910.

Presented at Middlesborough, Dec. 17th, 1910.

The Forty-eighth Annual Meeting was held at Scarborough on December 11th, 1909, and there was a very satisfactory attendance. The Scarborough Field Naturalists' Society had made excellent local arrangements, and, in the early part of the day, its members led excursions. The General Committee met at the Museum, and in the evening a General Meeting and Conversazione was held at the Grand Hotel, at which the President, Mr. W. H. St. Quintin, delivered his presidential address, entitled "Some Avicultural Notes," which has since appeared in "The Naturalist." In connection with the conversazione the Scarborough Society had arranged a very fine exhibition of local natural history, geological and archæological specimens. The fine show of living marine specimens also was particularly appreciated.

Seven Field Meetings have been held during the year, five being the usual divisional excursions; one the fungus foray; the additional Field Meeting being at Redcar, in connection with the Yorkshire Marine Biology Committee. At one of the meetings an opportunity was taken of joining forces with the Lincolnshire Naturalists' Union, at Scunthorpe, with very successful results. All the outings, however, have demonstrated that there is much still to be done in connection with the flora and fauna of our county, notwithstanding the half century of the Union's work.

The Excursions were held as follows:—

Yorks., N.W.—Middleton in Teesdale (Whit week-end, May 15th to 17th).

„ Mid.W.—Malham (Saturday, June 4th).

„ S.E.—Easington for Spurn (Saturday, July 9th).

„ N.E.—Kirby Moorside, (Bank Holiday week-end, July 30th to August 2nd).

Lincs., N.—Scunthorpe (with Lincs. Naturalists' Union; Thursday, August 25th).

Fungus Foray, Mulgrave Woods and Arncliffe (September 17th to 22nd).

Coast Excursion, Redcar, September 2nd to 6th.

Middleton in Teesdale.—On the borders of the county, with an occasional trespass into Durham, the Union held its first excursion of the year during Whit week-end. Everything was favourable for a pleasant and profitable excursion, and quite a

number of friends assisted with local arrangements, etc. The General Meeting was held at the Cleveland Arms, under the presidency of Mr. J. J. Burton. Thirteen new members were elected. A full report appeared in "The Naturalist" for July.

Malham, June 4th to 6th.—On this occasion one section of the members devoted the week-end to investigating the fauna of Malham Tarn; the owner, Mr. Walter Morrison, J.P., giving exceptional facilities. The geologists and botanists were particularly interested in the surrounding district; the famous Malham Cove and the surrounding valleys being well worthy of examination. A General Meeting was held at which Mr. G. T. Porrit presided. A full report appeared in "The Naturalist" for September.

Easington and Spurn, July 9th to 11th.—A pleasant week-end was spent at the south-eastern extremity of the county, the recent ravages of the sea and their effect upon the district, giving the excursion a peculiar interest. The geologists also had a definite piece of work in hand, which they successfully accomplished. Mr. J. W. Stather presided at the Society's head quarters, at the Marquis of Granby Hotel, Easington. A report of the excursion appeared in "The Naturalist" for September.

Kirby Moorside.—August Bank Holiday week-end was held at Kirby Moorside, Kirkdale, Rievaulx, etc. The famous cave at Kirkdale was of particular interest on account of Buckland's researches, and at one of the Evening Meetings Mr. T. Sheppard read a paper on the subject, and exhibited a recently prepared plan, which has since been published in the Union's journal. Mr. W. N. Cheesman gave an interesting address on Canadian Myxomycetes. Mr. H. E. Wroot described the fine ruins at Rievaulx. Mr. J. J. Burton presided at the General Meeting. An illustrated report appears in "The Naturalist" for November.

Scunthorpe. Thursday, August 25th.—On this occasion the members of the Lincolnshire Naturalists' Union joined our party in an investigation of the ironstone mines and moors around Scunthorpe. The Rev. Canon Fowler presided at an exceptionally representative gathering of Yorkshire and Lincolnshire Naturalists. Several important finds were made, as will be seen from the illustrated report in "The Naturalist" for November.

Redcar.—The Marine Biological Committee held its first official excursion on the coast between September 2nd and 6th. Unfortunately the meeting clashed with the British Association Meeting at Sheffield; but, nevertheless, an excellent amount of work was accomplished, as will be seen from the Rev. F. H. Wood's report in "The Naturalist" for November. The Committee intends to carry on its work on the coast next year.

Mulgrave Woods and Arncliffe.—In this interesting neighbourhood the members of the Yorkshire Mycological Committee held

their Annual Fungus Foray, between September 17th and 22nd. The week's work was fruitful of good result, some new species to science being found. The Secretary, Mr. C. Crossland, has prepared a detailed report of the work accomplished, which will shortly appear in "The Naturalist."

Speaking generally, a pleasing feature at the excursions during the past year has been the number of the older members of the Union who have taken part, and given their guidance. In this way they have greatly encouraged the younger workers, of whom, we are glad to say, we have a constantly increasing number.

In connection with the Field work and meetings of the Union, the following articles have appeared in "The Naturalist"—

"Yorkshire Naturalists' Union Report for 1909."

"Yorkshire Naturalists at Scarborough."

"The Diatoms of the Sedburgh District, A Study in Evolution" illustrated; R. H. Philip.

"Nemertine within test of Sea-urchin," J. Irving.

"Some Avicultural Notes," W. H. St. Quintin.

"Yorkshire Naturalists' Union; Report of Vertebrate section," H. B. B.

"Geological Notes on the District North of Malham," map, Cosmo Johns.

"Yorkshire Naturalists at Malham," T. S.

"The Natural History of Spurn," T. S.

"Natural History of Middleton-in-Teesdale," T. S.

"Geological Notes on the Middleton-in-Teesdale District," illustrated, J. J. Burton.

"The Origin and Tendencies of Parasitism in Fungi," G. Masee.

"Botanical Survey of Teesdale," W. G. Smith and T. W. Woodhead.

"Naturalists at Scunthorpe," illustrated, T. S.

"The Natural History of Kirby Moorside," illustrated, T.S.

"Marine Biology at Redcar," Rev. F. H. Woods.

"Contribution towards the Life History of *Dasyplia templi*," B. Morley.

Also the following short notes :—

"Mammals at Osnotherley," H. B. Booth.

"Worm Parasite in Sea-Urchin," J. Ritchie.

Excursion Programmes, with full particulars of the natural history, geology, etc., of the respective districts visited, have been regularly printed and sent to the members and associates. Extra copies have been struck off for binding in the Transactions.

Permission to Visit Estates has been given, as usual, by the landowners in various parts of the county, and in many instances these gentlemen have also given great assistance to our members in their investigations.

Railway Facilities.—As in past years the various railway companies have given every help, as regards reduced fares, etc., in this way enabling many to attend our rambles who would otherwise not have been able to take part.

The **Excursions for 1911** are recommended as under:—

Yorks., Mid. W.—Harewood, May 13th.

„ N.E.—Castleton, Whit week-end (June 3rd-5th).

Lincs., N.—Barton-on-Humber, (with the Lincs. Nat. Union),
July 1st.

Yorks., N.W.—Ingleton for Kingsdale or Grayreth, August
Bank-holiday week-end (August 5th-7th).

„ S.W.—Country between Huddersfield and Penistone,
September 9th.

Fungus Foray—Mulgrave Woods, September 23rd-28th.

The Annual Meeting for 1911. The Executive recommend that this be held at Dewsbury, on December 16th.

Objects of the Union.—Circulars setting forth the objects and aims of the Union will be gladly sent on application to the Secretary.

Winter Lecture Scheme.—The list of lectures being out of date, owing to various causes, is being revised, and will be sent to the Associated Societies very shortly. The Affiliated Societies are glad to avail themselves of the facilities offered by this scheme.

The Affiliated Societies.—There are now forty-three affiliated Societies, the South Yorkshire Entomological Society having joined at the Annual Meeting.

The Statistics furnished by the Secretaries of Societies shew that there are now 42 societies, with a total membership of 3449 or an average of 82. This, added to the membership of the Union, makes our total numerical strength 3868.

The Membership of the Union now stands at 419. This number does not include the Affiliated Societies, each of which is practically a member.

New Members.—The following new members and societies have joined during the year.*

Miss Constance Atkinson, 3 Woodland Terrace, Chapeltown Road, Leeds.

Colonel Bland, 35 Avenue Victoria, Scarborough.

Dr. Drake Brockman, F.R.P.S., Cleveland Asylum, Middlesbrough.

Mr. J. H. Brierley, 39 Main Street, Sutton Mill, near Keighley.

Mr. A. Burnley, York House, Gladstone Road, Scarborough.

Mr. H. Squier Cheavin, F.R.M.S., Clematis House, Somerset Road, Huddersfield.

Mr. John Cryer, 182 Cliffe Wood Mount, Shipley.

* This list includes those elected at the Annual Meeting at Middlesbrough.

- Mr. H. V. Corbett, 9 Priory Place, Doncaster.
Mr. E. H. Chapman, M.A., 3 Harecourt Temple, London, E.C.
Miss Annie Drake, Thwing, near Hunmanby.
Sir Charles Eliot, K.C.M.G., Brockwell, Triangle, Halifax.
Mr. F. H. Edmondson, 72 Devonshire Street, Keighley.
Mr. Andrew Fox, Lindum Terrace, Bradford.
Mr. J. W. Glendinning, Ash Villa, Huddersfield.
Mr. C. J. Hardy, 31 Hampton Road, Sheffield.
Mr. Bernard Hobson, M.Sc., F.G.S., Thornton, Hallam Gate Road, Sheffield.
Mr. Digby Legard, Headon Lodge, Brompton, S.O.
Mr. Miles Ling, F.Z.S.; 559 Spring Bank West, Hull.
Mr. E. B. Lotherington, 39 Grange Avenue, Scarborough.
Mr. A. J. Moore, 9 Brook Street, Hull.
Mr. E. A. Parsons, 45 Lansdowne Street, Hull.
Miss Mary Nina Peel, Knowlesmere Manor, Clitheroe.
Mr. A. C. Seward, M.A., F.R.S., Botany School, Cambridge.
Rev. Thos. Stephens, Horsley Vicarage, Otterburn S.O., Northumberland.
Mr. Theodore C. Taylor, M.P., Sunny Bank, Batley.
Mr. W. Thornber, 205 Hyde Park Road, Leeds.
Mr. G. B. Walsh, B.Sc., 6 Lancaster Road, Linthorpe, Middlesbrough.
Mr. H. Wade, 10 Pitt Street, Barnsley.
Miss Alice Hibbert Ware, 5 Granville Road, Scarborough.
Mr. H. Witty, 35 Nansen Street, Scarborough.
The South West Yorkshire Entomological Society, c/o J. Hooper, Grosvenor Terrace, Middleton, near Wakefield.

Obituary.—We regret to record the deaths of—

John Handley, Sedbergh.

C. Fox-Strangways, Hampstead.

An obituary notice of Mr. Fox-Strangways appeared in "The Naturalist" for May. A notice of the late John Handley is in preparation.

Divisional Secretaries.—As in previous years these gentlemen have been of the greatest assistance in arranging the excursions etc. The following are elected for 1911:—

York, S.W.—A. Whitaker, Worsborough Dale, Barnsley.

York, Mid.-W.—Riley Fortune, 5 Grosvenor Terrace, East Parade, Harrogate.

York, N.W.—W. Robinson, Greenbank, Sedbergh.

York, N.E.—J. J. Burton, Nunthorpe, R.S.O., Yorks

York, S.E.—J. W. Stather, Brookside, Newland Park, Hull.

Local Treasurers.—These gentlemen have also been of service in collecting subscriptions, and in looking after the Union's interests generally. The following are elected for 1911:—

Bradford—H. E. Wroot, 45 Pollard Lane, Bradford.

Halifax—C. Crossland, 4 Coleridge Street, Halifax.

Huddersfield—W. E. L. Wattam, 54 Towngate, Newsome,
Huddersfield.

Leeds—H. Ostheide, 91 Harehills Avenue, Leeds.

Malton—M. B. Slater, Newbiggin, Malton.

Middlesbrough—M. L. Thompson, 40 Gosford Street, Middles-
brough.

Redcar—T. H. Nelson, Redcar.

Scarborough—J. H. Rowntree, Folkton Manor, Ganton, York.

Sheffield—A. T. Watson, 11 Leopold Street, Sheffield.

Skipton—W. Wilson, Ryedale House, Colne.

Whitby—Thomas Newbitt, 17 Royal Crescent, Whitby.

General Committee.—The following names have been added to the list of members of the Permanent General Committee :—

J. B. Brown, Hebden Bridge.

H. C. Drake, F.G.S., Scarborough.

J. Irving, M.D., Scarborough.

J. W. H. Johnston, Thornhill.

A. Haigh Lumby, Bradford.

A. R. Sanderson, Bradford.

T. W. Saunders, Brotton.

T. Stainforth, Hull.

E. W. Wade, Hull.

G. B. Walsh, Middlesbrough.

Transactions.—The Union's funds have not enabled us to print a volume of Transactions during the year, and the Annual Report for 1909 was published in "The Naturalist" for January last; in this way, however, the valuable reports of the Committees and Sections were at once placed on record, they are also indexed, and in addition, greater publicity was given to the Union's work. Towards the next volume we have in hand the Geological Bibliographies for 1909-10; a list of Yorkshire Arachnida, by Mr. W. Falconer; Mr. P. Fox Lee's Supplement to the Flora of Dewsbury; and Mr. F. A. Lees' Supplement to his Flora of West Yorkshire; Yorkshire Hemiptera, etc., by Mr. W. Denison Roebuck, and Economic Fungi, Part IV., by Mr. J. H. Holland. There are also the reprints of the various excursion programmes of 1909 and 1910 (already printed off).

SECTIONS AND COMMITTEES.

The President and Secretary of the Union are ex-officio members of all Sections and Committees.

VERTEBRATE SECTION REPORT.

West Riding.—Mr. R. Fortune writes :—The spring and most of the nesting season was cold and inclement. The migrants,

however, arrived about their usual time, with the special exception of the Swift, which, for some unexplained cause, was unusually late. At Harrogate they did not put in an appearance until May 17th, unprecedentedly late, the 6th of May being their average time of arrival.

In many districts the cold weather affected the nesting of Partridges very considerably, many unfertile eggs being found, and a number of young birds dying off after hatching. Yet, strange to say, wild Pheasants have done very well, and almost a record season has been experienced as far as Grouse are concerned; on the Bolton Abbey shooting, 5170 brace were brought to the bag, the largest total for over ten years.

Red-legged Partridges continue to increase in the district stretching from about two miles south of Harrogate to beyond Church Fenton.

Goldfinches are reported as nesting in one or two fresh localities; as also are Hawfinches, showing a steady increase in both species. The Great Crested Grebe and Tufted Ducks continue to increase as resident breeding species.

Many Fieldfares lingered until a late date in May. A very large flock numbering some hundreds of birds was seen in the Hawes district on May 7th, and large numbers passed through the district on May 1st.

The autumn migration, although setting in rather late, appears to have been a strong movement. Hundreds of Redwings and Waders were passing over every night from the middle to the end of October.

In the Harrogate district and other parts of the West Riding, unusual numbers of Kestrels have been observed during October and November, several being seen on the wing at one time. Magpies, too, are unusually numerous. Both these, as far as the numbers are concerned, may be regarded as migrants in the district. Hooded Crows are more numerous than they have been for many years.

An immature Gannet was obtained near Wetherby on October 20th, and another one seen at the same time. The first bird has been added to the collection at the Cartwright Hall Museum, Bradford. The stormy weather prevailing about this date had, no doubt, driven these birds inland.

With reference to the great immigration of Crossbills into this county in 1909, careful search has been made, especially in Airdale and Wharfedale, to see if any remained to nest in the West Riding, but no authentic case has been noted nor birds seen.

Several Crossbills were seen in the Nidd Valley near Harrogate, on November 22nd, evidently newly arrived birds. On the same date twenty Wild Swans were seen on Fewston Reservoir. A flock of twenty-five Wild Geese passed over Harrogate on November 13th. Mr. Booth reports that a Little Auk was

obtained at Mountain, Queensbury, in the Aire drainage area, on November 24th. This date coincides with the great movement of these birds noted on the coast.

Mr. W. H. Parkin's report, for Airedale and Wharfedale, states that Tree Creepers are increasing in Bolton Woods. Herons at Esh-ton were sitting as early as March 19th; there does not appear to be any decrease in the numbers of this colony. A Missle Thrush's nest was found in April, only three feet from the ground. Dippers have been plentiful in Upper Airedale; three nests were found within a mile. Dunlins appeared in their usual numbers, but few pairs nested. Whinchats were found to be increasing in numbers on the bracken-clad Baildon Moor. On July 14th, a nest was seen with fresh eggs, all hatched on the 24th, a late date. Cuc-koos have been exceptionally scarce.

A list of the Vertebrate Fauna of the Hebden Bridge District, compiled by Mr. Walter Greaves, has been published during the year, and a review of the work appeared in "The Naturalist."

North Riding.—Mr. T. H. Nelson writes:—The autumn migration in the North Riding was delayed long beyond the usual time, probably owing to the fine weather which prevailed; I did not notice any pronounced southward movement until the end of October, when there was a great "rush," consisting chiefly of Fieldfares, Redwings, Hooded Crows, Short-eared Owls, Wood-cock, Goldcrests, and the usual species which are to be looked for at this period. The only remarkable feature was the immense quantity of Mealy Redpolls, that were reported along the whole of the coast line. I do not remember ever before having observed such immense flights of these little northern visitors. They were very tame and easily taken by the bird-catchers. A few Wheat-ears and Whitethroats accompanied the stream of migrants.

We had a great migration of Little Auks on November 19th, with a strong N.E. wind, and heavy sleet and hail showers. There were hundreds passing; also great flights of Wigeon and other Ducks; and also five Wild Swans.

Mr. Riley Fortune adds: An Osprey (immature) was unfortunately shot at Pickering at the end of October.

On July 10th a Great Skua was picked up on the beach at Marsk-by-the-Sea. It was in very poor condition. On July 17th two Fulmar Petrels were picked up between Marsk and Redcar, and another one in an advanced stage of decomposition was seen. The weather had been very cold and stormy for about a fortnight-with wind from N. and N.E.

A pair of Rooks again nested on the spire of Brunswick Church at Whitby.

A Hoopoe was shot on the Ganton Golf Links on November 3rd, by a youth with a catapult. It was an adult female, and upon dissection was found to have been feeding on the larvæ of the "daddy-long-legs."

It may be interesting to note the composition of a Sparrow's nest found at Helmsley. The nest was in an outhouse, and amongst the usual materials were found six pieces of string, a hat pin, half a telegraph form, two pieces of leather, fourteen pieces of paper, three match sticks, and one piece of orange peel.

Mr. W. J. Clarke reports that a Little Gull was shot from a boat at Scarborough, on September 28th; a Sooty Shearwater on September 10th, and a second bird of the same species on October 5th. Four Sandwich Terns were fishing in the South Bay on August 30th, and three more at Filey Brig on the following day. A Great Skua was flying about the piers on October 21st, during a strong easterly wind. It was chasing Herring Gulls. An adult Long-tailed Duck, ♂, was sheltering inside the piers on October 22nd; it was quite tame, and is the first adult Mr. Clarke has any note of locally. An immature bird of the same species was shot on October 2nd, and another one on October 11th.

Mr. Clarke also reports that the Peregrines again endeavoured to nest in the cliffs south of Scarborough, but the eggs were taken and both birds shot in the latter part of April.

About 150 pairs of Black-headed Gulls were nesting on a small bog on the moors, between Whitby and Scarborough. On May 25th Herring Gulls were there in numbers, stealing the eggs of the smaller species, the result being very few young were hatched.

The great migration of Little Auks was noticed at Scarborough by Mr. Clarke, on November 20th, and on the 21st they were passing in hundreds, *all going north*. Some of the flocks would number two hundred to three hundred birds. On this date there was a moderate N.E. wind, and rough sea.

East Riding.—Mr. E. W. Wade writes:—The winter of 1909-1910 was a hard one, with much snow, wind, and rain till mid-March, when about a month of fine sunny weather set in. The March gales were so violent that at Bempton chalk stones were carried inland as much as 250 yards from the cliff edge, though in comparison with the worst gales within memory of the oldest inhabitant, this appears to have been mild, as Ned Hodgson remembers finding a piece of flint when in the company of the late Mr. Nesfield, which had been blown fifty yards inland, and which they weighed together; it turned the scale at 7½ lbs. Spring generally was cold and showery till June brought a spell of fine dry weather. After that the season was cold and wet.

The Spring migrants observed in this district were: a solitary Tree Pipit in March, seen by Messrs. Jackson and Griffiths; Yellow Wagtail, Cottingham, 11th April; Swallows, 15th and 16th April; Chiffchaff, 22nd April; House Martin, and Garden Warbler, 24th-25th April; Tree Pipit, 26th April; Cuckoo, 27th April; Common Whitethroat, 24th April; Swift and Sedge Warbler, 8th May; Spotted Flycatcher, 14th May; the last

flock of Fieldfares, Bempton, 22nd May, which appears late, considering that the winter in Scandinavia was unusually mild.

Some early birds nested sooner than usual, viz., Thrush, young, 21st March, with contour feathers sprouting, and many others laying and building. Blackbird, four eggs on 1st April.

The Long-eared Owl nested much later than in 1909. Scarcely any had commenced in March, and first eggs were generally plentiful during the first week of April; some as late as the 10th April. The clutches were generally three eggs, sometimes only one or two, though in two instances five eggs were observed.

The Tawny Owl was scarce and late.

Barn Owl scarce and clutches small.

The scarcity of voles as compared with 1909 seems to have been the controlling factor, but though reproduction was retarded, some birds laid full clutches.

The March sunshine seems to have stimulated the Rooks, which, in one instance at least, only commenced building on 4th to 5th March, and a month later had generally hard-sat eggs, and young. Clutches generally were full, with a preponderance of five and four eggs. On the 1st May I observed Rooks feeding in flocks at Broomfleet.

The Peewits commenced laying in March, and had no setback.

Mistle Thrushes were well on the way with nesting operations early in April.

Magpies and Carrion Crows were well up to date, and produced full clutches. Two clutches of six each were observed in Holderness.

The Waders generally were earlier than usual. On the 6th of April a large flock of Golden Plover was seen in Holderness, when the North Yorkshire birds had been on their breeding ground about eleven days.

The cold and wet spring retarded the nesting operations of the Warblers, which generally were below the average in numbers, and late in laying.

The Spotted Flycatcher was scarce as compared with 1909.

House Martins were unusually numerous, which suggests the query as to whether these birds stay further south to breed in the case of an abnormally cold spring.

On the 16th July, a Corncrake sitting on nine eggs was mown out at Bempton. The bird sat on under the swathe after the machine had passed over it, and added to the nest from the cut grass. This species shows no increase in numbers in Hull and district.

The Turtle Dove maintains its advance over the eastern part of the county, and is extending nearer to Hull.

Wild Pheasants had a good year.

Partridges have been simply wiped out in most parts of

Holderness, and in some districts even the old birds have almost disappeared. On the Wolds the coveys, though not so numerous as in 1909, were good, and the birds recovering lost ground. During the first week in September eggs and cheepers unable to fly were seen in one part of East Yorkshire.

The Red-Legged Partridge has been found breeding nearer Hull than previously. The first birds were observed on the Wolds in 1898, when five were shot from a covey on Market Weighton Wold. Previous to that Capt. Langdale had shot odd ones at Houghton. On 24th October, 1899, three were shot at North Dalton. Now they are spread all over the Wolds, and are extending into Holderness.

SPURN.—Ringed Plover show a satisfactory increase, having nested from April to July.

Lesser Tern about the same as last year, breeding at the Point and near Kilnsea Beacon. This latter place requires more watching.

Two pairs of Oystercatchers nested this year, but hatched only one egg each. One pair was still sitting on the 1st July, an exceptionally late date. Five nests of Shelduck are said to have hatched off. A few Common or Arctic Terns hung about all the season, but did not breed.

The violent gale of the 6th June destroyed many eggs.

HORNSEA MERE.—Herons, Pochards, and Shovellers were breeding in the usual numbers. The Teal have not bred here this year. The Tufted Duck was seen all the season, but no young were reared. Three pairs of Grebes bred, and two broods of two each were reared. A pair of Red-backed Shrikes was seen in June, apparently breeding near the mere.

J. Taylor reports that the Pochards leave the mere for two or three weeks as soon as the young can fly, and then come back in increased numbers. Is this habit connected in any way with the moult?

BEMPTON.—An unusually forward season, a Razorbill's egg being observed on 1st May by John Hodgson, and both Guillemots and Razorbill's eggs were correspondingly forward. Jno. Hodgson commenced climbing on the 8th May, and by the end of the month had got through the first scale or fling. George Hodgson with Chandler and Robson as climbers in place of W. Wilkinson, commenced on the 15th May.

The prevalence of wet mists and high gales spoilt the climbing, and climbers one and all are unanimous in declaring that they never remember so interrupted and unprofitable a season. The eggs were plentiful, but when the climbers got to them a great proportion were slightly incubated and unsaleable, the next laying being also disorganised in consequence.

The Peregrines had three young on the 9th May, 1910, when the eyrie was reached, and as they were never disturbed again,

and young birds were seen on the wing, it is fair to presume that all were reared successfully.

W. Wilkinson says he thinks that a great proportion of the guillemots on what was his ground are too old to lay. He has taken an egg from the same bird for eighteen years, and possibly it had been laying some years before that, as it was there when he first climbed the ground. He puts forth the theory that Ringed Guillemots acquire the white eye-stripe through age.

Mr. T. Audas obtained a new type of egg this season—creamy white in ground-colour, with bold vermilion streaks.

Just a good word for the Jackdaws, the first I have heard. Chandler says that when egg-raiding, before rolling the eggs off the ledges, he has seen them eat all the ticks that are visible, and as these ticks, judging by the effect of their bite upon a human being, must cause the birds much pain and annoyance, the Jackdaw may be credited with this small amount of good, as against the undoubted evil of which he is guilty.

The Pink-footed Geese arrived on the 24th September, and were more numerous than usual.

The first migration of Woodcocks arrived on our coasts on the 14th October, accompanied by Hooded Crows and Gold-crested Wrens. The birds were seen at Hornsea, Withernsea and Spurn.

A Glossy Ibis, sex unknown, was shot by Mr. Norman near Atwick last autumn. It was feeding with two others in a marshy corner of one of his meadows. It is probably a mature bird, as there is a considerable amount of chestnut on the breast and thighs, though the head and neck show the grey streaks, as in immature plumage.

On 12th November, 15 Whoopers are reported by Mr. F. Boyes as having arrived at Hornsea Mere.

The following were elected for 1911:—

President—Oxley Grabham, M.A., York.

Secretaries—*General*—H. B. Booth, Ben Rhydding;

N. Riding—T. H. Nelson, Redcar;

E. Riding—E. W. Wade, North Ferriby;

W. Riding—Riley Fortune, Harrogate.

Representative on Executive—W. H. Parkin, Shipley.

Representative on Committee of Suggestions—S. H. Smith, York.

Wild Birds' and Eggs' Protection Committee's Report.—Mr. R. Fortune writes:—The amount received in subscriptions for 1910 is £54 9s. 0d. This, together with the balance left over from 1909, made the total of £75 9s. 7d. The expenditure has been £32 1s. 9d.; and we have a balance in hand of £43 7s. 10d. In 1909 our expenditure considerably exceeded our income. It is very satisfactory to realise that the contrary is the case this

year, and to know that we have now a reserve fund, which can be applied to any sudden and unexpected call that may be made upon us. This happy result has been brought about entirely by the exertions of our President, Mr. W. H. St. Quintin.

Both at Spurn and Hornsea watchers were employed during the whole of the breeding season, and in both localities a successful nesting season has been experienced.

At Bempton the Peregrines have again nested successfully, and for the first time have reared three young ones.

The Stone Curlews have been well looked after in one locality, and five pairs are reported to have nested.

Your Secretary has had some correspondence with the Town Clerk of Halifax, respecting the destruction of wild birds in their boundaries, and at Fly Flatts Reservoir. It was discovered that they had no order in force. The Corporation therefore decided to apply at once for an order. This was done, and the order is now in force.

The shooting of an Osprey near Pickering, once again draws attention to the unsatisfactory state of protection in the North Riding. Your Secretary communicated with the police upon this matter, and although they were very willing to prosecute, it was unfortunately found that whereas the Osprey is protected all the year in the West and East Ridings, it is not protected at all in the North. A Sub-Committee, consisting of Messrs. St. Quintin, Grabham, Nelson, Booth, and Fortune, has been appointed to go thoroughly into this matter with the North Riding Council, to see if an end cannot be put to this deplorable state of things.

Another unfortunate occurrence, again in the North Riding, was the robbing of a Peregrine's eyrie, and the shooting of both old birds. Your Secretary did not hear of the case until quite recently, so, even had the birds been protected, too long a time had elapsed to deal with the matter successfully. Members are urged to report these cases *at once* to the Secretary.

The periods for the special protection of the Spurn and Hornsea areas expire this year. Your Committee, through the President, has applied for an extension of a further five years, which the County Council are willing to grant. The Committee is also asking the Council to extend and amend their general order somewhat. The slaughter of a Hoopoe at Ganton on November 3rd, a bird which is not protected, renders this necessary, in order to include this and any other likely rare visitors.

The Committee are about to venture into an experiment to try and establish the Bearded Tit at Hornsea Mere, a very likely habitat. Our President has undertaken to obtain ten pairs of continental specimens at his own expense, and to keep them in his out-door aviary during the winter in order that they may be

turned down in the spring months. Special protection will be asked for these birds. If the experiment is successful, it will add a delightful species to our county avifauna, and our special thanks are due to Mr. St. Quintin for his exertions in this and other directions.

Communication was made to the police at Barnsley respecting the setting of Pole Traps in that district. They took the matter up, and will see that the practice is discontinued on the particular estate specified.

Information having been received that at the Fish Hatchery near Malton, Kingfishers were being destroyed by the agency of pole traps, a letter was sent to the manager, drawing attention to the fact that this was illegal, and asking that the practice should cease. A reply was received expressing regret, and promising that the traps should be immediately removed, and care exercised that they should not be set again.

Mr. Nelson, during a visit to Bempton, found that the pleasure steamers from Scarborough and Bridlington were reverting to their old practice of blowing their syrens underneath the cliff, thus disturbing the birds, and causing much destruction amongst their eggs. He wrote to the owners at Hull and the Harbour Masters at the two places named; the result being that instructions were issued for the practice to cease.

On November 19th we successfully instituted a prosecution for attempting to catch Goldfinches near Malton. The offender, in consideration of it being a first offence, was fined 5/-, with 8/- costs, or 14 days imprisonment. It is hoped this will put a check upon a practice which is altogether too prevalent in the county.

RECEIPTS FOR 1910.

	£	s.	d.
C. Milnes Gaskell, Esq.	20	0	0
Lord Bolton	5	0	0
W. H. St. Quintin, Esq.	5	0	0
W. Bethell, Esq.	2	2	0
B. Haworth-Booth, Esq.	2	2	0
Capt. A. Brooksbank	2	2	0
E. Turton, Esq.	2	2	0
Jasper Atkinson, Esq.	1	1	0
W. J. Beaumont, Esq.	1	1	0
H. B. Booth, Esq.	1	1	0
H. E. Dresser, Esq.	1	1	0
L. Gaunt, Esq.	1	1	0
Oxley Grabham, Esq.	1	1	0
H. H. Illingsworth, Esq.	1	1	0
Digby Legard, Esq.	1	1	0
E. Tindall, Esq.	1	1	0
Viscount Mountgarret	1	0	0

Capt. the Hon. J. Dawnay	..	..	..	..	..	1	0	0
Capt. F. S. Constable	..	..	..	..	..	1	0	0
G. T. Porritt, Esq.	..	..	..	..	..	1	0	0
R. Fortune, Esq.	..	..	..	..	..	0	10	6
E. W. Wade, Esq.	..	..	..	..	..	0	10	6
Johnson Wilkinson, Esq.	..	..	..	..	..	0	10	6
York and District Field Naturalists' Society	..	..	..	..	..	0	10	6
W. H. Parkin, Esq.	..	..	..	..	..	0	5	0
S. H. Smith, Esq.	..	..	..	..	..	0	5	0
						£54	9	0
Balance from 1909..	..	..	..	..	..	21	0	7
						£75	9	7

PAYMENTS FOR 1910.

						£	s.	d.
Watcher at Spurn	..	..	..	..	..	13	0	0
Watcher at Hornsea	..	..	..	..	..	12	0	0
Donation at Spurn	..	..	..	..	..	1	1	0
Donation at Bampton	..	..	..	..	..	1	0	0
Donation <i>re</i> Stone Curlews	..	..	..	..	..	1	0	0
Postages and Sundry Expenses	..	..	..	..	..	0	19	9
Special Posters for Spurn and Hornsea	..	..	..	..	..	1	10	0
Posting, Etc.	..	..	..	..	..	0	10	0
Other Expenses—Legal, etc.	..	..	..	..	..	1	1	0
						£32	1	9
Balance in hand	..	..	..	..	..	43	7	10
						£75	9	7

The Committee for 1911 is recommended as follows:—

Chairman—W. H. St. Quintin, D.L., J.P., Rillington, York.

Conveners—R. Fortune, 5 Grosvenor Terrace, Harrogate ;
T. H. Nelson, Seafield, Redcar.

Representative on Executive—H. B. Booth, Ben Rhydding.

Representative on Committee of Suggestions—W. Wilson,
Keighley Road, Colne.

Other Members—T. Bunker, Goole ; H. E. Dresser, London ;
Oxley Grabham, York ; L. Gaunt, Leeds ; Claude
Leatham, Wakefield ; A. Haigh Lumby, Bradford ;
W. H. Parkin, Shipley ; Prof. Patten, Sheffield ;
G. T. Porritt, Huddersfield ; W. Denison Roebuck,
Leeds ; T. Roose, Bolton Abbey ; S. H. Smith,
York ; E. W. Wade, Hull ; A. Whitaker, Barnsley.

Hon. Solicitor—Norman Lee, Bradford.

Yorkshire Mammals, Reptiles and Fishes Investigation Committee.—Numerous observations of interest and importance have been reported, and mention should be made of the appearance of the first part of Major Barrett-Hamilton's long-expected and much-needed work on the British Quadrupeds, which is of high scientific standard as regards the text, though very disappointing as regards the plates. It is satisfactory to find that the work of our Yorkshire observers obtains prominent mention.

Land Mammals.—Mr. Arthur Whitaker reports the capture of two Hairy-armed Bats (*Nyctalus leisleri*) at Worsborough Dale on 21st July, and Mr. H. B. Booth that although he has never been able to find any trace of Daubenton's Bat (*Vespertilio daubentonii*) in Upper Airedale, it is not uncommon along the river Wharfe, between Bolton Abbey and Burley, and that he has frequently observed it flying just over the water in the late evenings, and has examined one taken just above Ilkley, nearly at Nessfield.

The Lesser Shrew (*Sorex pygmaeus*) has occurred to Mr. Greaves at Hebden Bridge this summer, and Mr. H. B. Booth took or examined during May and July no fewer than four of this species, along a seven-mile stretch of the river Wharfe, between Denton and Bolton Abbey. Previously, we have only known of two records in twenty years or more. All these four were taken on the north side of the river Wharfe.

The reported occurrence of the Marten (*Martes sylvestris*) in Littondale is open to doubt, and needs investigation.

A case of albinism in the Stoat is reported by Mr. Riley Fortune, a white one having been obtained at Bedale at the beginning of September.

Although in small numbers, the Dormouse holds its ground, and the colony in the wood near Goathland of which Mr. Oxley Grabham took photographs last year, is steadily increasing in numbers.

Marine Mammals.—Mr. W. J. Clarke reports that a Common Rorqual (*Balaenoptera musculus*), fifty-one feet in length, was washed ashore, dead, at Cloughton Wyke, on the 27th March; and another one was washed ashore within half a mile of the first specimen at a later date. The second example, which had been dead some time, measured sixty-nine feet in length, and fourteen feet across the caudal fin.

Reptiles.—Mr. Oxley Grabham notes that a twenty-two inch Viper was killed on the Goathland Moors in the act of swallowing a young Curlew, three or four days old; and in the "Zoologist," the Rev. W. Warde Fowler notes the occurrence of an unusual variety of the same species at Danby Dale, in which the usual zig-zag markings were replaced by a broad black band down the back.

Amphibians.—Mr. H. B. Booth notes that although the Palmated Newt had been looked upon as the scarcest of the

three local newts in Mid-Wharfedale, it is the commonest in the Ilkley neighbourhood, where it abounds in the Upper Tarn, and can be found in many pools on the hill-sides.

Freshwater Fish.—Mr. Grabham notes that the Flamborough net men have had a poor season with Salmon, but in August there was a fair run of Sea Trout; also that inland, on the Ouse at Acaster Malbis, near York, the Salmon-netters have had a very fair season, but that the Smelts were a complete failure, very few being taken.

Mr. Riley Fortune reports that the long spell of wet weather at the end of 1909 and beginning of 1910 caused a big run of Salmon, Sea Trout and Bull Trout into the River Esk and its tributaries, and fish were to be seen spawning in many parts of the river. On the 5th of April, during a slight flood, large numbers of fish descended the river, three hundred being counted in one place in about an hour, of weights varying from $1\frac{1}{2}$ to $7\frac{1}{2}$ lbs. On the 26th of July a fair number of Salmon and Sea Trout passed up the river. On the 12th of October hundreds of Salmon and Sea Trout passed the weirs at Ruswarp, many heavy fish being seen; and at the end of the same month there was again a heavy run of fish. The Esk Conservators reported that in 1909 the fish caught weighed 15 tons 12 cwt. 3 qrs. 19 lbs., the heaviest being one of $25\frac{3}{4}$ lbs.

At Filey, Salmon were scarce up to the 23rd of July, but more plentiful after.

In the Lune, part of the tributaries of which are in Yorkshire, disease was very bad in the spring months, but there was later a good run of clean fish.

More fish than usual have been seen in the Ure and the Wharfe, several being as far up the latter as the mouth of the Washburn, one of which was estimated to weigh over 20 lbs.

A very good year was experienced on the Tees, and the number of Salmon taken exceeded that of the previous season by 3130, and of Sea Trout by 237; the total number taken in the nets being, of Salmon, 9732, weighing 95,942 lbs., of Sea Trout, 3394, weighing 13,763 lbs.; the heaviest fish weighed $38\frac{1}{2}$ lbs. By rod and line, 467 Salmon were taken, averaging 8.62 lbs. in weight, an increase on the previous season, both as regards number and weight.

Mr. Fortune also notes that Char (*Salmo salvelinus*) have been introduced into the Hewenden Reservoir by Mr. G. Waddington. The area of this reservoir is 14 acres, with a maximum depth of 37 feet, and as it is situated at an altitude of 687 feet above sea-level, it should prove quite a suitable habitat for the species. Hewenden Reservoir is six miles west of Bradford, and has a holding capacity of seventy million gallons. A couple of hundred of the Char, $2\frac{1}{2}$ inches long, were placed in the reservoir in February 1910, by Mr. Waddington, and in the latter half of

September, several were taken by legitimate angling. They measured $7\frac{1}{2}$ and 8 inches in length, shewing an increase in size for seven months' growth, of five inches.

Mr. Riley Fortune also furnishes the following details, remarking that it is, of course, practically impossible to make records of this kind except by the aid of anglers.

The year 1910 will be remembered for a long time by the capture of two record River Trout in the county. The largest, weighing 10 lbs. 9 oz., was found in a dying state in April on the side of the Wharfe, above Ilkley. It was 2 feet 7 inches in length, and 16 inches in girth.

Mr. H. B. Booth adds that this find caused a great sensation, the size being most extraordinary for so quick-running a river as the Wharfe, and that its presence had not been suspected by the local anglers, although they had previously spoken about two large trout being about; meaning, of course, fish of 3 or 4 lbs. weight.

Mr. Fortune states that the other exceptionally large Trout was one captured on the 19th of December, 1909, when netting for Pike in the Driffeld Beck; its weight was 10 lbs. 8 oz., its length 2 feet 3 inches, and its girth 19 inches.

A large example was also obtained on the Nidd, weighing $5\frac{3}{4}$ lbs., with a length of 2 feet 4 inches, and a girth of 12 inches. Another one in the Ure, taken at the end of Aug., weighed $4\frac{1}{2}$ lbs.

Other extraordinary weights of freshwater fish may be summarised as follows—

Perch, 1 lb. $10\frac{1}{2}$ oz. Ryhill, August.

Flounder. One weighing 1 lb. 1 oz. Captured at Tadcaster, end of October.

Barbel, 8 lbs. 9 oz. The Ure, 26th August.

Roach, 1 lb. 11 oz. River Derwent, 13th March.

Chub, 5 lbs. $5\frac{3}{4}$ oz. Yedingham, 15th October, and 5 lbs. 4 oz., Nidd at Scottar, 5th November.

Dace, $12\frac{1}{2}$ oz. In the Nidd, end of October.

Bream, 5 lbs. River Derwent, 17th September.

Grayling, 2 lbs. 6 oz. Yedingham, 9th September; 2 lbs., Malton, 12th November.

Of Pike, several extraordinary catches are recorded from Hornsea Mere. At the close of the 1909-10 coarse fishing season, a Hull man made a record catch. Six of his fish scaled 120 lbs., the two best fish weighing 24 and $22\frac{1}{2}$ lbs. respectively, and the smallest 17 lbs. Others caught on the 9th March, 8 Pike, weighing $97\frac{1}{2}$ lbs., of which the largest was $18\frac{1}{2}$ lbs.; on the 11th March 9, of which the largest was $15\frac{1}{2}$ lbs.; on the 13th March 11, weighing 84 lbs., of which the largest was 18 lbs.; on the 14th March 11, weighing 169 lbs., of which the largest was $24\frac{1}{2}$ lbs.; and on the same date, 3, weighing 33 lbs. A Pike was caught on the 12th March in the Derwent, below Kirkham Abbey, which weighed 23 lbs.

Marine Fishes. A few occurrences of rarities have been noted by Mr. W. J. Clarke.

On the 4th January a Cod-fish, caught by rod and line off the North Sands at Scarborough, contained in its stomach a freshly-killed Atherine (*Atherina presbyter*), which was perfect in every way, and had evidently only just been swallowed. This specimen is now preserved in the Scarborough Museum, together with another taken on Filey Brig, on 6th October, 1907, these being the only two specimens obtained in the district.

On the 3rd November one full-grown and another about half-grown specimen of Montagu's Sucker (*Liparis montagui*) were found by Mr. Clarke in front of Holbeck Gardens, Scarborough, at about half tide. Mr. Clarke got the spawn of this species last spring, trawled in deep water off Scarborough. On the 17th November another specimen of this fish, a quite perfect full-grown example, freshly swallowed, was found in the stomach of a Cod weighing 5½ lbs., which was caught off the Marine Drive at Scarborough. This last specimen is being placed in the Scarborough Museum, and the species is quite new to the Yorkshire list.

A Porbeagle (*Lamna cornubica*) about 5 feet in length, was taken in the herring-nets off Scarborough, on the 15th September; and the following day a very large Shark was entangled in the nets, but being too big to get on board the boat, was cut adrift.

A Tope (*Galeus canis*) measuring 4 feet 7 inches long, and weighing 22 lbs., was taken on rod and line in the South Bay at Scarborough on the 3rd of August. In Clarke and Roebuck's Handbook of Yorkshire Vertebrata (1881), the species is stated to be common at Scarborough and in Bridlington Bay, but this is the first specimen that Mr. W. J. Clarke has been able to examine.

Mr. Oxley Grabham records that he caught a Tope, 56 inches long, on a long line off Flamborough Head in September, also a Garfish, whilst railing for Mackerel, which were very numerous off the Head.

The Committee has been re-elected as follows:—

Chairman, Representative on Executive, and on Committee of Suggestions—Arthur Whitaker, Barnsley.

Convener—W. Denison Roebuck, Leeds.

Other Members—H. B. Booth, Ben Rhydding; W. J. Clarke, Scarborough; Riley Fortune, Harrogate; Oxley Grabham, M.A., York; F. Lawson, Skelmanthorpe.

ENTOMOLOGICAL SECTION.

LEPIDOPTERA.—Mr. A. Whitaker writes:—Once again it falls to our lot to have to attribute a poor year's work by Yorkshire lepidopterists to unfavourable climatic conditions. Although over sixty lepidopterists throughout the county have been asked to contribute notes on the season's collecting, only nine have thought it worth their while to do so, and this fact speaks volumes.

Butterflies appear to have been more than usually scarce, and that is saying a good deal for a county, where they are, at best, so poorly represented and sparingly distributed. In spite of this one or two interesting species have occurred, notably, *Thecla quercus* recorded for Rossington by Mr. Corbett; and *V. polychlorus* from Keighley district, where it was found by Mr. R. Butterfield. The white butterflies have again been plentiful, though we have not had anything like such a swarm as last year, either in the perfect or larval states. The Vanessas have once again attracted attention and comment by their absence; it is now some four or five years since we have had a season which has been suitable for them, and during this time they appear to have been steadily decreasing in numbers. Probably many of them will now remain scarce, not only until more favourable climatic conditions return, but also until their numbers have been augmented by another "immigration" season.

In contrast to the two last years, when "sugaring" has commenced unprofitably but has shown increasingly better results until late autumn, this season the early "sugaring" was the best, though nowhere in the county, and at no time, could it have been called good. As the season advanced, it became more and more useless, until by the time autumn came, in spite of a prolonged spell of fine open weather, this method of collecting was so unproductive as to prove positively depressing to the would-be "collector." One correspondent writes that even *polyodon* and *pronuba* have gladdened his heart. Personally very little has fallen to my lot, for I have "sugared" eight times during the year, and only seen one solitary *pronuba* the whole time! Mr. Smith, of York, appears to have been most successful with the early autumn "sugaring," and informs me that he took *E. fulvago* in some numbers by this means of collecting. Probably the most interesting species taken in this way were four *A. alni* (one showing decided traces of melanism), in Haw Park, near Wakefield, by Mr. Bunce; and one specimen of *A. occulta* taken near Skelmanthorpe, by Mr. T. Fisher.

A. ulmata was observed in unusual abundance at Sledmere, by Mr. Smith, and near Scarborough, by Mr. Rowntree.

Mr. Morley and Mr. Dyson, working the Skelmanthorpe district, have noticed larvæ of *B. repandata*, in unusual abundance, and these have resulted in very dark imagines. *D. templi* were exceedingly common, both in larval and perfect states. Larvæ of *T. variata* from Dunford Bridge, when reared, proved to belong to a fine black race. A strikingly melanic specimen of *A. basilinea* was taken in Haw Park by Mr. Morley.

A specimen of *C. munitata* was taken by Mr. H. Dyson on the moors, near Skelmanthorpe, whilst others were found on the moors near to Huddersfield by Mr. Mosley, who saw them in some numbers.

Amongst other interesting forms of *A. grossulariata* bred from wild larvæ taken at Worsbrough Bridge, near Barnsley, var. *varleyata* again occurred.

No matter how poor a season may be on the whole, it always seems to be especially favourable to certain species; thus *A. unanimitis* was found to be more than usually plentiful this year at Haw Park, and Mr. Morley noticed black *B. pilosaria* in exceptional numbers at Skelmanthorpe, and *O. filigrammaria*, in great abundance at Penistone.

Mr. G. T. Porritt writes:—Two species of Macro-lepidoptera have been added to the Huddersfield District List during the past season. The first, *Eupithecia lariciata* occurred to myself in Farnley Mill Wood, in June; the other, *Coremia munitata*, a much more interesting addition, was found in some numbers on high moorland banks, in the Holme Valley, by Mr. S. L. Mosley. Mr. B. Morley also reports the same species from the Skelmanthorpe district, thus making a second locality, and marking at present the most southerly distribution of the species in England, though it has been recorded from a locality still further south in Wales. In Yorkshire it had previously been taken at Malham and Buckden. Mr. Mosley also reported a great abundance of *Oporabia filigrammaria* in the Holme Valley. Of *Abraxas grossulariata* in which so much interest is now taken all over the country, the varieties *varleyata*, *nigrosarsata*, *lucticolor*, *subviolacea*, *semiviolacea*, *hazleleighensis*, and some unnamed other extreme forms have been bred at Huddersfield, by Messrs. James Lee, Alfred Kaye, and myself. Away from Huddersfield, Mr. Samuel Walker has reared a magnificent series of various forms of *A. grossulariata* from larvæ collected at York; and a few days ago, Mr. W. G. Clutten brought me representatives of very dark *Boarmia rhomboidaria* and *B. repandata* from Middlesbrough larvæ; the former is darker than anything in the species I had previously seen in Yorkshire, including the variety *perfumaria*, but yet not so dark as the very black form which has now for several years been sent out from Dartford in Kent. The *B. repandata* approached the now well-known black form of South West Yorkshire. Mr. Clutten had also taken *Miana captiuncula* commonly at Grassington in August; and *Gnophos obscurata* in the same locality.

NEUROPTERA AND TRICHOPTERA.—Mr. G. T. Porritt writes:—Not much has been done among these orders during the year, and no species new to the county has been reported. The most interesting record was the abundance of *Tinodes dives* on the river at Malham, on the occasion of the Union's Excursion there in June. The still more local *Stenophylax alpestris*, as well as *Hemerobius quadrifasciatus* occurred again to me, in their locality near Sheffield. Mr. J. W. Carter took *Tæniopteryx risi* at Buckden; and Messrs. George Bunce and B. Morley each gave me a

series of *Limnophilus politus* from the reservoir and canal close to Haw Park, Waketfield, where also they found the much commoner *Limnophilus rhombicus* and *Halesus radiatus* in abundance. At the same place I took *Molanna angustata* and a fine melanic form of *Glyphotælius pellucidus*, a little earlier in the season.

The following are the officers for 1911 :—

President—A. Whitaker, Barnsley.

Secretaries—(For Lepidoptera) : A Whitaker, Barnsley, and B. Morley, Skelmanthorpe ; (Hymenoptera, Hemiptera and Diptera) : W. Denison Roebuck, Leeds ; (Neuroptera, Orthoptera, and Trichoptera) : G. T. Porritt, Huddersfield ; (Coleoptera) : H. H. Corbett, Doncaster.

Representative on Executive—T. A. Lofthouse, Middlesborough.

Representative on Committee of Suggestions—W. Hewett, York.

Coleoptera Committee.—Mr. H. H. Corbett writes :—In 1910 another “Summer” was denied us, and consequently beetles have been scarce.

Mr. Carter reports :—

Carabus nitens L., a melanic variety, taken at Oakworth Moor in May, by T. Fieldhouse.

Amara consularis Duft. Baildon Moor in March, by T. Stringer.

Hydrophorus davisii Curt. Embsay, in July, C. T. Cribb.

Hydrophorus vittula Er. Skipton, in August, C. T. C.

Mycetoporus lepidus Gr. Ogden Reservoir, in March, T. S.

Myceta hirta, Marsh, Keighley, in June, R. Butterfield.

Lathridius bergrothi, Reit. Manningham, F. Bamford.

**Plinus tectus*, Manningham, F. Bamford.

Helodes marginata F. Malham, in June. J. W. Carter.

Mr. Thompson reports :—

Bradycellus collaris Pk. Kildale Moor, in September.

Amara lunicollis Schiödt. A melanic variety, Lunedale, in May.

**Amara curta* Dej. Eston, in Cleveland, in April.

Hydrophorus celatus Clark. Lunedale, in June.

**Homalota nigricornis* Pk. Eston, in Cleveland, in September.

**Quedius oblitteratus* Er. Knaresborough, in March.

Olophrum fuscum Grav. Kildale, in August.

Omius mollinus Boh. Kirkdale, on the occasion of the Union's visit.

Orthochætes setiger Beck. Eston, in Cleveland.

My own experience of the season is that it began with fairly good promise in the Spring, but failed to keep up to sample during the Summer, and only partially redeemed itself in the Autumn. The only species worthy of note that I have met with are :—

- Lesteva heeri* Fanc. Askern, in October.
Scaphisoma boleti Panz. Cusworth, in October.
Abræus globosus Hoff. Cusworth, in October.
Litargus bifasciatus F. Cusworth, in October.
Soronia grisca L. Cusworth, in October.
 **Cryptophagus populi* Payk. Thorne, in June.
Donacia semicuprea Panz. Thorne, in June.
 **Dorytomus salicinus* Gyll. Thorne, in May.
 **Orchestes saliceti* Payk. Thorne in May.

Those species marked with an asterisk (*) are additions to the County list.

The Committee for 1911 is as under:—

Chairman—E. G. Bayford, Barnsley.

Convener—H. H. Corbett, Doncaster.

Representative on Executive and Committee of Suggestions—
 J. W. Carter, Bradford.

Other Members—M. L. Thompson, Middlesbrough; H. Ostheide, Leeds; W. Foggitt, J.P., Thirsk; John Gardner, Hartlepool; W. Denison Roebuck, Leeds; E. W. Morse, Leeds; T. Stainforth, Hull; G. B. Walsh, Middlesbrough.

Yorkshire Hymenoptera, Diptera, and Hemiptera Committee.—The Committee have to deplore the loss of Mr. Edward Saunders, F.R.S., who for some years most willingly acted as Referee for Hymenoptera-Aculeata and Hemiptera-Heteroptera; and they have to thank the Rev. F. D. Morice, Mr. Claude Morley, and Mr. Percy H. Grimshaw, for their assistance in the determination of specimens.

Not very much has been done this year; the cold, sunless season having been very unfavourable to all but the commonest species of *Andrena* and *Bombus*. In August and September there were some sunny days on which a few species were abundant, and about Doncaster Mr. H. H. Corbett found *Mimesa bicolor* in quantity on flowers of *Torilis anthriscus*, along with many *Crabro cribrarius*. On the same flower he took in the same neighbourhood *Oxybelus uniglumis*, which is new for the Yorkshire list. Mr. E. G. Bayford reports two other additions, *Crabro* (*Crossocerus*) *palmipes* ♂ and *Cecidonomus inimicus* ♀, which occurred along with *Crabro* (*Rhopalum*) *clavipes* ♂ on a willow stump in his garden at Barnsley. Mr. John F. Musham has collected a few species of bees at Selby, including the black form of the ♂ of *Psithyrus campestris*, and *Colletes daviesiana* (a pair), a species quite new to the Yorkshire fauna.

An interesting occurrence during the year has been that of very much dwarfed examples of *Sirex gigas* ♀, scarcely half the usual size. One of these was brought to Mr. W. Denison Roebuck

from a joiner's shop at Wrangthorn, Leeds, and the other sent to Mr. C. H. B. Turner from Scarborough. Mr. Corbett on the contrary, reports several fine examples of *S. noctilio*, but total absence of *S. gigas* at Doncaster.

Mr. Geo. T. Porritt submitted an ichneumon fly, *Cratichneumon nigritarsus*, from Glaisdale.

Of Hemiptera a goodly number were shown from East Riding localities by Mr. H. C. Drake, but, in the absence of a published list, it is not possible to specify any as new records for the county. Mr. M. Lawson Thompson reports *Zicrona cærulea* from Littlebeck, near Whitby, and Mr. Porritt an example of *Nabis flavomarginatus* from Scalby Beck, Scarborough.

In Diptera several species were collected by Mr. W. Harrison Hutton in the much built-up district of East Leeds, and Mr. J. H. Ashworth of Ilkley has continued his systematic work in that district, the results of which he has published in the Bradford Scientific Journal.

The Committee has been re-appointed as follows:—

Chairman—G. T. Porritt, Huddersfield.

Convener—W. Denison Roebuck, Leeds.

Representative on Executive and Committee of Suggestions—
Rosse Butterfield, Keighley.

Referees—Percy H. Grimshaw, for Diptera; C. Morley, and
Rev. F. D. Morice, M.A., for Hymenoptera.

Other Members—E. G. Bayford, Barnsley; M. L. Thompson,
Middlesbrough; J. W. Carter, Bradford; H. H.
Corbett, Doncaster; T. Stainforth, Hull; H. C.
Drake, Scarborough; and Prof. W. Garstang, D.Sc.,
Leeds.

CONCHOLOGICAL SECTION.

With the increased knowledge of molluscan distribution, and in a well-worked county like this, one may hardly expect—big though the area is—to announce every season the occurrence of new species; but the blank, thus unavoidable, need not denote any lack of enthusiasm amongst the workers in the Section.

In the East Riding Mr. A. J. Moore has been able to add several varietal forms new to the Hull district, of well-known species, whilst at the opposite side of the same riding, Mr. John F. Musham secured a small, though interesting series of *Helix nemoralis* and *H. arbustorum*, including an example of the latter shewing the unusual aberration of var. *bifasciata*.

For the West Riding the most important event was the meeting at Malham, for further investigation of the molluscan inhabitants of the Tarn and surrounding plateau, where many interesting forms, considering the altitude and environment, were observed, and a pleasant week-end was spent through the kind

hospitality of the owner, Mr. W. Morrison, who right royally entertained some of the members of the Section during their four days' stay.

Three or four new records were directly or indirectly the result of the visit to Scunthorpe of the Y.N.U. and L.N.U., in August, when a disappointing day, conchologically, was saved by Dr. Wallace of Grimsby, who when scooping for water beetles, secured a specimen of two of the long-lost Lincolnshire shell *Limnea glabra*, and of its usual companion *Planorbis spirorbis* var. *rotundata*.

This discovery caused Messrs. Roebuck, Cobham and Musham a month later to visit the spot to confirm the record, when these two shells were found fairly numerous, though 'small, and we were enabled to delight the hearts of the botanists by submitting to them fifteen semi-aquatic plants, out of which three were new to the division, and one new to the entire county of Lincoln. These, together with four mosses and two characeæ (one possibly new to the county list), form sufficient material, though not all molluscan, for the conchologists of the two shires to claim the day as a red letter one.

The officers of the Section for 1911 have been elected as follows:—

President and Representative on Executive—William Cash, Halifax.

Secretaries—John F. Musham, Selby; T. W. Saunders, Brotton; and A. J. Moore, Hull.

Representative on Committee of Suggestions—W. Harrison Hutton, Leeds.

Marine Biology Committee.—Mr. F. H. Woods writes:—The most notable event of the year was the meeting of members of the Committee at Redcar, on September 2nd to 5th. Besides many zoophytes, crustaceans, etc., about 77 species of molluscs were collected, either in the form of shells washed up by the tide or living creatures. These included *Tonicella rubra*, *Venus fasciata*, *Dentalium entalis*, *Odostomia unidentata*, *Odostomia turrata*, *Pyrgulina interstincta*, *Turritella communis*, *Bela rufa*, *Mangilia costata*, *Mangilia nebula*, *Clathurella linearis*, *Philine catena*. These objects were arranged so as to form a temporary museum, and several residents, especially school teachers, inspected them.

Considerable progress has been made during the year with a collection in the Hull Museum. This now includes 121 species of shells. Among those which are rare, at any rate, on the Yorkshire coast, and have mostly been added during the year, are *Tonicella rubra* (Runswick Bay), *Nuculana minuta* (Scarborough), *Syndosmya prismatica* (Filey, etc.), *Cochlodoma pratense* (Filey), *Emarginula fissura* (Redcar), *Capulus hungaricus* (Redcar, etc.), *Venus fasciata* (Redcar, etc.), *Lamellaria perspicua* (Bridlington),

Pyrgulina indistincta (Scarborough), *Pyrgulina interstincta* (Scarborough), *Turbonilla lactea* (young, Scarborough), *Cæcum glabrum* (F.), *Trichotropis borealis* (in stomach of plaice, at Hull), *Nassa reticulata* (Scarborough), *Mangilia nebula* (Redcar), *Volvulella acuminata* (Scarborough), *Philine scabra* (Scarborough, etc), *Limacina retroversa* (Scarborough).

During the year Mr. T. W. Saunders, of Brotton, has done yeoman service by publishing in the *Cleveland Naturalists' Journal*, a list of molluscs found on the northern part of the coast from Runswick Bay to Teesmouth, with the localities. The list comprises about 100 different species.

Mr. J. A. Hargreaves has published in the *Journal of Conchology*, a list compiled from different sources, of the "Marine Mollusca of the Yorkshire Coast and the Dogger Bank."

The Committee has been re-appointed as follows:—

Chairman—Prof. W. Garstang, M.A., Leeds.

Convener—Rev. F. H. Woods, B.D., Bainton, Driffield.

Representative on Executive—Prof. W. Garstang, Leeds.

Representative on Committee of Suggestions—J. A. Hargreaves, Scarborough.

Other Members—D. W. Bevan, Scarborough; A. J. Burnley, Scarborough; J. Darker Butterell, Wansford; Sir Charles Eliot, K.C.M.G., Sheffield; E. Howarth, Sheffield; W. Harrison Hutton, Leeds; J. Irving, Scarborough; Geo. Masee, Kew; A. J. Moore, Hull; S. Lister Petty, Ulvertson; A. S. Robinson, Redcar; J. Fraser Robinson, Hull; W. Denison Roebuck, Leeds; W. H. St. Quintin, J.P., Scampston Hall; T. W. Saunders, Brotton; A. R. Sander-son, Bradford; and Arnold T. Watson, Sheffield.

BOTANICAL SECTION.

Mr. H. H. Corbett writes:—The Botanical Section of the Union has been well represented at the field excursions held during the past year, and as the reports in "The Naturalist" indicate, much good ecological work has been done.

There yet remains much to be done among the more critical species. If our botanical workers would take up the distribution of the segregates in *Ranunculus*, *Rosa*, *Rubus*, *Hieracium*, *Salix*, etc., much useful information would be forthcoming.

Among the more interesting "finds" of the season in my district may be mentioned *Lathyrus palustris* L. This very rare remnant of the old fenland flora was found just over the county boundary in Notts., near Bawtry. *Orchis latifolia* E. B.; this is the marsh orchis of the bog at Askern. It has a different habit and facies from the much commoner *O. incarnata*, flowering later and being a more robust plant with a longer and denser panicle.

The species has been confirmed by Mr. F. A. Lees. *Neottia nidus-avis* Rich. was found in Edlington Wood.

A change in the local florula is now taking place on Thorne Waste. A part of the old peat bog is being "warped," and where two years ago were to be found *Andromeda polyfolia*, *Drosera rotundifolia*, *Carex curta* and other peat lovers, are now *Aster Tripolium*, *Rumex maritimus*, *Atriplex hastata*, *Scirpus maritimus*, and other maritime plants. These will doubtless have only a short period allowed them, and will soon be succeeded by cultivated crops and their associated casuals.

The following were elected for 1911:—

President—Dr. T. W. Woodhead, Huddersfield.

Secretaries—H. H. Corbett, 9 Priory Place, Doncaster; J. Fraser Robinson, 22 Harley Street, Hull;

Representative on Executive—E. Snelgrove, Sheffield.

Representative on Committee of Suggestions—S. Margerison, Leeds.

Botanical Survey Committee.—Dr. T. W. Woodhead writes:

The ecologists have been particularly active, and the result of their work is reflected in nearly every number of "The Naturalist" for the current year. Mr. Frank Elgee's interesting observations on Heather Moors of North East Yorkshire were published in the January and February numbers, under the title of "The Vegetation of Swiddens," and show how areas which have been burnt become colonised, often by species which only temporarily occupy the ground, these being in turn driven out by one or other of the characteristic species of the Heath vegetation. This paper called forth some observations by Dr. H. F. Parsons on "The Effects of Heath Fires on Vegetation" ("Nat.," March).

Mr. W. M. Rankin's contribution on the "Peat Moors of Lonsdale" ("Nat.," March and April), gives a very suggestive account of these moors, in which he distinguishes two Formations: (1) The Swamp Moor Formation, and (2) The Heath Moor Formation, each with associations of (a) Lacustrine, and (b) Estuarine and Littoral origin. The paper is illustrated by six photographs.

Dr. C. E. Moss's paper on the species and varieties of *Quercus*, is valuable in that it shows the importance and significance of the distinctive characters of these forms when considered in connection with their distribution (see "Nat.," April).

Dr. Wm. G. Smith's excellent notice of Adamovic's work on the vegetation of the Balkan lands, calls attention to the influence of tectonic factors, which are of great importance in the study of vegetation (see "Nat.," July).

An admirable account of the Woodlands of England has been published by Messrs. Moss, Rankin & Tansley, which will be of great service to all interested in these constituents of our vegetation. (For a notice of this see "Nat." for Sept.).

Excellent use was made of the Yorkshire Naturalist's Union excursions to further the study of vegetation in Yorkshire, and much interesting work was done on the Sphagnum bogs in North-West Yorkshire, an account of which was given by Drs. Smith and Woodhead in "The Naturalist" for August. The excursion to Kirby Moorside provided a good opportunity for studying some of the calcareous dales in that district, as well as the curious vegetation of Spaunton Moor. The local knowledge of Mr. Slater proved of great service in the study of the vegetation of the dales in the neighbourhood of Helmsley. It is hoped that an account of this interesting area will soon be forthcoming.

The joint excursion to Scunthorpe with the Lincolnshire Naturalists' Union enabled the Rev. E. A. Woodruffe-Peacock to bring out admirably the changes in the flora of the neighbouring moors within recent years, and the Rev. W. Fowler furnished a list of characteristic species found in 1854 for comparison with those still existing.

The meeting of the British Association this year at Sheffield provided an opportunity for Messrs. Bentley and Snelgrove to write a capital account of the more interesting features of the flora of the neighbourhood. This was published in the "Handbook," and illustrated with excellent photographs of the more important types of vegetation.

The following were elected for 1911:—

Chairman—W. B. Crump, Halifax.

Convener and Representative on Executive and on Committee of Suggestions—T. W. Woodhead, Ph.D., Huddersfield.

Other Members—S. Margerison, Calverley, Leeds; C. Waterfall, Cheshire; H. H. Corbett, Doncaster; J. Hartshorn, Leyburn; J. W. H. Johnson, Thornhill; W. E. L. Wattam, Huddersfield; P. F. Lee, Dewsbury; F. Elgee, Middlesbrough; H. J. Wilkinson, York; W. Jackson, Goole; Wm. G. Smith, Edinburgh; W. Robinson, Hull; and A. L. Armstrong, Harrogate.

Yorkshire Bryological Committee.—Mr. Wm. Ingham, B.A., reports:—Several members have been busy again this year in the field, and some interesting mosses and hepatics have been found.

Mr. C. A. Cheetham reports *Dicranodontium longirostre* var. *alpinum* from Malham, in the Aire drainage, also *Diphyscium foliosum* var. *acutifolium* from Ingleboro'.

Mr. E. Snelgrove has contributed some interesting records of mosses and hepatics to the British Association Handbook for the Sheffield meeting, the principal being *Sphagnum molle*, *S. teres*, *Ceratodon conicus*, *Philonotis caespitosa* var. *laxa* (the correct name now for the *P. fontana* var. *ampliretis* of the Handbook),

Schistostega osmundacea, *Aneura sinuata*, *Lepidozia Pearsoni*, and *Calyptogeia fissa* (*Kantia Sprengelii*), all from the Rivelin Valley.

Mr. J. J. Marshall has sent *Weisia mucronata* mixed with *Weisia microstoma* v. *brachycarpa*, both new to the East Riding, the former also occurring at Ravenscar (leg. W. Ingham), and the latter at Ackworth (leg. W. Ingham). He also records *Orthotrichum stramineum*, new to the E. Riding. Mr. Marshall's two *Weisias* grow by a Cottingham footpath.

Mr. W. Ingham records *Plagiothecium silesiacum* in fruit, from Fimber, in the E. Riding. Its last record seems to be that by Dr. Spruce, in Arncliffe Wood, Goathland; see "The Naturalist," page 34, August, 1910.

Other interesting records are *Hypnum uncinatum* var. *plumulosum* from Skear's Gill, Middleton-in-Teesdale; *Lejeunea cavifolia* var. *planiuscula* from limestone cliffs, Lunedale, Middleton-in-Teesdale; *Hypnum Wilsoni* at Heworth, half a mile from York, on the bed of the old Subscription Skating Pond; *Haplozia crenulata* var. *inundata* in a small sandstone quarry, five miles from York, the first record of this large variety in the British Isles, and *Calyptogeia fissa*, a beautiful neat form, on ridge of Woodhouse Moor, Leeds (leg. Mrs. Ingham).

Mr. W. Ingham spent two weeks in August with Mr. Symers M. Macvicar, at Invermoidart, in S.W. Inverness, and he gathered in that district almost all the rare hepatics for which the Killarney district of Ireland is noted.

Mr. J. C. Wilson, of Manchester, has sent a fine robust form of *Hypnum fluitans* Gr. *falcatum*, var. *ovale*, gathered on the slopes of Wissenden Clough, Marsden.

The following were elected for 1911:—

Chairman and Convener—W. Ingham, York.

Representative on Executive—C. A. Cheetham, Armley.

Representative on Committee of Suggestions—W. Ingham, York.

Other Members—R. Barnes, Harrogate; R. Braithwaite, London; L. J. Cocks, London; W. West, Bradford; J. W. H. Johnson, Dewsbury; M. B. Slater, Malton; H. Foster, Leeds; A. R. Sanderson, Bradford; F. Haxby, Bradford; and E. Snelgrove, Sheffield.

Mycological Committee. Mr. C. Crossland writes:—Interest in Mycology continues to spread, and enquiries are often made as to text-books, etc. The Committee have, as far as possible, been represented at each of the Union meetings.

An unofficial foray was held at Mulgrave, May 28th to 30th. Messrs. Clarke, Cheesman, Peck, and the writer attended. About 70 species were noticed, several of which are only to be seen in the spring.

Four members of the Committee:—Messrs. Gibbs, Cheesman,

Philip and J. W. H. Johnson, attended the Kirby Moorside meeting; 140 species were collected, 57 belonging to the family Agaricaceæ, several being additions to the York. Fung. Flo. (see "The Naturalist," November of the current year).

Mr. Johnson collected a mould near Halifax, new to the British Flora, and one at Ilkley, new to Yorkshire; both will be noticed in "The Naturalist" in due course.

Canon W. Fowler, Mr. W. N. Cheesman, and the writer attended the Scunthorpe meeting, and worked out a goodly number of species, a list of which was supplied to the Lincolnshire Naturalists' Union.

This year's foray was held at Sandsend for Mulgrave, and was remarkably successful in respect to additions to the Fungus Flora of the British Isles, six additional Agarics being discovered. Notes on each will be given in the Mulgrave report. Upwards of 550 species were collected and identified. It was proposed and unanimously agreed that the results of all previous visits to Mulgrave be analysed and tabulated, and that we recommend the Union to sanction another year's investigations, to make the work done in this district more complete. The analysis is already in hand.

Mr. A. E. Peck has collected numerous species in the neighbourhood of Scarborough, many of which he has carefully photographed. Most of them have been certified by Mr. A. Clarke, and include several uncommon species.

Mr. H. Slater, the Helmsley schoolmaster, sent fine specimens of *Peziza reticulata* in May; Mr. H. H. Corbett, *Lepiota rachodes* from a greenhouse at Doncaster in July, and Mr. W. D. Roebuck a consignment of 22 species, which he collected in Lythe Bank Plantation, Grassington, on the 24th September. Mr. Roebuck sent three consignments to Sandsend.

Canon Fowler and the writer visited Hunsworth Wood, near Cleckheaton, in October, and found *Poria radula*, not previously recorded for Yorkshire, and *Flammula flavida*, which confirms a hitherto solitary county record.

As stated above, the Committee recommend another foray in Mulgrave Woods from September 23rd to September 28th.

The following members form the Committee for 1911:—

Chairman—G. Masee, Kew.

Convener—C. Crossland, 4 Coleridge Street, Halifax.

Representative on Executive—Harold Wager.

Other Members—Rev. Canon W. Fowler, Liversedge; Sir H. C. Hawley, Bart., London; Harold Wager, Leeds; A. Clarke, Huddersfield; W. N. Cheesman, Selby; Thos. Gibbs, Wirksworth; Jas. Needham, Hebden Bridge; R. H. Philip, Hull; J. W. H. Johnson, Dewsbury; C. H. Broadhead, Thongsbridge; M. Malone, Bradford; W. Robinson, Hull; and A. E. Peck, Scarborough.

GEOLOGICAL SECTION.

Report for Geological Section. Mr. Cosmo Johns writes :—

The excursions have been well attended by members of the Section, except on one occasion, and one or more of the sectional officers have been present. The excursion to Middleton-in-Teesdale afforded a welcome opportunity for renewing acquaintance with a classic region. A carefully worked out programme, for which Messrs. Burton and Robinson were responsible, was carried out. The igneous rocks, Carboniferous Limestone, Drift, and the interesting but puzzling sections of pre-Carboniferous rocks at the Pencil mills were visited.

Malham once more attracted a good number. The Craven Faults, with the evidence for a reading of the structure different to that given by the published Survey Map of the district; the little known Black Hill, an outlier of Yoredales with a capping of Millstone Grit, and the exposure of the ancient floor on which Carboniferous Rocks were laid down, received attention.

Easington afforded an opportunity for visiting drift deposits of Holderness, and thus of renewing acquaintance with the ever-changing sections of boulder clay. Under the guidance of Messrs. Stather and Sheppard, much of the new evidence was reviewed.

Kirby Moorside did not provide many geological opportunities, but at Scunthorpe the wonderfully interesting Liassic Sections afforded by the excavations for Ironstone, the re-distributed drift and the overlying blown sand received careful attention, and the thanks of the section is due to Mr. A. C. Dalton, whose local knowledge was placed unreservedly at their service.

The chief obstacle to the prosecution of work by the section is the shortness of time available during the excursions. A week-end with two clear days for field work represents the minimum time in which any useful programme can be carried out, and it is really only when four clear days are available, such as occurs during the Whit week and August Bank Holiday meetings, that a reasonably complete examination of a particular district can be made.

It cannot be too strongly urged that the feature of such visits can only be to review work that has been or is being done, and to suggest the lines for future work. The real additions to knowledge follow such visits, and are not necessarily made during them.

There are still many directions towards which the section might profitably direct its energies. In the Coal Measure districts a rich harvest awaits conscientious workers in the many clay pits or natural sections; in Yorkshire this representing an almost unworked field. Careful work along the escarpment of the Permian Rocks from Conisborough northward, so as to establish a definite correlation with the typical sub-divisions of Durham,

is bound to be rewarded. A new attack on the problem of the flora of the Secondary Rocks of Yorkshire—not necessarily the already known Plant Beds—has been suggested, and the suggestion should receive the careful attention of the Section. Our President, Professor Seward, has been instrumental in obtaining a grant from a Cambridge University fund to enable Mr. Thomas, of Cambridge, to collect and investigate the fossil flora of East Yorkshire, and in this connection he has already done much work.

The following were elected for 1911 :—

President—J. J. Burton, Nunthorpe.

Secretaries—Cosmo Johns, Sheffield; S. Nettleton, Ossett.

Representative on Executive—Godfrey Bingley, Leeds.

Representative on Committee of Suggestions—Prof. Kendall, Leeds.

Geological Photographs Committee.—Mr. A. J. Stather reports : During the year 1910 the following photographs have been added to the collection of geological photographs possessed by the Yorkshire Naturalists' Union Geological Photographs Committee :

By Mr. JOHN W. PATTERSON—

Two photographs of rock sections through the microscope.

1st—Whin Sill. Middleton-in-Teesdale.

2nd—Altered Sandstone. Middleton-in-Teesdale.

By Mr. J. W. STATHER—

1st—Section, Boulder Clay on Chalk. Kirk Ella.

2nd—Detail Section of Boulder Clay. Kirk Ella.

3rd—Conglomerate Boulder. Gristhorpe Bay.

4th—Section in Peat Bed. Joint Dock, Hull.

By Mr. A. R. ARMSTRONG, Harrogate—

1st—Glacial evidence near Harrogate. Field looking W.

2nd— " " " " " " S.

3rd— " " " " " " N.W.

By Mr. C. BRADSHAW, Sheffield—

1st—Ripple-marked Sandstone at Grimesthorpe (See "Naturalist," Oct. 1896).

2nd—Boulder Shap Granite from Adwick-on-Deerne. (Now at Weston Park Museum).

3rd—Erect tree trunk *in situ*, from Midland Railway, Brightsides. (Now at Weston Park Museum).

4th—Erect tree *in situ*, Midland Railway cutting, Brightside.

5th—Erect and prone trees *in situ*, Midland Railway cutting, Brightside.

By Mr. J. J. BURTON—

1st—Silurian upthrow at Burtreeford Dyke, Teesdale.

2nd—Tarns on the undercliffe. Cronkley Scars, Teesdale. (See July "Naturalist").

3rd—Saccharoid Limestone at White Force. Teesdale.
By Mr. H. THELWELL, Sledmere—

1st—Result of flood at Sledmere. (See July "Naturalist").

2nd—Nearer view. (See July "Naturalist").

By Mr. J. T. DYSON—

1st—Section shewing shell bed. New Joint Dock, Hull.

2nd—Nearer view, shewing varieties of shells.

3rd—Detail section.

4th—Tree trunk from peat bed. New Joint Dock, Hull.
(Practically *in situ*).

The following were elected for 1911:—

Chairman—Prof. Percy F. Kendall, M.Sc., Leeds.

Convener—A. J. Stather, 224a Spring Bank, Hull.

Representative on Executive—J. H. Howarth, J.P., Halifax.

Representative on Committee of Suggestions—Godfrey Bingley, Leeds.

Other Members—J. J. Burton, Nunthorpe; J. H. S. Dickenson, Sheffield; E. E. Gregory, Darlington; H. E. Wroot, Bradford; and C. Bradshaw, Sheffield.

Yorkshire Glacial Committee.—Mr. Thomas Sheppard reports the occurrence of a boulder of *Augite syenite* (*Laurvikite*) at Hessle, measuring 3 ft. by 2 ft. by 1½ ft. It is the largest of its kind yet recorded, and was found resting on solid chalk, covered with glacial gravel and boulder clay. It has been removed to the Hull museum.

Mr. Sheppard also records the occurrence of a "striated pavement" on the Lincolnshire shore of the Humber at South Ferriby. The tides have recently removed an accumulation of silt, near South Ferriby Hall, and exposed a bed of Neocomian Clay. In this is embedded a number of cake-like nodules, up to 1½ feet in diameter. These nodules are all striated in a direction parallel with the Humber, viz., from east to west.

Mr. J. W. Stather reports that during the past year the interest in East Riding boulders has been renewed by the publication of a work by Dr. V. Milthers, of the Danish Geological Survey, entitled "Scandinavian Indicator-Boulders in the Quaternary Deposits." In the memoir many well-marked Scandinavian rocks are described, which occur as boulders in the glacial beds of Denmark, and maps are given shewing their distribution.

The important bearing of this publication on the work of this Committee in the East Riding was at once recognised, and Dr. Milthers was communicated with. In response, he very kindly sent the Secretary a copy of his book, and a collection of the Indicator-boulders described therein. In looking over the Danish specimens, it was quite clear that many of them bore a strong family likeness to familiar Holderness types. Several

members of the Hull Geological Society have subsequently visited the Holderness coast, and made collections with a view to matching the Danish specimens. Much of this material has yet to be examined, but there seems little reason to doubt that three new records of Scandinavian rocks in Yorkshire have been made, viz.—(1) The Bredvad porphyry; (2) The Gronklitt porphyrite; and (3) The Red Särna porphyry.

The following were elected for 1911:—

Chairman—P. F. Kendall, M.Sc., Weetwood, Leeds.

Conveners—J. H. Howarth, J.P., Somerley, Halifax, and J. W. Stather, Hull.

Representative on Executive—E. Hawkesworth, Leeds.

Representative on Committee of Suggestions—E. Hawkesworth, Leeds.

Other Members—Rev. E. M. Cole, M.A., Wetwang; H. H. Corbett, Doncaster; W. Simpson, Settle; F. F. Walton, Hull; J. E. Wilson, Ilkley; H. Culpin, Doncaster; A. R. Dwerryhouse, D.Sc., Dublin; Godfrey Bingley, Leeds; A. J. Stather, Hull; E. E. Gregory, Darlington; J. J. Burton, Nunthorpe.

Yorkshire Coast Erosion Committee.—Mr. J. J. Burton writes that during the past year the coast between the Tees and the Esk has been very stable. The shore line between the Tees and Saltburn has been variously affected by wind and tides, but on the whole it has maintained an equilibrium, and the sand cliffs and boulder clays margining the shore are giving no evidence of wastage. The Lias cliffs between Saltburn and Whitby have not perceptibly receded and there have been no falls of cliff of any magnitude between those places. In some of the bays where the boulder clay has filled up ancient valleys, through which streams now find their way to the sea, there has been some slipping of the clay which has here and there encroached upon the shore line, but it will in the course of time be entirely washed away, and is only one stage in the process by which the bays will ultimately be extended inland.

Mr. J. W. Stather writes:—Coast erosion in Holderness is still proceeding at a very rapid rate, and when the members of the Yorkshire Naturalists' Union were at Kilnsea in July, it was the topic of conversation. In the wall of the Blue Bell Inn there is a tablet stating that the house was built in 1847, and was then 534 yards from the sea. The distance is now reduced to 272 yards. A similar tablet in an adjacent barn confirms the above. The distance of the old ruin at Out Newton (Dimlington) from the cliff edge was also measured, and found to be 29 feet 3 inches. In 1882 the distance was 120 yards. This shews an average loss of four yards per annum.

The Committee for 1911 is as under:—

Chairman—F. F. Walton, Hull.

Convener—J. W. Stather, Hull.

Representative on Executive—F. F. Walton, Hull.

Representative on Committee of Suggestions—H. Culpin, Doncaster.

Other Members—J. T. Sewell, Whitby; W. Y. Veitch, Middlesbrough; J. J. Burton, Nunthorpe; Rev. E. M. Cole, Wetwang; and J. A. Hargreaves, Scarborough.

Fossil Flora and Fauna of the Carboniferous Rocks Committee.

—THE FOSSIL FAUNA.—Mr Cosmo Johns writes:—Since the publication of the last Report work has been continued both in the Upper and Lower Carboniferous Rocks. The researches of Mr. Culpin and others on the fauna of the coal measures are extending our knowledge of the vertical and horizontal distribution of the marine fauna. The persistence of the various "marine bands" over wide areas has now been established, and the data accumulated will enable such exploratory borings as may be put down towards the east boundary of the Yorkshire Coalfield to yield definite information as to the level reached. It is not often that scientific research is so quickly followed by its economic application. So far there have only been opportunities for investigating the faunal succession down to the Barnsley seam. There is, however, no reason to doubt the probability of determining faunal horizons below the Barnsley seam when these lower measures are explored.

Several workers are giving their attention to the fauna of the Millstone Grit, though there has been no recent contribution to our knowledge of this highly important division of the Carboniferous Rocks. Mr. Holmes has collected a suite of fossils from the shales above the Kinderscout Grit, but their specific determination has not been completed.

As a result of continued work on the Carboniferous Limestone the important conclusion has been reached that the Pendleside series with its important Cephalopod fauna, is equivalent, in part at least, to the Yoredale Series of Phillips.

A definite correlation of the *Posidonomya becheri* beds of the Lower Culm of Germany and Devonshire, and of the Pendleside Series of Pendle Hill with the base of the Yoredale Series, as typically exposed in Wensleydale, has been made. It would appear that the Yoredale and Pendleside Series are, despite their distinct lithological and palæontological characters, representatives of the same time interval. The occurrence of two such distinct facies points to great differences in the conditions which determined the character of the sediments in the Yoredale and Pendleside areas. For the opinions expressed in the above report the writer only is responsible.

The following were elected for 1911:—

Chairman—R. Kidston, LL.D., F.R.S., Stirling, N.B.

Convener—Cosmo Johns, Sheffield.

Representative on Executive Committee—Miss Johnstone, Bradford.

Representative on Committee of Suggestions—Cosmo Johns, Sheffield.

Other Members—W. West, Bradford; C. Bradshaw, Sheffield; P. F. Kendall, Leeds; S. Nettleton, Ossett; E. E. Gregory, Bingley; Wheelton Hind, Stoke-on-Trent; Walcot Gibson, London; E. Hawkesworth, Leeds; H. Culpin, Doncaster; and John Holmes, Crosshills.

Jurassic Flora of Yorkshire.—On the recommendation of the Geological Section, the General Committee at Middlesborough agreed to the formation of a Committee for the Investigation of the Jurassic Flora of Yorkshire, with the following as its first officers:—

Chairman—Prof. A. C. Seward, M.A., F.R.S., Cambridge.

Convener—J. J. Burton, Nunthorpe.

Representative on Executive Committee—Prof. Kendall.

Representative on Committee of Suggestions—Cosmo Johns.

Other Members—Rev. A. C. Lane, Brighouse; T. W. Saunders, Brotton; F. Elgee, Middlesborough; T. Newbitt, Whitby; J. T. Sewell, Whitby; Miss M. A. Johnstone, B.Sc., Bradford.

OTHER COMMITTEES.

Yorkshire Arachnida Committee.—Mr. Wm. Falconer writes:—This, the first year in the career of the most recently constituted section of the Union—the Arachnid—has been a successful one, and one or more of its members have been present at most of the meetings held during the year, with the result that much valuable and enduring work has been accomplished. A gratifying feature also on these occasions has been the interest in spiders evinced by non-arachnological members, who have, notwithstanding the superior claims of their own special branches of study, found time to secure and hand over the casual specimens which came under their notice. Full reports and lists of the species obtained have appeared during the year in "The Naturalist," Upper Teesdale, July, pp. 261-4; Malham, September, pp. 334-6; Spurn, September pp. 344-5; Scunthorpe, pp. 394-5; Kirby Moorside, November, p. 403.

Individual enterprise has been even more successful. At the close of 1909, 290 species of true spiders had been reported for the county, and during the present year this total has been increased by the discovery of 5 other species, new to our area, viz.:—

1. *Prothesima subterranea* C. L. Koch., a few females, adult and immature. Beast Undercliffe, Stainton Dale, N. Riding, T. Stainforth.

2. *Clubiona facilis* Camb., one female, Gargrave, W. Riding, F. Rhodes. New to science; described and figured by the Rev. O. Pickard Cambridge, in the current Proceedings of the Dorset Field Club.

3. *Agroeca celans* Bl., near Huddersfield. One female.

4. *Leptyphantès angulatus* Camb., Malham Tarn. Two females.

5. *Entelecara trifrons* Camb., Malham Tarn. One male, two females.

Additions to the recognised stations of the rarer or more imperfectly known members of our Araneidal fauna have been numerous, but considerations of space permit mention only of such of these as have not already been recorded in the January, February, March, July, September, November and December numbers of "The Naturalist," or have not received notice in Mr. W. P. Winter's "The Spiders of the Airedale and Wharfedale Area," for 1909 and 1910, given in extenso below:—

Scotophæus blackwallii Thor., one female, Marske. New to N. Riding.

Prothesima latreillei C. L. Koch. Spurn. T.S.

Clubiona corticalis Walck. Kirby Moorside. T.S. New to N. Riding.

Clubiona terrestris Westr. Riftswood, Saltburn and Kilton Woods. Both sexes. New to N. Riding.

Clubiona grisea L. Koch. Coatham Marshes and Tees Mouth. Both sexes. New to N. Riding.

Clubiona neglecta Camb. Marske and near Tees Mouth. Females. New to N. Riding.

Protadia subnigra Camb. One male. Humber Shore, Patrington, T.S.

Amaurobius ferox Walck. One female. Askern. T. S.

Robertus arundineti Camb. One male. Coatham Marshes. New to N. Riding.

Linyphia pusilla Sund. One male. Patrington. T. S.

Sintula cornigera Bl. One female. Kilton Woods. New to N. Riding.

Coryphæus distinctus F. Cb. One female. Barmby-on-the-Marsh. T. S.

Edothorax apicatus Bl. One male. Coatham Marshes. New to N. Riding.

Gongylidiellum vivum Camb. One female. Near Bingley. W. P. W.

Maro minutus Camb. and *M. falconerii* Jacks. New stations, Slaithwaite.

Dicymbium tibiale Bl. One male. Eston Moor, via Lazenby.

Erigone arctica White var. *maritima* Kulcz. Spurn. T. S. New to E. Riding.

Lophocarenum nemorale Bl. One female. Beast Undercliffe, Stain-ton Dale. T. S. New to N. Riding.

Troxochrus scabriculus Westr. Bridlington. T. S. New to E. Riding.

Cnephalocotes elegans Camb. Slaithwaite. Both sexes.

C. obscurus Bl. Eston, J. W. H. Harrison. New to N. Riding. Slaithwaite.

Tapinocyba praecox Camb. One male. Bridlington. T. S.

Baryphyma pratensis Bl. Pulfin Bog, near Beverley. E. A. Parsons,

Meta menardi Latr. One male. Lonsdale. J. W. H. New to N. Riding.

Xysticus erraticus Bl. One female. Bridlington. T. S.

Evarcha falcata Bl. One male. Kilton Woods. New to N. Riding.

No new harvestman or pseudoscorpion has been discovered in the county, but the distributional range of a few of the former, notably *Oligolophus alpinus* Herbst., has been greatly enlarged.

Very little new ground seems to have been searched, and many most promising localities—to name a few, the higher mountains, Askham Bog and Strensall Common near York, Skipwith Common, and that part of Yorkshire adjoining Lincolnshire—still remain to be systematically investigated at all seasons. Anyone to whom these and similar places are readily accessible, would no doubt very soon add new and rare spiders to the county list.

In connection with the paper on “Abnormality in Spiders”—“Naturalist,” May and June, Professor W. Kulczynski, Krakau, has sent the writer a copy of his description of a gynandrous spider, “*Erigone* (now *Edothorax*) *jusca* Bl.,” published as long ago as 1885, and a reference to another example, a *Lycosa*, given by Bertkau, 1892, *Archiv für Naturgeschichte*.

During the year, “Keys to the Families and Genera of British Spiders, and to the Families, Genera and Species of British Harvestmen and Pseudoscorpions,” have been published in “The Naturalist,” June, September and December, and it is hoped that, with such an aid which has not previously been available to workers, other naturalists will turn their attention to the Arachnida, and be able to make progress in a difficult study.

THE SPIDERS OF THE AIREDALE AND WHARFEDALE AREA.*

W. P. WINTER.

Mr. W. P. Winter writes:—I have to thank the Rev. O. Pickard-Cambridge and Messrs. Falconer, Jackson and Frank P. Smith for their help in naming our specimens.

The “Victoria County History of Yorkshire” (Vol. I.) referred to 72 spiders and 10 harvestmen as having been found

* For First List, see *Bradford Scientific Journal*, April, 1909.

in our area. During 1908 we added to these 31 spiders, 4 harvestmen, and 1 false scorpion, and in 1909 this list was further increased by 40 spiders and 3 harvestmen, making a grand total of 143 spiders, 17 harvestmen, and 1 false scorpion, or 161 arachnids altogether. The additions of 1910 are 29 spiders, making 190 arachnids.

One spider (*Clubiona facilis* Cb.) is new to science, another (*Ivalckenaera obtusa*) is new to the county, as well as others mentioned in Mr. Falconer's list, and one harvestman (*Liobunum blackwallii*) new to the West Riding.

The southern species *Micrommata virescens* has again been found in Grass Woods, and, with the exception of 9 spiders and 1 harvestman, all the records of the Victoria County History for our area have now been confirmed.

Micaria pulicaria Sund. ♀. Under dead leaves, near Cottingley Village, Sept. W. P. W. In Bingley Woods, Oct. R. B. and W. P. W.

Clubiona diversa Cambr. Bingley Woods, Oct. R. B. and W. P. W.

C. trivialis L. Koch. Wilsden, Sept. R. B. Harden, Oct. W. P. W.

C. comta C. L. Koch. Wilsden, Sept. R. B.

Coelotes terrestris Wid. Imm. Arncliffe, July. T. S.

Hahnia helvecola Sim. ♀. Calverley Woods, Feb. S. M.

Hahnia montana Bl. Malham, May. T. S.

Theridion pallens Bl. ♀. Malham, May. T. S. ♀. Moorhead, July. W. P. W.

Pholcomma gibbum Westr. Bingley Woods, Oct. R. B.

Linyphia peltata Wid. ♀. Malham, May. T. S.

Leptyphantus cristatus Menge. ♀. Cottingley Wood, Oct. W. P. W.

L. pallidus Cambr. ♀. Calverley, Feb. S. M.

L. mengii Kulcz. ♀. Sept., Ilkley. W. R. B. Harden, W. P. W. Oct., Bingley Woods. R. B. and W. P. W. Baildon Green. W. P. W.

Bathyphantes approximatus Cambr. Beckfoot, Oct. R. B. and W. P. W.

Porrhomma microphthalmum Cambr. ♀. Feb., Calverley. S. M.

P. oblongum Cambr. ♀. Calverley Woods, Feb., S. M.

Tmeticus concinnus Thor. ♀. Calverley Woods, Feb. S. M. ♀. Harden, Sept. W. P. W. ♂ and ♀. Bingley Woods, R. B. and W. P. W., and Baildon Green, W. P. W. Both Oct.

T. prudens Cambr. Cottingley Woods, under *Nardus*, W. P. W.

Microneta rurestris C. L. Koch. ♀. Calverley, Jan., S. M. Ilkley, W. R. B., Aug. Bingley Woods, R. B.

Sintula cornigera Bl. Bingley Woods, R. B. and W. P. W.

Edothorax fuscus Bl. ♀. Harden and Baildon Green. Oct., W. P. W. ♂. Bingley Woods, Oct. R. B.

- Æ. agrestis* Bl. ♀. Harden, Sept. W. P. W. Bingley Woods, Oct. R. B.
- Erigone promiscua* Cambr. ♂. Harden, May. W. P. W.
- E. atra* Bl. ♂. Haystack debris, Moorhead, May. W. P. W. Ilkley, Aug. W. R. B. Harden, Oct. W. P. W.
- Dicymbium nigrum* Bl. ♂ and ♀. In grass and on flypaper, Moorhead, Shipley, Jan. W. P. W. ♀. Calverley, Feb. S. M.
- D. tibiale* Bl. ♂. Cottingley Woods, Sept. W. P. W.
- Enidia bituberculata* Wid. ♀. Malham, June. T. S. Harden, R. B. and W. P. W.
- Pocadicnemis pumilus* Bl. ♀. Calverley Woods, Feb. S. M. Harden, Sept. and Oct. W. P. W.
- Metopobactrus prominulus* Cambr. Ilkley, Sept. W. R. B.
- Styloctetor penicillatus* Westr. ♂ and ♀. Harden, Oct. W. P. W.
- Cnephlocotes interjectus* Cambr. Bingley Woods, Oct. R. B.
- Caledonia evansii* Camb. Ilkley, Sept. W. R. B.
- **Walckenaera obtusa* Bl. ♂. Calverley, Mar. S. M.
- Tetragnatha solandrii* Scop. Ilkley, Sept. W. R. B.
- Epeira pyramidata* Clerck. Beaten from hazel bushes, Grass Woods (Mr. Carter).
- E. cucurbitina* Clerck. Shipley Glen, June. W. P. W.
- Pirata piraticus* Clerck. ♀. Ben Rhydding, May, Bradford Naturalists.
- Salticus scenicus* Clerck. In straw from packing case in laboratory at Sewage Works, Bradford, Jan. (Mr. Reddy). Ilkley, June, Mr. Ashworth. W. R. B.
- Euophrys erraticus* Walck. Earby to Gargrave. June. F. B.

HARVESTMEN.

- †*Liobunum blackwallii* Meade. Harden Beckfoot, Oct. R. B. and W. P. W.
- Phalangium saxatile* C. L. Koch. Bingley Woods, Oct. R. B. and W. P. W.
- Platybunus triangularis* Herbst. Calverley, Mar. S. M. Earby to Gargrave, June, F. R.
- Megabunus insignis* Meade. V. C. H. Malham, June. T. S. Rawthey Valley, June. F. B.
- Oligolophus morio*, var. *urnigerum* [V.C.H.] R. H. M.
- O. ephippiatus* C. L. K. [V.C.H.] R. H. M.

1910.

- Dysdera crocota* C. L. K. ♀. June, Bolton Abbey. Mr. Roose. New to W. Riding.
- Harpactes hombergii* Scop. Imm., July. Collyer's Wood, Moorhead, Shipley. W. P. W.

* New to County.

† New to West Riding.

- Clubiona lutescens* Westr. Imm. ♂ July. Harden Beckfoot Lane, Bingley. W. P. W. ♀ Sept. 28th. Under dead leaves in Cottingley Wood. W. P. W.
- C. pallidula* Clerk. ♀ June, under *Erica carnea* in Saltaire Park. W. P. W. ♀, July 11th, Keighley Moor. R. B.
- Agroeca proxima* Cambr. ♀ Sept., at Guisburn. F. R.
- Cicurina cinerea* Panz. ♀ with cocoon, Aug. Hirst Wood, Shipley. Collected by Norman Airey. New to W. Riding.
- Theridion pictum* Hahn. ♀, April, Bradley Gill, near Skipton. W. P. W. New to W. Riding.
- Robertus neglectus* Cambr. ♂. August, Black Hills, near Bingley, under dead leaves at the roots of grass. W. P. W.
- Linyphia hortensis* Sund. ♂ and imm. ♀, April, Bradley Gill, near Skipton. W. P. W. June, Janet Force, Malham, 4 ♂ and 5 ♀. W. F. and W. P. W. July, ♂, Grass Woods. W. P. W.
- L. obscurus* Bl. July, ♀ Grass Woods. W. P. W.
- **Leptyphantus angulatus* Cambr. June, 2 ♀ Malham Tarn. W. F.
- Porrhomma pygmaeum* Bl. Aug., ♀ Rivoock, near Keighley. R. B.
- Mengia scopigera* Grube. Valley of Desolation, Bolton Woods. 1 ♂, 2 ♀s New to W. Riding.
- Hilaira excisa* Cb. June, ♂, Malham Tarn. W. F.
- Microneta conigera* Cambr. June, several ♂ and ♀ Janet Force. W. F. and W. P. W. July, ♀, Hirst Wood Shipley. W. P. W.
- Edothorax gibbosus* Bl. June, ♀, Collyer Wood, Moorhead, Shipley. W. P. W.
- Enidia cornuta* Bl. July, ♂, Malham. W. P. W.
- Dismodicus bifrons* (Bl.). June, ♂, Janet's Cove. W. F. and W. P. W. ♂, Moorhead to Cottingley. W. P. W. July, Grass Woods. ♀, common, W. P. W.
- Diplocephalus permixtus* Cambr. June, ♀, Malham Tarn. W. F.
- **Entelecara trifrons* Cambr. June, 1 ♂ and 2 ♀, Malham Tarn. W. F.
- Minyriolus pusillus* Wid. June, ♀, Malham Cove. W. P. W.
- Cnephalocotes obscurus* Bl. Aug., ♂, Black Hills (Bingley), W. P. W.
- Taphinocyba subitanea* Cambr. Aug, ♀, under bracken at Howden (near Keighley). W. P. W.
- T. pallens* Cambr. Sept. 28th, ♀, Cottingley Wood, under dead leaves. W. P. W.
- Wideria cucullata* C. L. K. Sept. 28th, ♀, Cottingley Wood, under dead leaves. W. P. W.
- Ceratinella brevipes* Westr. Sept., ♀, Black Hills, near Bingley, under dead leaves. W. P. W.
- Epeira umbratica* Clerck. Aug., ♀, Denton. Mr. J. T. Ashworth.
- E. cornuta* Clerck. ♀, June, Morton Moor. W. P. W. ♀, July 11th, Keighley Moor. R. B.
- Lycosa palustris* Linn. June, Malham, ♀, Mr. Jowett. ♂ and ♀ Goredale Scar and Beck. W. F. and W. P. W.

Total additions for the year, 29 to date, November 9th, 1910.

The initials of the recorders :—

R. B.—Mr. Rosse Butterfield.	F. B.—Mr. Fred Booth.
S. M.—Mr. S. Margerison,	F. R.—Mr. Fred Rhodes.
T. S.—Mr. T. Stringer.	R. H. M.—Dr. Meade.
W. R. B.—Mr. Ruskin Butterfield.	W. F.—Mr. W. Falconer.

The following Committee was elected for 1911 :—

Chairman—W. Falconer, Slaithwaite.

Convener—T. Stainforth, B.A., Hull.

Representative on Executive—T. Stainforth, B.A., Hull.

Representative on Committee of Suggestions—T. Stainforth, B.A.

Other Members—W. P. Winter, B.Sc., Shipley ; E. A. Parsons, Hull ; W. J. Fordham, M.B., Selby ; H. C. Drake, Scarborough ; W. D. Roebuck, Leeds ; C. B. Walsh, B.Sc., Middlesbrough.

Committee of Suggestions for Research.—A meeting of this Committee will be held in the new year.

The following are elected for 1911 :—

Chairman—P. F. Kendall, M.Sc., Rosedene, Weetwood, Leeds,

Convener—T. W. Woodhead, Ph.D., Huddersfield.

Representative on Executive—Professor P. F. Kendall.

Representatives of Committees and Sections—J. W. Carter, Bradford ; S. H. Smith, York ; W. Hewett, York ; Cosmo Johns, Sheffield ; W. West, Bradford ; W. Ingham, York ; E. Hawkesworth, Leeds ; Godfrey Bingley, Leeds ; A. Whitaker, Barnsley ; S. Margerison, Leeds ; J. A. Hargreaves, Scarborough ; Rosse Butterfield, Keighley ; W. Harrison Hutton, Leeds ; H. Culpin, Doncaster ; W. Wilson, Colne ; with Dr. W. G. Smith, Edinburgh.

The Yorkshire Micro-Zoology and Micro-Botany Committee.—

During the year one of the members of the Committee, Mr. M. H. Stiles, made an important contribution to the British Association Sheffield Handbook ; and Mr. R. H. Philip and others have made a few interesting records. It is hoped during the coming year to reorganise the Committee, and with the help of new members, to carry on the excellent work which has been done in the past.

The Committee for 1911 is as follows :—

Chairman—M. H. Stiles, 2 Frenchgate, Doncaster.

Convener—R. H. Philip, Hull.

Representative on Executive—H. Moore, Rotherham.

Representative on Committee of Suggestions—W. West, Bradford.

Other Members—J. N. Coombe, Sheffield, Prof. A. Denny, Sheffield, F. W. Mills, Huddersfield; G. Howard, Rotherham; T. Howard, Bradford; Mark L. Sykes, Leeds; and J. W. H. Johnston, Thornhill.

Soppitt Memorial Library.—Dr. T. W. Woodhead writes:—We are indebted to the kindness of Mr. C. Crossland, F.L.S., for a number of interesting additions to the library during the present year, especially papers dealing with Yorkshire fungi. Twenty-eight papers are included in the gift, and consist of reports of the Fungus Forays from 1896 to 1907, held at Grassington, Selby, Barnsley, Harewood, Mulgrave, Cadeby, Arncliffe, Helmsley, Rokeby, Maltby, Farnley, Tyas, Bolton, and Masham. Others deal with New Fungi at Halifax; West Yorkshire and new British Fungi, also Coprophilous Fungi, *Mollisia cinerea* and its varieties; the Study of Fungi in Yorkshire, and Plants of Pecket Wood, by Jas. Bolton.

British Association.—Mr. Sheppard attended both Conferences of Delegates from the corresponding Societies, at the British Association Meetings, at Sheffield, in September. The first of these was presided over by Dr. Tempest Anderson, and Mr. F. Balfour Browne opened a discussion on the best method of making natural history records. Your secretary advocated the Watsonian vice-county method, as adopted by the Union, and it was admitted by the reader of the paper that with regard to the work of the Union, and its records in its journal, "The Naturalist," he had nothing but praise. It was suggested that a Committee of biologists be formed to recommend a definite system on which collectors should record their captures.

The second meeting was presided over by Prof. Kendall, and a paper was read on the damage to roads by motor cars.

This subject seemed hardly suitable for the Conference, which probably accounted for the poor attendance. The Chairman introduced the question of the penny-wise and pound-foolish policy which had been adopted by the Treasury, of increasing the cost of the hand-coloured Geological Survey Maps: a subject dealt with in the Editorial Column of "The Naturalist" last March. The meeting expressed very strong views on the matter, and steps are being taken to endeavour to re-instate the former prices of the maps.

"The Naturalist" has regularly appeared at the beginning of each month, and has again devoted space to comments and notes of general interest, to reviews of books, and provincial scientific societies' publications; there have also been the usual references

to and criticisms of papers of interest to northern naturalists. A further instalment of the "Prominent Yorkshire Workers" series, which was started some years ago, has been contributed; this year the subject of the memoir being our past-president, Mr. Charles Crossland.

In the 89 pages devoted to geological subjects, we find the names of Mr. G. W. Lamplugh, F.R.S., Mr. G. C. Crich, of the British Museum; Prof. Kendall, Dr. Wheelton Hind, and Messrs. Cosmo Johns, Stather, Burton, Culpin, Sheppard, and others. The botanical notes, containing 78 pages, include papers by Drs. Woodhead, Smith, Rankin, Parsons, Keegan, and Messrs. J. F. Robinson, Crossland, Elgee, Cheetham, Cryer, Druce, F. A. Lees, Ingham, and others.

The arachnologists come next, and the fact that they occupy no fewer than 58 pages, is some indication of the growing interest in this usually neglected order, thanks to the work of Mr. W. Falconer and his followers.

The ornithologists fill nearly 44 pages, with notes from Messrs. Wade, St. Quintin, Fortune, H. E. Forrest, Booth, Butterfield, and others.

Messrs. G. T. Porritt, Parkin, Thompson, Winter, Silverlock, Morley and other entomologists occupy 35 pages; there are 22 pages devoted to general Zoology, by Messrs. Irving, Clarke, Friend, Stainforth, Woods, and others; there are 18 pages of general articles, by Messrs. Lamplugh, Auden, and Armstrong; 10 pages on Pre-historic Archæology, principally by Mr. Sheppard; 6 on Micro-botany, by Mr. Philip and others; 11 on Mammals, by Messrs. Fortune, Booth, Shuffrey, Whitaker, Cocks, etc.; and a similar number on Conchology, by Messrs. Roebuck, Sanderson, and others.

Hand-Coloured Geological Maps.—The following resolution, passed unanimously at a meeting of the Executive of the Union held at Leeds in November, was confirmed by the General Committee held at Middlesbrough:—"That the Yorkshire Naturalists' Union earnestly deplores the decision of the Director of H.M. Stationery Office to raise the price of the hand-coloured edition of the maps of the Geological Department to a figure that is practically prohibitive of their purchase, except by persons or institutions upon whom their acquisition is imperative. The Union believes that this action is most detrimental to the interest of every branch of science concerned with the investigation of the geological structure of the country, and of such subjects as Agriculture and Ecological Botany; and that in thus withholding from the public cheap and easy access to the results of the Geological Survey, the objects of the Survey are, in a large measure, defeated, and the cost of this Department of the public service deprived of much of its justification."

The Presidency for 1911 has been accepted by Dr. Alfred Harker, M.A., F.R.S., of St. John's College, Cambridge.

The Union wishes to record its indebtedness to its retiring President, Prof. A. C. Seward, M.A., F.R.S., of Cambridge, for his services during the year.

Other Officers—In addition to the President, Divisional Secretaries, Local Treasurers, etc., already referred to, the following officers of the Union were elected for 1911:—

Delegate to the British Association—Mr. T. Sheppard.

Auditors—Messrs J. W. Stather and J. F. Robinson.

Hon. Treasurer—Mr. H. Culpin, Doncaster.

Hon. Secretary—Mr. T. Sheppard, Hull.

LIST OF SOCIETIES

Affiliated with the Yorkshire Naturalists' Union, with the addresses of the Secretaries.

- BARNSELY NATURALISTS' SOCIETY.—H. Wade, 10 Pitt Street, Barnsley.
- BOOTHAM SCHOOL NATURAL HISTORY SOCIETY.—T. H. Knight, Bootham School, York.
- BRADFORD SCIENTIFIC ASSOCIATION.—A. Smith, Springfield, Guisley, near Leeds.
- BRADFORD NATURAL HISTORY AND MICROSCOPICAL SOCIETY.—F. Jowett, 2 Vincent Street, Bradford.
- BARNOLDSWICK AND EARBY SCIENTIFIC SOCIETY.—F. J. Garratt, 20 Mosley Street, Barnoldswick.
- CLEVELAND NATURALISTS' FIELD CLUB.—F. Elgee, 23 Kensington Road, Middlesborough.
- CRAVEN NATURALISTS' ASSOCIATION.—T. H. Holmes, 20 Castle View Terrace, Skipton.
- CROSSHILLS NATURALISTS' SOCIETY.—J. Holmes, 9 Campbell Street, Crosshills.
- DARLINGTON AND TEESDALE NATURALISTS' FIELD CLUB.—Prof. A. C. Dixon, 12 Kendrew Street, Darlington.
- DONCASTER GRAMMAR SCHOOL NATURAL HISTORY SOCIETY.—H. V. Corbett, 9 Priory Place, Doncaster.
- DONCASTER SCIENTIFIC SOCIETY.—G. H. Greenslade, Eastfield, Doncaster.
- EAST RIDING NATURE STUDY ASSOCIATION.—W. J. Algar, School House, Lockington, near Beverley.
- ELLAND NATURALISTS' SOCIETY.—G. H. Barrett, 111 Park Road, Elland.
- GOOLE SCIENTIFIC SOCIETY.—T. W. Hiley, 28 North Street, Goole.
- GREETLAND AND WEST VALE NATURALISTS' SOCIETY.—W. Moore, 15 Crosshill, Greetland.
- HALIFAX SCIENTIFIC SOCIETY.—F. Barker, 11 Hall Street, Halifax.
- HEBDEN BRIDGE LITERARY AND SCIENTIFIC SOCIETY.—E. B. Gibson, Croft Terrace, Hebden Bridge.
- HECKMONDWIKE NATURALISTS' SOCIETY.—G. W. Parker, 13 Vernon Rd., Heckmondwike.
- HUDDERSFIELD NATURALISTS' AND PHOTOGRAPHIC SOCIETY.—C. Mosley, 213 Lockwood Road, Lockwood, Huddersfield.
- HULL CO-OPERATIVE FIELD NATURALISTS' CLUB.—E. Pittaway, 4 Henley Villas, Adderbury Grove, Beverley Road, Hull.
- HULL JUNIOR FIELD NATURALISTS' CLUB.—A. J. Moore, 9 Brook Street, Hull.
- HULL GEOLOGICAL SOCIETY.—J. W. Stather, Brookside, Newland Park, Hull.

- HULL SCIENTIFIC AND FIELD NATURALISTS' CLUB.—T. Stainforth, The Museum, Hull.
- HONLEY NATURALISTS' SOCIETY.—A. Booth, 19 Oldfield Buildings, Honley, near Huddersfield.
- LEEDS CONCHOLOGICAL CLUB.—F. Booth, 18 Queen's Road, Shipley.
- LEEDS CO-OPERATIVE NATURALISTS' FIELD CLUB.—J. B. Drake, 54 Northbrook Street, Chapeltown, Leeds.
- LEEDS GEOLOGICAL ASSOCIATION.—E. Hawkesworth, Sunnyside, Crossgates, Leeds.
- LEEDS NATURALISTS' CLUB AND SCIENTIFIC ASSOCIATION.—C. H. B. Turner, 37 Sholbroke Place, Leeds.
- LINDLEY NATURALISTS' AND PHOTOGRAPHIC SOCIETY.—G. Kaye, 66 Rock Terrace, Lindley, Huddersfield.
- MALTON NATURALISTS' SOCIETY.—R. H. Smithson, 17 Yorkersgate, Malton.
- NORTH EASTERN RAILWAY NATURAL HISTORY AND SCIENTIFIC SOCIETY.—W. Hewett, 12 Howard Street, York.
- OVENDEN NATURALISTS' SOCIETY.—E. Roberts, 16 Melbourne Street, Lee Mount, Halifax.
- RAVENSTHORPE NATURALISTS' SOCIETY.—W. Wood, 2 Union Street, Ravensthorpe, Dewsbury.
- ROTHERHAM NATURALISTS' SOCIETY.—G. Howard, Sitwell Vale, Moorgate, Rotherham.
- SCARBOROUGH FIELD NATURALISTS' SOCIETY.—Miss M. Miers, 31 New Queen Street, Scarborough.
- SCARBOROUGH PHILOSOPHICAL AND ARCHÆOLOGICAL SOCIETY.—E. A. Wallis, Springfield, Scarborough.
- SHEFFIELD JUNIOR NATURALISTS' SOCIETY.—H. H. Proctor, 17 Wadsborough Road, Sheffield.
- SOUTH-WEST YORKSHIRE ENTOMOLOGICAL SOCIETY.—J. Hooper, Grosvenor Terrace, Middleton, near Wakefield.
- SHEFFIELD NATURALISTS' CLUB.—C. Bradshaw, Public Museum, Sheffield.
- SPEN VALLEY LITERARY AND SCIENTIFIC SOCIETY.—A. Moore, Booth Road, Cleckheaton.
- THIRSK AND DISTRICT NATURALISTS' FIELD CLUB.—J. E. Hall, Market Place, Thirsk.
- WAKEFIELD NATURALISTS' SOCIETY.—A. Price, 20 Northfield Terrace Wakefield.
- YORK AND DISTRICT FIELD NATURALISTS' SOCIETY.—V. G. F. Zimmerman, 7 Portland Street, York.

Total number of members belonging to the Yorkshire Naturalists' Union	419
Total number of Subscribing Societies	43
Total number of members belonging to Societies affiliated with the Yorkshire Naturalists' Union	3449

Financial Statement.—The following is the Hon. Treasurer's statement of the accounts:—

PROCEEDINGS OF PROVINCIAL SCIENTIFIC SOCIETIES.

The **Transactions of the Eastbourne Natural History, Scientific and Literary Society** (N.S., Vol. IV., Pt. III., 1909-10, 87 pp.), besides several short papers of general interest, contain a number dealing with the Eastbourne area. Amongst these are 'The Older Pre-historic Races of Sussex,' by W. J. Lewis Abbott; 'the South Downs,' by J. H. A. Jenner; 'Some Notes on the Eastbourne Flora,' by E. J. Bunnett; 'Ground-nesting Birds,' by E. J. Bedford; and 'Old Sussex Ironwork,' by W. Ruskin Butterfield.

The **Transactions and Journal of Proceedings of the Dumfriesshire and Galloway Natural History and Antiquarian Society** (N.S. Vol. XXI., 1908-9) have recently been issued. The volume contains 346 closely-printed pages, which contain reports of the Society's meetings and excursions, as well as abstracts of the various papers read at the Society's meetings. These deal with natural history, historical, botanical, meteorological and general subjects, by various well-known writers. The volume is a substantial record of a year's work.

The **Proceedings of the Liverpool Geological Society** (Vol. XI., Pt. I., 1909-10) are edited by Mr. J. H. Milton, and contain five important papers. The first is the Presidential Address of Mr. H. C. Beasley, in which he refers to the geological work accomplished by amateurs. There is an excellent address by Dr. J. W. Judd, on 'The Triumph of Evolution: a Retrospect of Fifty Years'; Mr. T. H. Cope has a paper 'On the Recognition of an Agglomerate (Bala Volcanic Series)'; Mr. W. Hewitt describes an excavation in the Keuper Marl in Liverpool, and Mr. C. B. Travis describes some Borings and a Buried Pre-glacial Valley near Burscough. There is also the usual record of meetings, balance-sheet, etc.

The **South-Eastern Naturalist for 1910**, being the Transactions of the South-Eastern Union of Scientific Societies (lxxvii. + 94 pp., 3/6 net. London: Elliott Stock) is an unusually interesting volume, and includes a record of the Guildford Congress. The 'Museum Notes' are illustrated by several blocks of pre-historic implements. The Presidential Address of Prof. E. A. Gardner deals with 'The Criteria of Artistic Progress.' Mr. H. Bury describes 'The Relations of the River Wey to the Blackwater and the Arun'; Mr. E. A. Martin gives the 'Results of Dew-Pond Investigation'; Mr. J. G. N. Cliff describes 'The Pilgrim's Way between Farnham and Albury'; Mr. W. Martin has a useful paper on 'The Interpretation of the Maps of the XVIth and XVIIth centuries'; Mr. O. H. Latter describes the Charterhouses at Godalming, and Mr. A. R. Horwood has a lengthy paper on 'The Extinction of Cryptogamic Plants.'

The **Proceedings and Transactions of the Liverpool Biological Society**, Vol. XXIV. (1909-10). Liverpool, 360 pp. 21/-.

This report contains the usual excellent record of a good year's biological work. There is an abstract of Mr. R. Newstead's Presidential Address, 'Some Notes on the Natural History of Jamaica'; Prof. W. A. Herdman contributes the Twenty-third Annual Report of the Liverpool Marine Biological Committee and their Biological Station at Port Erin, and Prof. Herdman, with Messrs. A. Scott and J. Johnstone, give their Report on the Investigations carried on during 1909, in connection with the Lancashire Sea-fisheries Laboratory at the University of Liverpool, and the Sea-Fish Hatchery at Piel, near Barrow. Under these headings is a review of an enormous amount of original work, of a quality far exceeding what might be judged from the somewhat official nature of the titles. The reports also are illustrated by numerous sketches, etc., in the text, plates; diagrams, and maps. There is a series of illustrations of plankton, the development of the Plaice, etc. Amongst the papers mention might be made of 'Fish Hatching at Piel,' by Mr. A. Scott; 'Internal Parasites of Fishes from the Irish Sea,' by Mr. J. Johnstone, who also gives a Report on Measurements of Irish Sea Plaice; 'The Flow of Water through the Irish Seas,' by Dr. H. Bassett' and 'Report on Temperature Observations,' etc., by Mr. J. Johnstone.

THE NATURALIST.

A MONTHLY ILLUSTRATED JOURNAL OF
NATURAL HISTORY FOR THE NORTH OF ENGLAND.

EDITED BY

T. SHEPPARD, F.G.S., F.S.A.Scot.,

THE MUSEUMS, HULL;

AND

T. W. WOODHEAD, Ph.D., F.L.S.,

TECHNICAL COLLEGE, HUDDERSFIELD.

WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF

J. GILBERT BAKER, F.R.S. F.L.S.,

GEO. T. PORRITT, F.L.S., F.E.S.,

Prof. P. F. KENDALL, M.Sc., F.G.S.,

JOHN W. TAYLOR,

T. H. NELSON, M.B.O.U.,

WILLIAM WEST, F.L.S.,

RILEY FORTUNE, F.Z.S.

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Yorkshire Naturalists' Union.

SECTION FOR VERTEBRATE ZOOLOGY.

President—OXLEY GRABHAM, Esq., M.A., M.B.O.U.

Two Meetings will be held in Room C 8, at the Leeds Institute, Leeds, at 3-15 p.m., and 6-30 p.m. respectively, on Saturday, February 18th, 1911.

BUSINESS:—

The appointment of Bird-Watchers for 1911, and the discussion of other matters in connection with the Yorkshire Wild Birds' and Eggs' Protection Acts Committee.

Short papers (illustrated by lantern-slides or specimens), will be read by the following gentlemen:—Mr. Oxley Grabham, M.A., "Yorkshire Freshwater Fishes"; Mr. E. W. Wade, M.B.O.U., "The Chough"; Mr. Walter Wilson, "The Lesser Black-backed Gulls at Foulshaw Moss"; Prof. C. J. Patten, M.A., M.D., Sc.D., F.R.A.I., "The Plumage Changes in *Calidris arenaria*, and their correlation with Sexual Maturity." Messrs. Jasper Atkinson, Riley Fortune, F.Z.S., H. B. Booth, and others will also contribute short items.

Any Member or Associate of the Y.N.U. is invited to attend, and to bring notes, specimens, lantern-slides, etc.; and is requested to bring forward matters of interest connected with the work of the Section, and to take part in any discussion.

Will Officials of Affiliated Societies kindly notify their Members.

Any further particulars from H. B. BOOTH, Ryhill, Ben Rhydding.

Yorkshire Naturalists' Union.

FORTY-NINTH ANNUAL REPORT FOR 1910.

Edited by the Hon. Secretary.

46 PAGES.

1/- NET.

Besides containing an account of the Union's field work, etc., during the year, includes reports on the various aspects of the Fauna and Flora of the County by Messrs. R. Fortune, T. H. Nelson, E. W. Wade, W. J. Clarke, O. Grabham, H. B. Booth, A. Whitaker, G. T. Porritt, H. H. Corbett, W. Denison Roebuck, F. H. Woods, T. W. Woodhead, W. Ingham, C. Crossland Cosmo Johns, A. J. Stather, T. Sheppard, J. W. Stather, J. J. Burton, W. Falconer, W. P. Winter, etc.

SUBSCRIPTIONS to the Yorkshire Naturalist's Union for 1911 are **NOW DUE**, and should be sent to the Hon. Treasurer, Mr. H. CULPIN, 7, St. Mary's Road, Doncaster.

NOTES AND COMMENTS.

BIRDS OF THE BRITISH ISLANDS.

This extraordinary work, as we have already mentioned in these columns, is being issued in twenty parts at 7 6 net, by Grant Richards, Ltd. Part XVI. is before us, and, as in the previous sections, the letterpress is by Charles Stonham, C.M.G., F.Z.S.; etc., the illustrations being by Lilian N. Medland, F.Z.S. Part XVI. contains descriptions of the Curlew Sandpiper, Purple Sandpiper, Knot, Sanderling, the Ruff and Reeve, Common Sandpiper, Wood Sandpiper, Green Sandpiper, Redshank, Spotted Redshank, Bar-tailed Godwit, Black-tailed Godwit, Common Curlew, and Whimbrel. The illustrations, etc., are quite up to the standard of previous parts.

INGLEBOROUGH.

At the astonishingly low price of fourpence, the Geological Survey Office has recently published an admirable 'Guide to the Geological Model of Ingleborough and District,' which is now in the Jermyn Street Museum. The pamphlet is written by Dr. Aubrey Strachan, under whose guidance the model, made by Mr. J. F. Stackhouse, has been geologically coloured. Upon it are shewn the geological formations, faults, caves, swallow holes, underground water-courses, contour lines, glacial striæ, etc. With the guide is a reproduction of a photograph of the model, and also a coloured plate shewing the various geological features. This handbook is the cheapest publication we have yet seen from the Geological Survey Office, and it should have a large sale. Every visitor to Ingleborough will certainly find it useful.

THE ARRIVAL OF MAN IN BRITAIN.

Prof. W. Boyd Dawkins favours us with a copy of the Huxley Memorial Lecture which he delivered before the Royal Anthropological Institute recently, the subject being 'The Arrival of Man in Britain in the Pleistocene Age. A valuable part of the address is the classification of the various remains of extinct mammalia which occur in different parts of Britain. He sees 'no evidence of Man in Eocene, Miocene, or Pliocene Periods.' He will not admit that Eoliths are the work of human hands. The range of the river drift men in England has been considerably extended northward on the strength of a single specimen found at Huntow, near Bridlington, an illustration of which is given. Personally, we should like a little more evidence than this single specimen affords. As regards the antiquity of man in Britain, Prof. Dawkins concludes, 'the more minutely I examine the events that have taken place since man appeared on the earth, the more profoundly am I impressed with the vastness of his antiquity, and with the futility of any attempt to compute it in terms of years.'

GRAVITY AND MICRO-ORGANISMS.

At a recent meeting of the Royal Society, Mr. Harold Wager read a paper on 'The effect of gravity upon the movements and aggregation of *Euglena viridis* Ehrb., and other micro-organisms.' This species, and others, when placed in shallow vessels or narrow tubes in the dark, become aggregated into peculiar network-like patterns, or more or less well-defined groups. In a narrow tube, placed horizontally in the dark, the aggregation takes the form of a series of groups which look like green bands crossing the tube from one side to the other. Each group shews a constant cyclic up-and-down movement, the denser central region moving downwards under the influence of gravity, and a lighter peripheral area consisting of organisms moving upwards, mainly by their own activity. The aggregation depends upon the number of organisms present, their activity, and the depth of the vessel in which they are contained, and may persist with its regular cyclic movements for several days. The downward movement appears to be purely a mechanical one, dependent upon the specific gravity of the organism, and is not due to a stimulus which evokes a physiological response, as in geotropism or geotaxis. The upward movement is, on the other hand, due partly to the activity of the organisms themselves, partly, no doubt, to the upward currents set up in the liquid by the friction of the downward moving stream. The upward movement of the *Euglena* is more or less vertical, and appears to be controlled, so far as the orientation of its elongate body is concerned, by the action of gravity. The aggregation resembles the cohesion figures produced when fine sediments are allowed, under certain conditions, to settle down slowly in a liquid, and are probably brought about much in the same way. The movements of certain micro-organisms are apparently controlled, therefore, in a purely mechanical fashion by gravity, combined with cohesive forces, and this is of advantage to species which, like *Euglena*, are often found in large numbers in a confined space, in that it prevents their accumulation in such dense masses as would be likely to interfere with their assimilatory and respiratory functions.

ORIGIN OF THE TRIAS.

At a recent meeting of the Geological Society, Mr. A. R. Horwood read a paper on 'The Origin of the British Trias.' He pointed out that during the Triassic period in Britain, deposition, in his opinion, was brought about solely by the action of water, and the British Trias is a Delta-system, for during Carboniferous, Permian and Triassic times, deposition was mainly in the same area. There is a gradation from the Bunter to the Rhætic. The Bunter is known to be of fluvial

origin, and there is a continuity from Lower to Upper Trias, with an unconformity due to the new mode of formation and change in sedimentation. Oscillation and overlapping are admittedly due to aqueous agency. The Triassic-outcrop and the delta-area of the river Mississippi are closely similar. Colouration is original, from below upwards, and not co-incident with bedding. The thickness of the Bunter is an argument for a subsiding area. The ferruginous types in the Carboniferous, Permian, and Trias are alike due to delta conditions. The Trias is horizontal now, as originally, away from any ancient hills which it covers. It is only the skerries that are rippled. Screes occur mainly to the south-west of submerged hills. Sandstones thin out eastward, marls westward, and the skerries are on the hills. Rock-salt and gypsum are also horizontal and continuous in a linear direction. The Keuper gradually merges into the Rhætic phase, and the latter into the Lias. Since the Bunter sediments came from the north-west into the Midlands, so probably did the upper Trias. Local metamorphic and volcanic rocks may have provided some of the heavier minerals, but, as a whole, their source was more distant. The flora and fauna can be grouped in provinces around the delta-head of the Trias. These considerations point to an aqueous mode of sedimentation in a moist and equable climate.

‘SEA MILLS.’

Museum curators are proverbially peculiar people, and now and then startle the world by some great deed. Some, we know, are like volcanoes, and break forth into fiery activity without any warning, and as quickly subside. Some, however seem to plod away and do their work without the aid of fireworks. The latest surprise comes from a modest and unassuming contributor, whose researches resulted in an article appearing in the *London Daily News* of January 7th, under the headlines ‘Sea Mills;’ ‘Remarkable Discovery by Leeds Curator;’ ‘New Force in Nature;’ ‘Marine Boring Machines at Work.’ From this we learn that the curator ‘has just discovered what may prove to be in effect a new force in Nature. Full details of the discovery, which is bound to create great interest in scientific circles, are to be given at a special lecture, but its importance merits more immediate attention.

A ‘NEW FORCE IN NATURE.’

It seems that whilst wandering among the rocks in North Devon, ‘he discovered some borings of an unprecedented character, in that they were horizontal in direction, and conical in form. Resting in the borings were boulders . . . which the tide turned over and over . . . the whole contributed a phenomenon of nature to which ‘the discoverer proposes to give

the name of sea-mill.' His friends 'regard the discovery, in that it throws light upon the problem of cliff formation, of great importance to geologists, but the curator, with the modesty of the true man of science [a curator modest!] is inclined to await the judgment of his confederates before formulating any definite claims.' He stated, however, that 'certainly so far as my experience goes, my discovery does relate to a phenomenon of nature hitherto unknown. The word "sea-mills," by which I propose to describe it, will, of course, also constitute a new term in science, and will, I suppose, find mention in the scientific text works of the future.'

SIR FRANCIS GALTON.

The death of Sir Francis Galton, D.C.L., F.R.S., etc., which occurred on the 17th January, severs an interesting link between the present and past generations of scientists. Sir Francis Galton's interesting 'Memoirs' were reviewed in this journal some little time ago, and threw much light upon the many-sidedness of the author's life. He was grandson of Dr. Erasmus Darwin, and cousin to Charles Darwin. It is consequently not surprising that Galton turned his attention to the subjects of heredity and eugenics—his researches in connection with which gave him a world-wide reputation. His system of identification by means of finger-prints, is also now almost universally adopted. He was born at Duddeston, near Birmingham, in 1822.

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Siskins at Hebden Bridge. On the morning of December 26th, 1910, whilst walking alongside the stream in Crimsworth Dene, Hebden Bridge, I put up from out of the decayed bracken, a small party of Siskins. My first impression was that there might be half a dozen birds, but on a close investigation, after they had settled, I could only find three, one ♂ and two ♀s. They gave every opportunity for observation, moving to the opposite side of the stream, but only a few paces away, and one female came down to the water's edge and drank within a few feet of me. The lower part of the stream is fringed with alders, but the birds were quite away from them, and when I disturbed them, they were evidently sheltering from a rather blustering wind. For many years I have watched these alders for Siskins in winter, with negative results. Thomas Allis, in 1844, wrote that this species was common in some seasons near Hebden Bridge. The late H. Kerr, Bacup, in the *Manchester Guardian* recorded a party in the Hebden Valley, in November, 1893, which is the immediately preceding local occurrence of which there is a record. He added that he had observed the species here nearly every winter.—WALTER GREAVES, Hebden Bridge.

THE JURASSIC FLORA OF YORKSHIRE.

A. C. SEWARD, M.A., F.R.S., ETC.

(Continued from page 8).

(PLATES V. and VI).

The fossil reproduced in figure 3 is one of the specimens from the late Professor Williamson's Collection, presented to the Cambridge Botany School by Mrs. Crawford Williamson. As seen in the photograph, the actual base of the specimen is not preserved, but the surface is covered by numerous linear bracts bent over towards the apex, and forming a protective



FIG. 3. *Williamsonia gigas* (Lind. & Hutt). From a specimen in the Williamson Collection, Botany School, Cambridge. Natural size.

covering to the oval flower or inflorescence which was originally borne at the apex of a fertile branch. The centre, now represented by a cavity, was no doubt occupied by a conical mass of tissue from which were given off slender seed-bearing appendages and interseminal scales. Between the broken ends of the bracts and the central space the fossil shows an obliquely inclined zone, characterised by numerous radiating lines, which may be regarded as the impressions of some of the appendages attached to the basal part of the conical axis of the flowering branch. Our knowledge of the structure of this type of Cycadean flower is still very incomplete, and additional specimens are urgently needed.

Though our knowledge of the Jurassic Cycads from the Yorkshire coast is still far from satisfactory, we are justified in asserting that plants of this class played a prominent part in the Jurassic vegetation; they were represented by species of *Otozamites*, *Ctenis*, *Nilssonia*, and other genera.

GINKGOALES (*Ginkgo* and *Baiera*). The Maiden-hair tree of China, *Ginkgo biloba*, so named by Kaempfer in 1712, and needlessly renamed by Smith in 1797 *Salisburia adiantifolia*, though well known in cultivation in Asia, Europe, and America, is probably extinct in a wild state. It was formerly included with the Yew as a member of the Taxeae, but since the Japanese botanist Hirase, in 1897, revealed the important fact that the male cells of *Ginkgo* are spirally coiled motile bodies, like those of the Cycads and comparable with the male cells of ferns, it has been customary to exclude *Ginkgo* from the Coniferae, and to consider it as the sole representative of the group Ginkgoales. Before Hirase's discovery it was recognised that in several respects *Ginkgo* differed from the Taxeae and other Conifers, but it was his researches that furnished the strongest reason for the institution of a special group. The Maiden-hair tree, now regarded in the East as a sacred plant and cultivated in the groves of temples, is a solitary survivor of a group of Gymnosperms which had an almost world-wide distribution during the Jurassic era. 'An old Oak,' wrote Robert Louis Stevenson in his 'Inland Voyage,' 'that has been growing where it stands since before the Reformation, taller than many spires, more stately than the greater part of mountains, and yet a living thing, liable to sickness and death, like you and me, is not that in itself a speaking lesson in history? But acres and acres full of such patriarchs contiguously rooted, their green tops billowing in the wind, their stalwart younglings pushing up about their knees—a whole forest, healthy and beautiful, giving colour to the light, giving perfume to the air; what is this but the most imposing piece in Nature's repertory?'

The contemplation of a living tree of *Ginkgo biloba* makes our minds reel in their fruitless attempts to grasp the full meaning of the antiquity of which it is the embodiment. The Maiden-hair tree, which, so far as we know, has persisted with but slight modification though successive æons, bridges across the enormous gulf between the present and a past inconceivably remote. In 1828 Brongniart described some fossil leaves from the Yorkshire coast as *Cyclopteris digitata*, and in the following year Phillips spoke of the same type as *Sphenopteris latifolia*, both authors regarding the impressions as those of a fern. Subsequently the true nature of the fossils was recognised, and they were referred to the genus *Ginkgo*. It is futile to attempt a specific separation of the numerous forms of *Ginkgo* leaves met with in a fossil state, which can confidently be re-

garded as final. In all probability several species of the genus existed in the English Jurassic flora, but in view of the very considerable range in the degree of dissection of the lamina and in the size of the leaves of the surviving species (fig. 4), we cannot hope to define with accuracy the boundaries of the several species. The important fact is that Ginkgo leaves, resembling more or less closely those of the recent tree, as well as flowers and seeds, are represented in the Yorkshire Jurassic flora. Leaves with the Ginkgo habit, but with a more divided lamina are usually placed in the genus *Baiera* represented by the British Jurassic species described by the late Sir Charles Bunbury as *Baiera gracilis*. Other species of the genus have been described, and by many palaeobotanists the common Jurassic genus *Czekanowskia* is considered to be another member of the group Ginkgoales, though the evidence for its close relationship with Ginkgo and *Baiera* is far from convincing.

CONIFERALES. The interpretation of the fragmentary records of coniferous twigs is often a well-nigh impossible task. Tempted by a resemblance in the form of the leaves, one is often inclined to assume a relationship with existing conifers which rests on wholly insufficient evidence. I would, however, refer more especially to a type of Jurassic Conifer from the Yorkshire rocks which can with confidence be assigned to a family position. Several years ago Mr. Carruthers described some seed-bearing scales in the Leckenby collection, which is one of the precious possessions of the Sedgwick Museum at Cambridge, as *Araucarites Phillippsi*: these broadly triangular scales with a single median seed are practically identical with the cone-scales of some recent species of *Araucaria*. From the Jurassic beds of Stonesfield, from the Great Oolite of Northamptonshire, and from the Coralline Oolite of Malton portions of cones have been discovered which afford additional evidence of the existence of *Araucarites* in the Jurassic vegetation. In all probability the common Jurassic conifer known as *Pagiophyllum*, or *Elatides, Williamsoni* represents the leafy shoots of an *Araucarian* plant, the form of the leaves being identical with that of the thick crowded leaves of the Norfolk Island Pine (*Araucaria excelsa*), and other species in the Australian region. Moreover from Upper Liassic beds at Whitby, petri ed wood was described as long ago as 1833 by Witham, shewing very clearly certain anatomical characters which enable us to identify the specimens as belonging to an *Araucarian* tree. It is clear that the genus *Araucaria*, now confined to a few regions in South America and to Australia, New Caledonia, and other islands was in the Jurassic era a common northern type.

As yet no examples have been found in the Jurassic rocks of Yorkshire of any undoubted species of the *Abietineae*, the

family of conifers which now plays so prominent a part in the floras of northern latitudes. Several species of Conifers are recorded from British Jurassic beds, but in most cases they are represented only by vegetative twigs, and their systematic position cannot be determined with any degree of confidence.

In the foregoing account I have referred only to a selected number of types, my object being to emphasise the need for more thorough investigation of the rich and important Yorkshire flora, and to give prominence to the fact that the fossil plants already obtained from the English strata have afforded uncontrovertible evidence as to the remarkable changes in the distribution of groups and genera of plants which have taken place since the days of the Jurassic period.

There remains a word to be said on the flora as a whole, both as regards the classes which seem to have been most abundantly represented as also in regard to conclusions deduced from negative evidence. In dealing with an assemblage of plants collected from different strata in a geological series, we are usually hampered by insufficient information as to the nature of the sediments from which the individual specimens were obtained. Our material consists for the most part of waifs and strays of a vegetation which happen to have been buried in sand or mud, and to have successfully withstood the destructive agencies inseparable from geological change. We are able to identify with reasonable precision a proportion of the specimens, and to form some idea of the relative abundance of different genera, but we are not, as a rule, in a position to say whether all the plants grew together in a similar situation, or whether certain specimens had travelled further than others before they came to rest on the floor of the estuary or sea. Evidence is seldom available which helps us to distinguish between the plants of a vegetation which clothed the higher ground, and those which lived at a lower level. The point is, that we are not justified in assuming an identical habitat for all the plants represented in the sedimentary strata exposed in the Yorkshire cliffs. It might be possible, by more intensive study of the beds in which the specimens occur, to gain some knowledge of the grouping of the plant-associations in the ancient flora.

In a region consisting of high ground abutting on a low-lying swampy area, we find associations of plants differing from one another both in the species characteristic of each, and, it may be, also in the structural features which reflect the strongly contrasted conditions in the two environments. So in the case of fossil plants, we should like to know whether some forms may have journeyed far in hill-fed streams, while others may have drifted but a short distance from some lower habitat.

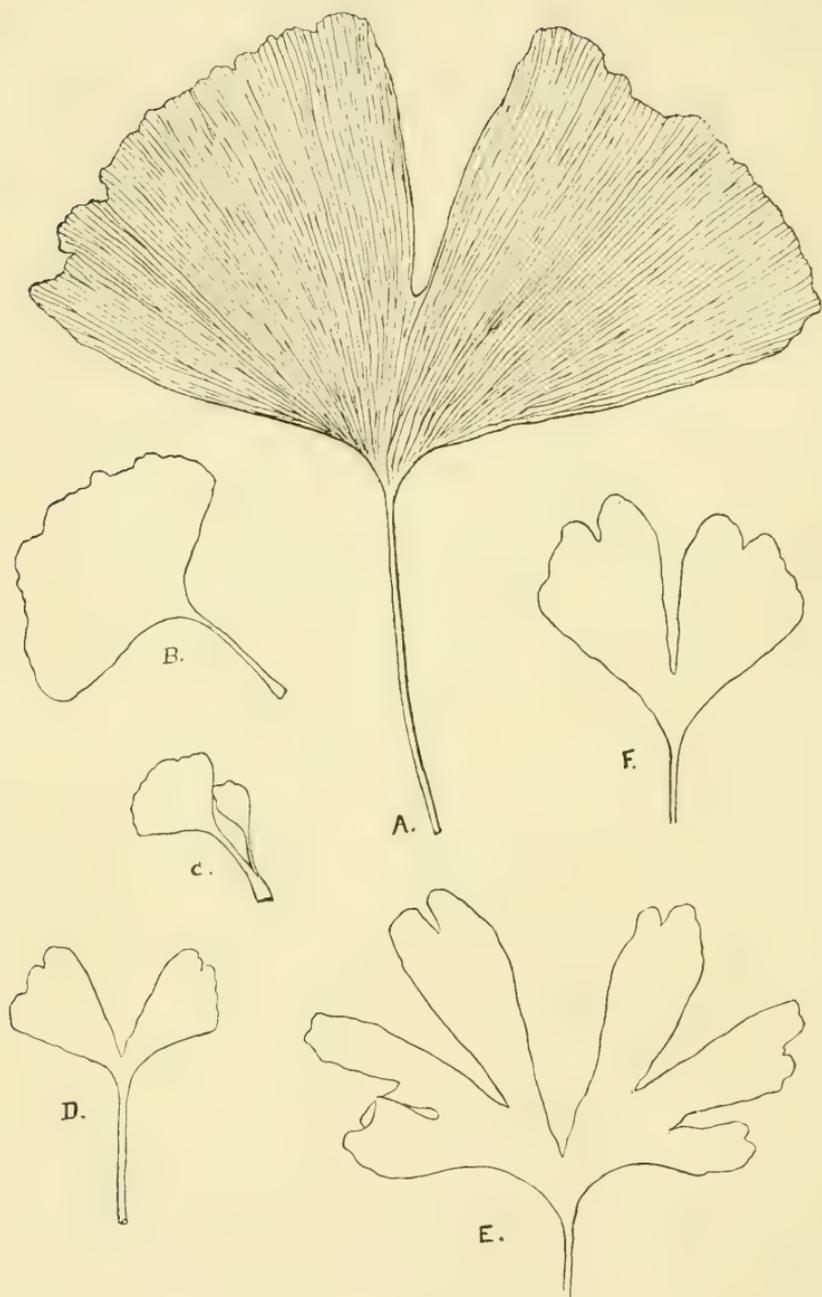
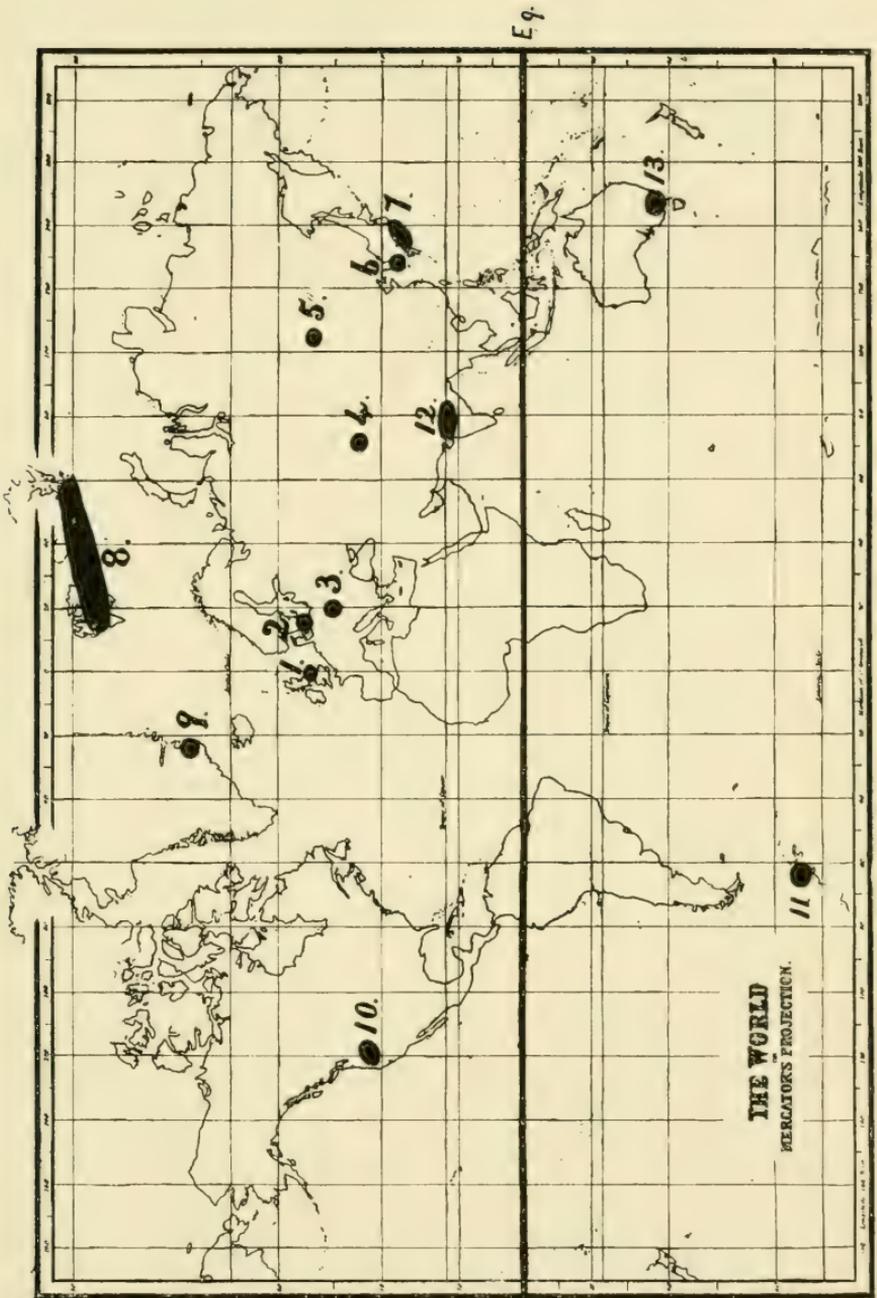


FIG. 4. *Ginkgo biloba* L. Leaves of the recent species illustrating differences in size and form. (Rather less than half natural size).



Map shewing the geographical distribution of the Floras referred to in the text.

It is in regard to such considerations as these that the botanist who concerns himself with the floras of the past ought to look for assistance from geologists. The palæobotanist should not be content with identifying the specimens submitted to him, but he should endeavour to extend his researches beyond the limits of mere systematic enquiry. It is important to do one's best to compile a list of species which may be cited with confidence by those who wish to make use of palæobotanical data; but in favourable circumstances it is possible to advance our work a stage further. If we are able to obtain petrified specimens in good preservation, we are not only in a much better position to ascertain the systematic position of the plants, but we have important information placed in our hands from which to reconstruct, though it may be in faint outline, the conditions under which the plants grew. In the case of the rich store of petrified samples of the Palæozoic vegetation preserved in the coal seams of Lancashire, Yorkshire, and other parts of England, it has been possible partially to revivify the Coal forests, and to form opinions as to the nature of the conditions under which the plants carried on their life.

Having pointed out the need of additional data, and the uncertainty of some of our determinations, I pass on to consider in a few words the general nature of the Jurassic vegetation so far as this is possible with the data available. The Yorkshire coast flora is characterised by the abundance of Ferns and Cycads and certain types of Conifers, but we are not as yet in a position to make any definite statement as to the relative abundance of these different groups. It is also probable that the Ginkgoales played a fairly prominent part in the composition of the vegetation. The most interesting fact in regard to the Jurassic ferns is that they afford strong presumptive evidence in support of the view that their nearest living allies are to be sought in the southern hemisphere. As regards the Cycads, comparison with recent genera is rendered more difficult because of the greater gulf between recent members of the group and those which flourished in the Jurassic era. There can, however, be no reasonable doubt that the Cycads of to-day are derived from an ancient stock which produced also *Williamsonia* and other Jurassic genera. Here, again, the recent plants most nearly akin to those of the Mesozoic floras are chiefly characteristic of southern and warmer regions. The same general statement is applicable to the relation of some of the Jurassic conifers to recent types. Finally, in the genus *Ginkgo* of the Jurassic flora, we have a member of a group which would probably have ceased to be represented among living plants were it not for the fact that the recent species has been long held in veneration in the far East as a sacred tree. With these southern forms there grew in profusion

stalwart Equisetums, which afford one of the few instances of a genus still represented by several species in the British flora, which can claim a Jurassic ancestry.

At first sight one might be tempted to infer from this hasty sketch that there is clear evidence of a tropical, or at least sub-tropical climate in Jurassic Europe. This would, perhaps, be a correct conclusion, but it is one which cannot be confidently made, so far at least, as the botanical evidence is concerned. We must bear in mind the fact that among living plants very closely allied types, or even one and the same species, may flourish under widely different climatic conditions as in the case of our familiar Bracken fern, which appears to be equally at home on the Yorkshire moors, in Tasmania, in tropical Africa, Abyssinia, and elsewhere. The comparison of a past with a recent flora is bound up with numerous considerations in addition to those connected with the comparison of existing and extinct species. During the Rhaetic and Jurassic eras, and in the succeeding Cretaceous and Tertiary epochs, the genus *Ginkgo* was very widely distributed in Europe. As recently as the Lower Tertiary period it existed in what is now the west of Scotland, in a form hardly distinguishable from the Maiden-hair tree. Are we justified in assuming that the living species is a safe criterion as regards power of resistance or capabilities of life with which the family was endowed at the zenith of its vigour? Were it possible to learn from the Maiden-hair tree what vicissitudes its ancestors passed through since the days of the Jurassic period, we might hear of unequal competition and gradual migration from northern to southern latitudes, and of a retreat which brought the genus within a measurable distance of extinction.

This brings me to an important point: admitting the insidious dangers of basing conclusions on negative evidence, we may, I think, assert with confidence that the Flowering plants, that is the Monocotyledons and Dicotyledons which are now the dominant class in the vegetable kingdom, were not represented in the Jurassic flora. It is true that a single specimen of what looks like a Dicotyledonous leaf is known from the Stonesfield Slate, but this does not justify the statement that the flowering plants were then in existence. Even if this Stonesfield impression is that of a true Dicotyledon, there is not a particle of evidence pointing to the occurrence of the highest class of plants in the Jurassic flora as represented in the Yorkshire strata. This fact alone—that the Angiosperms had not made their appearance, or to be on the safe side, if they had appeared they occupied a very subordinate position or were confined to habitats beyond the range of those agencies to which we owe the preservation of the Jurassic plants entombed in the Yorkshire beds—has an important bearing on the question

of our ability to draw conclusions as to climate from a comparison of Jurassic and recent floras. Darwin wrote in a letter to Bentham in 1869, 'I regret whenever a chance is omitted of pointing out that the struggle with other plants (and hostile animals) is far more important' than are soil and climate in determining the distribution of plants. We are totally unable to estimate the significance and the far-reaching consequence of the advent of the highly elaborated type of plant represented by the flowering plants. It is such considerations as these which help us to realise the complexity of the factors concerned in the sequence of events which have happened since the fragmentary fossils of the Yorkshire cliffs played their part in the machinery of living forest trees, or contributed to the needs of lower-growing Cycads or still humbler plants.

I now pass to the concluding section of my Address, namely a brief review of the relation of the Jurassic flora of the north-east of England to floras which flourished in other parts of the world during different phases of the Jurassic period. It is hardly necessary to point out that in treating of the geographical distribution of Jurassic floras, the application of the term Jurassic or even Inferior Oolite to floras from different regions does not carry with it the assumption of contemporaneity. All that we can do is to compare floras obtained from homotaxial rocks (to use Huxley's term) in order to ascertain whether or not there is any evidence for supposing that in the Jurassic era, as at the present day, there was a regional differentiation of the world into botanical provinces. It would involve us in a mass of detail were I to enter fully into this question, but by selecting a few genera of plants characteristic of the Jurassic flora of Yorkshire, and noting the records of their occurrence elsewhere, enough evidence may be put forward to furnish some justification for the belief that the Jurassic vegetation was remarkably uniform. In this incomplete survey are included a few floras assigned to the Rhaetic or Liassic series which, though not referable with precision to a particular horizon, are clearly older than the Jurassic flora of Yorkshire. It is important to notice that in their general facies, Rhaetic floras do not differ very materially from those of the Liassic and Oolitic periods. Similarly, the floras obtained from rocks at the base of the Cretaceous system conform in general features to those of Jurassic age. The floras selected for brief consideration are the following:—1—Yorkshire; 2—Bornholm; 3—Poland; 4—Turkestan; 5—Siberia; 6—Korea; 7—Japan; 8—Franz Josef Land and Spitsbergen; 9—Greenland; 10—Oregon and Oroville; 11—Louis Phillipe Land; 12—India; 13—Australia.

I can best illustrate the geographical range of some of the

Yorkshire types by means of a table of geographical distribution, and a map shewing some of the many localities from which Jurassic plants are recorded, selected from the point of view of emphasising the world-wide occurrence of remains of Jurassic floras. The floras chosen represent a comparatively small number of those which have been described by different authors. It must also be clearly stated that the records given in the table must not be regarded as implying that the Yorkshire plants are represented in the various localities by specifically identical forms; while there can be no doubt as to specific identity in certain cases, the distribution records as a whole are intended to draw attention to the occurrence in the selected regions of similar types, and not in all cases identical species. The plants chosen are not by any means peculiar in their wide distribution, other British types might be cited in further illustration of the general uniformity of the Jurassic vegetation. The numbers printed on the map are repeated in the table of distribution.

The distribution records given in the accompanying table are based on the figures and descriptions contained in the following publications:—

BORNHOLM. *Möller, H.* 'Bidrag till Bornholms Fossila Flora,' Part I., Lund, 1902; Pt. II., Stockholm, 1903.

POLAND. *Raciborski, M.* 'Flora Kopalna, Cracow,' 1894.

TURKESTAN. *Seward, A. C.* Jurassic plants of Caucasia and Turkestan. 'Mem. Com. Géol. St. Petersburg, vol. XXXVIII., 1907.

SIBERIA. *Heer, O.* 'Flora Fossilis Arctica,' vols. IV.-VI., 1877-80.

KOREA. *Yabe, H.* Mesozoic plants from Korea. 'Journ. Coll. Sci. Imp. Univ. Japan,' vol. XX., 1905.

JAPAN. *Yokoyama, M.* Jurassic plants from Kaga, Hida, and Echizen. 'Journ. Coll. Sci. Imp. Univ. Japan,' vol. III., 1889.

JAPAN. *Yokoyama, M.* Mesozoic plants from Kozuke, Kii, Awa, and Toza, *Ibid.*, vol. VII., 1894.

SPITSBERGEN AND FRANZ JOSEF LAND. *Nathorst, A. G.* 'Zur fossilen Flora der Polarländer Kongl. Svensk. Vet.-Akad. Hand, Vol. XXX., 1897.

Newton, E. T., and J. J. H. Tceall. Notes on a collection of Rocks and Fossils from Franz Josef Land, made by the Jackson-Harmsworth Expedition during 1895-96. 'Quart. Journ. Geol. Soc.', Vol. LIII., 1897.

Nathorst, A. G. The Norwegian North Polar Expedition, 1893-96, Pt. III. Fossil plants from Franz Joseph Land. Christiania and London, 1899.

GREENLAND. *Hartz, O.* Planteforsteninger fra Cap Stewart i Ostgronland, 1896.

OREGON AND CALIFORNIA. Ward, L. F. Status of the Mesozoic floras of the United States. I. and II. (U.S.A. Geol. Surv.), 1900 and 1905.

LOUIS PHILLIPE LAND. Nathorst, A. G. Sur la flore fossile antarctique; Compt. Rend. Paris, June 6th, 1904.

INDIA. Feistmantel, O. Jurassic Flora of Kach, etc. 'Mem. Geol. Surv. India,' 1876, 1877.

AUSTRALIA. Seward, A. C. On a collection of Jurassic Plants from Victoria. 'Rec. Geol. Surv. Victoria,' Vol. I., Pt. III., 1904.

Another important point is that the age of the floras from which the examples are drawn is not in all cases the same.

	1	2	3	4	5	6	7	8	9	10	11	12	13
	Yorkshire,	Bornholm,	Poland.	Turkestan.	Siberia.	Korea.	Japan.	Franz Josef Land and Spitzbergen.	Greenland.	Oregon and California.	Louis Philippe Land.	India.	Australia.
<i>Liquistites</i> , cf. <i>E. columnaris</i> ..	✓	✓	✓	✓	✓				✓		✓		✓
<i>Sagenopteris</i> , cf. <i>S. Phillipsi</i> ..													
<i>Cladophlebis</i> , cf. <i>C. denticulata</i>													
<i>Coniopteris</i> , cf. <i>C. hymenophylloides</i> ..	×	×	✓	×	×	×	×	×		×			
<i>Dictyophyllum</i> , cf. <i>D. rugosum</i>	×	×	×				×						
<i>Laccopteris</i> , cf. <i>L. polypodioides</i>	×	×	×										
<i>Todites</i> , cf. <i>T. Williamsoni</i> ..	×		×				×		×		×		
<i>Araucarites</i> , cf. <i>A. Phillipsi</i> ..													
<i>Brachyphyllum</i> , cf. <i>B. mamillare</i>	×												
<i>Podozamites</i> , cf. <i>P. lanceolatus</i> ..	×	×		×	×	×	×						
<i>Ginkgo</i> , cf. <i>G. digitata</i> ..	×	×		×	×		×						
<i>Baiera</i> , cf. <i>B. gracilis</i> ..	×	×		×			×						
<i>Czekanowskia</i> , cf. <i>C. Murrayana</i>	×	×		×	×		×		×				
<i>Otozamites</i> , cf. <i>O. obtusus</i> ..	×	×									×	×	×
<i>Dictyozamites</i> , cf. <i>D. Hawelli</i> ..													
<i>Nilssonia</i> , cf. <i>N. compta</i> ..	×	×			×					×		×	

The Bornholm flora is considered by Möller, who has monographed the plants, to be Liassic or Rhaetic; the Spitsbergen and Franz Josef Land plants are from Upper Jurassic beds. But, as already stated, there are comparatively few striking differences observable in the floras obtained from strata ranging from the Rhaetic to the Lower Cretaceous.

Making due allowance for local differences exhibited by the different floras, and for the fact that at the present day, despite the well-marked botanical provinces characteristic of different latitudes, there are some species which are almost cosmopolitan in their range, it is impossible seriously to doubt that the vegetation of the Jurassic period was more uniform in general facies than is the case with widely separated floras at the present day. I hope in the near future to analyse more fully the data on which some conclusions may be arrived at in regard to the geographical distribution of Rhaetic and Jurassic floras. My object now is, primarily, to show that beyond the determination of material collected from a particular locality, there are other questions of wider interest which are worthy of more attention than they have hitherto received. In endeavouring to interpret our local records of the rocks, we shall do our work more thoroughly and exercise more self-control when we are tempted to jump to conclusions without substantial reasons, if we remember that lists we compile may be utilised by students as data on which to base deductions of far-reaching importance.

Since my election as President of the Yorkshire Naturalists' Union I have frequently felt myself in a false position; every time I have seen my name printed in a prominent place in the notices sent to me from time to time, my conscience has reminded me that I serve no useful purpose. If, however, I have succeeded by means of this hasty sketch of the Jurassic flora in stimulating further research into the ancient herbaria of East Yorkshire, I shall feel that I have in some degree justified my Presidential existence.



The Report of the **Worcester** Museum shows that the museum lectures to scholars are still popular. The collection of British Coleoptera has now been arranged, and consists of 11,460 specimens (1772 species). Mr. A. Strickland has presented a collection of geological specimens formed by the late Hugh E. Strickland.

The Report of the **Sheffield** Public Museums is a modest pamphlet of 12 pp., but includes particulars of some important acquisitions, notably the collections of medals, china and natural history specimens bequeathed by the late Dr. H. C. Sorby. Mr. E. Howarth, the Curator, also favours us with copies of his papers on 'Meteorology,' and 'Museums and Art Gallery,' reprinted from the British Association Sheffield Handbook.

THE EVOLUTION OF THE MILLSTONE.

J. R. MORTIMER,
Driffield,

(PLATES VII. and VIII.).

THE study of anthropology and allied sciences suggests that primitive man did not possess the luxury of prepared food of any kind. For a long period he would simply feed on raw fruits in their crude condition, in the same way as the lower animals, his companions; and, possibly, man was then very little more intellectual than the higher mammals. However, even at this early period, he must have possessed some mental power superior to that of any of his brute contemporaries; and this, during a slow and lengthy evolution, has produced the mighty human achievements of the present day.

The stone shewn in No. 1 (Plate VII.) is the embryo, as it were, of the matured millstone, shown in No. 14 (Plate VIII.).

Man's earliest mode of pounding his food was by using a natural stone, about the size of his fist, such as the rounded cobble (fig. 1). The sides of this stone are battered and rubbed, through having been used in breaking the shells and pounding the kernels of wild fruits and other substances, on a stone anvil. Moreover, this form of pounder seems to have served, at times, as a hammer, etc., as well as a weapon in time of need, and it was probably for a long time his only implement.

While many of these pounders are natural cobbles with faces abraded from use, others are entirely artificially shaped, such as fig. 2, which seemed to have been newly made, when placed where it was found, near the hand of a body, in barrow No. 37.* Fig. 3 also seemed to have been new when placed with a body in barrow No. 18. As time progressed this globular pounder developed into two other forms, viz., the pear-shaped (fig. 3) and that with a flat grinding surface (fig. 4) due to rubbing and not to pounding. Of the former type, I found three in barrow No. 18, each accompanying a body. This form, by frequent pounding on the same anvil, developed into the pestle and mortar mill (fig. 5).

On the other hand the frequent rubbing with the flattened stone (fig. 4), to and fro, as a painter grinds his colours, resulted in an elongated hollow being formed on the surface of the lower stone, resembling the seat of a saddle; hence named the Saddle Mill (fig. 6).

The globular and the pear-shaped crushers seem to have obtained in East Yorkshire during the Neolithic, and well

* For particulars of the localities of these barrows see my 'Forty Years' Researches.'—J. R. M.

into the Bronze Age, as no other type, to our knowledge, has been found with interments of those periods.

The flat-faced grinding stone, such as fig. 4, seems to have come into use during the latter part of the Bronze Age, as a very fine specimen of this type was found associated with a bronze spearhead, in the lake dwelling at Ulrome, excavated by Mr. Thos. Boynton. This form of mill stands pre-eminent among the milling appliances, as it was the first contrivance by which grinding, as distinguished from pounding, was actually effected, and it was a great advance on the globular and pear-shaped crushers.

Not until we reach the beginning of the early Iron Age do we find the revolving quern (fig. 7)*; this consisted of two cir-

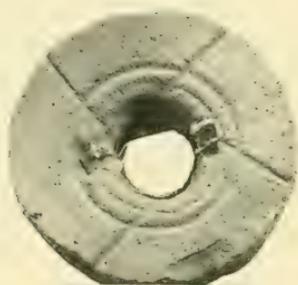
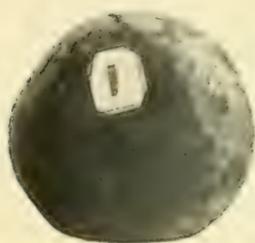


Fig. 7.

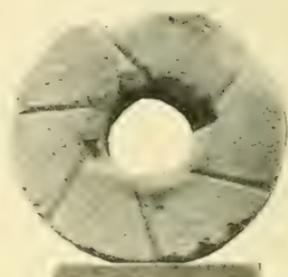
cular stones, 10 to 15 inches in diameter; the upper one being pierced in the centre with a funnel-shaped hole, to receive the corn to be ground. When in use this stone revolved round a wooden or metal pin, fixed in the centre of the lower stone, which was stationary. The motion was supplied by means of one or two wooden handles, inserted in holes drilled into opposite sides of the top stone, and twirled round by hand, as shown in fig. 7. The corn to be ground was at the same time dropped by hand into the funnel-shaped aperture in the upper stone, and the meal fell on to a cloth, or an animal's skin, placed to receive it, as shewn in fig. 8.

The adoption of the circular millstone revolutionized

* For permission to reproduce this illustration we are indebted to Mr. R. Welch, and the Belfast Museum.



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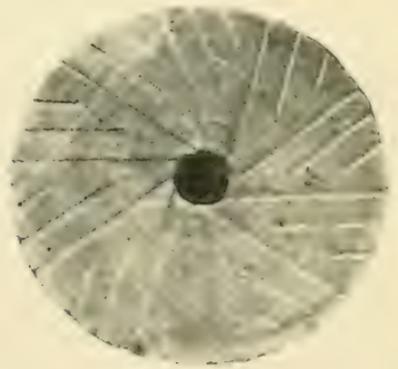
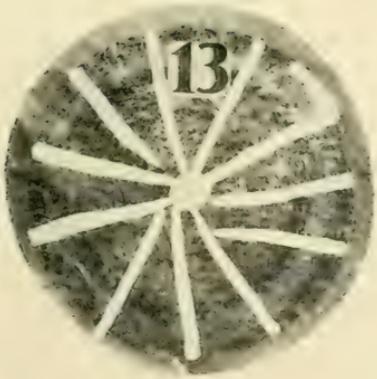
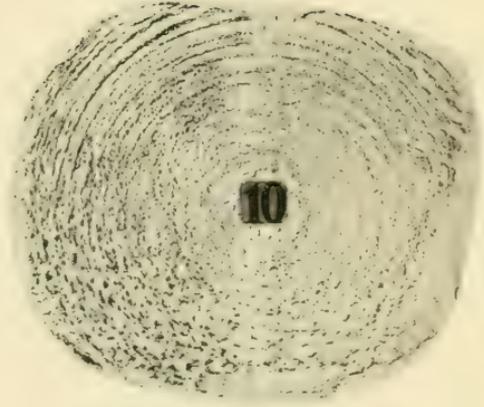
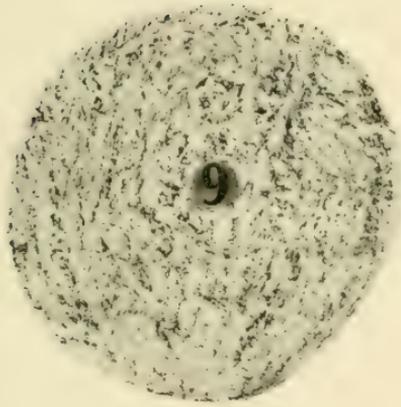
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8



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primitive milling, and remained the essential principle of every later form, down to the steel roller mill of our day. In most examples the grinding faces are flat ; but occasionally the surface of the under stone is convex, and the upper one is concave. This form of grinding surface would greatly facilitate the delivery of the meal from the mill.

Next, we have a less simple form of this mill, viz., the pot-quern (fig. 8), which consists of a shallow circular stone basin, with vertical sides internally, in which the top stone, which also has a hole in the centre to receive the corn, was made to revolve, as in the preceding example.

In the rim of this basin-shaped lower stone is a hole through which the meal escapes, and falls on to whatever has been placed to receive it. These querns are made of almost every kind of stone, but in most cases the texture is well adapted for grinding purposes, being often of a rough, hard, and porous structure.

In the earliest stages the grinding surface seems to have been practically effected by the porous nature of the stone, as no trace of tooling is observable (fig. 9).

When the natural texture of the stone was not sufficiently rough for a purpose of the mealing stone, the first attempt at tooling the grinding surface was, as far as I can gather from examples discovered in East Yorkshire, to roughen the surface by pricking it all over with a pointed tool,* sometimes concentric grooves were scratched on the grinding surface, at little distances apart, beginning with a small circle near the centre, and increasing the diameter of each succeeding circle until the circumference was reached. I possess the top stone of one of these querns (fig. 10), with its grinding face so dressed.† This stone has been made from a natural boulder of igneous rock, very little artificially shaped, except the circular grooves on the flat grinding surface. The two holes for handles have been chiselled, not drilled, and are oval in section, which is rather a rare feature. In most other instances these holes have been drilled by a tool having a rotary motion, and, consequently are circular in section.

This particular millstone was found near Danes' graves, and, very probably, belonged to the people of the early iron age, who lived near and interred their dead in these wrongly-named Danes' graves.

The shallow, circular grooving of the grinding surface, however, seems soon to have led to a more satisfactory method, in which we first find two circular furrows only, confined

* A fragment of a stone so dressed is in Mr. Morfit's garden at Atwick.

† A similarly dressed millstone is in the garden at Thorpe Hall, Robin Hood's Bay.

near the centre of the stone, and supplemented by four furrows, radiating from the centre to the circumference, cutting across the two circular ones, as shown in fig. 11.

In the next example I possess, all the circular furrows are discarded, and the dressing is confined to six radiating grooves only (fig. 12). From this specimen the radiating furrows increase in number, as shown in fig. 13, and continue to vary considerably in number and arrangement, until the most advanced form, fig. 14, was reached.

Before and during Roman times all the millstones were of small size, being from 10 to 20 inches in diameter only, and were mostly driven by hand power, or occasionally by an ox or ass. Water power was probably first applied not long before the Romans abandoned this island. Still later, most likely about the thirteenth or fourteenth century, the wind-mill was introduced, and lastly, steam power was applied in about 1700, and now almost entirely supersedes all other motive power for driving the millstone.

Since the introduction of water, wind and steam, the millstone has been increased in size from 1 foot to $4\frac{1}{2}$ feet or more, in diameter. But, alack, the water-mills that enliven the secluded glens, and the wind-mills that ornament the breezy uplands, are fast disappearing, and before long both will be things of the past. The long-used millstone is also fast being superseded. It was only about the year 1875 that the steel roller mill was first introduced, and now it has almost entirely replaced the latest form of mealing stone, which, like the quern, seems to be doomed as a producer of flour.

It may be asked what was there to grind in those early times, and had our remote ancestors wheat and other grains, such as we have now?

In the very early days of human existence in East Yorkshire, there would be a somewhat liberal supply of wild fruits, such as nuts, kernels, and seeds of the indigenous plants of the island, and other substances, the crushing and pounding of which would be man's first attempt at preparing his food.

It is not known when grain was first introduced and eaten by man in East Yorkshire, but it was in use during the neolithic age, as I possess carbonized grains of wheat taken from an interment in a barrow of that age, which, in all probability, dates back three to five thousand years.

How long before that period grain was used as food in East Yorkshire it is impossible to say.

Most likely wheat, which seems to be an exotic, was introduced into this island from the south or east of Europe, through Gaul, at a very early period. Moreover, it is almost certain that barley and oats would also be used as food in very early times. Yet I have not discovered any trace of either

in the barrows I have examined. Nevertheless, both may have been comparatively abundant at that early time, in spite of there being little trace of them remaining now.

The early use of these cereals is highly probable, as it is most likely that wild barley and wild oats are indigenous to this island, and may have been cultivated and used for human food long before the introduction of wheat; thus necessitating the use of millstones to make them more agreeable to the tastes of our ancestors, of whom we know so little, and are striving to know more.

MUSEUM NEWS.

The **Scunthorpe** Town Council, at its recent meeting, decided to take the necessary steps to adopt the Museums and Gymnasiums Act so far as it relates to Museums.

The Report of the **Warrington** Museum for 1910 includes a record of 2436 specimens of zoological, ethnological, botanical, and archæological specimens. Amongst them is Mr. L. Greening's collection of prepared skins of British birds. The wild flower table has also been kept up.

The **Hastings** Corporation Museum report for 1909 records many additions, including a fine collection of Wealden and Purbeck fossils presented by Mr. E. J. Bailey. Mr. W. Ruskin Butterfield, the Curator, has also issued 'Notes on Sussex Pottery' (12 pp., 2d.), with a catalogue of the specimens exhibited at the museum during the summer.

The Report of the **Manchester** Museum for 1909-10 (40 pp., 6d.), refers to some changes in the staff. Mr. Hardy has re-arranged the collection of British Coleoptera (11,200 specimens and 2374 species). Valuable additions to the list of exotic mollusca are recorded. The Herbarium has also had many additions. The same museum has likewise issued, as publication 67, a Catalogue of Hepaticæ (Anacrogynæ) in the Manchester Museum (31 pp., 6d.), by Mr. W. H. Pearson.

The Report of the Council of the Natural History Society of Northumberland, Durham and Newcastle-upon-Tyne is largely devoted to the progress at the **Newcastle** museum. This has been possible by the additional income of about £200 per annum bequeathed by the late G. E. Crawhall. A cabinet has been obtained for the collection of coleoptera, which, as in some other museums, has received special attention recently. A local specimen of the beluga or white whale, has been added, and a specimen of the White-beaked Dolphin has also been secured.

The **Bristol** Museum and Art Gallery report includes a pleasing item of information. Lady Smyth has given £1500 in order that a companion room may be made to that for which she previously gave £2000. This has enabled the natural history department to be considerably improved. In this museum a cabinet of British coleoptera has been commenced, and ten drawers have been completed. Much attention is being devoted to economic biology. In the antiquities' section, several additions to the collection of local historical specimens are recorded.

The Third Annual Report of the **National Museum of Wales** shews that progress is being made with what will, some day, be a truly palatial building. Plans have now been accepted, and a lengthy report on the plans is given by the architects. There are also reports of the Directors' visits to the Museums Association, and the International Zoological Congress at Graz, Austria. There are also particulars of some additions to the collection, two of which are of exceptional importance.

THE SPOTTED SANDPIPER IN YORKSHIRE.

WALTER GREAVES,
Hebden Bridge.

IN a list of the 'Vertebrate Fauna of the Hebden Bridge District,' which the Hebden Bridge Literary and Scientific Society recently published, I recorded two occurrences of the Spotted Sandpiper (*Totanus macularius*), one within the county, and one slightly over the boundary, in Lancashire. Repeating the latter record in a 'List of the



Birds of Todmorden,' in the 'Lancashire Naturalist,' it came to the notice of Mr. F. J. Stubbs, Stepney Museum, who added that further particulars would be acceptable. I thereupon procured the skin of the example obtained in Yorkshire, and paid a visit to the gamekeeper, who I was assured possessed the Lancashire specimen, obtained by himself on the moors about Cliviger. The latter, on inspection, proved to be a good example of the much commoner Green Sandpiper (*T. ochropus*), but the skin of the Yorkshire bird I submitted to Mr. Stubbs, the result being that my record was confirmed. Of the five alleged occurrences of this species in Yorkshire ('Birds of Yorkshire', p. 628), one record on the Tees in 1845

proved on investigation to be a Green Sandpiper, and one at Bridlington in 1848, and another at Rolston, in Holderness, in 1892, are considered doubtful, and the claim of this North American Sandpiper to be admitted to the Yorkshire list, rests on the authority of Sir Wm. Milner, who refers to the specimen shot to the north of the pier at Whitby, on March 29th, 1849, which it is stated was set up for Sir William's collection. The remaining record of the five specimens referred to concerns one which E. J. Higgins, of York, is said to have seen in the flesh in the company of a flock of Dunlins.

Rejecting the three 'doubtfuls', then, the example under notice is only the third known occurrence of this species in Yorkshire. In recording it I am wholly in the hands of a taxidermist, who owned the skin, and the data are rather scanty, but he is emphatic in declaring that this bird passed through his hands about the year 1899, and that it was obtained at Hebden Bridge. He adds that he has always understood that the locality was Harcastle Crag. His impression is that two representatives of the species were received by his employer both from Hebden Bridge, and about the same time, that one was stuffed and returned to the owner, and he gives me the reason this example remained in his possession. The month of the occurrence is also in doubt, but it was in autumn; whether July, August, or September he does not remember.

Mr. Stubbs, who has made a critical examination of the skin, comparing it closely with many dated American skins, expressed a doubt about the example being an autumn bird; and rather inclined to the opinion that it was a spring migrant. That belief is based on the fact that the autumn birds which he has examined have their primaries and secondaries very much abraded, whilst the one under notice does not show the slightest tendency to this. He suggests as an explanation that the bird may have been a spring migrant which had remained in Britain throughout the summer, and in that way escaped the wear and tear of the nesting season. On measuring the specimen I found it to be nearly $8\frac{1}{2}$ inches long, nearly an inch longer than is given by some authorities, the tail extending half an inch beyond the tips of the wings, which reach $4\frac{1}{4}$ inches; culmen, barely an inch; tarsus $\frac{7}{8}$ inch. The plumage of the under parts is whitish, with dark spots, these commencing at the base of the bill, and being continued to the end of the tail.

Having personally and specially interviewed the taxidermist referred to with the object of obtaining the history of the specimen, I am of opinion that there need be no hesitation in accepting it as the third representative of the species which has occurred in Yorkshire. The specimen has now been added to the fine collection of Yorkshire birds in the Hull Museum.

THE ACCIDENT ON THE BEMPTON CLIFFS.*

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

ON the 6th June, a most untoward accident cast a gloom over the whole climbing fraternity, Joseph or Joss Major, the Flambrø' climber, being killed by a falling stone when on the rope. A heavy gale was blowing from the N.W., sweeping along the cliff face, and all the climbers, after two or three descents, came up for the day. Jos. Major, with his brothers, was climbing between Staple Neuk and Dikes End, and at his second descent, about half-way between these two points, above a jumbled mass of fallen rock lying at the cliff foot, and known as Stean-i-Mooth Nab, the accident occurred.

The climb, save for a small ledge or two, fifteen to twenty yards from the top, is perfectly smooth till this mass of fallen rock, some sixty feet high, is reached, and the height of the whole cliff is not three hundred feet. The usual procedure is to collect a few eggs from the top ledges, and then drop without a check to the Nab, where a number of birds' nest.

On the 6th June, Jos. Major was lowered by his brothers as usual, at 9-30 a.m., and the full weight being apparently put on the body rope without a check, he went down to the Nab. As no signals were received at the top, his brothers became uneasy, and sent word to the next gang, led by Moore, senr., for assistance. Soon after 10, young Moore, who had run all the way carrying a heavy rope, arrived, and, without hesitation, went down in the terrible gale to see what was the matter. He reached J. Major at 10-15 a.m., and found him lying head downward on the Nab, bleeding from a wound in the top of the head, the body rope swaying violently with each furious gust of wind, and jerking the unfortunate man about, the blood gushing forth at each jerk. Moore at once unloosed the body rope, placed him head upwards, bound up the wound with cotton wool from his own climbing hat, and a handkerchief, and stanchèd the bleeding. Major, however, only regained consciousness once, namely, when he asked for water and refused brandy, saying, "That's not water." Moore then sent up the rope for E. Major, a skilful climber in his day, who joined him, and both unfortunately fastened their body ropes below, so that no further assistance could reach them till J. Hodgson's ropes had been brought from a distance of nearly two miles. Meanwhile a visitor had cycled to Bridlington for Dr. Wetwan, who arrived in his motor car at 3 p.m., and very pluckily descended the cliff, for the first time in his life. After he had re-bandaged the wound, all carried J. Major to the foot of the cliff, with the idea of getting him to a grassy slope nearer to

* Read at the meeting of the Vertebrate Section of the Yorkshire Naturalists' Union, held at Leeds, November 19th, 1910.

Staple Neuk, where he could be raised to the top with the help of ropes, but the tide was now too high, and after getting drenched with spray, the party waited until the rocket apparatus from Flambro' arrived, and raised them all to the top about 6 p.m. Dr. Wetwan then motored Major to the hospital at Bridlington, where he remained unconscious until his death, two days later.

It is doubtful whether any more could have been done, but the idea occurs to one that he might have been raised to the top at the first, on the back of a strong man sitting in the climbing breeches, and so have reached the hospital sooner.

Such an event has never happened before in the annals of climbing, and coming on the top of W. Wilkinson's accident in 1909, and a severe blow from a falling stone which disabled Chandler during the same month, made the climbers very nervous, and disheartened them for the rest of the season.

Joseph Major, the youngest of a climbing family, was the most intrepid and agile climber the present generation has seen, and, with a little more experience of the ins and outs of the cliff, would undoubtedly have eclipsed all previous records for skill and daring. The accident was probably caused by his hand rope, which was a very light one, being blown out of the perpendicular by the furious gale, and when he pulled at it to get it plumb, a piece of rock seems to have been dislodged, and fallen upon the top of his skull. This must have happened close to the top of the cliff, for four eggs about fifteen yards down had not been gathered. His intrepidity was probably the cause of his death, as he never would wear a padded hat, in spite of the advice of the other climbers.

A word of praise is due to young Moore for his promptitude and presence of mind in coming to the rescue under most trying conditions, as he has only mastered the art of climbing this season.

With the death of Harry Marr and Jos. Major, and the retirement of W. Wilkinson, a great and sudden change has taken place in the personnel of the climbing gangs, for the Majors never climbed again, Chandler and Robson joined George and W. Hodgson, and only three gangs were working from Flambro' Head to Speeton, and a corresponding stretch of cliff has lain fallow.

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LEPIDOPTERA.

Xylophasia zollikoferi at Methley — On the 12th August, 1910, I took at Methley a male specimen of this insect, in fine condition; it was shaken out of a bunch of withered leaves. Mr. G. T. Porritt identified the insect, and said it is, he thinks, the best in condition of the four (out of the five known) British specimens he has seen.—JOHN T. WIGIN, Methley, Leeds, 10th December, 1910.

ON *UNIO DISTORTUS* BEAN, AND *ALASMODON VETUSTUS* BROWN, FROM THE UPPER ESTUARINE BEDS OF GRISTHORPE, YORKS.

J. WILFRID JACKSON, F.G.S.,
Manchester Museum.

(PLATES IX. and X.).

IN 1843, Captain Thomas Brown described a number of fossil fresh-water mussels* under the generic name of *Pachyodon*, amongst them being two species found by Dr. Fleming in oolitic strata at Gristhorpe, Yorkshire. These were described as *P. hamatus* and *P. vetustus*, the latter being regarded by Brown as possibly belonging to the genus *Alasmodon*.

Since Brown's time these two species, presumed to be in the Manchester Museum, appear to have been entirely lost sight of, like many others he described. Nor do they appear to have ever been quoted except by Morris, in the second edition of his 'Catalogue of British Fossils.' It will be of interest, therefore, to know that whilst overhauling a number of miscellaneous fossils in the Manchester museum some time ago, I had the good fortune to discover a specimen labelled '*Alasmodon vetustus*, Gristhorpe,' and later on I found another Unio-like shell possessing a label, 'Gristhorpe Bay.'

These specimens, I found on reference, compared tolerably well, both as to size and markings, with the figures and descriptions given by Brown in the above-mentioned magazine, and in his 'Fossil Conchology.'†

His figures certainly represent shells in much better condition than those under discussion, but there appears to be no doubt as to the shells in question being those selected by Brown as his types, his figures being restorations based upon characters exhibited by the specimens. Further confirmatory evidence in the case of *vetustus*, is also afforded by the fact of the specimen possessing the irregular break at its posterior extremity, depicted by Brown in his illustration of the species.

In Brown's later work this species is referred to as '*Alasmodon vestustas*—the Ancient *Alasmodon*,' which is obviously a mistake, as the latin word for 'ancient' is 'vetustus,' as given in the original description. On the other hand, '*hamatus*' is corrected to '*Unio humatus*—the Buried Unio,' and the geological horizon altered to 'Coal Shale at Gristhorpe Bay,' instead of 'Oxford Clay,' as originally stated.

Brown's description of *vetustus* is, in its main details, fairly accurate. The only exception to be made is with regard to

* 'Ann. Mag. Nat. Hist.', vol. XII., pp. 395, etc.

† 'London,' 1849, pp. 179 and 181, pl. 72x., figs. 18 and 19.



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 1.



Fig. 2.



Fig. 3.

the anterior end of the shell, which is given as sub-acute. An examination of the fossil, however, revealed the fact that a large portion is broken away from the antero-ventral margin, thus giving to the shell its sub-acute appearance. A continuation of the growth-lines visible near the ventral border, proves the shell to have been rounded anteriorly, and a restoration of this end with plasticine makes this point quite clear.

Having this specimen with me when on a visit to the British Museum recently, I took the opportunity of comparing it with the type specimen of *Unio distortus* Bean,* and was at once struck by the remarkable similarity of the two specimens. Brown's species '*vetustus*' is rather more convex than *Unio distortus*, and is preserved in a somewhat different matrix, but the difference between the two forms—probably only one of condition—appeared to me to be so slight that I had no hesitation in concluding that they were one and the same species. This being so, Brown's name '*vetustus*,' although perhaps a much better name than '*distortus*,' must now fall, and become a synonym, as Bean's name antedates it by some seven years.

The distorted and crushed condition of Bean's type of *Unio distortus*, and the somewhat imperfect state of Brown's shell, does not permit of a proper diagnosis being made of their chief characters, but both superficially present a most remarkable resemblance to the recent Pearl-mussel (*Margaritana margaritifera*).

From the condition of the umbonal region in both specimens, it is quite evident that this part of the shell suffered considerable erosion, as is the case with recent shells of *Margaritana*. We may reasonably infer that this condition was brought about by similar means to those obtaining at present, viz.—the presence of humic and carbonic acids in water containing a low percentage of calcium carbonate, or none at all. In the fossil cases, the humic acid would, in all probability, be derived from the numerous forms of vegetation met with in the Estuarine Beds in which the shells occur, while the absence of any large amount of calcium carbonate might be accounted for by the fact of the catchment basin of the river being situated on rocks containing no soluble salts of lime.

Both the fossil examples present the same features as a well-eroded specimen of *Margaritana margaritifera* from the R. Lune, above Lancaster [pl. X., fig. 1], with which they were compared. In each case the back of the anterior adductor scar is clearly visible owing to excessive decortication at this end of the shell. The umbones, too, are widely separate, exposing what now remains of the umbonal ligament between

* Described and figured from a much-crushed specimen in 'Mag. Nat. Hist.', vol. IX., (1836), p. 376, text fig. 53.

them. In the fossils there is also the same deep pit-like cavity immediately in front of the umbo; as is observable in the eroded example of *Margaritana* just mentioned, which seems to point to the presence of a definite pseudocardinal tooth here as in *Margaritana*. Whether the fossils possess posterior lateral lamellæ or not, I am unable to say at present, as I have been unable, so far, to procure casts of these fossils in order to observe this feature. In the Manchester Museum, however, there is an example of a *Unio* from the Estuarine Beds of Yorkshire, which is undoubtedly a juvenile form of *Unio distortus*, and shews the resemblance to a recent *Margaritana* in a remarkable manner. It forms part of the Williamson collection, and, as will be seen by the photograph on pl. X. (fig. 2), is remarkably well-preserved, exhibiting only slight traces of decortication in the umbonal region. It is, fortunately, quite uncompressed and distinctly shows a tendency towards alation at the posterior dorsal margin—a feature met with in recent forms which do not possess posterior lateral lamellæ, such as *Anodon*, *Margaritana*, etc. In *Margaritana*, however, rudimentary posterior lateral lamellæ are often present in young examples.

Casts of Unioniform shells have been noticed in the Estuarine Bed of Yorkshire, by T. Wright* and John Leckenby,* but no reference to dentition is contained in their papers. Hudleston, however, in his paper on the Yorkshire Oolites*, states in a footnote on p. 318, that Leckenby obtained casts of the interior of a *Unio*-like shell, which shewed the hinge to be edentulous, the shells being, therefore, referred to *Anodon*. This fact is of some interest, but it appears to me possible that indications of pseudocardinals, which are usually rather inconspicuous in casts of recent *Margaritanas*, might easily have been overlooked in these casts, and deductions made mainly on the absence of posterior lateral lamellæ. That Bean's type is not an *Anodon*, is conclusively demonstrated to my mind by the deeply impressed character of the anterior adductor scar, as well as, to a lesser extent, by the presence of so robust a ligament. Moreover, *Anodons* seem never to be so deeply eroded as *Unios*; the beaks, or umbones, too, are much flatter.

That *distortus* possessed some sort of pseudocardinal teeth is suggested by the presence of a well-defined lunule, a feature which is met with in all recent members of the genus *Unio*, but which is almost, or entirely absent in edentulous forms, such as *Anodonta*. It might be argued that no lunule is present in *Margaritana margaritifera*, but such is not the case,

* 'Q. J. G. S.', vol. XVI. (1860), pp. 30, etc.

† 'Q. J. G. S.', vol. XX. (1864), p. 75.

‡ 'Proc. Geol. Assoc.', vol. III., (1872-73) p. 318.

as just above the pseudocardinal teeth, especially in young and middle-aged shells, there is an obvious subretusion of the dorsal margin, which seems to represent a formerly much larger and wider lunule, now reduced in size owing to the retrogression of the pseudocardinals and consequent approximation of the dorsal margins of the two valves.

Should it be ultimately proved, by the study of further casts, and more perfect examples of the shell, that *Unio distortus* is to be referred to *Margaritana*, it will be of considerable interest, as this species would be the oldest known, so far, of this genus, one species of which being at the present time circumboreal, inhabiting, according to the best authorities, all Europe, except the southernmost portion, northern Asia, Japan, northern North America, and Iceland. The amended description, based on the specimens in the British and Manchester Museums, is given below, with synonym:—

- Margaritana?* *distorta* (Bean, 1836). [Plate IX., figs. 1 and 2; pl. X., fig. 2].
1836. *Unio distortus* Bean. 'Mag. Nat. Hist.', ix., p. 376, fig. 53.
1843. *Unio distortus* Morris. 'Cat. Brit. Foss.', p. 105.
1843. *Pachyodon vetustus*, Brown. 'Ann. Mag. N. H.', xii., p. 395, pl. 16x, fig. 7.
1849. *Alasmodon vetustus* Brown. 'Foss. Conch.', p. 181, pl. 72x, fig. 19.
1854. *Cardinia vetusta* Morris. 'Cat. Brit. Foss.', Ed. 2, p. 190.
1856. *Unio distortus* King. 'Ann. Mag. N. H.' (Ser. 2), xvii., p. 55, pl. 4, fig. 7.

Shell* transversely elongated, compressed; beaks incurved and situated near the anterior extremity; umbonal region not prominent; lunule distinct, narrow and about one-fifth the length of the shell; ligament nearly half the length of the shell; anterior side short, rounded; posterior side long, broad, and rounded at the extremity, pinched up above into a somewhat blunt keel or ridge; hinge and basal lines slightly curved; external surface with well-defined concentric lines of growth.

Dimensions: Length, 5 inches; height, $2\frac{1}{4}$ inches, thickness, uncertain (Brown's shell is 1 inch).

Geol. Horizon: Upper Estuarine Series (Upper Sandstone and Shale of Phillips). Plentiful at the top of a rich bed of oolitic plants.

Locality: Gristhorpe Bay, Yorkshire.

(To be continued).

* Owing to its uncompressed condition, Brown's specimen shows the true form of the species better than Bean's type.

FIELD NOTES.

BIRDS.

Mealy Redpolls at Whitby.—Large numbers of Mealy Redpolls have recently visited the Whitby district, and the bird-catchers have taken heavy toll. The greater proportion are said to be old males. So far as can be ascertained, the earliest captures were made about October 21st.—THOS. STEPHENSON, Whitby, December 3rd, 1910.

Waxwings and Winter Corncrake near Preston, Lancs.—Two Waxwings were shot at Higher Walton, near Preston, on December 8th. Odd birds have been seen at the same place for quite a number of years during migration time. On December 19th a Corncrake was shot about two miles from Preston. It had been seen in the same field some weeks previously.—G. A. BOOTH, Preston.

Hen Harrier in Yorkshire.—Mr. C. F. Proctor flushed a Hen Harrier at Raskelf on November 24th last. The bird was sitting on the ground, but had no prey, and on being approached it rose about three feet and skimmed easily away, taking along a hedgerow in its course. It was within easy gunshot for two or three minutes, but as its life was spared it may be recorded elsewhere in the county before long.—SYDNEY H. SMITH, York, December 4th, 1910.

Whooper Swan in Yorkshire.—At East Cottingwith on November 30th, I obtained a young, but full-grown specimen of *Cygnus musicus*, measuring five feet two inches across the extended wings. The bird had not yet assumed the distinctive yellow patch on the upper mandible, but from the appearance of the part it would have done so in another month. The legs were almost black in colour, and curiously mottled with yellow on the under side of the webs.—SYDNEY H. SMITH, York, December 4th, 1910.

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MOLLUSCA.

***Acicula lineata* (Drap.) at Beast Cliff, near Hayburn Wyke, Scarborough.**—Last August Bank Holiday Mr. F. W. Fierkie and I found a number of *Acicula lineata* at Beast Cliff, near Hayburn Wyke, in a similar habitat to the one we were shown by Mr. J. A. Hargreaves the day previously in Forge Valley. It occurred in the moss rather sparingly at first, but upon a more careful search being made, about a couple of dozen specimens were procured. I have seen no published records of this rare shell occurring at Beast Cliff. Associated with it were *Agriolimax levis*, *Vitrea crystallina*, *Euconulus fulvus*, *Acanthinula aculeata*, *A. lamellata*, *Cochlicopa lubrica* and *Vertigo edentula*.—ALBERT J. MOORE, Hull.

REVIEWS AND BOOK NOTICES.

Anatomy of British Carices, by **F. C. Crawford**, pp. XIII. and 124, with 20 plates and portrait. Privately printed. Oliver & Boyd, Edinburgh. 7/6 net.

This book possesses many curious and interesting features. The author was born in North Berwick, in 1851, and in time developed a keen love for natural history. Eventually he went to London, where he made a fortune on the Stock Exchange, and at the age of forty-five retired, and decided to devote the rest of his life to natural history pursuits. At the Edinburgh Botanic Garden he became a voluntary demonstrator in botany, taking a keen interest in the students, and doing everything in his power to rear a race of naturalists. The present work is an instalment of a monograph on the Carices he was prevailed upon to undertake, and upon it he has devoted both time, energy, and money to no small degree. In the beginning of February 1908, the MS. was sent to the printer, and a week later he died, the proof sheets being delivered on the day of his funeral.

Naturally enough, the work opens with a biographical sketch, by Mr. A. J. Pressland; and Prof. I. B. Balfour has written an introductory preface and been responsible for seeing the work through the press. After a brief account of the general anatomy of the Carices, their special anatomy is described, dealing with the structure of stem, leaf, rhizome and root of each species in turn. The language used is often quaint, not to say unorthodox, and we can well believe that 'frequent discussion took place . . . of his use of descriptive terms,' and his retort that 'if people can't understand plain language, so much the worse for them,' would not always carry conviction. Secting cutting is referred to as 'operating' on the plant, and he evidently preferred to study the living plant than 'fashioning with its inwards.' He had little respect for custom in the use of technical terms, but the more important deviations are explained by the editor in footnotes.

Fifteen of the plates give forty-seven figures of sections from photomicrographs, and are most interesting and valuable, the rest are figures of epidermal tissues and stomata, said to be from camera lucida drawings, but we should imagine that there was something wrong either with the instrument or the observer, as some of them are impossible structures. Anatomy, however, was not his forte, and we cannot but regret that the author was not spared to publish his extensive notes and observations on the habitats, external forms and adaptations of these interesting plants.

NEW BIRD BOOKS.

Experience during the past few years has led us to expect anything from the press of Messrs. Witherby & Co., to be not only sound as regards its scientific value, but all that can be desired from an artistic and typographical point of view. **The Home-life of the Spoonbill, the Stork, and some Herons** (47 pp., 32 plates, 5/-) just published, is quite up to this firm's usual standard. The volume is written and illustrated by **Bentley Beetham, F.Z.S.**, and describes the haunts and habits of the Spoonbill, White Stork, Common Heron and Purple Heron. Localities are by no means definite, for reasons which are perhaps obvious. The narrative of the photographing expedition is fascinating to read, but the great attraction of the volume lies in the thirty-two plates, mounted on tinted paper. These are reproduced by the half-tone process, but the rulings are so fine, and the tint of the ink has been so carefully chosen, that it is difficult to tell that the plates are not actual photographs. They illustrate various stages in the life history of the species now referred to, though the Spoonbill series is perhaps the best. From the same firm comes **The Birds of Dumfriesshire**, by **Hugh S. Gladstone** (xc. + 472 pp., 25/- net), to which ornithologists have been looking forward for some little time. It is splendid; and in many ways is an improvement even upon the excellent county avi-faunas which Messrs. Witherby have previously produced. We are also surprised to notice

that the edition is limited to 350 numbered copies, by far the greater proportion of which are already subscribed for. Notwithstanding the extraordinary thorough manner in which the author has done his work, we observe that he modestly calls it a 'contribution to the fauna of the Solway area, which may be of assistance when the larger work comes to be written, a task which it is hoped will be undertaken by Mr. Robert Service, who has done so much towards the present volume.'

From the geographical position of Dumfriesshire, a work such as Mr. Gladstone's is of peculiar value, especially when we come to compare the avifaunas of the various parts of the British Isles. After a very careful and critical review of the numerous occurrences, and a perusal of the rather unexpectedly extensive literature (as shewn by the fine bibliography), the author considers that there are 218 birds safely recorded for the county, viz., 70 residents, 31 summer visitants, 31 winter visitants, 30 occasional visitors, and 56 very rare or accidental visitors, besides 10 introduced species, and 29 of doubtful occurrence. This compares very favourably with the Yorkshire list of 325, having regard to the exceptional physiological advantages of that county.

A particularly valuable section of Mr. Gladstone's volume is that devoted to an account of the various naturalists who have contributed to the ornithological literature of his county. It is a sound piece of work, and includes many well-known names. There are also chapters on the physical features and climate, migration, flight-nets, protection, local misnomers and names, etc., and then follows a history of the occurrences, distribution, etc., of each of the species represented in the fauna of the county. There is a plentiful supply of suitable illustrations of birds, nests, nesting haunts, etc., and a good map.

There can be no question that Messrs. Witherby are doing a great service to British ornithology by the publication of these valuable county volumes.

A History of Birds, by **W. P. Pycraft**. Methuen & Co. 458 pp., 10/6 net. From the days when 'Natural Science' (of blessed memory) was published, and contained contributions from Mr. Pycraft, we have eagerly read anything from that gifted and thoroughly scientific writer. The present book, we can safely say, appeals to us more than any of his others, which is saying a good deal. In it Mr. Pycraft seems to be at his best, without resource to technicalities, and yet without losing any of his scientific methods. The author gives a thoughtful and suggestive history of birds; 'Evolution' is his keynote, and whether dealing with distribution, migration, relations to environment, phases of social life, reproduction, eggs, offspring, variation, acquired characters, natural selection, structural adaptations, or convergent evolution and parallel development, or the many other subjects referred to in the volume, he seems quite at home, and has no difficulty in making his meaning clear. The chapters dealing with the structures of the parts of the birds will appeal to a far wider circle than the ornithological world. The illustrations, too, are numerous, and well supplement the author's remarks.

Ornithological Notes from a South London Suburb, 1874-1909. **F. D. Power**. London: H. J. Glaisher, 60 pp., 3/6 net.

In this little book Mr. Power gives a summary of thirty-five years' observations, with some facts and fancies concerning migration. Of course, it goes without saying that the district has changed considerably between the time he started making his observations, and now. But it is remarkable to find that the author has been able to make records of no fewer than 125 species. These are enumerated, and interesting facts given concerning each. There is also, at the end of the volume, an elaborate chart of twenty-five consecutive Octobers (1885-1909), shewing on each day 'the prevailing wind, with its force; and the dependence of the 'migratory movement' on the direction of the wind.' As a frontispiece is an illustration of the author's garden at Brixton, from which the migration notes were taken.

NORTHERN NEWS.

Mr. J. W. Taylor has been elected an Honorary Member of the Conchological Society of Great Britain and Ireland.

Dr. Tempest Anderson favours us with a reprint of his paper on 'The Volcanoes of Matavanu in Savaii' ('Quarterly Journal Geological Society,' No. 264). It is illustrated by a fine series of photographs.

Mr. Percy H. Grimshaw is preparing a work on British Diptera, upon the lines of Canon Fowler's 'Coleoptera of the British Isles.' It will probably occupy five volumes, and will be published by Messrs. Lovell Reeve & Co.

It is satisfactory to learn from the Chairman's introductory remarks to the report of the Brighton Library, Museum, and Art Gallery, that 'Mr H. D. Roberts, the Director, Mr. Toms, the Curator, and the Staff generally, have all done their work during the year to the satisfaction of the Committee.'

Messrs. A. Beck and S. Hainsworth, of the Bradford Natural History and Microscopical Society, have recently been the recipients of a presentation at the hands of their fellow members at Bradford. In future, they are to live in Queensland, and doubtless the love of natural history which has been fostered in Yorkshire, will stand then in good stead in Australia.

We should like to draw the attention of our readers to the fact that the widow of the late Rev. W. R. Linton has a few copies of the excellent 'Flora of Derbyshire' (cloth, 457 pp. and maps), on hand. These are being sold at the reduced price of 6/-. Application for copies at this price should be made promptly to Mrs. W. R. Linton, Bowbridge, Mackworth, Derby.

The 'Hastings and East Sussex Naturalist' (Vol. I., No. 5, 2/-) contains an obituary notice of the late E. T. Connold; 'Notes on East Sussex Ravens,' by Mr. T. Parkin; 'Notes on the local Fauna and Flora,' by Rev. E. N. Bloomfield; 'Hastings Coleoptera,' by Mr. W. H. Bennett; 'Neolithic Man in the Forest of Anderida,' by Col. H. W. Feilden; and 'The Marine Mollusca,' by the Editor, Mr. W. R. Butterfield.

The Geological Society of London this year awards its medals and funds as follows:—The Wollaston Medal to Professor Waldemar C. Brogger, Sc.D.; The Murchison Medal to Mr. Richard H. Tiddeman, M.A.; The Lyell Medals to Dr. Francis A. Bather, M.A., and Dr. Arthur W. Rowe; The Bigsby Medal to Dr. O. Abel; The Wollaston Fund to Professor O. T. Jones, M.A.; The Murchison Fund to Mr. Edgar S. Cobbold; The Lyell Fund to Professor Charles G. Cullis, D.Sc., and Mr. John F. N Green.

The Annual Report of the Brighton Library, Museum and Art Galleries for 1910, contains particulars of several interesting additions to the collections during the year. There are plates shewing a Hawk Owl which has been added to the Booth collection; and a collection of old Sussex candle-lanterns. The lady assistants in the library now wear dark green alpaca overalls. We are glad to notice that 'their provision appears to have given general satisfaction.'

A third museum is to be built at Hull, through the generosity of Mr. C. Pickering. It is to be erected in west Hull, and is to be devoted to specimens illustrating the growth and evolution of the shipping and fishing industries. It will also contain specimens illustrating the natural history and economical aspect of various species of fish, and room will also be found for the models of Japanese fishing appliances, which were presented to the Corporation of Hull by the Japanese Government, at the close of the Japan-British Exhibition in London.

NEWS FROM THE MAGAZINES.

The *Museums Journal* (Vol. X., No. 6), contains a paper by Mr. L. E. Hope on 'The Natural History Record Bureau at the Carlisle Museum.'

The Rev. T. R. R. Stebbing has a paper on the 'Opinions rendered by the International Commission on Zoological Nomenclature' in *Knowledge* (No. 509).

Mr. J. Davy Dean records *Clausilia cravenensis* var. *albina* nov., and *C. bidentata* var. *albina*, both from Westmorland, in *The Journal of Conchology* for January.

A Squacco Heron was shot on the Humber Bank at Great Cotes on September 29th. It is said to be the second record for Lincolnshire.—*British Birds* for January.

Messrs. W. and G. S. West contribute an admirable paper on 'The Ecology of the Upper Driva Valley in the Dovrefjeld,' with illustrations, to *The New Phytologist* (Vol. IX., No. 10).

Mr. G. W. Lamplugh contributes an admirable account of the excursion to Spitsbergen, in connection with the Geological Congress in Stockholm, to *Nature* (No. 2144). We hope Prof. Bonney has read it.

The *Quarterly Journal of the Geological Society* (No. 264) contains a paper on 'The Evolution of *Zaphrentis delanouei* in Lower Carboniferous times,' by Mr. R. G. Carruthers; and 'The Carboniferous Limestone South of the Craven Fault,' by Dr. A. Wilmore.

Mr. A. H. Patterson records a whelk with two opercula, 'the most extraordinary mollusc he ever saw.' (*Zoologist*, No. 834). In the same journal Mr. H. B. Booth describes a local race of light-coloured mice, in the Washburn Valley, evidently the descendants of 'tame' white-mice.

With part 20 of the *Harmsworth Natural History* is a coloured plate of the eggs of the best known British birds. It is not a success, however, either as regards the colouring or the shapes or sizes of the eggs. Without the aid of the key, it would be difficult for even an expert to identify half of them.

The *Yorkshire Weekly Post* for January 21st, contains a sketch of the new lecture theatre to be added to the Museum Building at York. The lecture theatre is being built by Dr. Tempest Anderson, who had a sum of money left by his sister, the late Mrs. Percy Sladen, to be devoted to scientific purposes.

In the *Lancashire Naturalist* (Vol. III., No. 30), Mr. J. W. Jackson describes and figures a fish spine (*Ctenacanthus brevis*), from the Carboniferous Limestone of Clitheroe. In No. 31 of the same journal 'Non-descript' writes notes entitled 'With the Conchologists at Gisburn.' In No. 32, Mr. J. R. Charnley has 'An attempt to enumerate the British *Chrysophanus dispar*.' He concludes 'The total number of specimens recorded is 936, of which 574 are males and 362 females. Of these 937 [*sic*] examples, only 165 have data.' Mr. J. W. Jackson illustrates a 'Double-mouthed *Clausilia bidentata*' in the same number.

The *Bradford Antiquary*, Part 15, contains many papers of interest to Bradfordians. Mr. H. Speight speaks of the ancient streets and lanes; Mr. P. Ross, of the old roads; and Mr. J. Sowden of the old 'characters' of Bradford. Dr. F. Villey describes some excavations made in earthworks near Keighley, when a number of 'finds' were made, all of which appear to have been 'planted' for the benefit of the antiquary! Prof. Skeat writes on the origin of 'Keighley,' pronounced Keethley, Domesday Chichelai, original Anglo-Saxon Cyhhanleah = 'Cyhha's lea,' and Cyhha was probably 'a cougher.' We shouldn't wonder; it's enough to make him so! There are also other items of interest, including some quaint tales about Dick Delaney and his donkey.

THE NATURALIST.

A MONTHLY ILLUSTRATED JOURNAL OF
NATURAL HISTORY FOR THE NORTH OF ENGLAND.

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T. SHEPPARD, F.G.S., F.S.A.Scot.,
THE MUSEUMS, HULL;

AND

T. W. WOODHEAD, Ph.D., F.L.S.,
TECHNICAL COLLEGE, HUDDERSFIELD.

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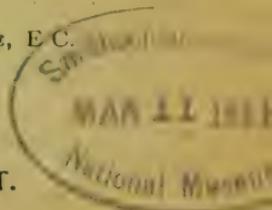
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All communications should be addressed to the Hon. Secretary,

T. SHEPPARD, F.G.S., The Museums, Hull.

NOTES AND COMMENTS.

THE IRISH COAL TIT.

With regard to the Irish Coal Tit, a new species described under the name of *Parus hibernicus*, in Vol. XXVII. of the 'Bulletin of the British Ornithologists' Club,' we learn from *British Birds* for February, that 'it is most regrettable that before the publication of the Bulletin, a note appeared . . . in the *Daily Mail* (Dec. 28th, 1910) . . . which, although inaccurate in many particulars, contains a sufficient description and the Latin name '*Parus hibernicus*' to allow it to stand as the first description of the bird, according to the present rules of zoological nomenclature.' Whether the Irish Coal Tit is a distinct species or not (and there is a growing tendency amongst ornithologists to describe 'new species'), future investigators will certainly not admire the way in which English zoologists publish particulars of their researches.

NATURE STUDY.

It must be gratifying to readers of *The Naturalist*, and to all interested in the study of Nature, to find that Nature Study is now the rule at our schools, whilst ten years ago it was the exception. One effect has naturally been the publication of an enormous amount of literature; good, bad, and indifferent. Many of the books and magazines have not stood the test of time, and in a process of 'natural selection,' have been eliminated. Some should never have appeared at all. We have before us a few volumes, all of which are of the right kind, and by well-qualified authors.

'THE AIMS AND METHODS OF NATURE STUDY.'*

Under this title, Dr. John Rennie has issued a valuable volume, which is essentially a 'Guide to Teachers.' Dr. Rennie is lecturer at the University of Aberdeen, and knows the teachers' requirements. His book is refreshing, also, as it is by no means principally occupied by botanical subjects—a fault too frequent in works of this kind. In an admirable Introduction, Prof. J. A. Thomson explains what Nature Study is, or should be, as well as we have ever seen it stated. The book itself covers almost every branch of the subject, a fair proportion being allocated to each. It has the further advantage of not being too elementary, and suggests lessons suitable for the upper classes. There are nearly two hundred illustrations, including a coloured 'Nature Calendar,' as frontispiece. For teachers we know of no better book on this subject.

* London: W. B. Clive: 352 pp. 3/6.

'HOW TO TEACH NATURE STUDY.'*

This work, by Mr. T. W. Hoare, a lecturer and instructor in Nature Study, and author of the well-known 'Look About You' Nature books, is, as it professes to be, 'a practical working guide for teachers.' It is certainly a teachers' guide, and contains various schemes for the different divisions of different types of schools. There are chapters on butterflies and moths, ice and snow, soil, spiders, aquaria and vivaria; but the major portion of the volume is devoted to botany—a subject with which the author seems to be particularly familiar. Mr. Hoare has a pleasant way of indicating the lines upon which teachers should work in order to get the most out of their scholars. There are numerous diagrams and illustrations from photographs.

'THE NATURE STUDY IDEA.'*

This is 'An interpretation of the new school movement to put the young into relation and sympathy with Nature,' by Mr. L. H. Bailey; and the fact that a third edition has been called for is an indication of its popularity. The book deals with the historical side of the movement. After giving information on what to teach and what not to teach; what Nature Study is, and what it is not, the author gives a series of questions and replies thereto for the benefit of the reader. For example: 'Now that there are so many Nature Study books, how shall I choose the most useful one?' 'Only by finding out what you want, etc.' Quite so. And again: 'How shall I acquire sufficient knowledge to enable me to teach nature study?' 'In the same way that you acquire other knowledge—by means of work and study. There is no way by which you can dream it or absorb it,' etc. 'Will not the nature study work interfere with school discipline?' 'That all depends on what you mean by "discipline." If you mean perfect "order," the child sitting erect with clasped hands, then nature study work may annoy you,' etc. It is most entertaining.

'THE BOOK OF NATURE STUDY.'*

This magnificent work, published under the editorship of Dr. J. B. Farmer, is now completed, the sixth volume being before us. It deals entirely with 'The Physical Environment'; the first eight chapters being by Dr. Marion I. Newbegin, and the remaining thirteen by Prof. W. W. Watts, F.R.S. Dr. Newbegin deals with 'Weather and Climate'; 'Precipitation'; 'Precipitation and Vegetation'; 'Snow and Ice'; 'The Sky'; 'The Sun'; 'The Seasons, etc.'; 'The Moon.' Prof. Watts refers to 'Denudation'; 'Deposition'; 'Rocks'; 'Models';

* London: Sidgwick & Jackson, Ltd. 316 pp. 3/6 net.

* New York: The Macmillan Company. 246 pp.

* London: The Caxton Publishing Co. 244 pp., 7/6.

Maps'; 'Landscape'; 'The Geological Record'; 'The Growth of Britain, etc.'. Both writers are well known for their lucidity, and Prof. Watts' section of the work will particularly appeal to our readers on account of the numerous reproductions from photographs taken in the northern counties, and especially Yorkshire. There is a carefully compiled general index to the six volumes. We should like to congratulate the publisher, editor and contributors, on the completion of this magnificent work.



Reminiscences of a Strenuous Life, by Edward Hull, M.A., L.L.D., F.R.S., London: Hugh Rees, 150 pp.

'Lives of great men all remind us, we can make our lives sublime.' We are not quite certain of the appropriateness of this quotation, as we are not sure that Prof. Hull would be classed amongst the 'great' men, notwithstanding what is stated in the "Reminiscences." On page 18, Prof. Hull states that it will be allowed 'Murchison has been happy in his biographer.' We can hardly say so much of Prof. Hull, as these 'Reminiscences' really form an autobiography, and we fear the 'author' has been prejudiced. The first chapter deals with the author's pedigree, and we learn that it was his father's wish that he should become a clergyman in the Church of Ireland; how different things might have been if Prof. Hull had carried out his father's wishes. He learnt Hebrew, Greek and Latin; and wasted a good deal of time and brain power in attempting shorthand, and 'would not advise anyone to go in for this art who did not intend to make it his profession.' But the present reviewer (as Prof. Hull will doubtless concede) is not particularly 'brainy,' yet had no difficulty in mastering shorthand! The second chapter is headed 'Elizabeth, Duchess of Gordon,' and from it we learn that Prof. Hull's father was chaplain to the Duchess, and the son fished in the waters on her estate, and landed his first fish, 'a grilse of *about* ten pounds weight,' there. We hope this was not his first fish story. He then deals with the Geological Survey and the great men he met there; his 'expedition' down the Danube (for a fee of £600, £500 of which is still owing!); his visit to Mount Sinai and Palestine, when Major Kitchener R.E. (now Field-Marshal Viscount Kitchener of Khartoum, G.C.B., O.M.) was a companion; 'Sir Howard Grubb, F.R.S.', is the heading of a further chapter, Sir Howard having allowed the Professor to look through his telescope; 'How I came to know the "Book of Kells"' (he had been some time in the Survey Office in Dublin; was brought up in Ireland at a school for the sons of Irish clergy; yet had never heard of it!); 'The late Earl of Enniskillen (whom he met at Belfast); 'Sir Robert Ball'; 'Sir Thomas Wardle and the Earl of Ducie' (the Professor met both); 'The Royal Commission on Coal-reserves' (when the Professor received a match-box); 'The Darwin Celebration at Cambridge' (Prof. Hull attended); 'My Marriage and Wedding Tour' (Prof. Hull took part); etc., etc. Brief references are made to 'Inter-Glacial Submergence,' and the 'highly imaginative theory' that the shells on Moel Tryfaen were placed there by ice; an 'absurd' theory which has found numerous supporters, 'amongst whom may be specially named Professor Percy F. Kendall.' Personally, we should have preferred an account of Prof. Hull's contribution to science; of the discussions in which he had taken part, and of the very warm debates; but perhaps he has reason for silence on these points. This would surely have been more useful than the information that when he was married, the girls of his 'wife's Sunday School formed a line on both sides to the door of the church.' Why *haven't* we been told in which pocket he placed the ring?

ANOTHER OCCURRENCE OF THE GLOSSY IBIS IN YORKSHIRE.

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

ON December 26th last, I went to Ulrome with Mr. T. Audas, to investigate a reported occurrence of the Glossy Ibis there. Mr. G. Gibson, of Skipsea Brough, who had stuffed the bird, told us that he had two specimens sent in within a week of each other, one from Atwick (reported in 'The Naturalist' for January), and another from Ulrome, in the autumn of 1909, but was unable to give either the date or sex of either. At Ulrome, we found the bird in the possession of Mr. G. Smith, of Eastgate Farm. It was a fine specimen, taller and larger,



and more brilliantly coloured than either of the birds shot on the Lambwath during October and November, 1909. It shows a considerable amount of chesnut-brown colouring on the breast, but has the grey streaks on head and neck, characteristic of the winter plumage. Mr. Smith fixed the date of its occurrence as the second week in October, because hatching had begun. Fortunately, the bird has been acquired by the Hull Museums Committee, who now possess a local specimen of their own, and to whose order the accompanying photograph was taken. The bird is familiar to Mr. J. Taylor, the Hornsea keeper, who has seen it more than once, and who reported that a solitary specimen haunted the Mere during the winter 1902-1903.

GLACIAL EVIDENCES NEAR HARROGATE.

A. LESLIE ARMSTRONG, F.S.A. (Scot.),
Harrogate.

THE development of Harrogate on its western outskirts has, during recent months, revealed various interesting glacial phenomena, particularly during the extension of Kent Road to a junction with the old Irongate Bridge Road. The latter enterprise has necessitated not only a cutting along the face of the Harrogate anticline, east of Birk Crag, thereby revealing many interesting sections of the upheaved Kinderscout Grit and its mantle of drift, but has also involved the widening



Erratic of Plumptre Grit, Harrogate.

16 ft. 0 in. in length.

of Irongate Bridge Road, where it abruptly descends the anticline to the Oak Beck, by what is locally termed Birk Crag Hill.

Here, and apparently for some distance westwards, the drift lies in a thicker cloak, and is of more varied character than that encountered in making the new portion of Kent Road; also it entirely envelopes the underlying grit.

Eastwards, along the new road, the sections show a bed of sandy yellow clay from four to six feet in depth, beneath

which is the true glacial blue clay covering the face of the anticline. Very few erratics were encountered here, and those met with were of small size and chiefly locally derived. Where the old road has been widened, however, the drift is of a more sandy composition, and encloses an unusual number of erratics. Although the cutting at one point is ten feet in depth, the bed of blue clay has not been reached, so that all the boulders referred to were contained in the sandy yellow clay forming the upper bed of the drift. Over seventy of exceptional size have been removed, as well as cart-loads of smaller angular and sub-angular fragments. These boulders were jumbled together in characteristic confusion, the exposed sections presenting remarkable object lessons in the transporting power of land ice.

The most interesting of the erratics is a giant slab of Plumpton Grit, 16' 0" in length, which is the largest glacial-borne boulder recorded for the district. This, as the illustration indicates, is still embedded in the face of the cutting, although a parallel width of four feet was split off and removed when the excavation was made. Probably the slab extends for at least a similar distance into the hillside, in which case the original dimensions would be 16' 0" \times 8' 0". The thickness is 18" extreme, with 15" as a minimum, and the weight would be upwards of 12 tons. An outcrop of this grit, having beds of almost identical stratification, occurs about nine miles to the north-west, on the moor between Blubberhouses and Thornthwaite, from which place this slab was probably derived.

Another large stone of the same description of grit was uncovered and measured 11' 4" \times 9' 0" \times 2' 10", others measured 8' 0" \times 4' 0" \times 1' 6", 8' 6" \times 3' 3" \times 3' 10", 7' 0" \times 4' 0" \times 3' 0", and several more were 6' 0" and over in length, and of either Follifoot or Plumpton Grits, all being rectangular masses, and, like the largest ones, bearing evidence of transit in their rounded and battered edges and smoothed surfaces. None of the larger stones were striated, but three smaller ones, derived from the neighbourhood of Pateley Bridge, were well marked in this respect. Large numbers of boulders were of the class met with in the Pennypot Lane field, described and illustrated in 'The Naturalist,' 1909, page 243. Numerous angular fragments, 3' 6" \times 3' 0" \times 1' 0" on the average, had been obviously derived from the beds of Follifoot Grit, which form such a prominent feature on the north side of this valley, at Long Crag, half a mile distant; whilst others had been torn from the beds of Kinderscout Grit, forming the face of the anticline against which this accumulation of boulders has been piled. At one point quite two loads of typical Pateley Bridge flagstones were discovered, ranging from an inch in thickness, up to large stones 2½" thick, and 4 to 5 superficial feet in area.

ON *UNIO DISTORTUS* BEAN, AND *ALASMODON VETUSTUS* BROWN, FROM THE UPPER ESTUARINE BEDS OF GRISTHORPE, YORKS.

J. WILFRID JACKSON, F.G.S.,
Manchester Museum.

(Continued from page 107).

With regard to *Unio humatus* Brown, this is very similar to *distortus* Bean, at its anterior end, and has evidently suffered a good deal of erosion here as the back of the anterior adductor muscular scar is visible as in *distortus*. It differs, however, from that species in being much more inflated in the umbonal region, as well as in being much shorter posteriorly. Some allowance, however, must be made for a portion which has been broken off this end. This fact was evidently not noticed by Brown when he described and figured the species, as he gives the posterior side as sub-acute.

Like *distortus*, the shell possesses a narrow, but quite distinct lunule. The ligament, too, is fairly well preserved, and extends from the umbones to a point a little short of the postero-dorsal corner. The shell, which is somewhat crushed, is quite adult; in fact, judging from the frequent interrupted growth-lines along the anterior and ventral margins,* it appears to have entered a gerontic stage. In its short antero-posterior diameter, coupled with the great inflation of the umbonal region, the species presents the features usually met with in sluggish water forms of the present day living well out of the reach of any strong currents.

With the exception of *distortus*, there appears to be no other species described from the Yorkshire Estuarine Beds, with which it can be compared; it seems, therefore, advisable to retain Brown's name *Unio humatus* for this form until more specimens are met with.

The amended description and synonymy of the species is as follows:—

- Unio humatus* Brown, 1847. [Plate IX., fig. 3].
1843. *Pachyodon hamatus* Brown. 'Ann. Mag. Nat. Hist.',
xii., p. 395, pl. 16x., fig. 6.
1849. *Unio humatus* Brown. 'Foss. Conch.', p. 179, pl. 72x.,
fig. 18.
1854. *Cardinia hamata* Morris. 'Cat. Brit. Foss.', Ed. 2.
p. 190.

Shell oblong ovate, considerably inflated, beaks large, slightly incurved, and situated centrally; umbonal region

* For the reason already stated, the posterior margin is not available for examination.

prominent; lunule and ligament distinct; anterior and posterior sides rounded; hinge line fairly straight; ventral margin curved; external surface with well-defined growth-lines, which are somewhat puckered at the posterior end.

Dimensions:—Length, $3\frac{3}{16}$ inches; height, 2 inches; thickness, uncertain.

Geological Horizon: Estuarine Series ('Coal Shale').

Locality: Gristhorpe Bay, Yorkshire.

'These notes afford a good opportunity to call attention to an article by Dr. M. C. Stopes, on 'The Flora of the Inferior Oolite of Brora (Sutherland)',* in which, on page 381, the authoress remarks: 'There were no animal remains among the plants, except a single example of a *Unio*, which was presumably a freshwater form: it could not be specifically identified.' This specimen has since been presented to the Manchester Museum; I have thus had an opportunity of examining it. It consists of an imperfect right valve, measuring 2 inches in length, and 1 inch in height, and is preserved in a block of ironstone. Unfortunately, the specimen is not perfect enough to determine its true specific characters, but in general shape and appearance it closely resembles the *Unio distortus* from the Yorkshire Estuarine Beds, and taking into consideration the fact of the fossil flora being so strikingly like that of the Inferior Oolite of Yorkshire, it does not seem at all unreasonable to suppose that the Brora *Unio* is to be referred to *Unio distortus* Bean.

In 1909, the Manchester Museum also came into possession of another fossil *Unio*, through the kindness of Mr. D. M. S. Watson, who collected it from the Great Estuarine Series in the north of the island of Eigg. This specimen consists of an impression in hard dark-coloured sandstone of a left valve, and shews the pseudocardinal teeth very clearly, but the presence of posterior lamellæ is uncertain owing to the imperfect condition of this portion of the fossil. The shell, which appears to be immature, measures $1\frac{3}{4}$ inches in length, and is 1 inch in height. Like the Brora example, it approximates very closely to *Unio distortus*.

Prof. Ed. Forbes, in his paper 'On the Estuary Beds and the Oxford Clay at Lock Staffin, in Skye,'† mentions the occurrence of a *Unio* in these beds as follows:—[p. 111], '*Unio? staffinensis*, pl. V., fig. 5a and 5b. I have given this name provisionally to impressions of a bivalve having the form and aspect of a small *Unio*. It is transversely oblong, inequilateral, depressed, truncated anteally, rounded and narrowed

* 'Q.J.G.S.', vol. LXIII. (1907), pp. 375-382, and pl. XXVII.

† 'Q.J.G.S.', vol. VII. (1851), pp. 104-113.

posteally, and transversely sulcated. Its breadth is $\frac{5}{12}$ ths of an inch. Adult specimens will probably be found hereafter.'

The Great Estuarine Series are Infra-Oxfordian in age, and occupy, according to Prof. Judd,* a somewhat analogous position in the Jurassic series of the western coast of Scotland to that of the series of estuarine strata which contain the famous coal seam of Brora in the Eastern Highlands.

The specimen on which Prof. Forbes founded his species '*staffinensis*' is, unfortunately, too immature to be of much value. Mr. Watson's example also, being a cast, is too imperfect for accurate specific determination, but the fact of it coming from the same beds as the Loch Staffin example, leads one to reasonably infer that both are forms of the same species. The fact of these beds being looked upon as equivalent in age to those in Sutherlandshire, and no doubt also to those of Yorkshire, makes one inclined to refer these *Unios* to the Gristhorpe form, to which they present so great a likeness.

Since the above notes were penned, my attention has been called to an interesting article by Mr. Bryant Walker, on 'The Distribution of *Margaritana margaritifera* (Linn.) in North America,'† in which the author brings forward good arguments in favour of an Asiatic origin for *M. margaritifera*. On page 128, he states: '*Margaritifera* itself is a very ancient species, which, through an enormous extent of time, during which it has wandered nearly, if not quite around the globe, has preserved its peculiar characters and specific identity to a remarkable degree. The essential similarity of the species as it exists at the present time on the different continents is very remarkable, and indicates that its specific characters were well established before its long migration was begun. As North America has been permanently separated from Asia and Europe since the close of the Tertiary period, and the progress of the species in its long journey must have necessarily been slow, there would seem to be no doubt but that the evolution of the species must have long antedated that period, and quite possibly may go back even to Cretaceous times.'

'Where the species did originate is by no means clear. It must have been either in Europe, Asia, or North America. That it is an immigrant into Europe is generally conceded. Dr. Scharff, in his recent work on European animals (1907, p. 34) expresses the opinion that it reached Europe *via* Greenland and Iceland. If so, the inference would be that it originated in North America, and from there spread east into Europe, and west into Asia. But there are several objections to that theory.'

Unfortunately, palæontological evidence is lacking regard-

* 'Q.J.G.S.', vol. XXXIV. (1878), p. 722.

† 'Proc. Malac. Soc.', vol. IX., pt. ii., June 1910, pp. 126-145, and map.

ing the former distribution of this species in the above-mentioned continents. It is, therefore, difficult to trace out conclusively its exact range in former times. Until further fossil evidence is forthcoming, it seems impossible at present to satisfactorily determine the place of origin, or the original stock from which the Margaritanas were evolved. The resemblance of *Unio distortus*, however, to recent species of the genus *Margaritana*, is not without interest, and one feels disposed to consider this form as a possible prototype, or forerunner, of the later Margaritanas, if not an actual *Margaritana* itself.

DESCRIPTION OF PLATES.

PLATE IX.

FIG. 1.—Cast of Bean's Type Specimen of *Unio distortus*, shewing anterior adductor scar, lunule, etc. [Original in British Museum].

FIG. 2.—Brown's Type Specimen of *Pachyodon* (*Alasmodon*) *vetustus*. [Manchester Museum, L. 9773]. Note.—Anterior end restored.

FIG. 3.—Brown's Type Specimen of *Unio humatus*. [Manchester Museum, L. 9774].

NOTE.—Figures 1 and 2 are two-thirds of the natural size; figure 3 is three-quarters natural size.

PLATE X.

FIG. 1.—Specimen of *Margaritana margaritifera* (L.) from R. Lune, Lancashire, shewing excessive decortication of the umbonal region, which has exposed the back of the anterior adductor scar, etc. [Mr. R. Standen's collection].

FIG. 2.—Neanic specimen of *Unio distortus* Bean, Estuarine Series, Yorkshire Coast. [Williamson Collection, Manchester Museum, L. 9775].

FIG. 3.—Neanic specimen of *Margaritana margaritifera* (L.), from R. Conway, Llanrwst, N. Wales, for comparison with fig. 2. [R. D. Darbishire Collection, Manchester Museum, EE. 2309].

NOTE.—Figure 1 is two-thirds natural size; figures 2 and 3 are slightly less than the natural size.

NORTHERN NEWS.

Mrs. Grindon has presented the herbarium formed by the late Leo H. Grindon, to the Manchester Museum.

We should like to congratulate our contributor, Miss M. A. Johnstone, B.Sc., F.L.S., on having received an important appointment in Manchester.

We notice that the Attendant at a Yorkshire Museum has applied for an increase of salary, and this has been granted. He now enjoys an income of six shillings a week.

Mr. R. W. Goulding favours us with a small pamphlet on the 'Louth Antiquarian, Naturalists' and Literary Society. Twenty-six Years—a Retrospect.' He points out that the society was founded by our contributor, Mr. Harry Wallis Kew, in 1884, when he was fifteen years of age.

From Mr. C. Bailey we have received his 'Third List of the Adventitious Vegetation of the Sandhills of St. Anne's on-the-Sea' ('Mem. and Proc. Manch. Lit. and Phil. Soc.'). The alien plants appear in poultry runs on the sandhills, and as building operations proceed, the poultry, with their alien flora, are pushed further afield. Mr. Bailey has now left the district, but we hope someone will be able to carry on the work.

A REVISED CHECK LIST OF BRITISH EARTHWORMS.

Rev. HILDERIC FRIEND,
Swadlincote.

So much progress has been made in the study of this subject since my Check List appeared in this Journal in January, 1893, that a revision and extension is eagerly demanded. The true Lumbrici remain the same, but in the old genus *Allolobophora* so many additions have been made, and so much more knowledge of internal anatomy has been acquired that several new genera have been established. We have also to record the discovery of the genus *Helodrilus*. I shall retain the old fractional system of marking the girdle segments and *tubercula pubertatis*. Thus in the common earthworm the formula $\frac{32-37}{33-36}$ means that the girdle extends from the 32nd to the 37th segment, inclusive; while the tubercula cover segments 33 to 36. When, instead of a band, there are individual pores for the tubercula, the fact is indicated by a colon (thus 31:33), instead of by a hyphen. The head is called the prostomium. The peristomium, to which the head is attached in various ways, is counted as the first segment. It is without setae, and some writers therefore begin to count from the first setigerous segment. This will account for the difference which is sometimes found to exist between the descriptions of different authors.

I. GENUS *LUMBRICUS* EISEN.

Prostomium inserted into peristomium like a perfect mortise and tenon; the processus dividing the first segment in two. Girdle of five or six segments, the innermost four carrying a band, known as the tubercula pubertatis, on each side. Setae eight on each segment in four couples, of which the individuals are near each other. Male pores on segment XV., with, or without papillæ. Colour dark-red with iridescence. Cylindrical in shape, with flattened tail. Slimy, but with no turbid or coloured fluid. Internally the presence of a median seminal capsule, in segments X., XI., with three pairs of seminal vesicles in IX., XI., XII., and two pairs of spermathecae in IX., X., opening in the line of the dorsal setae between segments IX/X. and X/XI., are the generic characteristics. Five species found in Great Britain, one of which has not yet been discovered in England.

1. *L. terrestris* L.—Male pores on papillæ. Girdle formula $\frac{32-37}{33-36}$. First dorsal pore between VII/VIII. Easily distinguished from the other species by observing the girdle and shape of head.

2. *L. rubellus* Hoffmeister.—No papillæ with male pores on XV. Girdle $\frac{27-32}{28-31}$. Smaller than the first.

3. *L. castaneus* Savigny. The smallest member of the genus in Gt. Britain. Girdle $\frac{28-33}{29-32}$.

4. *L. festivus* Savigny (*L. rubescens* Friend).—Very similar to No. 2, but possessing papillæ on XV., and having the formula $\frac{34-39}{35-38}$.

5. *L. papillosus* Friend (*L. Friendi* Cognetti).—Found only in Ireland, among the British Isles. Recognised by its five girdle segments $\frac{33-37}{34-37}$.

II. GENUS *ALLOLOBOPHORA* EISEN.

Prostomium partially dovetailed into peristomium. Girdle segments variable in number, mostly possessed of tubercula pubertatis. Setae eight on each segment, either in couples or variously distributed. Colour ranging from pink through brown, clay colour, steel blue and green; seldom purple or iridescent. Usually cylindrical throughout. Exude slime or turbid fluid, often pungent, fœtid, or earthy.

The external characters of this genus are so vague and varied, that resort has been had to the internal structure, and as a result several sub-genera have been formed. These are not yet clearly defined; partly owing to the difficulty of working out the minuter characters, and partly because new species have had to be described with insufficient material for full internal diagnosis. I do not follow Michaelsen and some others in all their conclusions, because my independent researches on British species will not allow me. The following arrangement, however, is subject to further revision and extension when I have the leisure to complete my investigations.

(1) Genus *Allolobophora*.

Prostomium dovetailed into peristomium. Male pores on papillæ; setae in pairs; body cylindrical, brown, clay coloured or pink. Earthy smell, slimy, no turbid fluid. Four pairs of seminal vesicles; gonads free. The type is that form of worm which has so often been confused with the true earthworm, but which is readily distinguished by the shape of the head, the colour, the position of the girdle, and the internal structure.

5. *A. longa* Ude.—Girdle $\frac{28-35}{32-34}$. Usually dark brown or umber; tail often flattened as in *Lumbricus*. Very earthy smell.

6. *A. trapezoides* Dugès. This and the next often with difficulty distinguished, and may perhaps still be regarded as different forms of one species. But there is great interest in this fact, for while the form here referred to has the continuous band of the true *Allolobophora*, No. 7 links us on to *Aporrectodea* by the discontinuous form of tubercula. Girdle $\frac{27-34}{31-33}$.

7. *A. turgida* Eisen (= *A. caliginosa* Sav.).—Girdle $\frac{28-34}{31:33}$.

(2) Genus *Aporrectodea* Örley.

The chief character is the tubercula on alternate segments. The green worm has long been recognized as an abnormal member of the genus *Allolobophora*, and Örley, with his keen discrimination shewed that it belonged to another genus. I have recently added a further species, and have no hesitation in using Örley's nomenclature.

8. *A. chlorotica* Savigny.—A very variable worm, often grass green; sluggish and grub-like. Formula $\frac{29-37}{31:33:35}$; having three pairs of tubercula instead of a continuous band.

9. *A. cambrica* Friend has the same formula, but is marked by internal as well as external differences.

10. *A. Georgii* Michaelsen. $\frac{29-35}{31:33}$. Here we again touch No. 7.

11. *A. similis* Friend.—Grey or indefinite in colour, little or no fluid. Length 7 centimetres, number of segments 180, tail somewhat flattened. Male pore hardly visible. Formula $\frac{28-35}{30:32:34}$, Kew, 1910 (See *Gardeners' Chronicle*, August 6th, 1910).

(3) Genus *Eisenia* (= *Notogama Rosa*).

Spermathecae opening near the median dorsal line.

12. *E. fetida* Savigny.—The well-known Brandling, $\frac{27-32}{28-30}$; subject to considerable variation, as are all the species of this group.

13. *E. Veneta* Rosa (= *A. Hibernica* Friend).—This polymorphic species is of supreme interest. It was described by Dr. Rosa and myself many years ago, but during the past few years about half a dozen varieties or sub-species have been found. I may name:—

(1) *Hibernica* Friend; Dublin, Louth, etc.

(2) *Zebra* Michaelsen; Limerick.

(3) *tepidaria* Friend; Oxford.

(4) *robusta* Friend; Malvern.

(5) *dendroidea* Friend; Malvern.

A further variety has been received by me from Cornwall but at present it remains unnamed. Formula for type $\frac{27-33}{30-31}$.

14. *E. rosea* Savigny (= *A. mucosa* Eisen).—Formula $\frac{26-32}{29-31}$.

I have named one or two of the many forms and varieties; and may refer especially to var. *glandulosa* found at Chelsea.

(4) Genus *Dendrobæna* Eisen.

This genus was first formed to receive certain worms found

in decaying timber and dead trees. It is an interesting group, but recent discoveries show the need of fuller and clearer definition, and the order is only tentative. In the type there are three pairs of seminal vesicles. The setae are more or less distant, and the colour is usually dark red or purple on the dorsal surface.

15. *D. mammalis* Savigny (= *D. Celtica* Rosa).—Formula $\frac{29-36}{33-34}$

16. *D. submontana* Vejdovsky.—Formula $\frac{25-32}{28-30}$. Found at Kew, September, 1909 (See *Gardeners' Chronicle*, January 29th 1910).

17. *D. subrubicunda* Eisen.—Formula $\frac{26-32}{23-30}$. Abundant in leaf-mould.

18. *D. arborea* Eisen.—Formula $\frac{27-31}{29-30}$. A smaller form than the last, and more frequently found in dead trees.

19. *D. octoedra* Savigny (= *D. boeckii* Eisen).—Formula $\frac{29-33}{31-33}$

(5) Genus *Bimastus* Moore.

Wanting in tubercula pubertatis. Along with this negative character we find also the absence of spermathecae. Three species are at present arranged under this genus.

20. *B. Eiseni* Levinsen.—Formerly regarded as a member of the genus *Lumbricus* because it has the type of head which is characteristic of that genus. Girdle extends from the 25th to the 32nd segment.

21. *B. constricta* Rosa; girdle from 26 to 31.

22. *B. Beddardi* Michaelsen.—At present found only in Ireland. This and Southern's species *relictus* are unknown to me. I have not confirmed Œrley's record for *A. platyura*.

(6) Genus *Octolasion* Œrley.

Rather large worms with the setae wide apart. Four pairs of seminal vesicles, with four seminal capsules.

23. *O. cyaneum* Savigny (= *A. studiosa* Rosa).—Formula $\frac{29-34}{30-33}$

24. *O. lacteum* Œrley (= *A. profuga* Rosa).—Formula $\frac{30-35}{31-34}$

25. *O. rubidum* Œrley.—Formula $\frac{30-35}{30-35}$, said to have been found by Œrley at Woolwich.

26. *O. intermedium* Friend.—Formula $\frac{28-35}{31-34}$. Found in Oxford Botanic Garden (see *Gardeners' Chronicle*, November 27th, 1909).

O. gracile Œrley.—Formula as number 25. I have found this form during the past year, and have given an account of the two in *Gardeners' Chronicle*, June, 11th, 1910.

(7) Genus *Eophila* Rosa.

Two pairs of spermathecae which are either invisible or open between IX/X., X/XI., in the direction of the dorsal setae. Setae scattered or paired.

27. *E. icterica* Savigny.—Cambridge and Chelsea. Formula
 $\frac{33 - 42}{35 - 41}$

I have not yet been able to assign a place to

28. *Allolobophora Hermannii* Michaelsen, which I found at Cambridge, July 6th, 1907. My specimens were mislaid, and have only just come to light again. Formula $\frac{22 - 32}{29 - 30}$. I also place here for the present

29. *Allolobophora alpina* Rosa, which Mr. W. Evans has discovered in Perthshire. The formula is $\frac{28 - 33}{30 - 32}$.

III. GENUS *HELODRILUS* HOFFMEISTER.

Here we have the most welcome addition to our Lumbricid fauna, and here I am obliged to part with Michaelsen and others, who have employed Hoffmeister's term in a sense which does not seem to me to be warranted. In 1845 Hoffmeister introduced the term for a worm which he had found in marshy places. The peculiarities included the presence of eye-spots in certain stages of development. The worm was lost to sight for many years, but was found some time ago in Scotland by Mr. Evans, and by myself in several localities around the Malvern Hills. I have now a second species from Cornwall which has not been described, and is, I believe, new to science. It adds much to our knowledge of this genus.

30. *H. oculus* Hoffm.—Body elongate and pink in colour. Length at most 135 mm.

It occurs on the sea-shore in pools more or less dried up; also inland in the beds of streams, and mud of ponds. Up till the present no specimen has been found with a girdle.

31. *H. elongatus* Friend.—Found in Cornwall in April, 1910, by Mr. Bartlett, of Pencarrow. Girdle present from 15th to 24th segment. Related to *Criodrilus* and *Pontodrilus*.

IV. GENUS *ALLURUS* EISEN.

I see no reason at present for changing this term, though some adopt *Eiseniella*. An interesting addition has been made during the year by the discovery in Scotland of *A. hercynius*, which I regard as a good species if not the type of a new genus.

32. *A. tetradrus* Savigny.—Male pores on 13th segment. Formula $\frac{22 - 26}{23 - 26}$.

33. *A. tetragonurus* Friend.— $\frac{18 - 22}{19 - 21}$. Found at Bangor in North Wales.

34. *A. macrurus* Friend.— $\frac{15-22}{19-21}$. From Dublin.

35. *A. hercynius* Michaelsen.—Male pores on segment XV. as in *Lumbricus* and *Allolobophora*, and not in XIII., as in typical *Allurus*. Girdle $\frac{23-27}{23-25}$.

My Check List of 1893 contained 25 species. Of these two are now ranked as varieties, leaving twenty-three. So that no fewer than twelve new species have since been discovered, besides several very distinct varieties of *Eisenia veneta*. It is possible that further additions may be made when our islands, mountains, lakes, rivers, and gardens have been thoroughly explored, and I shall be glad of the co-operation of collectors, in order that the Monograph of British Annelids which I am preparing for the Ray Society may be as complete as possible.

LIST OF BRITISH EARTHWORMS SHEWING THE SEGMENTS WHICH CARRY THE GIRDLE AND TUBERCULA.

I. *Lumbricus*.

	27	28	29	30	31	32	33	34	35	36	37	38	39
<i>L. rubellus</i>	---	---	---	---	---	---							
<i>L. castaneus</i>	---	---	---	---	---	---	---	---					
<i>L. terrestris</i>						---	---	---	---	---	---		
<i>L. papillosus</i> ..							---	---	---	---	---		
<i>L. festivus</i>								---	---	---	---	---	---

2. *Allurus* and *Helodrilus*.

	15	16	17	18	19	20	21	22	23	24	25	26	27
<i>H. oculatus</i>				not	known								
<i>H. elongatus</i>													
<i>A. macrurus</i>						---	---	---					
<i>A. tetragonurus</i>				---	---	---	---	---					
<i>A. tetraedrus</i>									---	---	---	---	
<i>A. hercynius</i>									---	---	---	---	---

N.B.—Between *L. castaneus* and *L. terrestris* is a gap which has been partially filled by Continental species, but which still needs completing.

	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	
<i>Beddardi</i>							not known															
<i>Hermannii</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>rosea</i>				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Eiseni</i>				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>submontana</i>				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>subrubicunda</i>				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>constricta</i>				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>foetida</i>				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>arborea</i>				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>veneta</i>				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>trapezoides</i>				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>turgida</i>				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>longa</i>				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>alpina</i>				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>similis</i>				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>intermedia</i>				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>chlorotica and cambrica</i>)				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Georgii</i>				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>octoedra</i>				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>cyanea</i>				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>lactea</i>				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>gracile and rubida</i>)				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>mammalis</i>				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>icterica</i>				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

N.B.—This scheme indicates that *Hermannii* and *icterica* may be importations. The rest form a pretty uniform series. It should be observed that this tabulation supplies the numbers of the normal or average segments only, and not the variations.

ASTERACANTHUS IN THE CORALLINE OOLITE.

HENRY CHARLES DRAKE, F.G.S.,
Scarborough.

No remains of this extinct shark have hitherto been recorded in the Coralline Oolite of the Scarborough district, and vertebrate remains are scarce in this deposit in Yorkshire.

There are some specimens in the Scarborough Museum, with no localities mentioned, but amongst these there are no remains of this species.

Dr. A. Smith Woodward* mentions an *Asteracanthus* spine being found in the Malton district, but no specimen of the *Strophodus* teeth have yet been recorded from there. It was, therefore, a great pleasure to me to find a spine of *Asteracanthus* in the Coralline Oolite of Seamer in lower beds than occur in the Malton district. The spine is not perfect, and although I searched diligently, I was unable to find the remaining portion.

It bears the usual tubercles, and the double row of sharp tubercles on the hinder surface, but they are much worn, as if the spine had been washed about before becoming finally buried.

Dr. A. Smith Woodward kindly examined it, and refers it to *A. ornatissimus*. The specimen is nearly 200 mm. in length, and, when perfect, would probably have measured another 60 mm.

A perfect specimen from the Oxford Clay of Fletton, Huntingdonshire, of nearly the same circumference at the base, measures 320 mm.

How to attract and Protect Wild Birds, by M. Hiesemann, Second Edition 100 pp., 1/6. London: Witherby & Co.

This work, the first edition of which was reviewed in these columns a little time ago, has proved so popular that a second edition has been called for. This has been revised and brought up-to-date, and many new features are included. In Germany the Minister of Agriculture has adopted the scheme with the greatest success, and it seems agreed that were it adopted by the Public, Government, and Municipal Bodies generally, the difficulty of enforcing Bird Protection Acts would become largely unnecessary.

'A hundred blue books boiled down into one red one' is a description which might be fittingly applied to 'Hazell's Annual for 1911.' But the new number of this old and valued companion is much more than a mere digest of hard, if valuable facts. Indispensable as it is to the writer, or the politician, it appeals to a much wider public. The scientist, the small holder, the sportsman, the artist, the photographer—even the idler with no special tastes, if such an individual there be—will find matter of interest in this encyclopædic guide book to the times in which he lives. Readers of 'The Naturalist' will find the volume particularly useful as it contains many facts bearing on their work. There is also an exceptionally good index.

* Geol. Mag., 1889, p. 362.

THE AQUATIC COLEOPTERA OF THE ISLE OF MAN, WITH SOME REMARKS ON THE ORIGIN OF THE FAUNA.

FRANK BALFOUR BROWNE, M.A.(Oxon.), F.R.S.E., F.Z.S.

IN his vice-presidential address before the Lancashire and Cheshire Entomological Society*, the late Dr. J. Harold Bailey discussed the coleoptera of the Isle of Man, and gave his opinion as to the origin of that part of the Manx fauna. He said: 'The Manx coleoptera fauna is derived, as regards the majority of its species, from migrations across former land-connections both from England and Ireland; the Irish element passing along the Irish-Welsh bridge which was the first to disappear, the great mass of the species reaching the island from land to the east and south, the last bridge to exist being to the coasts of Lancashire and Cumberland.'

This statement as to the origin of the Manx coleoptera has become the more interesting to me the farther my researches into the present distribution of the Britannic water-beetles has led me, and I have been able, during the past season to spend some ten days in the Isle of Man investigating the water-beetle fauna which has, as Dr. Bailey mentions, been almost neglected so far. I was not only able to collect a large number of species myself, but I learnt that Dr. Bailey's collection of beetles was in the possession of the Isle of Man Antiquarian and Natural History Society, and, owing to the kindness of Dr. Cassal, the custodian of the collection, I was allowed to examine the water-beetles, and so add to my knowledge of the species found in the island. I learn from Dr. Bailey's address that the Dale collection at Oxford contains some Manx beetles, but I have not so far been able to look through the water beetles of that collection.

I propose in the present paper to describe the results of my researches, and also to discuss shortly the origin of the fauna, so far as the water beetles throw any light upon it. I have as usual, only included the Hydradephaga and Hydrophilidae, omitting the genera *Sphæridium*, *Cercyon*, *Megasternum* and *Cryptopleurum*.

With regard to published records the Isle of Man apparently only boasts a fauna of nineteen species of water beetles, but, through the kindness of Dr. Bailey, Mr. W. E. Sharp and others, in sending me specimens or their lists of captures, I had accumulated a list of forty-two species. In Dr. Bailey's collection I found fifty-two species, a few of which had been

* '31st Ann. Rep. and Proc. Lanc. and Cheshire Ent. Soc.,' 1908, pp. 39, 40.

mixed up in other series, and I was able during my stay to collect eighty-two species. I did not find eight of the species of which I had records, and all are represented in Dr. Bailey's collection, and there were two other species in that collection which I did not find during my stay in the island, so that the total list of water beetles is now ninety-two species.

My visit was during the last week of June and the first week of July, by no means the best time of year, and there are probably other species which will be added to the list. Such species as *Hyphydrus ovatus*, *Rhantus exoletus*, and *Acilius sulcatus* have not yet been found in the island.

The island seemed to me a very good collecting ground for water beetles. Dr. Bailey (l.c., p. 29) says, 'Ponds are scarce, except for a series of old marl pits on the edge of the old cliff line to the south of the Ayre.' I did not find the ponds to which he refers, but in the northern plain, especially in the neighbourhood of Andreas, small ponds occur in most of the fields. There are streams of all sizes in all parts of the island, and the only groups of water beetles in which the Isle of Man is really deficient are the lake fauna and the halophil fauna. Except for one or two reservoirs, which I did not visit, there are no lakes, and I could not find any salt marsh areas.

With eleven exceptions (Snaefell, four, Point of Ayre, three, and Curragh, four), Dr. Bailey's specimens were all taken in the south of the island, *i.e.*, south of the railway from Douglas to Peel, and the great majority of his records are for the Port Erin district. My records are chiefly for the north of the island; I did not visit the Port Erin district, and only made one excursion to Castletown and Douglas.

Amongst the species taken on the island one of the most interesting is *Bidessus minutissimus*, which I found in the Sulby river, the only place I searched for it. I only took two specimens, one on each occasion that I looked for it, but these are sufficient to establish the record. Now that this species has occurred in Devonshire, Isle of Man, and Solway districts, I have little doubt but that it will be found in suitable rivers along the west of England.

Of other river and stream species *Deronectes latus* was common in the Sulby river, accompanied by *Hydroporus septentrionalis*, *Deronectes depressus* and *D. 12-pustulatus* and *Hydræna testacea*. In my previous experience this last species has always occurred in stagnant ditches or ponds, but it was not uncommon in one part of the river in moss on stones. *Agabus guttatus* was common in the mountain streams, and I took a few specimens of *Orectochilus villosus* in the north of the island. Dr. Bailey took a number of specimens of this last species in the south.

Although I searched carefully for it, I failed to find *Hydro-*

porus rivalis, nor is there a Manx record for it. It is difficult to account for its absence as it is recorded from England, Scotland, and Ireland. With regard to its British distribution there seem to be a fair number of counties in the south and south-east of England in which it has not occurred, and from its present known British distribution, I think it may be regarded as belonging to Watson's 'Scottish' type* which includes species showing a concentration in the north of England and south of Scotland. Of the ten species which, from their present known British distribution may be referred to this type, five others are apparently absent from the island, viz., *Calambus g-lineatus*, *Deronectes assimilis*, *Agabus affinis* and *unguicularis* and *Aciurus fasciatus*, so that the type is poorly represented. Of these, the first two are lake species, while the third and fifth may be described as 'lowland oxylophils.' Lowland peat moss is not common on the island, and I only visited three localities—(1) 'The Curragh,' which at one time was perhaps a good ground, but is now rather barren. Here I took the only specimen of *Hydroporus obscurus*; (2) a small area near Ballaugh, detached from the Curragh, where *Sphagnum* flourishes. Here *Helochares punctatus* and *Copelatus agilis* were abundant. The former only occurred on this ground, but I took one specimen of the latter in another place; (3) at Foxdale, where a pond, covered with *Equisetum* and surrounded with thick *Sphagnum* yielded *Gyrinus minutus*, *Ilybius ænescens* and *Rhantus bistriatus* among the species. This was the only place I found the first two species, and they were very common.

A single specimen of *Ilybius subæneus* turned up in a pond near Andreas. The only other British records for this species are Lincs. N., Norfolk E. and W., Cambs., Suffolk E., Surrey and Kent W., but it has a wide range elsewhere from N. America to Siberia. In England, as in the Isle of Man, I have always taken it in drains or ponds with the group of 'helophils' or fresh-water marsh species, but in Norway at 3000 feet elevation, it was common as an 'oxylophil.' or peat moss species in company with *Dytiscus lapponicus*, *Agabus arcticus*, *Ilybius angustior* and *ænescens*, etc.

Of the 'helophils,' the most interesting species was *Berosus affinis* which was common in a farm pond near Andreas. The northern plain is the chief centre of this group in the island, owing to the scarcity of stagnant water elsewhere. I found a single specimen of *Gyrinus urinator* in a slow flowing drain near Sandygate, and there is another specimen in Dr. Bailey's collection. It was amongst a series of *G. natator*, and is

* It must be remembered that H. C. Watson, in the *Cybele Britannica*, founded his types on the British distribution of the species without any reference to the sources from which the plants reached the country.

labelled 'K, 2, vii., 1908,' the 'K' I believe, standing for 'Kentraugh.'

With regard to systematic arrangement, there are two points upon which I have been unable to follow recent writers. After examining large numbers of *Haliplus ruficollis*, I have been unable to satisfy myself as to the specific distinction between it and *H. immaculatus*, a specimen of which I received from Mr. E. A. Newbery. Shape alone is, at the best, a poor criterion upon which to separate species, and the shape of the group at present included under the name *ruficollis* varies so much that I can find no break which should justify the separation from it of *H. immaculatus*. Perhaps an investigation of the whole 'ruficollis' group would clear up the difficulty by discovering some distinct specific characters, and perhaps several species!

Edwards* recently re-separated *Anacæna ovata* and *limbata* as distinct species, and I have not followed him in this. Edwards admits that these two forms and *A. bipustulata* are 'evidently very closely allied.' I will not enter into the question of the specific distinction of the latter, as it does not occur in the Isle of Man, and I have not worked at it, but so far as my experience goes, it is easily separated, and has a distribution limited to the south-east of England (Lincs. N., to Hants S.), except for a single record for Lancs. S.

The other two forms are not easily separated, as I find all intermediate grades of colour between the black (*limbata*) and the brown (*ovata*) and both forms seem to be widely distributed in the country, the black one apparently being the rarer. Out of seventy collections made during the past season (1910), the black one occurred twenty times, and the various browns fifty-eight times, so that in only eight collections did black and brown occur together. I think the colour is affected by the environment, the black specimens occurring chiefly in a kind of peaty water, which is not too acid for certain snails, such as *Planorbis spirorbis*, and where the water beetle fauna includes helophil and oxylophil species, e.g., *H. gyllenhalii*, *vittula* and *nigrita*, *I. obscurus*, *Ph. melanocephalus*, etc. There are several other species of water beetles with colour variations as for instance, *Deronectes depressus* and *12-pustulatus*, *Platambus maculatus*, etc., and I think the differences between their extreme forms, the strongly yellow marked and the black, are quite as great as in the case of the *Anacænas*. In the case of these species, the dark form of *P. maculatus* is commoner in the north than in the south, and on high than on low grounds, while I think that the dark forms of the two *Deronectes*,

* 'On the British Species of *Anacæna*,' E.M.M., Ser. 2, xx., 1909, pp. 169-171.

although not absent from rapidly flowing, gravelly streams, are commoner in the more sluggish and muddy ones.

In the following list I have mentioned the parish in the case of every record, as Dr. Cassal told me that he recorded all his captures of lepidoptera on that basis. Dr. Bailey's name is mentioned in connection with all the records I have taken from his collection, and a bibliography at the end of the paper includes all the references to Manx water beetles that I have been able to find:—

Brychius elevatus Panz. Andreas (common in one small stream).

Haliplus confinis Steph. Andreas; Ballaugh [only three specimens].

H. flavicollis Sturm. Rushen (Colby R., Kentraugh), (Bailey); Ballaugh, only in the Killane River.

H. fulvus F. Andreas; Ballaugh; Lezayre.

H. ruficollis De G. Rushen (Bradda and Kentraugh), (Bailey); Andreas; Ballaugh; Jurby; Lezayre; Michae.

H. lineatocollis Marsh. Rushen (Bradda, Cronk Mooar, Fleshwick and Colby River) (Bailey); Andreas; German; Jurby; Lezayre.

Noterus sparsus Marsh. Ballaugh; Jurby.

Laccophilus obscurus Panz. Andreas; Ballaugh; Jurby; Lezayre; Michael.

Bidessus minutissimus Germ. Lezayre (Sulby River, two specimens).

Celambus inæqualis F. Andreas; Ballaugh; Jurby; Lezayre.

Deronectes latus Steph. Lezayre (Sulby River), (common).

D. depressus F. Rushen (Cronk Mooar and Kentraugh), (Bailey); Andreas; Ballaugh; Jurby; Lezayre (Sulby River, etc.).

D. 12-pustulatus Ol. Rushen (Kentraugh, Colby R.), (Bailey); Jurby; Lezayre (Sulby R., etc.).

Hydroporus pictus F. Andreas; Ballaugh; Jurby; Lezayre.

H. lepidus Ol. Rushen (Cronk Mooar), (Bailey); Andreas; Ballaugh; Jurby.

H. septentrionalis Gyll. German (R. Neb.); Lezayre (Sulby R., etc.).

H. lineatus F. Andreas; Ballaugh; Jurby; Lezayre.

H. tristis Payk. Ballaugh (900 feet) several.

H. umbrosus Gyll. Andreas; Ballaugh; Jurby; Lezayre.

H. gyllenhalii Schiöd. Rushen, etc. (Bailey); Andreas; Ballaugh; German; Jurby; Lezayre.

H. morio Dej. Lezayre (Snaefell and Mallew (S. Barrule), (Bailey); Ballaugh (950 ft.).

H. vittula Er. Andreas; Ballaugh; Jurby; Lezayre; Michael.

H. palustris L. Andreas; Ballaugh; German; Jurby; Lezayre; Michael; Patrick.

H. incognitus Sharp. A number in Dr. Bailey's collection mixed with *H. palustris*, but I overlooked the localities; Ballaugh; Jurby; Lezayre.

H. erythrocephalus L. Andreas; Ballaugh; Jurby; Lezayre; Patrick.

H. celatus Clark. Mallew (S. Barrule); Rushen (Mull Hill), and 'Sound' (?) (Bailey).

H. melanarius Sturm. Ballaugh and Lezayre (fairly common, 800-950 ft.).

H. memnonius Nic. Andreas; Ballaugh; German; Jurby Lezayre.

H. obscurus Sturm. Ballaugh (a single specimen in the Curragh).

H. nigrita F. Rushen (Bradda, Mull Hill, etc.) (Bailey); German; Lezayre.

H. discretus Fairm. Rushen (Surby and Bradda) (Bailey); German; Lezayre.

H. pubescens Gyll. Rushen (Bradda and Mull Hill) (Bailey); Andreas; Ballaugh; German; Jurby; Lezayre.

H. planus F. Rushen (Cronk Mooar and Kentraugh), (Bailey); Andreas; Ballaugh; Jurby; Lezayre.

H. lituratus F. Bride (Point of Ayre); Rushen (Cronk Mooar, Fleshwick, Mull Hill and Scholaby), (Bailey); Andreas; Ballaugh; German; Jurby; Lezayre.

H. obsoletus Aubé. Lezayre (Snaefell, 2 specimens '1906') (Bailey).

Agabus guttatus Payk. 'Common in Rushen, 1902' (Bailey); Ballaugh; Lezayre; Patrick.

A. biguttatus Ol. Rushen (Surby, 1902, one specimen) (Bailey).

A. paludosus F. Mallew (Ballakilley); Rushen (Cronk Mooar) (Bailey); Andreas; Mallew.

A. nebulosus Forst. Andreas; Ballaugh; Jurby; Michael.

A. femoralis Payk. Andreas, one specimen).

A. sturmi Gyll. Rushen (Colby R., Kentraugh) (Bailey); Jurby; Lezayre; Patrick.

A. chalconotus Panz. Rushen (Bradda, Cronk Mooar, Fleshwick and Mull Hill) (Bailey); Andreas; Ballaugh; German; Jurby; Lezayre.

A. bipustulatus L. Arbory (Balladoole); Lezayre (Snaefell); Rushen (Cronk Mooar and Mull Hill, and two red specimens, Bradda) (Bailey); Andreas; Ballaugh; German; Jurby; Lezayre; Michael; Patrick.

(*To be continued*).

FIELD NOTES.

MAMMALS.

Bottle-nosed Whale at Spurn.—On December 14th, Mr Consett Hopper of Spurn Head, sent me word that on the previous day a whale had come ashore, just under what is known as the station, Spurn Head, the like of which no one in the neighbourhood had ever seen before. Unfortunately, I was unable at the time to go down and see it and take a photograph of it, as I should much have liked to have done, but I wrote again to Mr. Hopper, and he kindly supplied me with a sketch of its head, from which I had no difficulty in recognizing it as a Beaked or Bottle-nosed Whale (*Hyperoodon rostratus*). Mr. Hopper further informed me that it was twenty-five feet in length, slatey blue in colour, and estimated to weigh between nine and ten tons. It was very shortly afterwards cut up and buried by the coastguards. Curiously enough in the 'Zoologist' for January, Mr. A. H. Patterson, of Great Yarmouth, records the stranding of a whale of this species at Holme-next-the-Sea, near Hunstanton, on the Norfolk coast. on the very same date as the Yorkshire specimen came ashore, viz., December 13th.—OXLEY GRABHAM, York.

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BIRDS.

Waxwings in the Whitby District.—A small flock of Waxwings was seen near Whitby on December 20th, and the two following days. The birds were not at all wild, and permitted near approach. They were feeding greedily on the 'hips' of the wild rose, which they swallowed whole.—THOS. STEPHENSON, Whitby, 13th January, 1911.

Whooper Swans in Wharfedale, etc.—Upon a lake in Lower Wharfedale, eight miles from Harrogate, there are at present (Jan.) eleven wild Whooper Swans. They are consorting with eight pinioned birds, which at different periods visited the lake in a wild state, but which were captured, and after they had been pinioned, were allowed their liberty in the lake, where they appear to thrive. Although now familiarised with the human form, they do not lose their shyness, and when strangers are about they either keep to the centre of the lake or on the far side. Mr. Nelson reports seeing Whoopers at the Tees mouth on November 19th.—R. FORTUNE.

Another Pugnacious Grouse.—Since my note upon the Pugnacious Grouse appeared in 'The Naturalist' for December, I have received a communication from Mr. T. Turnbull, of Conisbro', to the following effect:—'In August 1909, I was

visiting a daughter at Curbar, near the Duke of Devonshire's moors, and hearing of two ladies being attacked and driven back by a Grouse, my son-in-law and I took a stroll on the moor, to verify the statement, and as soon as we reached the bird's beat, we heard a w-r-r-r of wings, and a fine cock grouse alighted on the path in front of us, and disputed our passage with the cry of "Go-back" or "get-out," but which I think is "Grouse," probably the origin of the bird's name. It fought with my stick, which I tried to hook round its neck, and jumped at my friend's straw hat, which he held in his hand, like a bantam cock, and kept up the game until we had passed over his ground, when he flew back to cover in the heather. Confirmation of this may be had from Mr. Peet, the head keeper, who lives close to the place, and who, I understand, had reared it with his chickens.'—R. FORTUNE.



The Earth and its Story, by A. R. Dwerryhouse, D.Sc., F.G.S. London: C. H. Kelly, 304 pp., 5/- net.

Dr. Dwerryhouse, who is a frequent contributor to the pages of *The Naturalist*, has written this volume in order 'to lay before the general reader, in a simple and interesting manner, some of the facts which are known about the earth upon which we live, and the processes of change to which it is constantly being subjected.' It contains in Part I.* a series of articles on Wind and Rain, Brooks and Rivers, A Glacier, The Sea, The Floor of the Ocean, Volcanoes and Earthquakes, Fossils, etc; and in Part II., descriptions of the rocks and their contents, beginning with the Archaean. Each chapter is a separate essay on the subject given, and for the most part is written in simple language. In 'The Interior of the Earth,' however, it is much too 'deep' for us—though we may not be a properly qualified 'general reader.' For example: 'Now, from the equation on p. 148, we have

$$f = G \frac{B \times I}{a^2} = G \frac{B}{a^2}, \quad \text{also } w = G \frac{E \times I}{R^2} = G \frac{E}{R^2}$$

and from these two equations we get a third, from which we can calculate the value of E, because we know the value of all the other letters which the equation contains.

$$E = B \frac{w}{f} \times \frac{R^2}{D^2}$$

Thus the mass of the earth can be determined.'

Personally, we don't believe it, though the general reader can do as he (or she) likes. Similarly, we are not quite sure that (speaking of the formation of columnar basalt) 'all the forces meeting along *ab* can be resolved into forces parallel to *1f* and *2f*, and others acting along *bf* and *af*. The latter, being equal and opposite, would balance,' etc.

The volume is well illustrated, many of the photographs (by Mr. Godfrey Bingley and others) will be familiar to our readers. The coloured maps shewing the probable position of glaciers in the British Isles before the advent of the Scandinavian Ice-Sheet, and the condition of the British Isles at the period of Maximum Glaciation, are particularly interesting. A coloured geological map of the British Isles form the frontispiece.

* This is entitled 'The Historians and their Language.'

In Memoriam.

JAMES WILLIAM TUTT.

1858—1911.

It is with the greatest regret that we record the death of Mr. J. W. Tutt, which took place on January 19th last, in the fifty-third year of his age. In close connection with the various London Entomological Societies, and in contact, either as correspondent or by personal acquaintance with almost every lepidopterist in the kingdom, probably no entomologist, living or dead, was ever so widely known as was Mr. Tutt.

The work he did, too, in his favourite science, was prodigious; and it was a marvel to everyone as to how he found time to get through it. The titles alone of his various papers and notes would take a long time to read through, and his numerous books are in all our Entomological libraries. Of these latter the first were of popular character, and one will not soon forget the fascination which the reading of his 'Rambles in Alpine Valleys,' 'Woodside, Burnside, Hillside, and Marsh,' 'Random Recollections,' etc., produced. Later his books became more scientific, and his 'British Noctuæ and their Varieties,' followed by his work 'British Lepidoptera' are known to all of us. Of this last great work, eight very bulky volumes had already been published, and the author was busily engaged on the ninth up to the time of his death.

Twenty-two years ago, too, he started the 'Entomologist's Record' as a monthly journal, and acted as its editor until his fatal illness overtook him. In its early years the journal shewed strongly the independent and forcible character of its editor, and the drastic way in which he characterized the writings of some of his fellow students, no doubt caused him to be bitterly disliked by several of the older entomologists who could not understand that his scorn was vented on their theories only, and not on themselves. Indeed, probably no one has more severely criticised some of his methods and work, both in conversation, and in correspondence with him, than the writer of this notice, but Tutt always took it in good part, and we remained throughout close and intimate friends. That by his sterling value, and high scientific work he had lived down all opposition among those who knew him, is shewn by the fact that at the time of his death, he was President-elect of the Entomological Society of London, and had he lived eight days longer would have had that—the highest honour to which a British entomologist can attain, conferred upon him.

Besides being so keen a student, Mr. Tutt was a most energetic and enthusiastic collector in the field. The writer first met him in Chattenden Woods, Kent, near the place (Strood) where Tutt was born, well on to forty years ago, and when he was a mere boy; since which time we have often worked together in various well-known entomological localities—Wicken Fen, Deal, etc., including Yorkshire, where some years ago, as my guest for a few days, I introduced him, to his great enjoyment, to some of our well-known collecting districts.

Of late years he was greatly interested in European Butterflies, and spent his holidays abroad in their pursuit. He amassed large collections, all of which, we understand, are to be disposed of at Stevens' Salerooms, in five sales, during the next two years.

Mr. Tutt was buried at the cemetery at Lewisham, on January 14th, a large number of his entomological friends attending to show their token of regard for a man whose loss as an entomologist, both to Britain and the Continent, will be great indeed.

G. T. P.

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NEW BOTANICAL BOOKS.

Perhaps next to birds, plants are, now-a-days, the most favourite subjects dealt with in popular natural history, and the number of books referring to various aspects of botany is continually increasing. As in the case of the birds, also, these vary a good deal in quality. From Messrs. F. Warne & Co., we have received '**Wayside and Woodland Trees,**' a pocket guide to British Sylva, by **Edward Step, F.L.S.** (182 pp., 6/- net). This contains no fewer than 175 plates from water colour drawings and photographs. Readers of *The Naturalist* are familiar with the excellent way in which Mr. Step does any work he undertakes. The present volume is no exception to this. Each species is dealt with, and illustrations are given of the trees in winter and summer; the boles, leaves, flowers and fruits. The present edition contains forty-eight extra plates. It is a most useful volume, and is a handy size for the pocket.

British Ferns and their Varieties, by **C. T. Druery, F.L.S., V.M.H.** (George Routledge & Sons, Ltd., 460 pp., 7/6 net) is a volume for which we have nothing but praise. It is magnificent. It will appeal alike to the expert botanist and to the amateur just beginning to dabble in 'nature study.' There is an excellent Introduction, followed by chapters on British Ferns as a Hobby; the Life History of Ferns; Fern Propagation and Culture; Selection; Crossing and Hybridizing; Multiple Parentage; Rockeries, Frames and Wooden Cases; Wild 'Sports,' and how found; Types of Variation; Fern Foes and Remedies; and the details of the various and numerous species found in Britain. Each is illustrated by an uncommonly large number of fine prints and drawings, there being forty coloured plates, ninety-six nature prints, and over three hundred 'woodcuts,' etc. A remarkable feature is the Appendix, containing 'ninety-six nature prints of fine varieties of British Ferns, selected from some three hundred printed from the fronds by the late Colonel A. M. Jones of Clifton.' The book is rather heavy to handle, but this is unavoidable in view of the number of plates.

NEW BOTANICAL BOOKS.

A Garden in Bogland, by 'H. E. S.' (Siegel Hill & Co., 60 pp. 2/6 net).

In this little volume 'H. E. S.' describes how a dreary peaty waste in the north of Ireland has been transformed into a veritable botanists' paradise; and how the difficulties of having beautiful plants where rabbits are so plentiful, was overcome by making islands in the bogland. Judging from the fine coloured plates, the effect has been wonderful, and we can appreciate the writer's enthusiasm. There is a long list of plants which now are thriving in the garden.

Mosses and Liverworts, by T. H. Russell (Sampson, Low, Marston & Co., Ltd., 211 pp. and plates. 4/6 net).

We reviewed the first edition of this excellent work to some length, and reproduced one of the plates, in *The Naturalist* for July, 1908. That a second edition has been called for so soon, supports the remarks we then made. The author has also thoroughly revised the present impression; and we are glad to notice he has adopted the suggestions we made, particularly in reference to his use of the word 'flowers.' For this, the author has 'somewhat reluctantly, substituted the less euphonious expression, "reproductive organs."' Four entirely new plates have also been added to the edition. It is a remarkably cheap book.

Plant Life in Alpine Switzerland, by E. A. Newell-Arber, M.A., F.L.S., etc. (John Murray, 355 pp., 7/6 net) is a volume that will quickly sell. It is just the work which has been wanted for a long time. As might be expected from the name of the author, it is thoroughly scientific, yet not technical; and he has constantly in his mind the relationship of the various species with which he deals, to their surroundings. There is also much original research recorded in the pages, and, in addition, the ecological work of Kerner, Christ and Schroeter has been largely drawn upon. In recent years the author has paid many visits to Switzerland, and the numerous beautiful photographs of the flowers in their natural surroundings are largely his own work. 'Plant Life in Alpine Switzerland' should unquestionably be a part of the equipment of every visitor to Switzerland.

The Oak: its Natural History, Antiquity and Folk Lore, by Charles Mosley (Elliot Stock, 126 pp., 5/- net) is by a contributor to this journal. In this volume Mr. Mosley seems to have gathered together all the information he can get dealing with the oak, from whatever source, and upon whatever aspect, one chapter being on 'The Oak in Holy Writ.' The illustrations, though taken by the author, remind one very much of those in Mr. Step's book, just referred to. Amongst the 'Historic Veteran Oaks,' mention is naturally made of the Cowthorpe Oak, and reference is made to the fact that 'some years ago the Vicar of St. James's, Wetherby, together with a number of churchwardens and school-children, *ninety-five in all*, got inside the hollow tree.' Mr. Mosley gives a list of the various species of oak, and a real 'oak-board,' if a thin one, is pasted on the cover. The price seems rather high for a small volume.

The Wild Flowers, by J. H. Crawford, F.L.S. (T. N. Foulis, 232 pp., 5/- net) is an artistic production, and its charm lies in the sixteen coloured plates by E. Alexander, A.R.W.S., with which the volume is embellished. These plates must not be looked upon as prepared for the purpose of identifying the species of plants, as for the most part they represent the commonest species; but they exhibit the flowers as seen by an artist. For example, that entitled 'Bluebells,' *i.e.*, Harebells (a really beautiful sketch), has the hind part of a bee as its most conspicuous feature. The book does not contain a survey of the leading features of the principal plants in our flora, but a series of well-written chapters containing the author's various impressions of wild plant life. The book is printed on good paper, and is excellently bound. The fact that this is the second edition speaks for its popularity.

REVIEWS AND BOOK NOTICES.

NEW SHILLING BOOKS.

In view of the fact that, until a few years ago, scientific books were generally exceptionally expensive, it is gratifying to find that we are now able to purchase neatly-printed and well-bound volumes, by our best scientific writers, for the small price of a shilling. We have five such works before us. The first is issued for the Rationalist Press Association, by Messrs. Watts & Co., London, and is entitled '**History of Anthropology**' by **Dr. A. C. Haddon** (158 pp.). This may be said to be the first attempt towards a History of the Science of Anthropology, and in the capable hands of Dr. Haddon, the work is all that can be desired. He deals with the Pioneers and Systematisers of the Science; Controversies; the Antiquity of Man; Psychology; Distribution of Man; Ethnology; Archaeological Discovery; Technology; Sociology and Religion; Linguistics; Cultural Classification, etc. There are several illustrations, the frontispiece being a portrait of E. B. Tylor. The Cambridge University Press is issuing a series of Manuals of Science and Literature, under the editorship of Dr. P. Giles and Prof. A. C. Seward. These are sold at 1/- each, and the volumes referred to below are already published, each being perfect as regards typography, etc. **The Coming of Evolution: The Story of a Great Revolution in Science** (171 pp.) will be perhaps the most popular, and is by Dr. J. W. Judd. In this Dr. Judd refers to the origin of the idea of evolution, and step by step gives a valuable historical review of the subject. The parts played by Scrope, Lyell, Darwin and Wallace are carefully dealt with, and there is a portrait of each of the authorities named. Needless to say the volume is most fascinating to read. **Heredity** in the light of recent research, is a companion volume, by **Mr. L. Doncaster** (140 pp.). Amongst the subjects discussed are Variation, and its Causes; the Statistical Study of Heredity; Mendelian Heredity; Some Disputed Questions; Heredity in Man, etc., etc. The book contains a most admirable summary of the subject. **Plant Animals: a Study in Symbiosis**, by **F. Keeble** (163 pp.) is in the same series. Prof. Keeble spent ten years in a small marine laboratory in Brittany, during which he paid considerable attention to the habits etc., of the minute worm-like animals found among seaweeds, and known as *Convoluta*. Two species particularly are dealt with—*C. roscoffensis* and *C. paradoxa*, a coloured plate and diagrams, etc., of which are given. **The Natural History of Coal**, by **E. A. N. Arber** (163 pp.). In this volume the author shews that the discussion on the origin of coal would be simplified if it were borne in mind that all coal was not formed in the same way. Mr. Arber deals with the chemical and physical properties of coal, associated rocks, origin, terrestrial coals, estuarine and Lacustrine coals, etc. There is a useful bibliography, and several fine illustrations.

Proceedings Yorkshire Geological Society, Vol. XVII., Pt. 2, 1910, publ. 1911, 71 pp.

This excellent Yorkshire Society has issued a volume containing three admirable papers, dealing with the geology of the Isle of Man, Lancashire, Derbyshire, and Nottinghamshire. In the past it has made Yorkshire the field of its operations, and there is still much to be done in that county. Dr. Wheelton Hind describes four new Carboniferous Nautiloids, and a Goniatite new to Britain; Mr. E. A. Newell Arber describes the Fossil Flora of the Coalfields, in Nottinghamshire and North Derbyshire, and Mr. F. W. White describes the Complex of Igneous Rocks at Oatland, Isle of Man. All three are valuable, and well illustrated. There are also obituary notices of the late C. Fox-Strangways and J. R. Dakyns; the latter we have seen before, and a footnote might perhaps have been added, if merely to say that a list of Dakyns' works was given in *The Naturalist* for November last. There are some unnecessary misprints, etc.

How Sealskins are Obtained, by **J. Collinson** (Animals' Friend Society York House, Portugal Street, W.C., 8 pp., 2d.). draws attention to the cruelties practised in securing seal-skins for the adornment of our ladies. It is anything but pleasant reading.

Darwinism and Human Life, by **Prof. J. Arthur Thomson**. London: Andrew Melrose, 245 pp., 5/- net.

In 1909 Prof. Thomson gave the 'South African Lectures' to the South African Association for the Advancement of Science; and, appropriately, the subject chosen was Darwinism. The subject was dealt with under the heads, 'What We Owe to Darwin'; 'The Web of Life'; 'The Struggle for Existence'; 'The Raw Materials of Progress'; 'Facts of Inheritance'; and 'Selection: Organic and Social.' All naturalists will be familiar with Prof. Thomson's charming style, hence the present work is one that can be heartily recommended, and it will unquestionably take a permanent place amongst the extraordinary amount of literature on this subject that has appeared during the past two years.

Report on the Immigrations of Summer Residents in the Spring of 1909, edited by **Mr. W. R. Ogilvie-Grant**, being Vol. XXVI., Bull. B.O.C., 347 pp. and 25 maps. London, Witherby & Co., 6/- net.

This Annual Report of the B.O.C. Migration Committee continues to grow very considerably each year. The Chronological Summary of the arrival and dispersal of the various species of the Spring migratory birds is continued on the original lines, any alteration or improvement in the system at first adopted being strenuously avoided by the Committee, evidently in order 'to afford facilities in comparing the results of one year with another.' This we consider to be a mistake (*vide* 'The Naturalist,' 1906, pp. 164-166, and 1909, p. 31).

Fortunately in other directions the Committee has been much more enterprising. There are Weather Reports from the weekly returns of the Meteorological Office; Daily Details of the Weather Conditions with the Corresponding Arrivals of the Summer-Residents; Details of the chief Movements observed at the Lighthouses and Light-vessels in the Spring; and full notes on the Autumn migratory movements, both at the Light-stations and inland. A useful map, giving the positions of the ninety light-stations included in the Report, is added for the first time. We are glad to see that in these additional reports and records the precise locality is usually given, instead of such vague terms as 'Yorkshire,' 'Lincolnshire,' etc., as in the systemised 'Chronological Summary' of Spring arrivals.

Comparative notes are added from Scotland, and also from the Isle of Texel (Holland), where one member of the Committee went in order to report observations of passing migrants. Such a huge mass of reports is being accumulated that we confess we are beginning to look forward to the promised 'Digest' of the whole.

Owing to the yearly increasing work of tabulation three additional members have been added to the Committee, and Dr. N. F. Ticehurst has undertaken the secretaryship, hitherto held by Mr. J. L. Bonhote.

The records from the Light-stations are amazingly numerous, and it makes one wonder at the number of embryo ornithologists there must be amongst the Light-keepers, more especially when critical species are 'seen' in 'cloudy weather.' But where wings of the birds killed at the lights are forwarded to the Committee (as is frequently the case), identification is more satisfactory. Amongst this multitude of 'facts' there are some which are open to question: for instance, the first arrivals in the autumn of both the Fieldfare and the Redwing are from the extreme south of England! But taken altogether this Committee is doing splendid work, and no student of Bird migration can possibly be without these publications.—H. B. B.

NEWS FROM THE MAGAZINES.

The name of Mr. R. Welch has been added to the list of Editors of the *Irish Naturalist*, in place of that of Mr. Robert Patterson, who has resigned.

The *Scientific Roll* and Magazine of Systematised notes, conducted by Alexander Ramsay, continues to make its appearance. Vol. II., No. 26 (pp. 291-322, 1/-) is still in 'Bacteria,' and deals with Vital Chemistry: Butyric, Caproic, Caprylic, Carbolic, Citric, and Formic Acids.

Dr. David Starr Jordan's Presidential Address to the American Association for the Advancement of Science, is printed in *Nature*, No. 2150. He deals with 'The Making of a Darwin,' and refers to the question as to whether a Darwin could be produced at a University to-day. It is an excellent comparison of present with past educational methods.

We should like to congratulate a Mr. 'S. F. Cook, B.E.N.A., Middlesbrough,' upon the way in which he has 'lifted' Mr. Riley Fortune's note on 'A Pugnacious Grouse' from the pages of *The Naturalist*, and placed it under his own name in another journal, without any acknowledgment whatever. Or is it that 'S. F. Cook' is a species of 'Mrs. Harris'?

The '*Lancashire Naturalist*', which started as a journal devoted to Lancashire, subsequently included Cheshire, Derbyshire, Westmorland, the Lake District, and the Isle of Man. It now takes in the 'Lake District,' which 'will explain the alteration on the part of the cover.' This we presume, refers to the fact that part of the title is printed upside down! But why not drop the word 'Lancashire'?

Mr. W. Eagle Clarke (*Ann. of Scottish Nat. Hist.*, January, 1911), records that he visited St. Kilda from September 1st to October 8th, and met with quite unlooked-for success. Fifty-four species of birds were noticed on *passage*, of which thirty-five were new to the avi-fauna of the island, and included some not previously recorded for the west of Scotland; whilst the American Pipit is new to the British fauna, and the Marsh Warbler to that of Scotland.

Parts II. and III. of Major Barrett-Hamilton's *History of British Mammals* (2/6 each, Gurney & Jackson), are to hand, and are well up to the standard of the first part, already noticed in these columns. In addition to the General Introduction to the Bats, the author deals with Leisler's bat, the Pipistrelle, the Serotine, the Parti-coloured bat; Daubenton's, the Rough-legged Water Bat, and the Whiskered Bat. His grasp of the scattered literature on the subject is astonishing.

Remarks on some *Palæoxyris* from the Middle Coal Measures of Lancashire, by Mr. J. W. Jackson, of the Manchester Museum, appear in *The Lancashire Naturalist* for January. These curious organisms are now generally accepted as being the egg-capsules of some species of Carboniferous fish, though at one time opinion was strongly in favour of their being the fruits of some plant. It will be remembered that one of the first British examples was figured in *The Naturalist* by Prof. A. C. Seward, some years ago.

The Animal World gives the following specimen of police court natural history, in connection with a R.S.P.C.A. prosecution for cruelty to a seal. 'The bench declared that the seal was an animal, but the solicitor for the defence disputed this, arguing that from the definition given in a dictionary, it was a mammal. The Chairman said a mammal was an animal, and the clerk, consulting a dictionary, said a mammal was defined as a mammalian animal. The Chairman said a whale was an animal, but the solicitor said it was a mammal. One of the justices observed that it certainly was not a vegetable, and the bench ultimately held the seal to be an animal!

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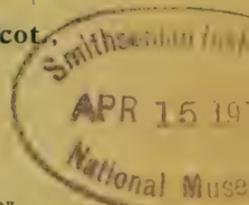
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All communications should be addressed to the Hon. Secretary,

T. SHEPPARD, F.G.S., The Museums, Hull.

NOTES AND COMMENTS.

THE SCAMRIDGE DYKES.

We were recently informed that the Scamridge Dykes— one of the few fine prehistoric earthworks left to us, were in danger of being mutilated in connection with a reservoir that the Scarborough Urban District Council proposed to construct, in order to supply the village of Snainton with water. From a plan which was sent to us, it was clear that, were the scheme carried out, the earthworks would be



Photo

[A. Bushy.]

Trenches overlooking Troutdale Valley connecting Scamridge.

ruined. It was evident that a good and suitable site could be found a little further away, though it would necessitate a small additional expenditure as regards excavation. As there was little time to lose, the daily press was communicated with, as were also the various societies and influential gentlemen interested in the preservation of our ancient monuments. We hear that it has now been decided to alter the proposed site of the reservoir, which is satisfactory.

SUPPLEMENT TO THE WEST YORKSHIRE FLORA.

For some years Mr. F. A. Lees has been at work on a Supplement to his well-known Flora of West Yorkshire, which was published by the Yorkshire Naturalists' Union so long ago as

1888. The supplement is now practically ready, and includes particulars of several additional records. Mr. Arnold E. Bradley has taken the responsibility for the difficult group, the brambles, and Mr. W. Ingham is responsible for the mosses. In the Supplement Mr. Lees groups, as far as data permit, the present and extinct Yorkshire species, in order of their sequence in time, and the source from which they came to us.

A NEW BRITISH FLORA.

About a hundred years have elapsed since the 'appearance of the last volume of Sir J. E. Smith's 'English Botany,' with illustrations by James Sowerby, and about fifty years since the appearance of the first volume of Boswell-Syme's edition of that epoch-making work. The time appears to be ripe, therefore, for the issue of another illustrated Flora of this country. The Cambridge University Press have made arrangements for the appearance of such a Flora, by Dr. C. E. Moss. The author will receive assistance from specialists in several critical genera. Engler's system of classification will, generally speaking, be followed; and the first volume to appear will deal with the earlier Dicotyledonous families from the *Salicaceae* to the *Chenopodiaceae*. The work will be illustrated by pen and ink drawings by Mr. E. W. Hunnybun, about 1750 of which have already been completed. Each of Mr. Hunnybun's drawings has been made from living specimens; each plant has been drawn natural size; and, in the case of critical species and varieties, the name of each specimen has been vouched for by some competent authority, whose letter of identification has been preserved. In addition to these drawings, each volume will contain numerous photographs of plants in their natural habitats; and maps, showing the distribution of the more interesting genera and species, will also be a special feature. It is expected that the work will be completed in ten volumes.

REFERENCES TO PUBLICATIONS.

We have before us quite a number of publications with double-barrelled references, the utility of which is difficult to conceive. For instance, a 35-page pamphlet, entitled 'Transactions of the Manchester Geological and Mining Society,' is issued as 'Vol. XXXII., parts 1 and 2.' Why would not 'Vol. 32, part 1.' do, and leave 'part 2' for the next issue? Similarly, 'The New Phytologist' just to hand is 'Vol. X. Nos. 1 and 2, Jan. to Feb., 1911, published March 13th.' Would not 'Vol. X., No. 1, March 13th' convey all that is necessary? Two parts of the 'Exsex Naturalist' have been received, one is referenced as 'Parts III. and IV., Vol. XVI., Oct. '09 to Jan. 1910,' and is 'published Dec. 1910.'; the other is labelled 'Parts V. and VI., Vol. XVI., Feb. to July, 1910,' and 'published Feb. '11.'

Why would not ' Vol. XVI. part 3, Dec. 1910 ' and ' Vol. XVI., part 4, Feb. 1911 ' respectively, answer the purpose? These complicated references do not simplify matters, are confusing to bibliographers, are lengthy and inconvenient to quote, and are likely to cause error in copying.

MR. WM. CASH, F.G.S.

We are delighted to learn that Mr. Wm. Cash of Halifax, a contributor to this journal, and one of the original members and prominent workers of the Yorkshire Naturalists' Union, has received two grants of annuities, one from the Treasury, and one from the Scottish Murdock Fund. We hope he may long be spared to enjoy them.

SCANDINAVIAN BOULDERS IN DENMARK

A memoir of particular interest to glacial geologists has recently been published by the Geological Survey of Denmark, entitled ' Scandinavian Indicator-Boulders in the Quaternary Deposits, Extension and Distribution,' by Mr. V. Milthers. By ' Indicator-boulders ' are meant the stones in the Quaternary layers, the characteristics of which are so peculiar and distinct that it can be determined exactly from what spot or rather limited area of the region once covered by the ice they came. Knowledge of the fact that loose stones were to be found outside Scandinavia, which bore a resemblance to the permanent rocks of Scandinavia, had already been obtained long before any clear conception could be formed of the significance of the resemblance. It was only gradually, as the theory of the Scandinavian inland ice advanced, that a clear understanding on the matter was arrived at. The origin and nature of the boulders are dealt with in the following order:—(1) Boulders from the Christiania district; (2) Boulders from Dalarne; (3) Boulders from Scania; (4) Boulders from Eastern Smaland; (5) Boulders from the North Baltic district.

AND OTHER PLACES.

The author then proceeds to describe the very wide area over which the ' Indicator-boulders ' are distributed, including Denmark, North-west Germany, North-east Germany, and Poland, parts of Russia, the Netherlands and the East coast of England; and by means of four coloured maps he shows how certain lines of distribution can be traced and a chronological order established, which throws much light on the position and direction of movement of the ice streams responsible for the presence of the boulders in the area.

Though Dr. Milthers has not visited the glacial deposits on this side of the water, the short chapter devoted to the East coast of England is full of interest, and it is very satisfactory to note that he has, in this connection, made full use of the

data supplied in the Boulder Reports published by the British Association and the Yorkshire Naturalists' Union. He regards, of course, the presence of Christiania rocks in the Holderness Drifts, as a fact established beyond dispute, but he appeals for more evidence with regard to the Baltic rocks.

Dr. Milthers' work, which by the way is written in English, will be heartily welcomed by all students of the many interesting problems connected with boulder distribution; and the working geologists of the Yorkshire Naturalists' Union should be specially grateful for the new field that has been opened for their investigation—J.W.S.

FIELD NOTES.

MAMMALS.

PORPOISE AT TADCASTER.—A strange creature was seen disporting itself in the Wharfe at Tadcaster on March 11th. The usual fate of strangers overtook it. The man with the gun appeared on the scene, and shot it. It proved to be a Porpoise, 3 feet 8½ inches in length, and weighing 46½ lbs. It was exhibited for some time at one of the local hotels.—R. FORTUNE.

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BIRDS.

Cormorants at Harrogate.—Late on Saturday night, February 11th, I had a telephone message to say that there were two large birds perched on some chimneys not very far from my house. It was a very clear moonlight night, and, upon going to the place, I was surprised to find two Cormorants, which had evidently taken up their quarters there for the night.—R. FORTUNE.

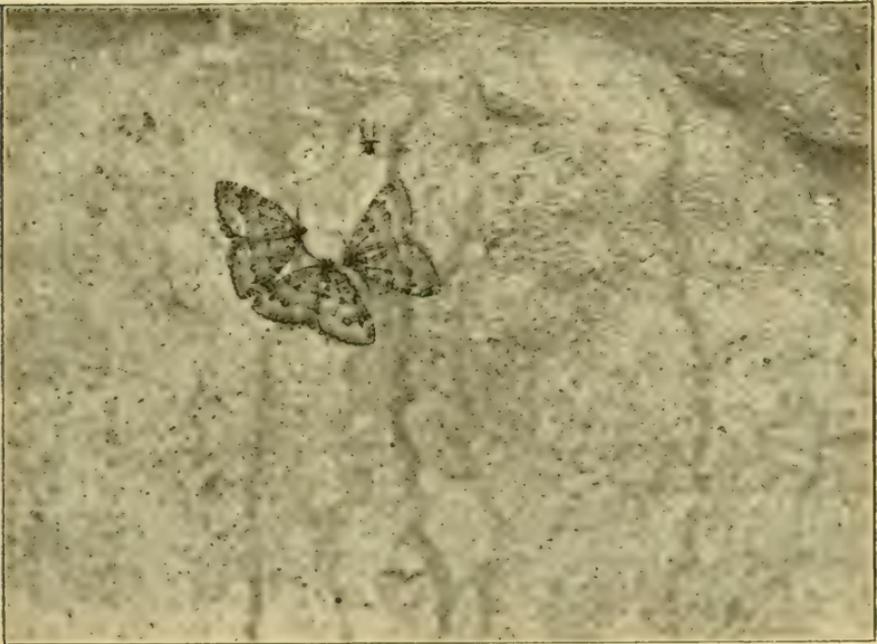
Early Flocks of Pied Wagtails in Yorkshire. On February 10th there was a very large flock of Pied Wagtails in Manningham Park, Bradford, Mr. M. Malone counting over fifty birds at one time. Mr. Oxley Grabham informs me that there were flocks near Pickering about the same date, which would probably be part of the same northern migratory movement. This is quite six weeks earlier than we expect to see large flocks in the West Riding. What became of these early arrivals is difficult to say, as since that time I have neither seen nor heard of any flocks, only occasional stray birds, as is usual at this time of the year.—H. B. BOOTH, Ben Rhydding, March 21st, 1911.

A Portrait of Prof. W. Boyd Dawkins, F.R.S., was recently presented to the Whitworth Hall, of the University of Manchester, by a number of friends who wished to show their appreciation of Prof. Dawkin's long and distinguished services to the University.

THE HIBERNATION AND PAIRING OF *SCOTOSIA DUBITATA* L.

J. W. CARTER, F.E.S.,
Bradford.

IN Mid-Airedale *S. dubitata* cannot be considered a common insect. Mr. Porritt states it is 'moderately common in Yorkshire,' and it appears to be rarer and more thinly distributed northwards. Dr. Ellis in his 'Lepidopterous Fauna of Lancashire and Cheshire,' says 'generally distributed though scarcely common'; and the late J. E. Robson, in his 'Catalogue



Cuthbert Hastings].

Scotosia dubitata on roof of cave.

[Photo.

of the Lepidoptera of Northumberland, Durham and Newcastle-upon-Tyne,' regarded it as a very rare species in these northern counties. So far as Airedale is concerned, during a period of more than thirty years, the species has been taken very rarely in autumn and spring, and all that I have myself obtained either in autumn or spring have proved to be females.

The late Edward Newman, in his 'Natural History of British Moths,' says: 'the impregnated females hibernate and deposit their eggs in the spring, the males being destroyed by the early frosts at the approach of winter.' That this is not the case has been clearly proved by some interesting observations recently made by Mr. Cuthbert Hastings. That the

species, like many others, hibernates during the winter months, is well known, but of how many species can we say that we know the exact kind of situation—hibernaculum—selected?

So far as *Scotosia dubitata* is concerned, Mr. Hastings, during his cave explorations in various parts of the West Yorkshire dales, has met with this species on several occasions; and on January 22nd last, in company with Messrs. J. Beanland, R. Butterfield and J. H. Holmes, it was met with in a cave in Wharfedale in extraordinary numbers, indeed, not fewer than



Cuthbert Hastings).

Scotosia dubitata on roof of cave.

[Photo.

150 to 200 specimens were observed. About a dozen specimens were secured, and these I have had under examination, and find that about a third of them are *males*, and the remainder females, mostly in excellent condition, the females being especially so, so that it would almost be safe to assume, without actual proof, that pairing takes place in very early spring. At the same time it would add to our knowledge of the habits of the species if this could be proved during the coming season. The accompanying photographs were taken by flash-light, by Mr. Hastings.

If Mr. Carter will keep these specimens alive in separate boxes, he will probably be able easily to ascertain whether the females deposit fertile eggs without pairing in the spring; and as he has both sexes he can also endeavour to pair some of them.—G.T.P.

Naturalist,

STROPHODUS TEETH IN THE CORALLIAN BEDS OF MALTON.

J. WILFRID JACKSON, F.G.S.,
Manchester Museum.

WITH reference to the note on *Asteracanthus* in the Coralline Oolite, in 'The Naturalist,' (p. 130), the Manchester Museum possesses specimens of *Strophodus* teeth from the Coralline Oolite of Yorkshire. Four examples in all are included in the collection. Two of these are attached to the matrix, and possess a label as follows: '*Strophodus* sp. Malton, Yorkshire. Coralline Oolite.' They have been in our collection for some considerable time, but are without particulars as to the donor. The other examples are loose teeth minus the roots; they are labelled, '*Strophodus tenuis* Agassiz, Coralline Oolite, E. Coll. Williamson.' Though no locality is given on the label, it is not unreasonable to suppose that they came from the neighbourhood of Malton, as nearly all Williamson's researches were made in Yorkshire. Some evidence is afforded by the fact that most other Corallian fossils in the Williamson collection are labelled 'Malton.'

The four teeth are in an abraded and rolled condition. All four, however, approximate nearer, both in shape and details of ornamentation (where this is visible), to the type of dentition named by Agassiz '*Strophodus reticulatus*,' than to any other.

Other vertebrate remains from the Malton beds contained in the Manchester Museum collections are:—A fine series of the teeth of *Hybodus obtusus* Agassiz; two much abraded teeth of a Pycnodont Ganoid, either *Mesodon bucklandi* (Ag.) or *M. rugulosus* (Ag.); and two or three loose Crocodilian teeth belonging to *Steneosaurus* and *Teleosaurus*.

We have also a dorsal fin-spine, doubtless referable to *Hybodus obtusus*, which was obtained from the Corallian at Headington, Oxfordshire, by Mr. P. Manning.

Spines of this species appear to be of very rare occurrence, in fact, the only example that I am acquainted with is one figured and described by Mr. H. M. Platnauer* from the Coralline Oolite at Malton.

The Headington specimen measures some 264 mm. in length, but is not perfect, as a small portion is broken away from each end. It is moderately well-preserved, but, owing to its having been much rolled about, the flat characteristic ridges are only discernable in certain places.

From the same beds Mr. Manning also obtained several teeth of *Hybodus obtusus*, which he has presented to the museum.

* Ann. Rept. Yorks. Phil. Soc. (1887), 1888, p. 36, pl. i., f. 16.

ACTINOCAMAX QUADRATUS IN THE CHALK OF YORKSHIRE.

J. W. STATHER, F.G.S.,

AFTER many years' search for this belemnite, it is possible to record that an undoubted specimen of *Actinocamax quadratus* has at last been found in the Yorkshire Chalk. Although Dr. Rowe and Mr. Sherborne when collecting in Yorkshire, considered the uppermost beds of the chalk of Flamborough Head to be in this zone, they were unable to find the actual name fossil, and on page 261 of their notes*, remark :—' We have yet to see an example of the true *Actinocamax quadratus* collected in this area, either by ourselves or by Yorkshire geologists.'

The specimen which now enables us to record this species for Yorkshire, was found by the writer in September 1909, in the White Hill Quarry, on the Scarborough Road, a mile north of Bridlington old town. It is a typical *Actinocamax quadratus*, with the short stout guard, the strong pustulation, and the deep and square alveolar cavity. Mr. Crick and Mr. Sherborne, who have both seen the specimen, fully confirm this opinion.

During the summer of 1910, the White Hill Quarry was again visited by the members of the Hull Geological Society, when Mr. G. W. B. Macturk secured a specimen of exactly the same type, which he kindly handed over to the writer of this note.

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The West Riding of Yorkshire. These 'Little Guides' are much more than any compilation, for they are the digested, reliable, and judicious work of Mr. Joseph E. Morris, B.A. ('West Riding', 569 pp., Methuen & Co., 1911, 3/6). Such a flair or instinct has their author for the essential, the core in whatever he may be describing, that I have found his account of many places, Bolton demesne, Meaux, Rougemont, the Mayden Bowar, near Topcliffe, etc., to throw a distinct light upon the flora of the areas concerned; and this without a dropped word on the natural, or even local earth-history! The Guide itself is not only little in format and cost, easily slipped into a breast-pocket, but leaves little to be desired in other ways. Of course the topic where towns and not church architecture is involved (since tastes differ, and standpoints are not singular), may give occasion for contentious criticism; but, upon the whole, these 'Guides' take a place easily first in their literary genre, with the dry-as-dust or ponderous rest, Nowhere! Only one non-content strikes me: lack of any reference under Bolton Priory or Barden to 'the Riddings,' a ridge farmstead with adjoining cottage on the scarp of the Wharfe, a half mile above the Abbey, the cottage having a curious 'bow' window, some of it built around an old 'peel' or round tower, which was the hawks'-eyrie in the days of Clifford's and the dame Cicely, wife of Wm. de Meschines, and who gave her name to the anise-aromatic 'Sweet Cicely,' grown by, and introduced to this reach of Wharfe, by her. The cottage buttresses and conceals a mural curio unique in Yorkshire. The cot garden on a slope, of toy dimensions, still retains the little terrace-shelf from which the gosses and peregrines were 'flown.' Perhaps, in a second edition, Mr. Morris might add an inset leaf. The West Riding Guide is dedicated 'to the Memory of my Uncle, Richard Metcalfe, M.D., of Leyburn.' Every peregrinating naturalist should make friends with this aid to a 'liberal education.'—F. ARNOLD LEES.

* Proc. Geol. Assn., Vol. XVIII., Part 4.

THE EARTHWORMS OF HOLLAND.

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Rev. HILDERIC FRIEND,
Swallincote.

WHILE we have a pretty accurate knowledge of the Annelid fauna of France, Germany, Switzerland, and many other parts of Europe; and are able thereby to compare the distribution of European species with those found in Great Britain we seem to have no available records in English of the worms found in Holland. To supply this defect, I have recently studied the species to be found at the Hague, and hope, in time, to extend my researches to other parts of the Netherlands. The following list is intended merely as a first contribution to a very important subject, and it may be pointed out that, with one exception, the species here enumerated are those which we find most commonly in our own country. So far, no fewer than twelve species, embraced under seven genera, have been discovered. No attempt has yet been made to tabulate the Enchytraeids or White-worms, and the Water-worms.

Three species of *Lumbricus* occur pretty generally, viz., *L. terrestris* Linn, *L. rubellus* Hoffm., and *L. castaneus* Savigny. We find also certain forms of *Allolobophora*, using the term in the newer and more restricted sense; as *A. longa* Ude, a worm which has always been confused with the true Earthworm; and both forms of *A. caliginosa* Savigny, viz., *turgida* Eisen and *trapezoides* Dugès. It is at present difficult to decide whether these are to be regarded as varieties, forms, sub-species, or species. *Aporrectodea* is represented by one species, *A. chlorotica* Sav. both type and varieties; the latter of which still need careful study. Two forms of *Eisenia* are found. The one is the well-known brandling, *E. foetida* Sav., while the other, *E. rosea* Sav., was long known as *Allolobophora mucosa* Eisen. *Octolasion cyaneum* Sav. completes the list of *Allolobophoras*, so far identified. There remain two other species to mention. The first is *Allurus tetraedrus* Sav., which is represented not only by the type, but also by a well-marked and beautiful variety (*luteus* Friend), exactly corresponding with forms found by me in the Eden near Carlisle. The worm of greatest interest, however, is *Helodrilus oculatus* Hoffm. This perplexing annelid was first described by Hoffmeister in 1845. It was then lost to sight for many years. Later Michaelsen placed his *Allolobophora hermanni* under the same heading. I have found the latter at Cambridge, and the true *Helodrilus oculatus* at Malvern, while Mr. Evans has found it in Scotland. At present I regard the two species as distinct, but the Hague form seems to countenance Michaelsen's view. I hope shortly to obtain further material from different localities with a view of the solution of the problem. I am greatly indebted to Dr. de Visser Smits of the Hague, for much valuable assistance in my pursuit, which is undertaken by the aid of a Government Grant for special research.

THE AQUATIC COLEOPTERA OF THE ISLE OF MAN, WITH SOME REMARKS ON THE ORIGIN OF THE FAUNA.

FRANK BALFOUR BROWNE, M.A.(OXON.), F.R.S.E., F.Z.S.

(Continued from page 168).

Ilybius fuliginosus F. Rushen ('Kentraugh Wood') (Bailey); Andreas; Ballaugh; Jurby; Lezayre; Patrick.

I. subæneus Er. Jurby (one specimen).

I. ater De G. Andreas; Ballaugh; Jurby; Lezayre; Patrick.

I. obscurus Marsh. Andreas; Ballaugh; Jurby; Lezayre.

I. ænescens Thoms. Patrick (Foxdale, common in one pool).

Copelatus agilis F. Andreas (one); Ballaugh (common in one locality).

Rhantus bistriatus Bergstr. Ballaugh; Lezayre; Patrick (Foxdale).

Colymbetes fuscus L. Bride (Point of Ayre) (Bailey); Andreas; Ballaugh; Jurby.

Dytiscus punctulatus F. Arbory; Rushen (Bradda and Kentraugh) (Bailey); Andreas; Ballaugh; German; Jurby; Lezayre.

D. marginalis L. Rushen (Bradda two ♀) (Bailey); Patrick (Foxdale ♂ and ♀). My visit was at a bad time for the imago of this species; I saw a fair number of well-grown larvæ.

Gyrinus minutus F. Patrick (Foxdale, common in one pool).

G. urinator Ill. 'K. 2, vii., 1908' (Kentraugh?), one specimen (Bailey); Jurby (one specimen).

G. elongatus Aubé. Andreas; Ballaugh; Jurby; Patrick.

G. natator Scop. Arbory, Mallew and Rushen (Bailey); Andreas; German; Jurby; Lezayre; Patrick.

G. marinus Gyll. Ballaugh (The Curragh) (Bailey); Andreas; Ballaugh; Lezayre.

Orectochilus villosus Mull. Mallew (Silverdale); Rushen (Colby Glen and Kentraugh) (Bailey); Ballaugh (stream in glen); Lezayre (Sulby River, etc.).

Hydrobius fuscipes L. Andreas; Ballaugh, not common!

H. fuscipes var. *picicrus* Thoms. Mallew (S. Barrule); Rushen (Bradda and Kentraugh) (Bailey); Ballaugh; German; Lezayre.

Philhydrus melanocephalus Ol. Mallew (S. Barrule); Rushen (Bradda and Mull Hill) (Bailey); Andreas; Jurby.

P. coarctatus Gredl. Ballaugh (The Curragh) (Bailey); Andreas; Ballaugh; Jurby; Lezayre.

Cymbiodyta ovalis Thoms. Ballaugh (two specimens).

Paracymus nigroæneus Sahlb. Rushen (Bradda, one specimen) (Bailey).

Anacæna globulus Payk. Rushen (Mull Hill, Surby and Bradda); Santon and Spaldrich (?) (Bailey); Ballaugh; German; Jurby; Lezayre; Mallew; Patrick.

A. limbata F. Ballaugh (Curragh) (Bailey); Ballaugh; Jurby; Lezayre.

A. limbata var. *ovata* (brown specimens of *limbata*!) Andreas; Ballaugh; Jurby; Lezayre.

Helochares punctatus Sharp. Ballaugh, only locality, but very common.

Laccobius nigriceps Thoms. Rushen ('K' Kentraugh?) (Bailey). Two other specimens in the collection without locality.

L. ytenensis Sharp [*sinuatus*, Brit. Auct.]. Rushen (Mull Hill) (Bailey), one other specimen in the collection without locality. German (one ♂).

L. alutaceus Thom. Ballaugh (Curragh) (Bailey); Andreas; Ballaugh; Jurby; Lezayre.

L. minutus L. Jurby (one or two specimens only).

L. bipunctatus F. Andreas; Jurby.

Berosus affinis Brullé. Andreas (in one pond only, but common).

Limnebius truncatellus Thunb. Arbory; Mallew; Rushen; Santon (Bailey); Andreas; Ballaugh; German; Jurby; Lezayre; Patrick.

Chætarthria seminulum Herbst. Ballaugh (Curragh); Rushen (Mull Hill); (Bailey); Jurby; Lezayre.

Helophorus porculus Bedel. Rushen (Croitecaley, Port Erin and Surby) (Bailey).

H. nubilus F. Rushen (Ballygawne, Bradda and Port Erin) (Bailey).

H. aquaticus L. Arbory; Bride; Mallew; Rushen (Bailey); Andreas; Ballaugh; German; Jurby; Lezayre. Almost all the specimens were of the small form (*æqualis*) between which and the type I can find no distinction except in size.

H. viridicollis Steph. (*æneipennis* Thoms). Mallew; Rushen (Bailey); Andreas; Ballaugh; German; Jurby; Lezayre; Patrick.

H. affinis Marsh (*griseus* Herbst.) Andreas; Jurby.

H. brevipalpis Bedel. Mallew; Rushen (Bailey); Andreas; Ballaugh; German; Jurby; Lezayre; Michael; Patrick.

Hydrochus angustatus Germ. Ballaugh; Lezayre.

Octhebius pygmæus F. Andreas; Jurby; Lezayre.

O. bicolon Germ. Rushen (Ballakeigan, Colby Glen, Perwick) (Bailey); Lezayre (Sulby R., one specimen).

O. lejolisii Rey and Muls. German (Peel); Mallew (Castleton).

Hydræna testacea Curt. Lezayre (Sulby R.).

H. riparia Kug. Andreas; Lezayre.

H. nigrita Germ. Arbory (Balladoole) (Bailey); Lezayre (Sulby R., two or three specimens).

H. gracilis Germ. Mallew (Silverburn); Rushen (Colby Glen and Kentraugh) (Bailey); Ballaugh (in the glen); German (R. Neb); Lezayre (Sulby R., etc.); Santon.

H. atricapilla Wat. Rushen or Arbory? (Colby Glen), one specimen (Bailey).

H. britteni Joy Arbory (Balladoole) (Bailey).

Cyclonotum orbiculare F. Rushen (Gramma, Port Erin) (Bailey).

The great majority of the Manx Water Beetles belong to the group which Watson termed 'British,' consisting of species which are spread more or less generally over the whole of Great Britain, and also Ireland! But there are a certain number of the Manx species which are decidedly localised in the British Islands. Some belong to a group which has its headquarters in the south and west of Britain, a group which, for the most part, turns up again in the south and west of Ireland. To this group which, by some, is regarded as probably the oldest part of the British fauna and Flora* belong such species as:—

Bidessus minutissimus.

Gyrinus urinator.

O thebius lejolisii.

B. minutissimus is so far only recorded from Devon S., Wigtown and Kirkeudbright, Kerry S., Cork Mid (of Praeger) and Dublin, but, as I have already remarked, it almost certainly occurs in suitable rivers in the west of England, and perhaps, also all round Ireland.

G. urinator occurs in Devon N. and S., Hereford, Somerset N., Dorset, and Sussex E. In Ireland it has occurred in Kerry S., and Cork W. (of Praeger) and I have a single specimen from Toome bridge (Co. Antrim), taken by Mr. R. Welch two years ago. There are English records for Yorks. N.E., and Durham, but the centre for the species in Britain is distinctly south-western.

O. lejolisii is now known from various places, ranging from the Isle of Wight round the western coast to the North Ebudes, † and almost certainly occurs all round Ireland, though the

* Vide Forbes, E., *The Geological Relations of the Fauna and Flora of the British Islands*, etc. 'Mem. Geol. Survey,' Vol. I., 1846; also Scharff, Carpenter, etc.

† *The Aquatic Coleoptera of the North Ebudes*, 'Ann. Scott. Nat. Hist.', 1911.

present records are only for the northern half, *i.e.*, for most of the coast counties from Dublin to Mayo W.

Paracymus nigro-æneus which is represented in Dr. Bailey's collection by a single specimen, probably also belongs to this group. Its English distribution is southern and western, although it extends along the south coast eastward as far as Kent.* In Ireland it is decidedly western, the only records being for Kerry S., Galway W., and Mayo W., and in Scotland, also, it is at present only known from Argyll Main, Mid. Ebudes, and North Ebudes.

Several other Manx species have a distribution which in Britain is chiefly southern and eastern, but in Ireland is southern and western:—*Copelatus agilis*, for instance, has its 'centre' in the south-eastern counties of England, spreading northward as far as Yorks. N.E. and Mid W. and westward to Lancs. S., Chester, Salop, Glamorgan, Devon S., and Cornwall (E. or W.?) The only Scottish record is for Dumfries. In Ireland it has been taken in Wexford, Cork Mid (of Praeger), and Galway W.

Similarly *Helochares punctatus* is chiefly eastern and south-eastern in England, though there are records for Devon N., and Cornwall W., Chester and Derby, Yorks. Mid. W., and Cumberland. In Scotland Dr. Sharp records it from Moncrieff Hill (Perth Mid),† and it is not uncommon in the Solway district. One specimen has also been taken in Midlothian. In Ireland the records are for Cork W. (of Praeger), Galway W., and Mayo W.

Cymbiodyta ovalis, on the other hand, with an English distribution somewhat similar to that of *C. agilis*, is recorded in Ireland, from Meath and Cork Mid. (of Praeger), having therefore what might perhaps be called a south-eastern range there.

A few of the Manx species belong to Watson's 'Scottish' and 'Highland' types, *e.g.*, *Hydroporus morio*, *H. melanarius*, *H. obsolctus*, etc., but with the possible exception of *Ilybius subæneus* there are, apparently, none of his 'Germanic' type species in the Manx fauna. This is an interesting fact as it is in agreement with what has been observed in other groups of the fauna and in the flora.

Some interesting points are brought to light by comparing the water-beetle fauna with that of the surrounding districts of England, Scotland, and Ireland. The nearest point of England to the island is St. Bee's Head, Cumberland, which is about thirty miles distant. Burrow Head, Wigtownshire, is only sixteen miles, the Mull of Galloway being rather more distant, while the county Down coast is about thirty miles away.

* The record for Essex N., refers to *P. æneus*, vide 'E. M. M.', xxxv., 72, 1899, and 'Ent. Rec.', xix., 254, 1907.

† Col. of Scotland, 'Scottish Naturalist', 1871-8.

The Manx list contains eleven species not found in the Lancashire list, and fourteen species absent from the Cumberland list. If, however, we combine the Lancashire and Cumberland lists, giving a total of about one hundred and forty-four species, only seven species remain peculiar to the Isle of Man:—

<i>Bidessus minutissimus.</i>	|	<i>Helophorus porculus.</i>
<i>Ilybius subæneus.</i>	|	<i>Hydræna testacea.</i>
<i>Gyrinus urinator.</i>	|	<i>Octhebius lejolisii.</i>
<i>Paracymus nigroæneus.</i>	|	

Compared with the 'Solway' list which has about one hundred and twenty species there are nine species which are peculiar to the Isle of Man:—

<i>Noterus sparsus.</i>	|	<i>Cymbiodyta ovalis.</i>
<i>Deronectes latus.</i>	|	<i>Paracymus nigroæneus.</i>
<i>Ilybius subæneus.</i>	|	<i>Berosus affinis.</i>
<i>Gyrinus urinator.</i>	|	<i>Helophorus affinis.</i>
" <i>marinus.</i>	|	

As against the combined lists of Antrim and Down, containing about one hundred and seven species, the Manx list has thirteen peculiar species:—

<i>Bidessus minutissimus.</i>	|	<i>Helochares punctatus.</i>
<i>Deronectes latus.</i>	|	<i>Laccobius ytenensis.</i>
<i>Agabus biguttatus.</i>	|	<i>Berosus affinis.</i>
<i>Ilybius subæneus.</i>	|	<i>Hydrochus angustatus.</i>
<i>Copelatus agilis.</i>	|	<i>Hydræna testacea.</i>
<i>Cymbiodyta ovalis.</i>	|	" <i>atricapilla.</i>
<i>Paracymus nigroæneus.</i>	|	

From these three lists there is a slight indication that the Manx water beetles are more like those of North-West England than those of either South-West Scotland or North-East Ireland but an analysis of the lists will bring out this fact much more clearly.

First of all with regard to *Ilybius subæneus*, which appears in all three lists, we might probably regard the specimen as a stray one, and the record as belonging to the 'ectopic' ones to which I referred in a previous paper,* and we can therefore neglect it in discussing the lists. With regard to the list of species peculiar to the Isle of Man as compared with the north-west of England, five of the species are found both north and south of that district, so that their absence from that list is probably only a temporary one. One species only, therefore, is of importance as indicating a difference between the faunas of these two districts, *i.e.*, *G. urinator*, a southern species, present in the Isle of Man, and not found in the north-west of England. I have already pointed out that there are records for Yorks. N.E., and Durham, but that these are beyond the normal British range of the species.

* Aquatic Coleoptera of the Mid-Ebudes, 'Ann. Scott. Nat. Hist.', April, 1910.

The Manx list of species which are not found in the Solway list includes four species whose distribution does not reach Scotland, viz., *N. sparsus*, *G. urinator*, *C. ovalis*, and *B. affinis*. The other four species have all been found farther north, so that we may regard their absence from the Solway list as perhaps temporary.

The difference between the Manx fauna and that of N. E. Ireland is even greater than that between it and the Solway list, as four of the species in the third list have not occurred anywhere in Ireland and eight others have only been taken in the south or west. Of the remaining two, *A. biguttatus* has occurred only once., i.e., in Armagh, while *H. atricapilla* is a great rarity, having only been recorded from Derry, Armagh, and Cork, E.

The relationship of the Manx water beetle fauna is therefore much closer with N.W. England, than with either S. W. Scotland, or N.E. Ireland, and if present distribution is any indication of origin this fact is of considerable importance.

Unfortunately I have no list of species for Anglesey, and my lists for North Wales are much too scanty to be of any use, but, as I shall endeavour to show later, there are good reasons for doubting whether the Manx fauna came from this quarter.

I have already quoted Dr. Bailey's opinion that the Manx fauna has in part originated from Ireland. Professor Carpenter also adopts this attitude. He says*: 'The fauna of the Isle of Man resembles on the whole that of Ireland, western England and Wales. Its cliffs form the most northern station for certain species of moths, e.g., *Dianthecia luteago*, var. *barrettii*, *D. cæsia* and *D. capsophila*, some of which are scattered along the western British and eastern and southern Irish coasts as far as Land's End and Dingle Bay. If the Isle of Man could not have supported any fauna during the height of the glacial period, we are forced to the conclusion that its shores must, since then, have formed part of the northern coasts of a gulf opening to the south, down to St. George's channel.'

Both these authors, therefore, hypothecate a land-bridge connecting the Isle of Man with Ireland, as well as one connecting it with N.W. England, and both believe that these bridges supplied the fauna and flora to the island after the glacial period.

Now the chief resemblance between the Manx and Irish faunas seems to be that both lack a number of species found in Britain, species belonging to what has been called the 'Siberian' or 'Germanic' type, and such a resemblance does not require the assumption of a land-bridge. Indeed Dr. Scharff† makes

* The Problems of the British Fauna, 'Nat. Science', xi., 1897, pp. 375-386.

† History of the European Fauna, 1899, p. 123.

no suggestion of such a post glacial land-connection, but says: 'The case of the Isle of Man . . . can be met, I think, by the supposition that it was connected with Cumberland until quite recently, and quite independently of any connection between England and Ireland; that the Isle of Man, in fact, was always a cape or peninsula of the mainland, and only recently became separated by local subsidences or by the action of the sea.'

Now there seems to be no doubt that the Isle of Man was completely ice-bound during the glacial period. Ice-scratchings are found at the tops of the highest mountains, and a great glacier drove down upon the high ground from the north, depositing quantities of boulder clay at the north end of the island, and forming what is now the low northern plain. The problem of how the island obtained its fauna and flora, therefore, commences with the disappearance of the ice.

Geologists differ widely as to whether there has been any post glacial land-connection between the island and England, and their conclusions are reviewed by Dr. Scharff in the work already referred to. Dr. Dwerryhouse, who has specially studied the glacial period, tells me that there is no geological evidence of such land-connection, though it is possible that a boulder-clay bridge may have existed. Judging, however, by the rate of denudation on land since the glacial period, it seems doubtful whether sufficient time has elapsed to allow of the removal of all traces of such a bridge.

Dr. Scharff argues very strongly as to the necessity for land-connections to account for insular faunas and floras, and allows almost no value to the endless means of dispersal possessed by both animals and plants. Although there is in many cases undoubted evidence that the so-called 'continental' islands have, in past ages, been joined to the neighbouring main lands, I venture to think that the evidence which Dr. Scharff adduces in support of his line of argument is beside the mark. He makes such points as the following: 'The animals die shortly after their arrival on foreign soil' [l.c., p. 24]. 'Attempts to acclimatise the English species [of hare] have been made in a number of places in Ireland, but many of them have been failures, and not one has been a signal success' [l. c., p. 29]. 'The two species of snails, *Helix pomatia* and *Cyclostoma elegans* both of which occur in England . . . were turned out in several suitable localities in Ireland by Thompson, but failed to establish themselves' [l.c., 4. 32]. He quotes many similar cases and his attitude towards the question is seen in the following sentence: 'When we once more carefully review the evidence as to the undoubted difficulty attendant on intentional introduction of animals by human agency, placed as they often are in most suitable localities, we must feel that accidental introduction cannot play an important rôle in the making of the fauna of any country' [l.c., p. 32].

I have quoted only from one work but similar examples of Dr. Scharff's evidence occur again and again in his books and papers, and in every case they refer to the attempted acclimatisation of new species *in a country already fully stocked*, and it seems to me that not only is this the important fact which keeps out invaders, but that it is upon the competition between species, the biological factor, that we rely when we recognise in the northern, southern, and eastern groups of the Britannic fauna and flora elements which reached the country at different times: it is largely owing to this factor that we find a localisation of species within a country. For example, various groups of plants are recognised according to the habitat they occupy; there are some which occur on peaty soil, others in salt marshes, others again on mountains, and so on, yet most of the species from these very different habitats can be grown side by side in ordinary garden soil. Competition drives them, under natural conditions, each to that kind of environment where alone it can hold its own against invaders, to that kind of environment where climatic and edaphic factors may not be the most suitable to it, but are more suitable to it than to its competitors.

Numerous examples can be brought forward to show that the relationship of a species to its physical environment is controlled by its biological environment. For instance, we describe certain plants as calcicolous, and others as non-calcicolous, according as they naturally live upon soil rich or poor in lime, yet only those plants to which lime is a poison are permanently excluded from it.* Praeger † notes several cases in which non-calcicolous plants occur on limestone, and calcicolous species on other rocks. Warming ‡ mentions that 'Alders attain their most luxuriant development on well drained soil. But they are usually expelled from this by other competing trees. Only in swamps where they do not thrive so well, are they dominant. In like manner *Calluna vulgaris* flourishes upon rich soil better than on poor soil, but it is excluded from the former by competing species,' etc., etc. (pp. 367-8).

Mr. A. W. Stelfox tells me that certain land mollusca may be calcicoles in one place, and calciphobes, or indifferent in another. He mentions that *Helix arbustorum*, which is practically confined to limestone in the north of Ireland is quite indifferent in Britain, being common from the south of England to the north of Scotland, while '*Helix lapicida* is generally looked upon in England as calciole, but it occurs in Norway in purely precambrian areas.' Mr. Davy Dean in a paper on the

* Schimper, 'Plant Geography,' Eng. Transl., p. 100, 1903.

† 'A Tourist's Flora of the west of Ireland,' pp. 12 and 108, Dublin, 1909.

‡ 'Ecology of Plants,' Eng. Transl., Oxford, 1909.

'Ecology of the Mollusca of Lonsdale,' mentions *Unio margaritifer* and *Neritina fluviatilis* as associated species, while in Ireland, Mr. Stelfox tells me, the former is entirely calcifuge and the latter purely calciole.

Among the water beetles there are similar examples—*Helochares punctatus* is chiefly a fresh-water marsh species in East Norfolk, while in the Isle of Man, south west of Scotland, and the west of Ireland, it is purely oxylophile. The same is true of *Hydroporus granularis* and *Philhydrus nigricans*, which are helophiles in E. Norfolk, and oxylophiles in the Solway district, and I have already referred to the case of *Ilybius subæneus*.

These facts all illustrate the control exercised by the biological factor, and Dr. Scharff's cases of the failures of invading or introduced species to establish themselves, are only further examples of the same thing.

In these remarks I have criticised Dr. Scharff's *evidence*, and not his contention as to the necessity for land-connections to account for insular faunas and floras. Whether there is a case for proving a general principle I am not at present in a position to judge, but it seems to me that some other kind of evidence than that which he has brought forward is necessary. In the case of the Isle of Man, geologists can give us no definite assistance, but the fact that the flora, as I learn from Mr. Praeger, the land and fresh-water mollusca—I am told, and the water beetles, as I have endeavoured to show, are more closely related to those groups in the north west of England than to those in S.W. Scotland or N.E. Ireland, seems to provide us with evidence of another kind.

If on the disappearance of the ice-age, the Isle of Man was an island, then, being virgin soil, it was open to attack from all directions. Now under such circumstances the prevalence of westerly winds would undoubtedly have favoured species coming from Ireland. The ocean currents also would have brought Irish species, and would have kept out English ones. Dr. Dakin has kindly supplied me with details of tides and currents in the Irish Sea, and there is, apart from the tides, a general drift from south to north, so that bottles thrown from steamers leaving Liverpool always appear on the coasts of Lancashire or Cumberland, and shingle also tends to move northward. The best proof of this northerly drift is afforded by detailed observations on salinities and temperatures, which show that a current of warm and more saline water passes northward as far as the Isle of Man, and then the bulk of this current turns eastward so that there is no great drift between the Isle of Man and Ireland. The south tidal current runs up St. George's Channel, and bends round Anglesey, turning east into Liverpool Bay. The north tidal current sweeps down the north channel, divides at the point of Ayre into two, a larger part

running between the Isle of Man and Cumberland, and meeting the south tide in a line between Morecambe Bay and Maughold Head.

Thus the main bulk of the flora of the land and fresh-water mollusca, and of the water beetles, and probably of the other groups, has reached the Isle of Man in spite of adverse winds and currents, and this fact is at least suggestive that they covered the intervening region by spreading along a land-bridge which has since completely disappeared.

With regard to the southern element in the fauna and flora Dr. Scharff apparently thinks that it was present in the north of England even during the ice-age, in which case of course it would have travelled with the main fauna and flora to the Isle of Man. On the other hand there seem to be strong objections to Dr. Scharff's views on the distribution of the fauna and flora in England and Scotland during the glacial period, and it is, perhaps, reasonable to entertain the possibility of the species of this group having taken advantage of wind and tide, and having reached the island from the south and west.

Considering the extraordinary multiplicity of contrivances for dispersal possessed by so many animals and plants it seems to me unsafe to assume land-bridges to account for insular faunas and floras unless definite geological evidence is forthcoming, or unless the biological facts point to this method as the only possible explanation.

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RECENTLY DISCOVERED FUNGI IN YORKSHIRE.

C. CROSSLAND,
Halifax.

THE following is the fourth summary of additions made to known Yorkshire Fungi since 1905. With two or three exceptions, these have been discovered during 1909-10. Nearly all have been temporarily recorded in 'The Naturalist,' under the reports of the two annual forays, and the general excursions; it is, however, thought advisable to bring them together in one article. Under each one the date of its first mention in 'The Naturalist,' and the number it should follow, or precede in the 'Yorkshire Fungus Flora,' is given. They consist of two new to science, ten and one var. new to Britain, and fifty-six and three vars. new to the county. These bring the total number of known Yorkshire species to 2831, or an addition of 205 during the last five years.

Confirmations of a doubtful and a solitary record are added.

NEW SPECIES.

CLAVARIA PERSIMILIS Cotton.

N.E.—Mulgrave Woods F.F., 1908 and 1910.

Plants small, unbranched, isolated or fasciculate, orange yellow to orange, becoming darker on drying. Clubs slender, 3-5 cm. high, 2-3 mm. thick, cylindrical or somewhat compressed, apex usually acute. Stem not sharply defined. Flesh pale. Internal structure composed of loosely-packed, longitudinally-running filaments, 3-6 μ diam., not pseudo-parenchymatous in transverse section. Basidia small, 30-35 \times 7-8 μ , contents granular, sterigmata 4, erect. Spores hyaline, smooth, guttulate, subglobose-oblong, 5-6 \times 4 μ , with a conspicuous oblique apiculus. (A. D. Cotton, 'Trans. Brit. Myc. Soc.', Vol. III., Part 3, pp. 182-3).

Hab. In short grass, not uncommon.

Has been found in several places in Britain by various mycologists during the last five years, including Mulgrave Woods, at the 1908 and 1910 forays. Specimens from the several localities were submitted to Mr. Cotton, who considered it an undescribed species. [To follow No. 1232].

CLAVARIA STRAMINEA Cotton.

S.W.—On the ground among ling, Erringden, near Halifax, October 1905.

Plants small, unbranched, isolated or cæspitose, straw colour becoming brownish with age; smell and taste not marked; clubs slender, brittle, 3-5 cm. high, 3-4 mm. thick, cylindrical or somewhat compressed, smooth, apex usually acute; stem usually very distinct, cinnamon-yellow; flesh somewhat darker than

hymenium ; internal structure pseudo-parenchymatous in transverse section ; basidia rather large, $40-60 \times 7-9 \mu$, contents granular sterigmata 4 ; spores hyaline, smooth, granular, globose $5-7 \mu$ diam.' (A. D. Cotton, 'Trans. Brit. Myc. Soc.', Vol. III., part 4).

Since being found near Halifax, it has been met with at Carlisle, 1908-9 ; Chatsworth, 1909 ; Broseley, Salop, 1909 ; and Clare Island, 1910. [To follow 1233].

NEW TO BRITAIN.

The descriptions given under the following six agarics are from Masee's 'Eur. Agaricaceae.'

OMPHALIA BIBULA Quel.

N.E.—Mulgrave Woods. (F.F., 1910, 'Nat.', 1911, p. 22).

'*Pileus umbilicate when moist, silky, olive yellow, then grey ; gills arcuate, broad, citron, stem tinged citron.*' [To follow No. 282].

Pluteus cervinus Var. RIGENS Pers.

N.E.—Castle Howard. (F.F., 1909, 'Nat.', 1909, p. 419).

CLITOPILUS ANGUSTUS (Pers.).

N.E.—Mulgrave Woods. (F.F., 1910, 'Nat.', 1911, p. 21).

'*Pileus convexo-plane, subumbonate, grey, silky-shining when dry ; gills tinged flesh colour ; stem glabrous, white, base incurved, downy ; spores $7-8 \times 5 \mu$.*' [To follow 263].

INOCYBE COOKEI Bresad.

N.E.—Mulgrave Woods. (F.F., 1910, 'Nat.', 1911, p. 22).

'*Pileus conico-campanulate, expanded, umbonate, edge becoming upturned and split, fibrillose and silky rimose, centre glabrous, straw-colour, then lurid yellowish ; gills crowded, attenuato-adnexed, greyish white, then yellowish cinnamon ; stem colour of pileus, silky fibrillose, base marginately subbulbous, apex naked ; spores $8-10 \times 5 \mu$; smooth, cystidia absent.*' [To follow 436].

HYPHOLOMA MELANTINUM Fr.

N.E.—Mulgrave Woods. (F.F., 1910, 'Nat.', 1911, p. 22).

'*Pileus campanulate, then expanded, umber then pale, variegated with black innate pilose squamules ; gills adnexed, ventricose, pale umber ; stem fistulose, pallid, fibrillosely hispid ; spores $6-7 \times 3-4 \mu$.*' [To follow 662].

LACTARIUS TABIDUS Fr.

N.E.—Mulgrave Woods. (F.F., 1910, 'Nat.', 1911, p. 22).

'*Pileus submembranaceus, acutely umbonate, reddish then pale, edge striate when moist ; stem subfistulose, pallid ; gills flaccid, pallid ; spores $8 \times 4-5 \mu$.*' [To precede 850].

MARASMIUS XEROTOIDES.

N.E.—Mulgrave Woods. (F.F., 1910, 'Nat.', 1911, p. 22).
'*Pileus umbilicate, umber, striate; gills broadly adnate, becoming greyish; stem velvety, base thickened, strigose.*' [To follow 930].

ACREMONIUM SPICATUM Bon.

Mid. W.—Developed at Wakefield (S.W.) on sub-cultures of material obtained from Ilkley, April 1910, by J. W. H. Johnson, and submitted to Miss A. Lorrain Smith, who describes it in the 'Trans. Brit. Myc. Soc.', Vol. III., part 4, as follows:—

'*Hyphae creeping, sparingly septate, conidia borne on short lateral branches arising singly from the hyphae or grouped near the apex of a filament, globose, often with a distinct outer wall, colourless, 10-12 μ diameter.*' [To follow 2325].

SPOROTRICHUM LANATUM Wallr. 'Fl. Kr. Germ.', II., p. 276

S.W.—On sill of settling tank, dye-purification works, Greetland, near Halifax. Coll., J. W. H. Johnson, B.Sc., Thornhill.

'Tufts cushion-shape, soft, elastic, of loosely interwoven branched hyphae; conidia globose, whitish, at length falling off . . . No measurements are given in any description of the species, but in the specimen from Yorkshire the woolly look is very characteristic, the spores are very abundant, and are borne on short sterigma, often in groups, near the tips of the branches. They measure up to 5 μ diameter. The original substratum was decaying goose-feathers in Germany; it has also been found on paper in Holland.' (A. Lorrain Smith, 'Trans. Brit. Myc. Soc.', 1910, p. 223). [To follow 2330].

ACREMONIELLA ATRA Sacc.

N.E.—On moss and dead leaves, Castle Howard. (F.F., 1909, 'Nat.', 1909, p. 419). [To precede 2387].

CERCOSPORA CALENDULA Sacc.

N.E.—On cultivated marigolds in the Inn garden, Welburn, Castle Howard. (F.F., 1909, 'Nat.', 1909, p. 419). [To follow 2417].

NEW TO YORKSHIRE.

Scleroderma vulgare Var. *LAEVIGATUM* Fckl.

N.E.—Castle Howard. (F.F., 1909, 'Nat.', 1909, p. 419).

LEPIOTA VITTADINII Fr.

S.W.—Battysford, Mirfield, August 1909, F. Buckley, Certe A. Clarke. [To follow 67].

TRICHOLOMA ARGYRACEUM (Bull.) Fr.

N.E.—Castle Howard. (F.F., 1909, 'Nat.', 1909, p. 419). This was also found at Mulgrave the year following. [To follow 107].

T. terreum Var. *ATROSQUAMOSUM* Mass.

N.E.—Mulgrave Woods. (F.F., 1910, 'Nat.', 1911, p. 24).

CLITOCYBE RIVULOSA (Pers.) Fr.

N.E.—Among grass near the Carrmire-gate, Castle Howard.
'Nat.', 1909, p. 419. [To follow 143].

C. SPLENDENS (Pers.).

N.E.—Mulgrave Woods. (F.F., 1910, 'Nat.', 1911, p. 24).
[To follow 158].

Collybia tenacella Var. *STOLONIFERA* (Jungh.) Fr.

N.E.—Mulgrave Woods. (F.F., 1910, 'Nat.', 1911, p. 24).

COLLYBIA TYLICOLOR Fr.

N.E.—Castle Howard. (F.F., 1909, 'Nat.', 1909, p. 419).
Also at Mulgrave Woods in 1910. [To follow 207].

PHOLIOTA SPHALEROMORPHA (Bull.) Fr.

N.E.—Mulgrave Woods. (F.F., 1910, 'Nat.', 1911, p. 24).
[To follow 400].

FLAMMULA NITENS Cke. and Mass.

N.E.—Seamer Carr, Scarbro', date? Previously overlooked. [To follow 467].

Naucoria sobria Var. *DISPERSA* (Pers.) Fr.

N.E.—On bare soil under hedge near Gillamoor, Kirby Moorside Exc. *'Nat.', 1910, pp. 405-6.

CREPIDOTUS CALOLEPIS Fr.

N.E.—Mulgrave Woods. (F.F., 1910, 'Nat.', 1911, p. 24).
[To follow 524].

BOLBITIUS BOLTONI Fr.

N.E.—Among dung and rotting leaves, Mulgrave Woods. (F.F., 1908, 'Nat.', 1909, p. 24). Some uncertainty has been expressed as to whether this was a native of Britain. It is quite distinct from *B. flavidus* (Bolton) Fr. in the depressed, darker disc, and subadnate gills. [To follow 529].

CORTINARIUS (Tela.) *QUADRICOLOR* (Scop.) Fr.

N.E.—Mulgrave Woods. F.F., 1910, 'Nat.', 1911, p. 24).
[To follow 592].

CORTINARIUS (Hygr.) *REEDII* Berk.

N.E.—Mulgrave Woods. (F.F., 1910, 'Nat.', 1911, p. 24).
[To follow 620].

AGARICUS XANTHODERMUS Genev.

N.E.—Castle Howard. (F.F., 1909 'Nat.', 1909, p. 419).
Also at Mulgrave F.F., 1910, 'Nat.', 1911, p. 24). [To follow 632].

HYPHOLOMA CASCUM Quel.

N.E.—Manor Dale, Kirby Moorside Exc. ('Nat.', 1910, p. 406). [To precede 663].

PSILOCYBE CATERVATA Mass.

N.E.—Castle Howard. (F.F., 1909, 'Nat.', 1909, p. 419).
[To follow 696].

COPRINUS MACROCEPHALUS Berk.

N.E.—Castle Howard. (F.F., 1909, 'Nat.', 1909, p. 419);
Kirby Moorside Exc., 'Nat.', 1910, p. 406). [To follow 741].

PAXILLUS LIVIDUS Cke.

N.E.—Mulgrave Woods. (F.F., 1910, 'Nat.', 1911, p. 24).
[To follow 758].

HYGROPHORUS (Cam.) *LEPORINUS* Fr.

N.E.—Scarboro'. Brought to the Castle Howard F.F., 1909
by Mr. A. Peck, 'Nat.', 1909, p. 419. [To precede 774].

H. (Cam.) *CLIVALIS* Fr.

N.E.—Mulgrave Woods. (F.F., 1910, 'Nat.', 1911, p. 24).
[To follow 778].

H. (Cam.) *IRRIGATUS* (Pers.) Fr.

N.E.—Mulgrave Woods. (F.F., 1910, 'Nat.', 1911, p. 24).
[To follow 784].

LACTARIUS (Piper) *ZONARIUS* (Bull.) Fr.

N.E.—Mulgrave Woods. (F.F., 1910, 'Nat.', 1911, p. 24).
[To follow 811].

MARASMIUS SCORTEUS Fr.

N.E.—Mulgrave Woods. (F.F., 1910, 'Nat.', 1911, p. 25).
[To follow 919].

M. IMPUDICUS Fr.

N.E.—Castle Howard. (F.F., 1909, 'Nat.', 1909, p. 419).
[To follow 924].

M. COHAERENS (A. and S.) Fr. (= *Mycena cohaerens* Fr.).

N.E.—Castle Howard. (F.F., 1909, 'Nat.', 1909, p. 419).
[To precede 935].

Boletus luridus Var. *ERYTHROPUS* (Pers.) Fr.

S.W.—Luddenden Dean, near Halifax, 'Nat.', Sep. 1892;
'Flo. Halifax,' p. 265. Accidentally omitted when the 'Yorks.
Fungus Flora' was being compiled. In Dr. M. C. Cooke's
recently published 'Catalogue and Field Book of British
Basidiomycetes,' this is registered as a species.

POLYPORUS CEREBRINUS B. and Br.

N.E.—Castle Howard. (F.F., 1909, 'Nat.', 1909, p. 419).
[To follow 1035].

MERULIUS RUFUS Pers.

N.E.—Kirby Moorside Exc. ('Nat.', 1910, p. 406). [To
follow 1100].

HYDNUM MOLLUSCUM Fr.
N.E.—Kirby Moorside. ('Nat.', 1910, p. 406). [To follow 1113].

CORTICIUM VIOLACEOLIVIDUM (Somn.) Fr.
Mid. W.—On fallen branch, Bishop's Wood, near Selby, ('Nat.', 1909, p. 320). [To follow 1169].

PENIOPHORA PUBERA (Fr.) Sacc.
Mid. W.—On dead branches, Stainer Wood, near Selby. ('Nat.', 1909, p. 320). [To follow 1184].

CYPHELLA FULVA, B. and Br.
N.E.—Mulgrave. (F.F., 1910, 'Nat.', 1911, p. 25). [To precede 1190].

THELEPHORA CRISTATA Fr.
N.E.—Mulgrave. (F.F., 1910, 'Nat.', 1911, p. 25). [To follow 1200].

ALDRIGEA GELATINOSA Mass. 'Brit. Fung. Flo.', Vol. I., p. 103 (= *Coniophora gelatinosa* W. G. Smith, Brit. Basidiomycetes).

S.W.—On soil in pans of seedling Lobelias, in greenhouse, People's Park, Halifax, May 1910, H. Lawson, Head Gardener. [To follow 1205].

CLAVARIA STRICTA Pers.
N.E.—Castle Howard. (F.F., 1909, 'Nat.', 1909, p. 421. Entered in error in the list as being new only to V. County). [To follow 1227].

C. LUTEOALBA Rea.
Mid. W.—Mossy Bank, Grassington, 1907. ('Tr. B. M. S., 1908, for season 1907, p. 31. A. D. Cotton). [To follow 1230].

C. FISTULOSA Holmsk.
N.E.—Mulgrave. (F.F., 1910, 'Nat.', 1911, p. 25). [To follow 1240].

Mr. A. D. Cotton, who has for some years been making a critical study of British Clavarieae, regards *C. fistulosa* Holmsk and *C. ardenia* Sow as synonyms for one and the same species.

HYPOXYLON CRUSTACEUM Ntscke.
N.E.—Mulgrave. (F.F., 1910, 'Nat.', 1911, p. 25). [To follow 1493].

HYPOSPILA PUSTULA (Pers.).
N.E.—Mulgrave Woods. (F.F., 1910, 'Nat.', 1911, p. 25). [To follow 1508].

VALSA SALICIS Fckl. (= *Diaporthe salicella* Sacc).
S.E.—On dead willow-twigs, Osgodby, near Selby. ('Nat.', 1909, p. 320). [To precede 1524].

HEPTAMERIA CONOIDEA Not.
N.E.—Mulgrave Woods, Aug. 1908; again at the 1908 F.F. ('Nat.', 1909, p. 27). [To follow 1644].

In some works this is ranked as a variety of *H. doliolum*; in Cooke's 'Syn. Pyrenomycetum,' it is classed as a species.

THIELAVIA BASICOLA Zoph.

S.W.—The *Torula* stage on young pea-plants, sent to Kew from Doncaster 1908. ('Nat.', 1909, p. 238). [To follow 1689].

ELAPHOMYCES VARIEGATUS Vitt.

N.E.—Whitby. ('Tr. Brit. Myc. Soc.', 1905). [To follow 1698].

CHOIROMYCES MEANDRIFORMIS Vitt.

N.E.—Mulgrave. (F.F., 1910, 'Nat.', 1911, p. 22). [To follow 1700].

HELVELLA ATRA Konig.

N.E.—On the ground in Ray Wood, Castle Howard. (F.F., 1909, 'Nat.', 1909, p. 419). [To precede 1732].

GEOGLOSSUM PECKIANUM Cooke, Mycog., p. 5, fig. 5.

S.W.—Among short grass in field south of the Druid's Altar, near Bingley, Nov. 1910. Thos. Hebden.

The only previous mention of this species having been found in Britain, is in 'Massee's Mon. of the Geoglosseae,' Anns. Bot., Vol. XI., pp. 250-1 (figs 42, 43, pl. XII.), where we read: 'England (a specimen from Sowerby's herbarium at Kew, called *Geoglossum difforme*).'

It has been found at two or three places in the United States, and is recorded from France. The following is an abridged description from Massee's Monograph:—

'Gregarious or tufted, black, viscid, 4-7 cm. high, glabrous, with the exception of the well-defined stem which is minutely squamulose, club narrowly lanceolate, slightly compressed. Ascii narrowly elliptic-fusiform, 180-200 × 18-20μ, pore blue with iodine; spores 8, fasciculate in the ascus, clear brownish-umber, linear-fusoid or subclavate, sometimes slightly curved, 7-septate at first, 15-septate when mature, 115-125 × 6-7μ; paraphyses slender, septate, tips brownish, slightly thickened, variously curved and twisted.'

'Apart from being glabrous, this species is almost indistinguishable from some forms of *Geoglossum hirsutum*.' The Bingley specimens were only very slightly viscid. [To follow 1736].

SPHAEROSPORA CONFUSA (Cke.) Sacc. (= *Lachnea confusa*, 'Phil. Grev.', XVIII., p. 83; *Peziza brunnea*, 'Nyl. Obs.', p. 21)

N.E.—Among moss and humus, Ray Wood, Castle Howard. (F.F., 1909, 'Nat.', 1909, p. 419). [To precede 1854].

HELOTIUM PHYLLOGENON (Rehm.) (= *Phialea* Sacc).

N.E.—On the veins of decaying poplar leaves, Castle Howard. (F.F., 1909, 'Nat.', 1909, p. 419). [To follow 1969].

SEPTORIA ULMI Kze.

N.E.—On *Ulmus* leaves, Castle Howard. (F.F., 1909, 'Nat.', 1909, p. 419).

S. HERACLI Fckl.

N.E.—On *Heracleum*, Castle Howard. (F.F., 1909, 'Nat.', 1909, p. 419). The above two come between Nos. 2258 and 2264.

VERTICILLIUM MARQUANDI Mass. ('Trans. Brit. Myc. Soc.', 1896-7, p. 24).

N.E.—Mulgrave Woods. (F.F., 1910, 'Nat.', 1911, p. 22). [To follow 2345].

A beautiful mould of a clear lilac colour, parasitic on the gills of *Hygrophorus virgineus*. First described by G. Masee from specimens received from Guernsey.

GONYTRICHUM CAESIUM Nees.

S.E.—Escrick, 'Nat.', 1909, p. 320). [To precede 2392].

CHALARA LONGIPES Cke.

N.E.—On decaying bark, Castle Howard. (F.F., 1909, 'Nat.', 1909, p. 419). [To follow 2393].

HORMODENDRON HORDEI Zoph.

N.E.—Castle Howard. (F.F., 1909, 'Nat.', 1909, p. 419). [To follow 2396].

FUMAGO VAGANS Pers.

S.W.—Wakefield, on privet leaves, and on gelatine cultures, 1910. J. W. H. Johnson [To come between 2427 and 2428].

STEMONITES MAXIMA (=S. *splendens* Rost.).

N.E.—Scarboro'. [To follow 2499].

PHYSARUM CONTEXTUM Rost.

N.E.—Scarboro'.

P. DIDERMA Rost.

N.E.—Scarboro'. [Both to precede 2566].

The last three additions were recorded in 'Nat.', 1910, p. 147, by Miss Hibbert-Ware.

CONFIRMATION OF A DOUBTFUL AND A SOLITARY RECORD.

AMANITA STROBILIFORMIS (Vitt.).

N.E.—Castle Howard. (F.F., 1909, 'Nat.', 1909, p. 419).

The two previous records are uncertain, see 'Y.F.Flo.', p. 19.

COPRINUS VOLVACEO-MINIMUS Crossl. ('Nat.', Dec., 1892, p. 372).

This species has again been found, but this time near Derby, October 8th, 1910. It was seen by Thos. Gibbs, growing on paper-works refuse during the Fungus Foray held by the Derby Midland Railway Naturalists' Society. ('Jour. Derbyshire Archeo. and Nat. Hist. Soc.', 1911, p. 200).

YORKSHIRE NATURALISTS' UNION. SECTION FOR VERTEBRATE ZOOLOGY.

ON February 18th two meetings were held at the Institute, Leeds; Mr. W. H. St. Quintin, J.P., F.Z.S., presided at the afternoon meeting, and Professor Patten, M.A., M.D., Sc.D., at the evening meeting.

BEARDED TITS EXPERIMENT AT HORNSEA MERE.—After disposing of the business in connection with the Yorkshire Wild Birds' and Eggs' Protection Acts Committee's arrangements for the coming season, Mr. W. H. St. Quintin outlined the scheme whereby he intended shortly to liberate several pairs of Dutch Bearded Tits, or Reedlings, at Hornsea Mere. These birds had been in his aviaries for some time, and will be under Mr. St. Quintin's personal care and protection for the first few days. The birds (and their eggs, in case they should nest) will be under the close observation of the Yorkshire Naturalist's Union's bird-watcher, and of Mr. Constable's gamekeepers. As this is quite a harmless species, no injury can result from the experiment, which, if successful, will give additional interest to Hornsea Mere.

THE CHOUGH.—Mr. E. W. Wade, M.B.O.U., read an exhaustive paper on the Chough, dealing with its structure, status, habits, nesting economy, and the probable reason of its steady and continual decrease in numbers; illustrated by several good lantern-slides. Some of the slides showing the nests of these birds in cavities of rock cliffs, had been photographed by flash-light. Mr. Wade said the Chough was one of the oldest birds known to man; but beyond doubt, several species, such as Jackdaws, Rooks, etc., were known in those early days by that name; as by the quotations of their habits, and by the quantities of grain that they were stated at times to devour, it was quite plain that the species described could not be identical with our *Pyrhocorax graculus*. Later this species became known as the 'Cornish Chough,' because of its abundance in Cornwall, where now it has unfortunately recently become extinct. Mr. Wade opined that the Chough was dying out simply as an antiquated form, and just as races of men die out. Although the decrease of the Choughs at their nesting haunts was invariably followed by an increase of Jackdaws, yet he did not believe that either the Jackdaw or the Peregrine Falcon had really anything to do with the declining numbers. In the discussion that followed it was stated that the final extermination of the Chough in Cornwall had been hastened by a pair of these birds having been presented to the late Queen Victoria. This occasioned a demand for the birds in Cornwall, £2 and more being freely offered for young birds. Mr. St. Quintin said they were charming pets, but difficult to keep in aviaries, and soon died off. He had found that they thrived best on 'Spratt's Food.' They would not eat any kind of grain, but were especially fond of mealworms, which, however, soon caused them to have fits.

A YORKSHIRE HOOPOE.—Mr. St. Quintin exhibited a Hoopoe that had been shot in mistake after a week's sojourn at Thirkleby in 1896, on January 10th, an unusual date for this species in England. The bird had every appearance of being a wild bird, and not an escape from confinement. At the time of its death it was well nourished, and had been recently feeding.

THE SCAMPSTON AVIARIES.—The same gentleman exhibited eggs of many uncommon and interesting birds, including those of the Great Bustard, Little Bustard, Common and Japanese White-naped Cranes, Willow Grouse, Pink-footed and Bean Geese, Ferruginous Duck, Pine Grosbeak, and Snow Bunting, which had been laid in his aviaries at Scampston.

AMERICAN GREY SQUIRREL IN YORKSHIRE.—Mr. St. Quintin reported that the turning down of about eighteen pairs of the North American Grey Squirrel at Scampston Hall, in June, 1906 (see *The Naturalist*, 1907, p. 37), had not been an unqualified success. For the first two years they

did not appear to breed at all. After that they increased enormously, greatly exceeding the fecundity of the English Squirrel, and they then commenced robbing neighbouring fowl-houses, and last July they commenced stripping the bark off Sycamore trees by gnawing it. Much as he had liked them as charming and confiding little animals, he had been compelled on this account to reduce their number to a few pairs.

CURIOUS SCOTCH RED GROUSE.—Mr. G. Bolam showed an uncommon and beautiful grouse which had been shot in Argyleshire last December. It might be roughly described as 'golden-spangled' all over its body feathers, similar to a Hamburg breed of domestic fowls. Its general build, skeleton, and shape, proclaimed it to be really an interesting sport of the Red Grouse.

LESSER BLACK-BACKED GULLS AT FOULSHAW MOSS.—Mr. Walter Wilson showed a series of charming lantern pictures illustrating his remarks on the Lesser Black-backed Gulls at Foulshaw Moss, in Cumberland. With the aid of a small tent he had been able to secure good photographs of the actions and habits of these gulls at close quarters, during the nesting season, and instanced a rather curious incident whilst thus engaged, viz. : a mother Pheasant and her very young brood passed through the gallery quite unmolested by the gulls. Mr. Wilson passed over the screen a series of slides owned by The Royal Society for the Protection of Birds, showing the sad and gloomy aspect of an Australian Egret nesting colony, after it had been visited by plumage-hunters in the demands of the millinery trade.

BIRDS AT THE FARNES AND BASS ROCK.—Mr. Jasper Atkinson showed a series of lantern-slides dealing with the nesting birds on the Farne Islands, and at the Bass Rock. He also passed round a large series of mounted photographs belonging to the Zoological Photo. Club. These were much appreciated by the members present, for, besides being picked specimens in the art of photography, they illustrated many most interesting birds and mammals, and their habits.

PLUMAGE CHANGES IN THE SANDERLING, ETC.—Professor Patten gave an exhaustive address on the 'Plumage Changes in *Calidris arenaria*, and their Correlation with Sexual Maturity,' being illustrated throughout by lantern-slides of the birds, and by diagrams of the birds' testes, examined from birds secured monthly for the first few years of their lives. His experiments tended to prove that although Sanderlings in their first Spring may assume the nuptial- or breeding-plumage externally, that internally they are juveniles, and that the testes of such males do not increase in size with the approach of the breeding season, as they do in the older and breeding males. In the few experiments he had conducted with Turnstones and Dunlins the results had tended in the same direction; but with the Black-headed Gull it was not until the Spring of the third year, and with the Herring Gull not before the fifth year, that the testes had developed to maturity. In the young Hedge-Sparrow, however, the young male of just under a year old had the testes fully developed as the pairing season advanced.

WEST OF IRELAND ISLAND BIRDS.—Professor Patten shewed skins of several common birds obtained from islands of the west coast of Ireland. A male House-Sparrow was contrasted with a similar bird from Sheffield, in which the former showed not only brighter, but apparently richer coloration. Two female Blackbirds, both obtained the same day and on the same island, offered a great contrast in size, one being but a pigmy compared with the other.

A CURIOUS KITTEN.—Prof. Patten also exhibited a newly-born kitten, which had an unusually sharp, rat-like muzzle and face, and had been born with its eyes open. He considered that these abnormalities had been due to delay in its birth by at the least nine or ten days, and were probably owing to some obstruction.

BIRD-LIFE IN HOLLAND.—Mr. Riley Fortune, F.Z.S., dealt with Bird-

life in Holland, where, during the past summer, he had made a sojourn for the purpose of studying and photographing birds. He pointed out that nearly all the interesting birds which were common on the meers and polders in Holland had formerly nested in similar situations in England, and, except for persecution, they would still be nesting here. He then exhibited a succession of descriptive lantern-slides, showing the nesting areas, and in most cases, the birds and nests, of the following species:—Spoonbill, Purple Heron, Bittern, Marsh Harrier, White Stork, Black Tern, Avocet, Black-tailed Godwit, Ruff, Kentish Plover, Great Reed Warbler, Blue-headed Wagtail, Shoveler, Garganey, etc.

THE NATTERJACK.—He remarked upon the abundance of the Natterjack Toad, showed pictures of several 'in focus' at one time; stating that he considered they differed slightly from British Natterjacks, in having a broader yellow stripe down the back; but he intended to make further observations in the future respecting this matter.

ICELANDIC MEADOW PIPIT.—Mr. Leonard Gaunt exhibited a Meadow Pipit, which he had obtained in Iceland, some years ago. It was of the small lighter form, and appeared to be similar to some that pass through Yorkshire on migration.

WHITE STOAT AT ILKLEY.—Mr. Rosse Butterfield brought a very beautiful white female Stoat or Ermine, taken a month previously at Ilkley, and now in the Keighly Museum. It was entirely white, excepting a small spot behind each eye, and its black-tipped tail, the basal half of which was yellow.

CRYSTAL PALACE CAGE BIRD SHOW.—Mr. H. B. Booth described a visit to the recent Crystal Palace Cage Bird Show, which was quite a lesson in ornithology to a field-naturalist. Besides such freaks as 'talking' canaries and hybrids, there were hundreds of British birds exhibited. They all appeared to be in good plumage and health, and included such unusual cage-birds as the Dartford Warbler, Lesser Spotted Woodpeckers, Tree-Creepers, Goldcrests, and Bearded Reedling, besides several Nightingales, Blackcaps, and Hawfinches.

YELLOW-NECKED MOUSE AND POLECAT.—Mr. Booth showed a Yellow-necked Mouse (*Mus flavicollis*) from Gloucestershire. This exceptionally large, long-tailed species of Wood Mouse was only described by Mr. De Winton in 1894, and has not yet been recorded so far north as Yorkshire. He also exhibited a large male Polecat which had been recently trapped near Aberystwith. In the discussion it was stated that Polecats were still crossed with the domestic Ferret to increase the savageness of the offspring, and that these latter adopted more of the Polecat's tactics in hunting and killing. It was reported that on an estate within thirty miles south-east of London, Polecats had recently become almost common again, owing to some escaping and the house afterwards being unoccupied for some length of time.—H.B.B.

—: o :—

It will be remembered that at the Sheffield meeting of the British Association, much was heard of the so-called fossil horse of Bishop's Stortford, which was 'trotted out' by Dr. J. Irving before at least two of the sections. In the *Essex Naturalist* (Vol. X., parts 5 and 6) Mr. E. T. Newton, F.R.S., gives good reasons for believing that the remains are those of a modern horse, and, apparently, the only point in which Mr. Newton agrees with Dr. Irving is that the age of the skeleton is 'dubious.'

The *Essex Naturalist* for October, 1909, to January, 1910, published December, 1910, and received by us on March 18th, 1911, contains an interesting paper on some curiously carved bone objects found at Braintree, Essex, and elsewhere, by Mr. F. W. Reader. Some of the objects described are by no means so rare as Mr. Reader thinks, and were used in connection with the old windmills, up to half-a-century ago. In the Hull Museum are specimens from mill-sites in Hull, and from Elloughton, East Yorks.

In Memoriam.

REV. E. MAULE COLE, M.A., F.G.S.

1833—1911.

WE much regret to learn, as we go to press, of the death of our old friend and contributor, the Vicar of Wetwang. The Rev. E. M. Cole has been in indifferent health for some little time, though he joined the East Riding Antiquarian Society on the occasion of one of its meetings but a few months ago. Those who then saw him could discern that his more than three score years and ten were soon to be brought to a close.

The Rev. gentleman was never so happy as when conducting a geological or archæological party over his beloved district, the Yorkshire Wolds; and none knew them so well nor could describe them so ably. He was a frequent contributor to these pages, and took a keen interest in geology and prehistoric archæology. The Rev. gentleman was present at most of the excavations in the British barrows made by his friend Mr. J. R. Mortimer. As a popular lecturer, too, he had a great reputation. One of the last occasions upon which he was away from home, if not the last, was on paying a visit to the present writer, in company with his life-long friend, Sir Tatton Sykes.

An account of the Rev. E. M. Cole, with a portrait and list of his papers appeared in *The Naturalist* for August, 1907 (pp. 267-269 and Pl. XXXII.).

T. S.

PROCEEDINGS OF PROVINCIAL SCIENTIFIC SOCIETIES.

Vol. XXV. of the **Transactions and Proceedings of the Botanical Society of Edinburgh**, (336 pp.), is entirely occupied by a memoir on 'Distribution of Hepaticæ in Scotland', by Symers M. Macvicar.

The Forty-ninth Annual Report of the **Yorkshire Naturalists' Union** for 1910, containing the reports, etc., of the various committees and sections, is on sale by Messrs. A. Brown & Sons, Hull, at one shilling net.

In addition to **The Library Circular**, a Quarterly Record of Additions; the **Sunderland Public Library** has recently issued a 'Select List of Books on Nature Study, including Aquaria, Microscopy, and Taxidermy.' This will prove very useful to teachers and others. We were a little startled to find that *The Naturalist* was not in the list of periodicals taken by this otherwise up-to-date library; but we learn that this state of things is to be remedied.

The **Transactions of the East Riding Antiquarian Society**, Vol. XVII., 1910, contain four papers, viz.: 'The Aske Family,' by Col. Philip Saltmarsh; 'The Stature of Early Man in East Yorkshire,' by J. R. Mortimer; and 'The Pre-historic Boat from Brigg,' by Thomas Sheppard; (illustrated by 29 blocks); and 'Hull and East Yorkshire Trademen's Tokens,' by W. Sykes (with 106 illustrations). There is also the Secretary's Report, List of Members, and Balance Sheet.

NEWS FROM THE MAGAZINES.

An immature male rough-legged Buzzard was shot at Seaton-Delaval, Northumberland, in November, 1910.—*British Birds*, March.

The final part (24) of *Kearton's Nature Pictures* (Cassell & Co., 1/-) has been issued, and in addition to the usual plates, contains the title-page, list of plates, etc.

Miss E. Maude Alderson has some useful 'Notes on *Chrysopa dorsalis*' illustrated with a beautiful coloured plate, in the *Entomologist's Monthly Magazine* for March.

Mr. L. E. Prout describes an interesting aberration of *Eustroma reticulata* (Schiff), bred by the Rev. E. J. Nurse of Windermere; in *The Entomologist*, No. 573.

Parts 23, and 24 of the *Harmsworth Natural History* (7d. each) are devoted to the parrots, owls, falcons, eagles, buzzards, etc. One or two of the coloured plates are particularly good.

There is an admirable account of the Geology of the Districts around Settle and Harrogate, by Prof. P. F. Kendall, in the *Proceedings of the Geologists' Association*, Vol. XXII., part 1.

Mr. K. J. Morton writes on '*Tæniopteryx putata*, with Notes on the Species of the Genus,' and Mr. W. J. Lucas records 'Cheshire and South Lancashire *Odonata*' in *The Entomologist* for March.

In the *Yorkshire Archæological Journal* (part 18), Mr. John Bilson gives a scholarly description of Newbald Church. This was built of the local Cave oolite, before the times when the Tadcaster magnesian limestone was brought down by water.

We have received part I. of *Insecta*, an illustrated entomological review issued by the Entomological Section of the Faculty of Sciences at Rennes. It contains a number of entomological papers, including descriptions of some new species of insects.

The Museums Journal (Vol. X, No. 7) contains a protest against the appointment of Sir Thomas Carlaw Martin, as Director of the Royal Scottish Museum, Edinburgh. Apparently Sir Thomas's chief qualification for the appointment is that he has been the editor of a provincial newspaper.

Amongst many interesting items in the February *Geological Magazine*, are 'The Mineral Condition of Calcium Carbonate in Fossil Shells,' by Messrs. G. A. J. Cole and O. H. Little; 'The Dragon Tree of the Kentish Rag,' by Dr. M. C. Stopes; and 'Fossil Myriopods from the Middle Coal Measures, Sparth, Rochdale,' by Mr. W. Baldwin.

We are delighted to find that Major Barrett-Hamilton's *History of British Mammals* (Gurney & Jackson) is appearing with commendable punctuality. Part 4 (2/6 net) is, to hand, and is partly occupied by a portion of the General Introduction to Bats; and partly by detailed descriptions of The Whiskered, Bechstein's, Natterer's, The Notched-eared, the Mouse-eared, and the Long-eared Bats. There are coloured and black and white plates, and illustrations in the text.

In *British Birds* for March, reference is made to the note in *The Naturalist* (page 100) respecting the occurrence of the Spotted Sandpiper in Yorkshire. It is stated that 'the history of the specimen is so confused and uncertain that it seems inadvisable to accept the record as fully authenticated.' We, of course, accept the opinion of *British Birds*, and at the same time can only regret that the specimen was not 'seen in the flesh' somewhere on the south-east coast of England; in which case we are confident that it would have been described in, and accepted by that journal as 'A New British Bird.'

THE NATURALIST

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EDITED BY

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AND

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WITH THE ASSISTANCE AS REFERREES IN SPECIAL DEPARTMENTS OF

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RILEY FORTUNE, F.Z.S.

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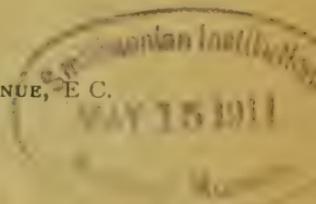
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NOTES AND COMMENTS.

A well-attended Conference of Museum Curators from Yorkshire and Lancashire, was held at Halifax, on April 8th. Messrs. Crump, Crossland and Wellburn, the Hon. Curators, conducted the visitors round the natural history museum at Belle Vue, and Mr. Ling Roth shewed the party round the Bankfield Museum. It was evident that the people of Halifax were to be congratulated upon their excellent museums, and upon the fact that there is such an admirable staff of Honorary Curators. It was obvious, however, that it would be an advantage to have a permanent salaried curator. After tea, which was kindly provided by the Mayor of Halifax, papers were read by Mr. T. Sheppard, on 'Museum Guides'; by Mr. W. B. Crump, on 'A New Method of Illustrating British Vegetation in Museums'; by Mr. H. Ling Roth, on 'The Use and Place of Anthropological Collections in Museums'; and by Mr. H. P. Kendall, on 'The Value of Photographs of Local Antiquarian Interest in Museums.'

YORK ANTIQUITIES.

Mr. C. F. Bell, of the Achmolean Museum, has been writing to the *Yorkshire Herald*, drawing the attention of the authorities to the admittedly inadequate housing of the priceless collection of antiquities at York; and all those who have an interest in the subject, including the officials at the museum itself, will be grateful if good results from the public appeal. Mr. Bell, after pointing out the extraordinary interest of the York collection, says:—'the whole effect is so sadly marred by crowding and lack of arrangement, that nobody but the special student can realize the extent and meaning of the collection. The manner in which the priceless Roman antiquities are displayed is mean and unworthy, the impossibility of controlling the temperature and humidity of the atmosphere in the old hostel—picturesque and appropriate as it is in many ways for the purpose—is becoming increasingly evident from the condition of the specimens and the mounts. Many of the bronze objects are beginning to decay in an alarming manner. Not less precarious is the condition of the famous tapestry maps in the Lecture Hall, which are in a deplorable state of decay and dirt, and require immediate attention.' Mr. Bell makes suggestions for improving this state of things, but the whole thing probably rests on the old complaint—'lack of funds.'

THORNE WASTE.

The great fire which raged on Goole and Thorne Moor during the middle of April is much to be regretted from a natural history point of view; and though it may be possible to gather some interesting information in reference to the way in which the barren burnt ground is re-clothed by vegetation, and repopulated by animal life, this will not atone for the enormous loss which the fire has caused. Some little time ago the York-

shire Naturalists' Union proposed to thoroughly investigate the natural history of the area, but difficulties arose in regard to the necessary permission from the owners to make the investigations. In view of the recent conflagration, the records that might have been made would have been of altogether exceptional value.

THE LATE REV. E. MAULE COLE.

Our readers will doubtless be glad to have the accompanying characteristic photograph of the late Rev. E. Maule Cole, for



the loan of which we are indebted to Mr. R. H. Barker, of Scarborough. The photograph was taken a little while ago in his garden, by Mr. Barker, whilst the Rev. gentleman was paying a visit.

THE SCAMRIDGE DYKES.

Since our last issue, the Scarborough Rural District Council has met, and, in view of the outcry which was made in reference to their proposal to place a reservoir on the Scamridge Dykes, definitely decided to chose another site for the reservoir. One member, Little by name, suggested that those who had taken such a great interest in the matter, should subscribe towards the expense of the alterations in the plans.

HOW MANY BRITISH BIRDS ?

Mr. Hugh Boyd Watt has summarised Mr. Ogilvie-Grant's list of British Birds, and gives the following interesting figures in 'Knowledge':—

- | | |
|--|---------|
| 133 species are resident and breed. | } = 185 |
| 52 species are regular summer visitors,
and breed. | |
| 55 species are regular autumn, winter or spring visitors ;
not breeding. | |
| 9 species are occasional visitors ; used to breed. | |
| 192 species are occasional visitors ; never known to
breed. To this number the American Pipit falls
to be added. | |
| i species is extinct (Great Auk). | |

Total 442 species admitted unquestionably.

3 varieties are named in the List, but not numbered.

35 species, of which the history is doubtful, are named
in the List within brackets, and are not numbered.

480 birds in all are thus found named in this List.

—◆◆—

Nesting of the Common Gull on the Farne Islands.—

During visits to the Farne Islands in the nesting season for several consecutive years, I have noted the presence of the Common Gull (*Larus canus*) there. Usually there would be two or three, or up to over half a dozen birds on the rocky portion of the Knoxes Island. They were chiefly adult birds, and it was evident from their behaviour that they were not nesting, but were simply resting there. On July 11th, 1910, however, a gull of this species was flying round and round over the "Inner Wideopens" in quite an anxious manner, and calling all the time. It was evident that it was a nesting bird—probably with young ones that had already left the nest. I tried to watch it down, but was unsuccessful, as I had to leave the island in half-an-hour, and any unaided attempt to find the chicks in the dense undergrowth of this island would not only have proved futile, but would have been disastrous to the many hundreds of other young birds that seek shelter therein. Before leaving I pointed the bird out to Darling, the watcher. Mr. H. A. Paynter, the Honorary Secretary of the Farne Islands' Association, wrote me later that he and both of the bird-watchers there, had subsequently often seen the three young ones, together with the two old Common Gulls on the Inner Wideopens.—H. B. BOOTH, Ben Rhydding.

About twenty-five years ago, I identified a pair of Common Gulls, nesting on the Outer Wideopens. The late John Hancock was much interested in this occurrence, as it was the first pair he had known to nest there. If my memory serves me correctly, he took one or more eggs from the nest.—R. FORTUNE.

ON MOVEMENTS IN ROCKS.*

By G. W. LAMPLUGH F.R.S., F.G.S.

(PLATES XI. and XII.).

WHEN man began to think of his surroundings he soon became impressed with the idea of the unchangeableness of rocks in this world of change. 'As firm as a rock' has its equivalent in every language; and from the very earliest times men have raised pillars of stone, unhewn or hewn, as memorials that should outlast all others.

Until science undertook its critical scrutiny, the permanence of the 'everlasting hills' went unquestioned; and the geologist had to do battle with many old prejudices when he first ventured to make known the truth that 'the hills are shadows, and they flow from form to form, and nothing stands.' But the evidence being so clear and the facts so irrefragable, it has now sunk into common knowledge that, in regard to their surface aspect, the rocks have no stability, but are passing perpetually through cycles of change, and that the giant crags, so far from being eternal, are giants only because of their youth or immaturity.

There are changes of a more intimate kind, however, that are not so conspicuous as these surface-phenomena, though they are equally well-known to geologists. They are the changes which have affected every particle of the rock throughout its mass, and have often so greatly modified its internal constitution or its structure that, under the cloak of apparent immobility, the rock may carry a history of interstitial movements almost as complex as a life-history, and far more prolonged. As for the igneous rocks—the parents of all—that were once molten and have slowly become solid, it is recognised by every student how profound and intricate have been the re-actions in the magma, as in some vast cauldron charged with a flux of unlike substances, and how vigorous has been the interplay of particles, before the rock took form.

Considering the far simpler sedimentary rocks alone—solidification with the ever-mysterious cohesion in its train, concretionary action, mineral replacements, metamorphism, folding, jointing, shearing, cleavage—all imply subtle creepings of the particles within the mass into new places and new relationships under the play of forces of which we have as yet an imperfect comprehension.

Of course, there is no such state known to us in Nature as absolute quiescence; and it may be granted that rocks are relatively quieter than most objects on this unquiet earth. But I

* Presidential Address to the Herts. Nat. Hist. Soc., Feb. 28th, 1911.

want to impress the idea that the deadness of the stone has been 'greatly exaggerated.' To illustrate this, I propose to touch upon just a few of the symptoms of unrest that force themselves upon our attention in examining the rocks. It goes without saying that to deal thoroughly with any one of the forms, even supposing that such a course were within our power, would require more time and patience than we have at command. Yet I think that it will be possible quickly to dispel any remnant of reputation for immutability that the rocks may still have, by simply fixing attention on some of the lively processes that are constantly in operation among them. The comparatively simple processes affecting the sedimentary strata will provide us with ample matter for this purpose.

(1) Let us first consider the processes of solidification undergone by a piece of banded slate which we know was once the muddy sediment of a sea-floor; or by a piece of quartzite that was once a loose aggregation of sand-grains; or by a fragment of compact limestone that was once a soft calcareous ooze. In our present seas all these deposits occur in their pristine state, and we can trace their equivalents of bygone times backward through all the ages and epochs to the very earliest, finding them as a rule, though not invariably, more and more changed as we go backward down the scale of geological formations. Mud becomes clay, then shale, then slate; sand becomes sand-rock—sandstone—quartzite; calcareous ooze becomes porous rock—firm stone—compact limestone, though not always by these stages. Through the gradual loss of water, the creeping of particles nearer each other, the filling of interstitial spaces by travelling matter, under the slowly but constantly varying conditions of pressure and temperature, these changes have been going on incessantly through all the ages; and—the point I want particularly to emphasize—they are going on now under our feet. A million years ago many of the rocks were not as we find them to-day; and a million years hence they will again be different.

These processes have affected and are affecting every particle of the solid crust, bringing about re-adjustments throughout the mass. Personally, I believe that some of the phenomena of disturbance on a visible scale that we usually assign to earth-movements of the more violent kind may be the result solely of re-adjustments made necessary by consolidation-shrinkage.* (Plate XI., fig. b).

(2) Next let us turn to the curious processes of segregation and concretion that are so frequently exemplified in the sedimentary rocks—the slow but irresistible gathering together

* This and other points in the address were amplified and illustrated with the aid of specimens and lantern slides.

of like to like from masses of mixed composition. The particles of silica scattered by the decay of silica-secreting organisms through the calcareous mud of our Carboniferous and Cretaceous seas could not stay where they were cast, but must creep from all directions to their rallying-points, around which they have combined into lumps of chert and flint. Similarly, the lime-particles scattered among clay have clustered themselves into nodules which have often energetically pushed aside the layers of the clay in their gradual expansion. Thus, also, the particles of iron, of phosphate, of magnesia, and of other rarer ingredients among sediments have shown intolerance of isolation, and have responded to the mysterious bonds of kinship. (See Plate XI., fig. *a*).

Into the nature of the subtle all-pervading forces implied by this kind of movement, I shall not attempt to enter. We know that they are akin to the wonderful forces of crystallization which are, as yet, indifferently understood at the best. Most of the movements, but probably not all, are performed through the agency of solution; the restless particles, in obeying the call of kinship, take advantage of the water circulating through all the pores of the rock as a medium to carry them from place to place. Be the agency what it may, the fact remains that there is ceaseless activity among the rocks, not only near the surface, but deep down in the earth—an activity that is concealed from our senses. Often it happens that, like the march of a relief-guard, as a particle of one kind is taken up into solution, a particle of another kind drops out exactly in its place; and so we get the singular phenomenon of replacement, by which the shape of a body remains unchanged while its substance is completely altered. For example, we may have a shell originally of lime, which has been converted into flint, or into pyrites, with all its minute and delicate sculpturing unimpaired.

Then there is the allied but more intense display of activity known as metamorphism to be reckoned with. In this case heat and pressure have so greatly facilitated the movement of particles in sedimentary rocks that the ingredients have partly or wholly re-arranged themselves according to their affinities into true crystals, and the original aspect of the rock is more or less completely lost. This kind of alteration has usually been effected when the strata were buried deeply in the earth's crust, and we cannot discover it until very long afterwards, when the elevated parts of the land have been worn down so far that the once deep-seated layers are revealed. But we are reminded by such rocks that the same processes are almost certainly in operation at the present time in the depths beneath our feet, and that the transformation of the strata in the crust of the earth by solution, pressure and heat is never in abeyance.

Not in the depths alone, but also close under the surface, are the subtle activities in progress. The alteration of rocks when exposed to the air, which we call weathering, equally implies re-adjustment among the particles ; with every change of condition, however slight, some of the ingredients shift their places and enter into new concatenations. Every quarryman knows that his freshly-cut stone differs somewhat in hardness and other qualities from stone of the same kind that has been seasoned awhile. The precise cause of the difference is often not easy to discover, but it must mean some change in the relation of particle to particle.

In the aggregate, these individually minute re-adjustments of the rock-particles are immensely potent in the construction of the earth, though their effect is not immediately impressive to our senses. There are other movements, however, which have produced results that everyone recognises. These are the movements that have affected the strata as a whole, pressing them into folds, stretching and breaking them asunder by faults, and crushing them into a mass of fragments by shearing.

Take, for example, the case of folding. We know that the sediments were originally spread out in nearly horizontal sheets ; yet the rocks into which they have been converted are rarely horizontal. The strata have been tilted in one direction or another, and sometimes so steeply that they now stand nearly or quite on end. Frequently they have had to pack into a narrower space, and in order that this might be achieved the more rigid rocks have been bent into folds, more and more tightly, until at last they have been doubled sharply back upon themselves again and again. It is very remarkable that hard and brittle rocks should have maintained their integrity though squeezed into most complicated forms, as if they were plastic. The distortion, however, has been wrought by forces that were not only intense but also very gradual and very prolonged, so that the individual particles of every rock-band had time to re-arrange themselves, each seeking as much relief as possible from the growing pressure. We shall frequently find convincing evidence of this if we look carefully at the arches of the folds, for it will be seen that the beds are generally thicker there than in the two limbs, because of this transference of particles ; indeed, it sometimes happens, when the pressure has been very intense, that the limbs are squeezed out entirely, and all the material has crept into the arches. Even in a very gentle fold, the creep is generally apparent : for example, on measuring a slight fold in the Carboniferous Limestones of the Isle of Man I found that the beds which were seven feet thick on the sides of the arch were swollen to eight feet on its crest. (See Plate XII., fig. *d*).

In fact, whenever we study the condition of rocks in the earth's crust we learn that their rigidity is only relative, and that even the hardest have behaved like plastic bodies when subjected to intense pressure. It is believed that at great depths, under the combination of pressure and heat, all rocks become plastic, so that there is a 'zone of flowage,' as it is called, always beneath us. Certain it is that when strata which have once been very deeply buried are laid bare at the surface, they generally exhibit what is known as 'schistosity,' all the particles having been dragged or squeezed into new positions. Sometimes among these schists there are what have originally been bands of rounded pebbles of very hard material such as quartz, and not infrequently all the little pebbles have been drawn out into pencil-like rods, or have been flattened into thin discs.

The force required to make the rocks so lively as this is, of course, enormous. We may get some vague conception of it by calculation, and that is all. But even within the range of pressures at our command by mechanical means, it has been quite possible to illustrate on a small scale how some rocks may be deformed. Limestone has long been known to yield with comparative readiness under pressure, and this is strikingly demonstrated in some experiments recently made by Prof. F. C. Adams, of Montreal. To mention only one of these interesting experiments, Prof. Adams found that a short column of limestone, 1.56 inch long, when submitted to a pressure of about 140 tons to the square inch in a hydraulic press, was converted into a disc only .682 inch thick, while the limestone remained nearly as hard as before.

I have mentioned that time is an important factor in all the movements within the earth; and we have reason to believe that most of the great contortions have been produced in the strata very slowly. But there are other effects which have probably been in most cases produced much more quickly. Among these are the well-known 'faults,' or dislocations of the strata along definite planes of fracture. The strain has been too sudden and too great for the rocks to sustain by bending, so they have snapped and slid into new positions by relative displacement at the fault-planes. Generally the displacement has taken the form of a sliding down of the strata on one side of the fault relatively to the other, which implies that the tendency of the movement has been to pull apart or to stretch the rocks. Such are known as 'normal faults.' Sometimes, however, the rocks on one side of the fracture have been pushed forward over the other, it may be for a distance of many miles; and this, of course, implies that relief has had to be obtained from violent compression. These are called overthrust faults, and they are nearly always accompanied by severe contortion, crushing and alteration of the strata.



Photo by]

(a)

[G. Bingley.

(1) Ball-beds of the Lower Calcareous Grit (illustrating concretionary action).
Cliff under Scarbro' Castle, north side.

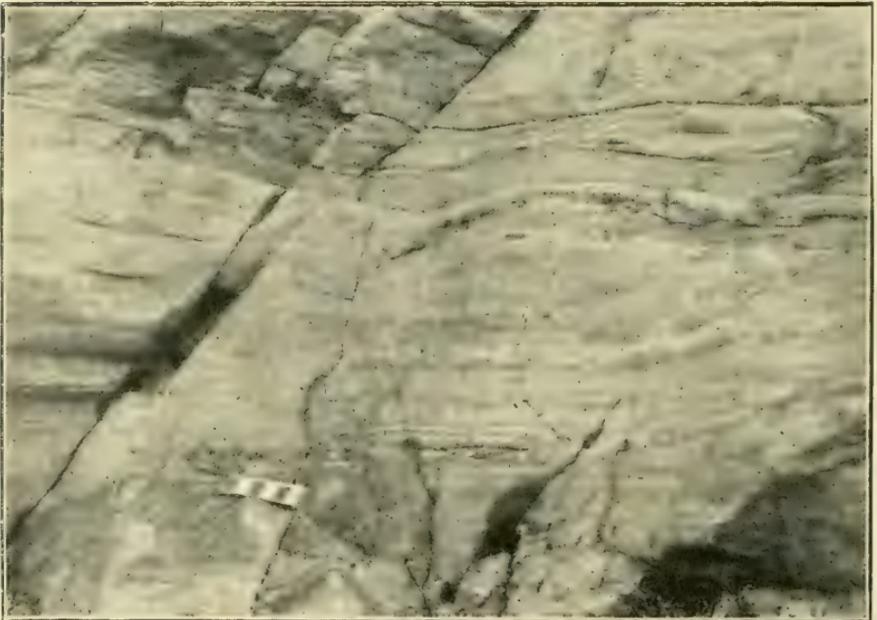


Photo by]

(b)

[G. Bingley.

(2) Upper Estuarine Beds, Carnelian Bay, near Scarbro' (showing minor disruption of bedding, probably due to consolidation-shrinkage).

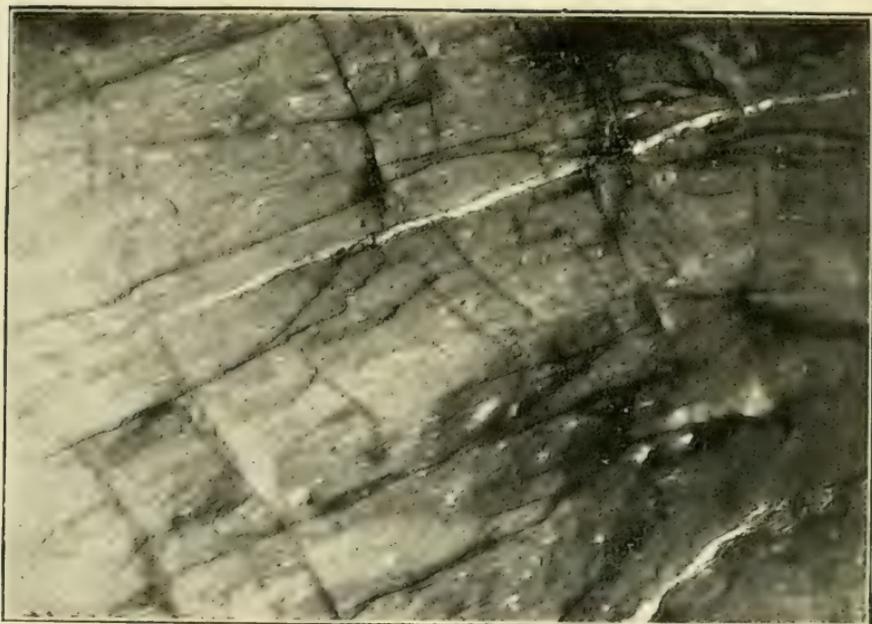


Photo by]

(c)

[G. Bingley.

(3) Crush-conglomerate, with segregation-veins of quartz, in Manx Slates.
Cliff at Gob y Deigan, Isle of Man.



Photo by]

(d)

[G. Bingley

(4) Gentle fold in Carboniferous Limestone, N. of Scarlet Point,
Isle of Man (referred to in text).

There is one further illustration of the instability of rocks under forceful earth-movement to which I should like to draw your attention, because it impressed me greatly when I was at work in the Isle of Man. The rocks in which the phenomena occurred were clay-slates with bands of hard grit or quartzite. These rocks have been violently pressed, crumpled, and thrown into all kinds of twists and folds. But the slates were able to adapt themselves to the movements more readily than were the hard grit-bands interbedded among them; consequently the beds did not hold together; disruption set in; the grit-bands were broken up into fragments, and squeezed among the slates, and a curious new rock was produced in which all trace of the original bedding was lost. From its superficial resemblance to a clastic conglomerate, I named this rock 'crush-conglomerate.' Now, this crush-conglomerate is some hundreds of feet thick in places, and extends in a great sheet for several miles, so it may be judged what commotion there was in the rocks when it was produced. The intense squeezing not only broke up the beds into fragments, but also brought about a general re-arrangement among all the minuter particles in the mass, so that the slates were converted into sericitic schist. The crags of Sulby Glen and Gob y Deigan, in which the crush-conglomerate is displayed, are restful enough to look upon, but to me, after I had worked among them, they carried the impression of vehement turmoil. (See Plate XII., fig. c).

It is easy to appreciate the visible effect of these great earth-movements, while their interstitial effect may be overlooked; and it is this minute restlessness that I have sought to emphasize. Whether the strata as a whole are quiescent or whether they are undergoing disturbance, the interstitial play, in one form or another, is increasing. I might have adduced many further illustrations of it, but perhaps those I have touched upon will suffice to bring to notice the activity that is masked by an impassive exterior in the stony framework of the earth.



An invitation having been received from the Heckmondwike Naturalists' Society for the Annual Meeting of the Yorkshire Naturalists' Union to be held at Heckmondwike in December next, the Executive Committee has decided to accept the invitation. The next Annual Meeting of the Union, therefore, will be held at Heckmondwike, and not at Dewsbury.

'The capture of a couple of females by Mr. Dutton' seemed somewhat startling to read in a pamphlet before us, until we noticed that it was the innocent entomological notes from the Warrington Field Club, 'gathered from fugitive sources.' We are invited to criticise, but beyond pointing out that there are almost as many interesting records as there are misprints, we have but little to say; *bembeciformis* seems particularly to have troubled our Warrington friends, and though they have tried spelling it in different ways, they have not guessed it right! We are pleased to see that entomology (not etymology!) is a strong feature at Warrington.

PROMINENT YORKSHIRE WORKERS:

V.—JOHN ROBERT MORTIMER.

(PLATE XIII.).

DURING the past half-century there have been numerous workers who have contributed largely to our knowledge of English prehistoric archaeology. Amongst these are such well-known names as Bateman, Evans, Dawkins, Lubbock (now Lord Avebury), Pitt-Rivers, Greenwell and Mortimer. To these writers our literature is indebted for much. 'Ten Years' Diggings'; 'Ancient Stone Implements of Great Britain'; a similar volume on 'Ancient Bronze Implements'; 'Cave Hunting'; 'Early Man in Britain'; 'Prehistoric Europe'; 'Excavations in Cranbourne Chase,' etc.; 'British Barrows,' and 'Forty Years' Researches in British, etc., Burial Mounds.' Few countries can shew so extensive, and none can produce so sound, a series.

The most recent, and perhaps the most lavishly illustrated volume, is by a Yorkshireman, who has spent his life in investigating the geology, and, more particularly, the prehistoric archaeology, of his native county. We refer to Mr. J. R. Mortimer, formerly of Fimber, now of Driffield.

Mr. Mortimer, who in former years had the assistance of his brother, the late Robert Mortimer, is a strong advocate of local museums and local scientific societies. And he has confined the area of his own life's work to that section of the Yorkshire Wolds that lies within a few miles from Driffield, and his extensive private museum of geological and archaeological specimens at Driffield deserves the title 'local' probably more than does any other museum in the country.

Eleven years ago the present writer had the privilege of preparing a catalogue of the specimens in the Driffield museum, a work which impressed him very forcibly with the magnitude of Mr. Mortimer's researches. It was then that he first saw a huge trunk full of manuscripts containing the notes of his barrow-openings, etc. A few years later, and Mr. Mortimer's 'Forty Years' Researches' appeared, from the same press as this journal.

It was the great Exhibition of 1851 which did so much good in so many ways, that first gave Mr. Mortimer a taste for scientific enquiry. Later, he saw the collections of fossils and flint implements formed by the late Edward Tindall, of Bridlington. His first ammonite was bought from Tindall.

For ten or twelve years the brothers Mortimer had the field almost to themselves, George Pycock of Malton and Tindall being practically their only rivals. The farm hands were trained to collect flint arrow-heads, etc., and leaflets were distributed offering prizes for the greatest number of imple-

ments brought in. In those days many farm servants spent their evenings and Sundays in walking up and down the fields, finding flints. Baskets-full were often brought to the office at Fimber, where a case or two of typical implements were on view. One 'prize' consisted of a free ticket to the Leeds Exhibition of 1866.

Later, as might be expected, there were other competitors, amongst whom were S. Chadwick of Malton, Canon Greenwell of Durham, F. Porter of Yedingham, C. Monkman and C. Hartley, G. Edson and T. Allerston of Malton, the Rev. J. Robertson of Barton-le-Street, T. Boynton and R. Gatenby (Bridlington), and the Rev. T. J. Monson of Kirby Underdale. Most of those named have 'gone before,' though a younger race (of whom the writer may count himself one) has entered the field, albeit there remains but the 'gleanings.' Yet, such a hold has Mr. Mortimer on the district, that flint implements are to-day known as 'Mortimers,' and 'Tak it ti Motimer' is still the phrase heard when anything unusual is turned up.

As regards the geological specimens, for half a century Mr. Mortimer had practically no serious rivals, Messrs. Chadwick and Tindall being the only others interested. In this way all the fine specimens, principally from the chalk, which occupy the cases on the ground floor in the Driffield Museum, are accounted for; and the value of these is increased by the careful way in which they are all labelled as regards locality—even to the very field* in which they were obtained.

Notwithstanding the archæological and geological value of the tens of thousands of specimens picked up from the fields and quarries of the wold area, the greatest scientific work which Mr. Mortimer has accomplished lies in the explorations he has made in the prehistoric burial mounds of the Wold area. During the past fifty years he has opened over three hundred barrows, and methodically described and sketched their contents. Much of this work was dealt with in papers printed in the proceedings of various archæological societies, and in 'The Naturalist,' and the whole was brought together, with plans, sections, and over a thousand beautiful drawings by his daughter, Miss Agnes Mortimer, in the 'Forty Years' Researches' † already referred to. A few barrows have been opened since that work appeared, particulars of which have been given in the papers referred to at the end of these notes.

It is a great gain to archæology that Mr. Mortimer, almost single-handed, undertook this work when he did; as agricul-

* The specimens bear numbers which correspond with the fields numbered on the ordnance plans of the district.

† The full title is 'Forty Years' Researches in British and Saxon Burial Mounds of East Yorkshire.' Hull: A. Brown & Sons, 1905, pp. lxxxvi. + 452, and 125 plates.

tural operations have levelled most of the mounds, rendering it absolutely impossible for any later worker to have carried out the investigations.

In another way, also, has Mr. Mortimer earned our gratitude, viz., by carefully mapping the various intricate pre-historic earthworks which formerly crossed the wolds in all directions. These are carefully shewn on a map in his volume, a map which contains information of priceless value; and one which could certainly not be produced at any future time, as year after year the earthworks are being destroyed; almost all the smaller ones having already disappeared.

Further, (and this is particularly gratifying to workers in the East Riding), Mr. Mortimer has retained every specimen in the district in which it was found.

Geologically, Mr. Mortimer has accomplished much by keeping a record of the Driffield drainage sections, by obtaining particulars of the strata, etc., in the wold wells, and in other ways. Details of this work have been published in the Proceedings of the Yorkshire Geological Society and elsewhere.

He has amassed a fund of information relating to old manners and customs in East Yorkshire, much of which he has put together in a manuscript entitled 'Reminiscences of my Boyhood days,' which will doubtless be published ere long.

It is nearly eighty-six years since Mr. Mortimer was born in a thatched farm-house at Fimber,* and the fact that he is amongst us to-day, and so active, is doubtless largely due to the nature of his scientific recreations, which have taken him so much into the fields and fresh air.

The results of his work will be appreciated by future generations of scientists.

LIST OF PAPERS ETC., BY J. R. MORTIMER.

ON A BONE SPEAR HEAD (?) FROM THE ESSEX COPROLITE PITS.—'Geologist,' 1863, p. 298 (Illustrated).

AN ACCOUNT OF THE OPENING OF A CELTIC TUMULUS NEAR FIMBER, YORKSHIRE.—'The Reliquary,' Oct., 1868.

THE OPENING OF A BARROW AT GRIMTHORPE.—'Reliquary,' 1869, vol. ix., p. 180.

NOTICE OF THE OPENING OF A LATE BRITISH GRAVE AT GRIMTHORPE, NEAR KIRBYUNDERDALE, YORKSHIRE.—'Reliquary,' January, 1869.

ON A PECULIAR STRIATED STRUCTURE IN THE CHALK.—[Abstract]. 'Quart. Journ. Geol. Soc.', 1873.

A DESCRIPTION OF THE GEOLOGY OF THE EASTBURN FARM, NEAR DRIFFIELD.—(Map). 'Journal Royal Agric. Soc.', 1873.

* On June 15th, 1825.

MARKINGS IN THE CHALK OF THE YORKSHIRE WOLDS—[abstract], 'Quart. Journ. Geol. Soc.', Vol. XXIX., 1873, p. 417. also see 'Geol Mag.', 1869, pp. 570-571.

AN ACCOUNT OF A WELL-SECTION IN THE CHALK AT THE NORTH-END OF DRIFFIELD, EAST YORKSHIRE.—'Quart. Journ. Geol. Soc.', 1875, pp. 111-112.

THE DISTRIBUTION OF FLINT IN THE YORKSHIRE CHALK—[Abstract], 'Quart. Journ. Geol. Soc.', Vol. XXXII. 1876, (Proc.) p. 131.

ON SOME CRANIA OF THE ROUND BARROWS OF A SECTION OF THE YORKSHIRE WOLDS.—'Journ. Anthropol. Inst.', vol. iv., Part III., 1877.

ON THE FORMATION OF FLINT IN THE CHALK OF YORKSHIRE.—'Proc. Geol. Assn.', 1877.

AN UNDERGROUND STRUCTURE NEAR DRIFFIELD.—[Romano-British hypocaust?] 'Journ. Anthropol. Inst.', Feb., 1878 3 pp.

THE CHALK WATER SUPPLY OF YORKSHIRE.—'Proc. Inst. Civil Engineers, Vol. LV., 1879, pp. 1-9 [of reprint]; and 'Trans. Hull Sci. and Field Nat. Club,' 1899, pp. 31-36.

'KEMP HOWE,' COWLAM.—'Journ. Anthropol. Inst.', May, 1880.

ON THE SECTIONS OF THE DRIFT OBTAINED BY THE NEW DRAINAGE WORKS AT DRIFFIELD.—'Proc. Yorks. Geol. and Polyt. Soc.', 1881, pp. 373-380; also 'Rep. Brit. Assn.', 1881, p. 617.

ACCOUNT OF THE 'DISCOVERY OF SIX ANCIENT DWELLINGS FOUND UNDER AND NEAR TO BRITISH BARROWS ON THE YORKSHIRE WOLDS.'—'Journ. Anthropol. Inst.', May, 1882; and 'Rep. Brit. Assn.', 1881, p. 691.

ON THE ORIGIN OF THE CHALK DALES OF YORKSHIRE.—'Proc. Yorks. Geol. and Polyt. Soc.', 1885, pp. 29-42.

ON THE HABITATION TERRACES OF THE EAST RIDING.—'Proc. Yorks. Geol. and Polyt. Soc.', Vol. IX., Part II., 1887, pp. 221-224.

PRE-HISTORY OF THE VILLAGE OF FIMBER.—Part I., 'Proc. Yorks. Geol. and Polyt. Soc.', 1889, pp. 217-230; Part II., 'Proc. Yorks. Geol. and Polyt. Soc.', 1890, pp. 445-457.

A PROBABLE SITE OF DELGOVITIA.—[Abstract], 'Rep. Brit. Assn.', 1890, p. 980.

A SUPPOSED ROMAN CAMP AT OCTON.—'Proc. Yorks. Geol. and Polyt. Soc.', pp. 457-459. 'Rep. Brit. Assn.', 1890, p. 980. [Abstract].

A DESCRIPTION OF THE ORIGIN AND DISTRIBUTION OF THE UN-WATERWORN CHALK-GRAVEL ON THE YORKSHIRE CHALK HILLS.—'Proc. Geol. Assn.', Vol. VIII., No. 5, 1890.

EVIDENCE OF THE RELIGIOUS BELIEFS OF THE ANCIENT BRITONS.—'Yorks. Arch. Journ.', Vol. XIX., 1891.

AN ACCOUNT OF THE OPENING OF THE TUMULUS, 'HOWE HILL,' DUGGLEBY.—'Proc. Yorks. Geol. and Polyt. Soc.', 1892, pp. 215-225.

FURTHER OBSERVATIONS ON THE CONTENTS OF THE HOWE TUMULUS [DUGGLEBY].—'Proc. Yorks. Geol. and Polyt. Soc.', 1893, pp. 242-244.

THE OPENING OF A BARROW NEAR SLEDMERE.—'Trans. East Riding Antiq. Soc.', Vol. II., 1894, 6 pp.

THE OPENING OF SIX MOUNDS AT SCORBOROUGH, NEAR BEVERLEY.—'Trans. East Riding Antiq. Soc.', Vol. III., 1895, pp. 21-23.

KILLING PITS.—'Proc. Yorks. Geol. and Polyt. Soc.', Vol. XIII., Part II., 1897, pp. 144-149.

THE ORIGIN OF SOME LINES OF SMALL PITS ON ALLERSTON AND EBBERSTON MOORS, NEAR SCAMRIDGE DYKES IN THE NEIGHBOURHOOD OF SCARBOROUGH.—'Archæol. Journ.', Sept., 1895. 'Proc. Yorks. Geol. and Polyt. Soc.', 1897, pp. 150-154.

ANCIENT BRITISH STAR-WORSHIP INDICATED BY THE GROUPING OF BARROWS.—'Proc. Yorks. Geol. and Polyt. Soc.', 1897, pp. 201-209 (map); and 'Trans. East Riding Antiq. Soc.', Vol. III., 1895, p. 53. and 'Proc. Soc. Antiq.', Vol. XV., p. 429.

'EMBANKMENT CROSSES.'—'Proc. Soc. Antiquaries,' Jan. 28th, 1897, Vol. XVI., p. 278.

A SUMMARY OF WHAT IS KNOWN OF THE SO-CALLED 'DANES' GRAVES,' NEAR DRIFFIELD.—'Proc. Yorks. Geol. and Polyt. Soc.', Vol. XIII., 1897, pp. 286-298.

'THE DANES' GRAVES.'—'Annual Report Yorks. Phil. Soc.' for 1897 [pub. 1898], 10 pp. and 3 plates. Also in 'Proc. Soc. Antiquaries,' March 24th, 1894, 10 pp.

THE DANES' GRAVES.—No. II., 'Annual Rep. of the Yorks. Phil. Soc.' for 1897.

AN ANCIENT BRITISH SETTLEMENT CONSISTING OF A DOUBLE ROW OF PITS ON DANBY NORTH MOOR, YORKSHIRE.—'Archæol. Journ.', June, 1898.

ON SOME BARROWS AT KILHAM, AND A CHARIOT-BURIAL OF THE EARLY IRON AGE.—'Proc. Soc. Antiq.', Vol. XVII, 1898, p. 119.

THE SO-CALLED BRITISH HABITATIONS ON DANBY NORTH MOOR.—'Proc. Yorks. Geol. Soc.', Vol. XIII., 1899, pp. 406-418.

NOTES ON THE HISTORY OF THE DRIFFIELD MUSEUM OF ANTIQUITIES AND GEOLOGICAL SPECIMENS.—'Proc. Yorks. Geol. Soc.', Vol. XIV., 1900, pp. 88-96; 'Trans. Hull Sci. and F. N. Club,' 1900, pp. 135-141, and 'A DESCRIPTIVE CATALOGUE OF THE . . . MORTIMER MUSEUM . . . 1900, pp. 9-16.

AN ACCOUNT OF THE DISCOVERY OF ROMAN REMAINS AT LANGTON.—'Trans. of the East Riding Antiq. Soc.', Vol. X., 1902.

NOTES ON SOME PRE-HISTORIC JET ORNAMENTS FROM EAST YORKSHIRE.—'The Naturalist,' 1903.

FORTY YEARS' RESEARCHES IN BRITISH AND SAXON BURIAL MOUNDS OF EAST YORKSHIRE.—1905, pp. 86 + 452, and 125 plates.

NOTES ON THE BRITISH REMAINS FOUND NEAR THE CAWTHORNE CAMPS, YORKSHIRE.—'The Naturalist,' September, 1905, pp. 264-265.

NOTE ON A BRITISH BURIAL AT MIDDLETON-ON-THE-WOLDS.—'The Naturalist,' 1908, pp. 230-231.

OPENING OF A BARROW NEAR BORROW NOOK.—'Journ. of the Yorks. Arch. Soc.', Part LXXX., 1910.

THE STATURE OF EARLY MAN IN EAST YORKSHIRE.—'Trans. of the East Ridg. Antiq. Soc.', Vol. XVI., 1910; and 'Man,' 1910.

THE EVOLUTION OF THE MILLSTONE.—'The Naturalist,' 1911, pp. 95-99.

OPENING OF TWO BARROWS AT BORROW NOOK.—'The Journ. of the Yorks. Arch. Soc.', Part LXXXII., 1911.

The following papers have also been prepared, but not published :—

THE FIRST MANUFACTURED WEAPON USED BY MAN.

'DANES' GRAVES.'—No. 3.

OUR ANCESTORS IN EAST YORKSHIRE.

THE GENESIS OF THE YORKSHIRE CHALK.

SUPPLEMENTARY EXCAVATIONS AT DANES' GRAVES, IN 1899.

SOME RECOLLECTIONS OF MY BOYHOOD.

ON THE MENTAL DEVELOPMENT OF PRIMITIVE MAN.

DEW-PONDS OF THE YORKSHIRE WOLDS.

T. S.

—: o :—

Mammoth Tusk at Withernsea.—On the 23rd March, Mr. C. G. France, of Withernsea, showed me a portion of a large Mammoth tusk, which he had found on the beach about 1½ miles south of Withernsea. The specimen was noticed at a distance of about 20 yards from the cliff, and from its slightly water-worn appearance, it had evidently been out of the boulder-clay for some time. Probably the recent high spring tides had washed it out from the other material on the coast. The tusk was in an excellent state of preservation, and measured 24½ inches along the outer curve of its length. Its greatest diameter was 6 inches and its weight 24 lbs. From its appearance the specimen had evidently been part of a fully developed individual; and the successive rings of growth could be traced to the centre of the tusk. The tusk is now in the geological gallery of the usual Museum, having been presented by Mr. France.—GEORGE SHEPPARD, Withernsea.

BRITISH PSEUDOSCORPIONS.

WM. FALCONER,

Slaiithwaite, near Huddersfield.

Mr. H. Wallis Kew in writing, and the Royal Irish Academy in publishing 'A Synopsis of the False Scorpions of Britain and Ireland'* ('Proc. R. I. A.', Vol. XXIX., Section B., No. 2, pp. 38-64, Feb. 1st, 1911), with figures of all the species, and at a price which makes it accessible to all, have rendered a distinct and much-needed service to the cause of natural history in the British Isles. Mr. Kew has spent years in the close and systematic study of these creatures, and there is no one more competent to produce the standard work on the subject he has so successfully made his own. He has been able to clear away all obscurities with regard to the British species, to correct or remove those wrongly named, and to add others to the British list, with the result that our information on the number, distribution and occurrence of the British Pseudoscorpions is for the first time placed on a firm and sure foundation. His book, based on the most recent classification, and provided with tables for identificatory purposes, affords a ready and certain means of determining the various kinds, while its availability, reliability and fullness should induce many naturalists to take up the study of these animals, which in this country forms a small, compact, highly interesting and little known group of twenty-two species.

As it is now nineteen years since the Rev. O. Pickard-Cambridge issued his 'Monograph of the Chernetidea' ('Proc. Dorset Field Club,' Vol. XIII., pp. 199-231), it may be of interest and value to mark some features of the progress made since its publication, and incidentally to note the necessary additions to, and corrections in my keys to the British Pseudoscorpions which appeared in 'The Naturalist,' December 1910.

The following have been dropped out of the British list:—

Obisium sylvaticum C. L. Koch, the solitary British example so named was unskilfully prepared and mounted as a microscopic object, making its correct identification very difficult; it is really *Roncus lubricus*.

Chelifer meridianus L. Koch, a solitary example from Dorset, wrongly determined by Simon to be this species; now referred by Mr. Ellingsen, in spite of some differences, to *Chernes cimicoides* Fabr.

Chelifer hermannii Leach, the single type specimen in the British Museum collection is a young example of *Chelifer cancroides* Linn.

* London: Williams and Norgate, 14 Henrietta Street, Covent Garden, W.C. Price 1s. 6d.



Yours truly
J. R. Mortimer

Chernes insuetus Camb., two examples obtained in 1880 in Dover oil mills; probably introduced with substances used in the mills, and not British at all.

Chernes phaleratus Sim., so named in error, being really referable to *C. scorpioides* Herm., since recognised as a British species.

Seven species have been added to the British list, of which *Chernes godfreyi* Kew and *C. wideri* are not dealt with in my Keys. The former belongs to the same section I. as *C. nodosus* Schr. and *chyzeri* Tom., with the body polished and a tactile hair on tibia IV., and the latter to the same II. as *C. scorpioides* Herm. and *C. dubius* Camb., with the body unpolished, and tibia IV. without a tactile hair.

I.—The broad upper protuberance of the trochanter of the palp showing on the posterior margin well distinguishes *chyzeri* from *godfreyi* and *nodosus*, in which the same part is narrower and does not show on the posterior margin. In *godfreyi* the tactile hair on *tarsus* IV. is near the middle of the joint, and in *nodosus* one-third from the base.

II.—*C. wideri*, *scorpioides* and *dubius* have an isolated accessory tooth on the anterior margins of the forceps, and the ventral face of the maxillae granulate. The tactile hairs of abdominal segment XI. are absent in *wideri*, and present in the other two; *scorpioides* has a tactile hair on *tarsus* IV., which *dubius* does not possess.

III.—The rest of the genus *Chernes* belongs to the same section as II. *supra*, but the anterior margins of the forceps are provided with a series of accessory teeth, and the ventral face of the maxillae is smooth or nearly so. *C. cimicoides* alone has no tactile hair on *tarsus* IV., and the palp of *C. cyrneus* unlike that of *C. panzeri* is brilliantly glossy.

Chelifer subrubus Sim. is made the type of a new subgenus *Withius* Kew.

- A.—Legs I. with articulation between the trochantin and femur wide and oblique *Chelifer*
 B.—Legs I. with this articulation rather narrow and nearly perpendicular *Withius*

All members of these two genera are without accessory teeth on the margins of the forceps, and may thus be distinguished from *Chernes*.

Roncus cambridgii L. Koch, having falces furnished at extremity of movable fang with a transparent cylindrical apophysis known as a galea, enters the genus *Ideoroncus* Balzan.



The Eighteenth Report of the Leicester Museum and Art Gallery includes the gratifying statement that the long projected extension and reconstruction of the buildings have at last been commenced. Illustrations of the proposed additions are given.

A NEW BORING IN THE VALE OF PICKERING.

W. MILLHOUSE, C.E.,
Scarborough.

ANYTHING which adds to the History of the Geological formation of Pickering Vale is of interest to Yorkshire Geologists, and an account of the most recent boring in the Vale may not be out of place.

In the Autumn of 1910 an attempt was made to obtain water at the Derwentdale Farm, the property of the Earl of Londesborough. The site of the boring is about $1\frac{1}{4}$ miles south of the boring at the Irton Water Works, and thus became of considerable interest both from a geological and a hydrogeological standpoint.

The great East and West Fault, passing through Eberston and Brompton, on the south side of which the Kimeridge Clay had been proved to upwards of 300 feet, is not known east of Brompton, and this Derwentdale Boring promised to throw some light on the matter. The debris from the boring was carefully preserved by Mr. R. S. Blaylock, the Earl's agent, and Mr. Hy. Preston, F.G.S., very kindly assisted in identifying and describing the specimens, besides twice visiting the boring during its progress. The full details of the boring are as follows:—

DERWENTDALE FARM.

In the Parish of Seamer. 6" Ordnance Sheet, No. 93. 90'00 ft. above Ordnance Datum.

Details of Strata, etc., passed through in sinking a 3" Borehole for water supply in the Vale of Pickering.

		November, 1910.			
		Thickness.		Total Depth.	
		Ft.	ins.	Ft.	ins.
MODERN ALLUVIUM.	Dark blue warp	13	—	13	—
	Gravel, the larger stones (3" to 4") being variously coloured sandstones, Igneous rocks, etc., and a fragment of fossil (<i>Ostrea</i>)	27	—	40	—
	Dark reddish brown sandy silt	6	—	46	—
	Sand and gravel, sand being very sharp angular quartz grains	13	—	59	—
	Liver coloured marl with very few grains of sand ..	1	—	60	—
LAKE SILTS.	Soft dark brown silty warp	5	—	65	—
	Soft reddish grey ditto ..	6	—	71	—
	Soft light brown silt ..	4	—	75	—
	Very fine grey silt	10	—	85	—
	Dark brown fine silt	10	—	95	—
	Fine clayey silt, dark reddish brown	11	—	106	—

		Thickness.		Total Depth.		
		Ft.	ins.	Ft.	ins.	
ANCIENT ALLUVIUM.	{	Hard pan, composed of sand and gravel, with many oolitic grains and frag- ments of oolitic limestone	17	—	123	—
		Ditto, with less sand grains	2	—	125	—
		Kimeridge clay	26	—	151	—
		Rock (upper Calc. Grit.) ..	14	—	165	—

NOTE.—Water rose to the surface from the 'hard-pan' at 106-125 feet, but was afterwards excluded by the Borehole tube which finished at 153 feet.

At 160 feet the overflow was at the rate of 4680 gallons per day. Two small fissures were then passed through, and the flow at 165 feet increased to 7538 gallons per day.

The Irton Boring is north of Derwentdale, and its Section is given in the Geological Memoir for the District (No. 54, 55, new series), but for easy comparison we reproduce the Section as far as the Calcareous Rocks, immediately below the Kimeridge Clay.

IRTON BOREHOLE, SCARBOROUGH WATERWORKS.

6 inch sheet, No. 93. 96'00 ft. above O.D.

				Thickness.		Depth.	
				Ft.	ins.	Ft.	ins.
ALLUVIUM.	{	Clay	1	6	1	6	
		Gravel	17	4	18	10	
		Clay	2	10	21	8	
		Sand and gravel	0	6	22	2	
		Marl with stones	1	0	23	2	
		Sand and gravel	2	9	25	11	
		Marl and stones	6	5	32	4	
		Quicksand and gravel ..	11	9	44	1	
		Strong dark warp	5	3	49	4	
		Yellow marl and stones ..	2	9	52	1	
KIMERIDGE CLAY.	{	Blue marl	3	9	55	10	
		Blue bind (fossils)	40	2	96	0	
		Stone bind	3	3	99	3	

Upper Calcareous grit, etc.

It will be noticed that in each case the Kimeridge Clay has been passed through and the Upper Calcareous Grit encountered immediately below.

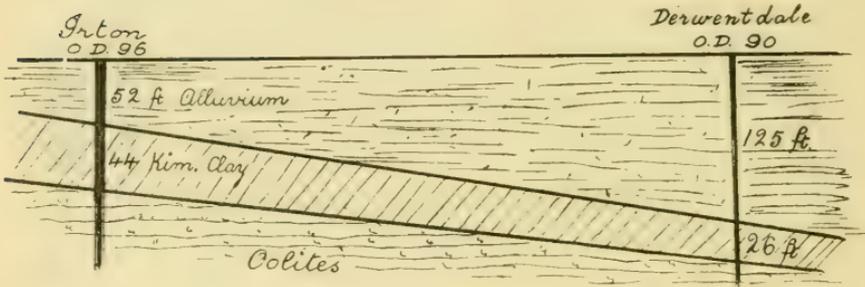
As a water supply the new boring has been very successful, there being a good supply from the rocks underlying the Kimeridge Clay, which is under an artesian head, sufficient to force the water to all parts of the farm premises.

The following is a summary of the geological information obtained from the boring:—

- (a) If the line of fault as shewn on the geological maps be continued eastward it must now be drawn south of Derwentdale, thus giving a great increase to

the known area, in which a good supply of artesian water can be obtained.

- (b) The depths at which the Kimeridge Clay was struck in the two borings were 52 feet (Irton), and 125 feet (Derwentdale) respectively, from which it is found that the ancient floor of Pickering Vale has an incline to the south of about 63 feet per mile between these two borings.
- (c) The thickness of clay at Derwentdale is less than at Irton (see sketch), hence the dip of the upper surface of the oolites beneath the Kimeridge Clay is less than the incline of the ancient valley



floor, and the Kimeridge Clay would thin out southwards unless the fault were encountered. From this it is possible that the stored water of the oolites may get into the alluvium beds above and give the artesian pressure sometimes found from borings which have not reached the Kimeridge Clay.

- (d) A very careful examination of the Alluvium Beds of this boring was made, from which it seems possible to arrange them in three sections, viz:—

(1) Recent Alluvium	40 feet.
(2) Lake Silts	66 ..
(3) Ancient Alluvium	19 ..

Total 125 ..

We notice that amongst the recent additions to the Norwich Museum are 'two eggs of an Eagle Owl laid in confinement.'

The shorter form of *Belemnites giganteus*—13 ft.' we notice is referred to on a recent Geological Society's programme. We wonder what length the longer form attains.

We are glad to see that the President of the Yorkshire Naturalists' Union, Mr. Alfred Harker, M.A., F.R.S., is to preside at the Section of Geology at the British Association Meeting at Portsmouth.

ANNELID FAUNA OF CUMBERLAND.

Rev. HILDERIC FRIEND,
Swadlincote.

I COMMENCED my study of Annelids in the year 1890, in the city of Carlisle. In May of that year I wrote to 'Nature' on the subject. My letter was handed by the editor to Prof. Lankester, who in turn passed it on to Dr. Benham. On May 28th, I received a request from Benham to send him any interesting forms which might be observed, and this led to the interchange of letters on the Annelids of Cumberland, which laid the foundations for my first List of Earthworms of the North of England (see 'The Naturalist,' Jan., 1891, p. 13).

The species identified for me by Dr. Benham included *Lumbricus terrestris*, L.; *Allolobophora longa*, Ude; *Aporrectodea chlorotica*, Savigny; *Allo. turgida*, Eisen; *L. rubellus*, Hoffmeister; *L. castaneus*, Eisen; *Allurus tetracdrus*, Savigny, and three other worms of exceptional interest. One of these, found in the stump of a tree, Dr. Benham mistook for *Lumbricus castaneus*, Sav. Tree worms were then unknown in England, and this was probably the first time that *Dendrobaena arborea*, Eisen, was ever found in this country. The next was *Dendrobaena mammalis*, Savigny (= *Allo. celtica*, Rosa, of former lists), and the third *Bimastus Eiseni*, Levinsen, both then new to Britain.

Since that period I have from time to time added to the Cumberland list during my residence at Cockermouth, or on the occasion of more recent visits. Thus in 1899 I recorded *Dendrobaena subrubicunda*, Eisen. It occurred high up on Skiddaw and near the top of Catbells. *Octolasion lacteum*, (Erley (= *Allo. profuga* Rosa) was found near the Art School and Station, Keswick, and in gardens at Cockermouth.

Aided by a Government Grant for these researches, I have recently paid two visits to Carlisle and the Lake District, and have been able to extend our knowledge of the larger forms, and undertake some new researches into the distribution of the enchytraeids and waterworms. It has long been held that no worms are to be found in bogs. There is a certain amount of truth in the statement, but it is apt to mislead. I think it would be useless to examine the peat itself for worms, *in situ*; but when the peat has been dug and stored, worms will gather around the heaps, and if there are bushes or brushwood about, whose foliage falls and decays in the bog, one may expect to find a rich annelid fauna among the vegetable debris. I visited Newton Moss, near Penrith, specially to study the question, and found myself amply rewarded.

I may also draw attention to the fact that wherever I examined old, decaying tree trunks, the true tree-worm, *Dendrobaena arborea* Eisen, was to be found, together with its small

bottle-green cocoons ; while the heaps of road scrapings nearly always yielded the interesting form now known as *Dendrobaena mammalis* Savigny. I first found this worm near Langholm, in 1890. As it was new to Britain I paid a special return visit to the locality some time later, missed the worm and my train, and found myself on a Saturday evening cut off from the busy world, and unable to get another train till Monday. Now I can find the creature by almost any road-side if I simply turn up a suitable stone, or dig into a heap of scrapings.

On Monday, February 6th, 1911, Dr. Aitken, of Carlisle, kindly took me in his motor to Monkhill, Great Orton, and other places in the vicinity, and enabled me to do a good morning's work. In addition to the species already mentioned I was able to add *Octolasion gracile* Erley, to the Cumberland list. So far this species has only been found in two or three localities, and previous to Easter, 1910, was unknown in England.

I found at Monkhill and elsewhere several enchytraeids and water-worms, about which I hope to give details later. In March I went to Penrith, specially to visit Newton and Brougham. The weather was intensely cold, but as this is the season of the year when a number of the smaller worms are adult it was important to get the work done. The splendid condition of the roads, hedgerows, and fields in this district made it difficult for me at first to find suitable hunting grounds. In time, however, I came across stumps of trees, road scrapings, manure heaps, and other breeding places, and found that the usual earthworms were abundant. In addition to the three well-known forms of *Lumbricus*, viz. : *L. terrestris*, *L. rubellus*, and *L. castaneus*, I found some fine adults of *L. festivus* Savigny (= *L. rubescens* Friend), which is a new addition to our lists for this county. *L. festivus* is about the size of *L. rubellus*, but on the fifteenth segment there are prominent papillae, like those found on the common earthworm. I found the worm many years ago in Yorkshire and described it as new to science, under the name of *rubescens*, but it had doubtless already been described half-a-century earlier and lost to sight.

Going one day to Brougham Castle, I found another worm new to the district. A fine specimen of *Octolasion cyaneum* Savigny (= *Allolobophora studiosa* Rosa), was leisurely proceeding across the road in the mid-day sunshine when it fell into my trap. My work among the smaller annelids resulted in some valuable finds, but as it will need a special article to deal with this branch I will close the present paper with a list of those species of *Lumbricidae* which are at present known to occur in Cumberland with such data as may be of interest.

New records are denoted by an asterisk.

1. *Lumbricus terrestris* Linnaeus. First recorded in 1890 from gardens in Carlisle.

2. *Lumbricus rubellus* Hoffmeister. Found first by the Calder, near Dalston, in 1890. Near the top of the Beacon, Penrith, 1911.

3. *Lumbricus castaneus* Savigny. Under droppings in fields at Dalston, and from the top of Cross Fell, 1890.

4*. *Lumbricus festivus* Savigny. Between Penrith and Newton Reigny, March 1911.

5. *Allolobophora longa* Ude. Meadows by the Eden, Carlisle, 1890. Keswick and Portinscale, 1899. Near Newton, 1911.

6. *Allolobophora caliginosa* Savigny, (including the two forms *turgida* Eisen, and *trapezoides* Duges). By the Eden, Carlisle, 1890. By a stream on the north side of Catbells, 1899.

7. *Aporrectodea chlorotica* Savigny. In 1890 found it at Monkhill, Carlisle, and elsewhere. Since found in almost every part of the county. A very variable worm; one of the forms, found by the lake at Bassenthwaite, being specially interesting.

8. *Eisenia foetida* Savigny. The Brandling, first recorded in 1890 for Carlisle. Found everywhere in rotting manure. Etterby, 1911.

9*. *Eisenia rosea* Savigny (= *Allolobophora mucosa* Eisen). Sent to Dr. Benham in 1890 from Kendal, but apparently not reported previously for Cumberland. Between Penrith and Newton, March 1911.

10*. *Dendrobaena mammalis* Savigny (= *D. celtica* Rosa). First discovered in Great Britain near Langholm, in 1890, but now found in road scrapings at Carlisle, Penrith, and elsewhere.

11. *Dendrobaena subrubicunda* Eisen. Catbells and Skiddaw, April 1899.

12*. *Dendrobaena arborea* Eisen. Old tree stump near Carlisle, 1890, but confused with *Lumbricus castaneus*. Tree stumps at Orton, February, and Newton Reigny, March 1911.

13. *Bimastus Eiseni* Levinsen. First British record, 1890. Found by the Calder at Cummersdale, and identified by Dr. Benham, who wrote on August 2nd, 1890, that among my gleanings was 'One quite small red worm, similar in colour to *L. rubellus*.' This is *Lumbricus* (now called *Bimastus*) *Eiseni*, 'new to Britain.' (See 'The Naturalist,' January 1891, p. 14).

14*. *Octolasion cyaneum* Savigny (= *Allolobophora studiosa* Rosa). On the road near Brougham Castle, March 1911.

15. *Octolasion lacteum* Œrley (= *Allolobophora profuga*, Rosa). Keswick and Cockermonth, April 1899.

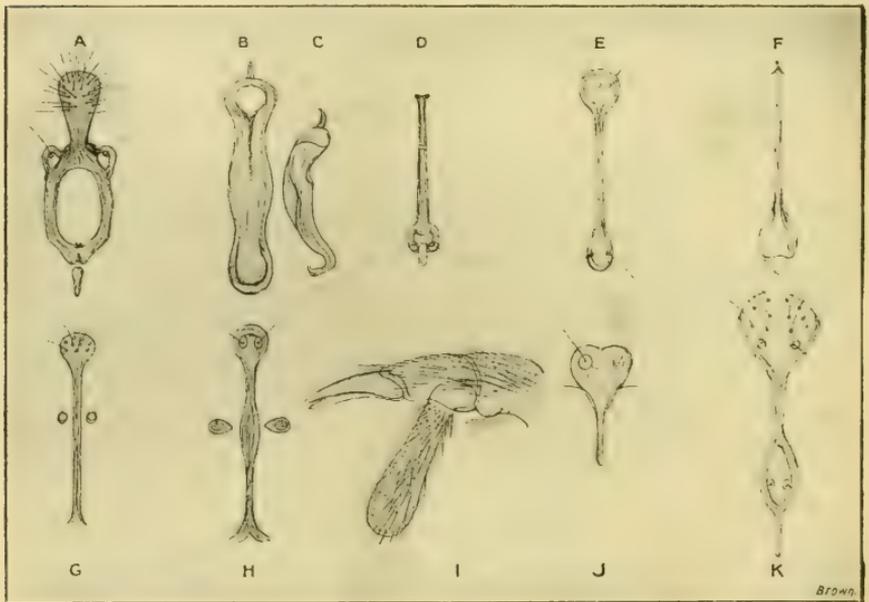
16* *Octolasion gracile* Œrley. First record Caldewlees, near Carlisle, 1911.

17. *Allurus tetraedrus* Savigny. By the Calder, 1890. In the sandy bottom of the stream I found also a rich golden variety (var. *luteus* Friend), which is rarely found elsewhere in Great Britain. I obtained a specimen once in Yorkshire, and a further example reached me recently from the Hague.

NOTES ON THE CRISTA OF SOME BRITISH EARTHMITES.

C. F. GEORGE, M.R.C.S.,
Kirton-in-Lindsey.

IN some of my former papers on 'Some British Earthmites,' figures of the 'crista' (sometimes erroneously called the 'sternite') were given, whilst in others, there is no figure, and in others it is not mentioned. I have, however, found that this organ is a most important one, and as it remarkably varies in figure, often to an extraordinary extent, it may prove of great



use in determining species. I have good reasons for thinking that it is present in all cases, though in some it is difficult to see, except by careful dissection. I have, however, received from Mr. Soar, figures of such as I have been able to send to him. A very casual examination of Mr. Soar's figures will shew how very varied in structure this organ is.

Fig. *a* is the crista of *Trombidium fuliginosum*. It was figured by Professor Sig Thor, in his 'Forste undersogelse af Norges Rhyncholophidæ' in 1900, also by Professor Ivan Trägårdh, in his 'Results of the Swedish Zoological Expedition in Egypt and the White Nile in 1901.' I have examined several specimens of this mite, some from Putney, others from

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Scotland, and one from Gloucestershire, and find that the variation in different specimens is very slight.

Figs. *b* and *c* are dissections from *Trombidium holosericeum*. This mite, though one of our largest species, has remarkably small crista, not mentioned or figured by me in the description of it on page 333 of 'The Naturalist' for September 1908. It is difficult to see in the unmounted mite in consequence of the very thick coating of long-feathered hairs in the skin covering it, as well as the presence of other structures. Moreover, it is bent like a bow, and difficult to fix in a position like that which it has in the living mite, *b* is a front view, and *c* is a view partly on its side. It may be to some extent seen in mounted specimens which have been bleached and flattened.

Fig. *d* is the crista of *Ottonia bullata*. This pretty little mite was figured and described in 'The Naturalist' for March 1909, page 88, and Plate IV.

Fig. *e* is the crista of *Rhyncolophus communis*. Here we find a distinct and rather large capitulum. The mite from which this was taken is figured on page 428 of 'The Naturalist' for December 1910. The crista can be seen in the unmounted mite.

Fig. *f*, the crista of *Ottonia valga*. This mite and its crista is figured in 'The Naturalist,' December 1909, plate XVIII.

Fig. *g*, crista of *Ottonia evansii*, figured *loc. cit.*, plate X., May 1909.

Fig. *h*, crista of *Johnstoniana errans*. The mite is figured *loc. cit.*, August, 1909.

Fig. *j*, crista of *Ottonia bicolor*. *Loc. cit.*, plate II., Feb., 1910.

Fig. *k*, crista of *Ritteria hirsutus*. *Loc. cit.*, plate X., April, 1910.

On plate XXXIX. of 'The Naturalist' for October, 1907, is a figure of the crista of *Eatoniana plumifer*, fig. 12. Here the capitulum is not ball-shaped, but conical. I have also seen the crista in *Ritteria nemorum*, *R. mantonensis*, *Ottonia clavata*, *O. conifera* and *O. ramosa*. I have also a few mounted specimens which I am not able to describe for want of recent examples. Besides these, there must be many species I have not met with. Possibly some younger acarologists will continue the work, and record their investigations in 'The Naturalist.'

Fig. *i* is the palpus of a *Trombidium*, with the claw double: the only time I have found this to be the case in *holosericeum*.



Prof. T. Rupert Jones, whose death is announced at the age of 91, was well known as a geologist half a century ago, and at different times has occupied prominent positions in various scientific societies. He was an authority on the Entomostraca and Estheridæ.

SOME RECENT WORKS ON PETROLOGY AND MINERALOGY.

Principles of Chemical Geology, by **J. V. Elsdén**; pp. viii.+222; London: Whittaker & Co., 1910.

Igneous Rocks, vol. i., by **J. P. Iddings**; pp. xi.+464; New York: Wiley & Sons, 1909.

An Introduction to Petrology, by **F. P. Mennell**; 2nd edition, pp. vii.+204; London: Gerrards, Limited, 1910.

The Recognition of Minerals, by **C. G. Moor**; pp. vii.+231; Mining Journal, no date.

It is very generally recognised that the comparatively new science of Physical Chemistry has many and important applications to the problems of Geology, and especially of Petrology. That no very great progress has yet been made on these lines is due to the inherent complexity of the operations of Nature as compared with those of the laboratory, but partly also to another cause. The chemist has not, as a rule, sufficient acquaintance with geological questions to apply his knowledge; while the geologist is seldom well versed in a special branch of chemistry which is of recent and rapid growth. We are the more indebted to Dr. Elsdén, who, combining both qualifications, has given in the volume before us the desired connecting link. According to the sub-title of the book, it is 'a review of the application of the Equilibrium Theory to Geological Problems.' In successive chapters he considers equilibrium in reference to fusion, viscosity, diffusion, surface-tension, vapour-pressure, polymorphism, solution, eutectics, and solid solution. Each chapter is full of useful matter, and furnished with copious references. If we have any criticism to make, it is that, in the effort to compress so much into a small compass, the treatment becomes in some places rather fragmentary and tantalizing. Nevertheless, the book will be heartily welcomed by the student.

Professor Iddings' volume, uniform with his 'Rock Minerals' (1906), must rank as the best and fullest account of the characters of igneous rocks hitherto offered to the English reader. The earlier chapters deal with the chemistry of the subject. Chapter I. gives a very clear and useful view of the chemical composition of igneous rocks, with a comparison of various devices for the graphical presentation of rock-analyses. Chapter II., which treats of the chemical composition of the constituent minerals, might perhaps be abridged with advantage, and more space given to the important chapters which follow: viz., those devoted to the chemistry and physics of rock-magmas in the light of accepted principles. Of special value is Chapter VI., on the textures of igneous rocks, illustrated by numerous well-chosen figures. Next comes a discussion of magmatic differentiation, which will be read with interest. Then, after a rather brief account of the modes of occurrence of igneous rocks, we come to the second part of the book, dealing with classification and nomenclature. This consists of three chapters. The first is a historical review; the second groups the more important igneous rocks in a 'qualitative' mineralogical system; and the third is an exposition of the 'Quantitative Classification,' of which the author is joint-creator. Concerning the value of this, we have our own opinion, which cannot be set forth in this place. Suffice it to say that we shall await with lively curiosity the appearance of volume II., in which the author must face the task of a systematic account of igneous rocks in terms of the new classification.

The student of petrology has the choice of numerous text-books which have appeared in Germany, France, and England. Mr. Mennell's book is written from Bulawayo, and many of the illustrations are drawn from South African sources. Beginning with the collection of specimens and the preparation of thin slices, the author goes on to give a concise account of the characters of crystallized minerals. The crystallographic part is too brief to be of much service; but the use of optical properties in discriminating the common rock-forming minerals is clearly set forth, and

the accounts of the specific minerals are sufficient for the purpose in view. Then follow chapters dealing with the constitution and structure of the leading types of igneous rocks, grouped under four heads: acid, intermediate, basic, and ultrabasic. Sedimentary rocks and metamorphism are in like manner discussed briefly but clearly. We think the author might wisely have limited the scope of the book to this practical side of the subject; for his excursions into the more speculative region are much too brief to do justice to the large questions which are here touched. The attempt to prove that granites are made from the melting up of sediments is likely to puzzle the student, as it does the reviewer, and the statement that basic rocks are the most fusible should not be made without some attempts to reconcile it with obviously conflicting facts.

Mr. Moor tells us that the object of his book is 'merely to provide an elementary guide to the recognition of the minerals that possess commercial value . . . In order that an unknown mineral or stone may be quickly identified, all those of *similar appearance* are classified into groups, without reference to their composition. Thus all *black minerals* appear in a group by themselves, all *red* ones form another group, all minerals having a metallic appearance are grouped together, and so on.' This seems to offer the prospector, not a guide to the knowledge of minerals, but a cheap substitute for such knowledge. It is true that the author warns him against forming any final judgment 'until confirmatory tests have been applied'; viz., blowpipe tests, specific gravity determinations, and the like. We strongly incline to believe that, if the novice follows this very necessary counsel, his experience will in the end cost him at least as much labour as would a proper training on systematic lines. In addition to its main subject, the book includes a general account of mineral deposits by Mr. D. A. MacAlister and sundry appendices. It is printed only on one side of the paper, presumably to allow for manuscript notes.—A.H.

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Bacon is Alive! being a reply to Sir Edwin Durning-Lawrence's 'Bacon is Shakespeare.' By **Thomas Sheppard** (Hull: A. Brown & Sons, 46 pp., 1/-) is perhaps not of particular natural history interest, beyond the fact that the author 'proves' (according to Sir Edwin's methods), that Bacon wrote 'Gent's History of Hull,' and Sheppard's 'Geological Rambles in East Yorkshire.' Perhaps some idea of the nature of the pamphlet, (which was the presidential address to the Hull Shakespeare Society) can be gathered from Sir Edwin's criticism thereon, viz.: 'Sir Edwin Durning-Lawrence regrets that the Curator has so degraded the Hull Museum and disgraced himself'!

Proceedings of the Sheffield Naturalists' Club, Volume I., 1910, 146+XIV. pp., 1910, 2/- net.

Although the Sheffield Society has been in existence forty years, it has not hitherto published anything of a tangible nature. The present Proceedings certainly appear substantial, and contain the various natural history, etc., contributions which were prepared for the Handbook for the British Association at Sheffield, the only difference being that they are now put together and re-paged. These contributions are by Messrs. Howarth, Hobson, Johns, Bradshaw, Snelgrove, Gibbs, Stiles, Denny, Patten, Allen, Roebuck, Brady, Hardy, Evans and Brown, and certainly most appropriately form a first volume for the Sheffield Society; a good foundation, in fact, upon which to build further work. The excellent maps which appeared in the Handbook are also reproduced here. It seems a pity that whilst these valuable articles were being reprinted, a larger size of paper was not used; as it is the Proceedings are only $7\frac{1}{2} \times 5$ inches, instead of ordinary 8vo size, and presumably future volumes will have to correspond. The title, also, should have been printed along the back; as it is, it is possible, when on the shelves, to be mistaken for an art gallery catalogue or a prayer-book. Bibliographers should note that the date 1910 on the cover really ought to be 1911.

NEW NATURAL HISTORY BOOKS.

WE are glad to find that after the glut of third or fourth-rate Natural History Books which occurred soon after the revival of nature study a few years ago, the publishers are at last exercising more care in the publication of works on natural science. It is doubtless the result of the survival of the fittest; the weak ones long since having gone to the wall. But a few years ago anyone with a field glass and a fountain pen, so long as he knew a hawk from a handsaw, felt qualified to write books, and strange to say, was able to find publishers to put them on the market. Now, as was inevitable, this has changed, and we have good books, by good men, published by good houses. Many such are on our tables.

Probably most readers of 'The Naturalist' who, like the writer, are in the autumn of their lives, will look back with pleasure upon the days when Wood's Popular Natural History was *the* book on the subject, when all that seemed knowable of beast, bird, reptile, fish, or insect, was to be found within its covers. Since then, notwithstanding the thousands of books that have been placed upon the market, none seem to have quite filled the place of Wood. Several have tried, certainly. At last we feel that a volume has appeared that will take its place, and will appeal with equal fascination to the new generation of young naturalists. This is a **New Illustrated Natural History of the World**, by **E. Protheroe, F.Z.S.** (564 pp., 7/6: G. Routledge & Sons, Ltd.). It is on Wood's well-known successful plan, but has the advantage of better illustrations; better descriptions of a greater number of species, and is much better produced. Mr. Protheroe handles the various natural orders with equal success, and in selecting representative mammals, birds, reptiles, fishes, insects, corals, sponges, etc., has given evidence of great care. In addition to the numerous illustrations from photographs, etc., there are many good coloured plates. In the future when we are asked to recommend a sound general natural history, we shall have no hesitation in saying 'Protheroe.'

With Nature and a Camera, by **R. and C. Kearton** (368 pp., Cassell & Co., 5/-) has been issued once more, and there is therefore good reason for calling the present the 'popular' edition, and at this price it is deservedly so.

Many of our readers will doubtless have already seen the volume in one or other of the many previous editions; if not, the present is a good opportunity of getting the volume cheaply. There are three chapters on St. Kilda, one on gamekeepers, four on birds, one on duck decoying, one on 'people we have met,' and one on 'our methods of photography,' which we like the least, as we certainly think that many, if not most of the photographs could have been taken without the extraordinary trials and hardships which we doubt not were entailed. We cannot quite see the object of two pages being occupied by a 'fac simile of portion of a letter received by the author per St. Kilda Mailboat,' unless it is to let us see the reference to 'the big stone that nearly killed Cherry.' We have heard of that Cherry stone before.

Convergence in Evolution, by **A. Willey, F.R.S., etc.** (177 pp., John Murray, 7/6 net).

Dr. Willey has travelled much, and has made many suggestive observations whilst on his travels. Several of these are included in the present volume, though we take it this work is largely a reply to Dr. W. H. Gaskell's recent 'earthquake hypothesis,' regarding the origin of the Vertebrates, which has already been referred to in this journal. Dr. Willey's contribution is well worthy of careful perusal and study. An idea of the variety of the subjects dealt with can be gathered from the following heads to chapters:—The Art of Morphology; Physiological Classification; Exposed and Concealed Animals; Free and Fixed Animals; Mimicry and Homoplasia; Divergence and Parallelism; Special Convergence, Habitudes and Attitudes; The Ways of Breathing; and Convergence in minute structures. Dr. Willey's book, *inter alia*, contains many observations, some decidedly remarkable; which we do not remember having seen recorded previously.

Lives of the Fur Folk, by **M. D. Haviland** (234 pp., Longmans, Green & Co., 15/-) is a series of stories of 'Redpad the Fox,' 'Fluff-button the Rabbit,' 'Grimalkin the Cat,' and 'Stubbs the Badger.' The stories are well told, and are evidently by one who is thoroughly familiar with the woods and fields where these animals are at home. There is a strong flavour of the game-keeper and poacher, and now and then the sporting instinct tells, as for example in the story of the fight between a dog and a badger. The volume is brightened by numerous head pieces, tail pieces, and 'side' pieces.

Of Distinguished Animals, by **H. P. Robinson** (234 pp., W. Heinemann, 6 net) is largely a reprint of a series of articles which appeared in *The Times* during 1909, under the title of 'Studies in the Zoological Garden.' They are much more useful and get-at-able in their present form. The author deals with lions, tigers, bears, wolves, dogs, elephants, rhinoceroses, and hippopotami, buffaloes, gorillas, monkeys, crocodiles, snakes, eagles, owls, and ostriches. The various stories are pleasantly written and incidentally contain much useful information. The volume is greatly improved by the series of excellent reproductions of very fine photographs. These are amongst the best we have seen recently. Some are very quaint; the Monkey-eating Eagle has a particularly dissipated appearance!

The Open Book of Nature, by the **Rev. C. A. Hall** (268 pp., A. & C. Black, 3/6 net).

The author of this comprehensive 'Introduction to Nature Study' was at one time stationed in a prominent Yorkshire city, and whilst there, gave evidence of his broadmindedness. In the present work he 'gives the reader credit for ingelligence and earnestness. He does not think that youngsters like to be spoken to in namby-pamby terms, and treated as babies.' And he stands for thoroughness. The book is largely devoted to geology and botany, that part relating to fossils being almost an elementary text-book on the subject; and in parts is certainly 'text-booky.' Pond life, photography, collecting, and other items likely to be of interest to young readers are also dealt with. There are quite a number of illustrations, including several coloured plates; though they are not 'classified' quite so well as the author insists that fossils, etc., should be. For instance, plate XVIII. and XIX. are both on the same piece of paper; the first is a photograph of the Red Campion; the second is a coloured plate of the Moornen and young, and facing it are figures of *Paradoxides Davidis* [sic] and *Conocoryphe Lyelli*, trilobites of the Cambrian age. Generally speaking, the volume is one which will appeal to young naturalists, and its author certainly does not lack enthusiasm. In the first portion of the first paragraph on page 1, there are no fewer than thirteen capital P's.

Hunting in British East Africa, by **P. C. Madeira** (304 pp., J. P. Lippincott Co., Philadelphia and London, 21/- net). This fine volume is 'dedicated to a girl and two boys who stayed at home, and for whom the story was written'; their parents, Mr. and Mrs. Madeira, having had a successful hunting expedition in British East Africa. The author narrates not only what he did whilst in the bush-country, but gives an entertaining account of the journey there and back. This is made much more entertaining by the reproduction of the fine series of photographs, nearly all of which are his own, and vary from 'An Aden water-cart' to 'Mrs. Madeira sat on a dead rhino.' Of course the main part of the book deals with the big game, and judging from the extraordinary numbers of fine trophies figured, the author had a gory time. Mr. F. C. Selous gives a 'foreword' in which he justly commends Mr. Madeira's 'plain unvarnished tale, modestly and interestingly told.' Mr. Selous also records his admiration for Mrs. Madeira, though he has not met her. Unfortunately the photographs of the lady are not as successful as we could have wished. There are two useful maps in a pocket at the end of the volume.

The Age of Mammals in Europe, Asia, and North America, by **H. F. Osbourn** (635 pp., The MacMillan Co., 18/6 net). This volume contains 'The Harris Lectures, delivered at North-western University,' and is dedicated to Huxley and Balfour, the author's British teachers, the influence of whom is apparent throughout the work. In an admirable Introduction Prof. Osbourn refers to the Rise in Palæontology, Darwin's Influence, the Influence of American Discovery, the Origin of Mammals, the geographic or space distribution of mammals, their geologic or time distribution, fossils, zones, etc. He then deals in detail with the various geological discoveries that have been made, in their order, and by the aid of numerous maps, diagrams, photographs, and restorations, makes one of the most comprehensive and scholarly contributions to palæontology that we have seen. The work is the result of many years' study on the comparison of the new and old world life; and many, besides geologists and zoologists, will find 'The Age of Mammals' of value. The work certainly deals with the subject most thoroughly, and will be *the* text-book thereon for many years to come.

The Book of Migratory Birds met with on Holy Island and the Northumberland Coast, to which is added descriptive accounts of Wild Fowling on the Mud Flats, with notes on the General Natural History of this district, by **W. Halliday** (258 pp. London: John Ouseley, Ltd. 5/- net). We suppose there is some good purpose served in printing this book, but at present we have failed to see it. It is not a book of migratory birds; it has but little, and certainly nothing new, on the question of migration; and if it has a good sale, we opine it will be due to its somewhat misleading title. Its subtitle, too, is also wrong, unless we are very much mistaken, as surely there are no Cassowaries and Ostriches and Ostrich farms on Holy Island? And what can the ghastly representation of 'St. Cuthbert on Holy Island being offered the Bishopric of Hexham' have to do with the migration of birds, unless it is that his face (if represented aright) was the cause of the birds' first migration from holy Holy Island? The illustrations, too, are about on a par; the photo of the 'Climmers' at Flamborough (though Flamborough is not referred to) and of nests and eggs of birds from all over—anywhere almost but Holy Island, can have little bearing upon either migration or Holy Island. And anyone can tell that the angelic, not to say holy expression on the Great Crested Grebe (facing page 135), stamps it as a fraud. The author has been fortunate in getting the permission of different writers to reprint their papers on quails on Hatfield Chase, Yorkshire; Marking of Woodcock, etc., but what possible connection can these have with either migratory birds or Holy Island? and the chapter on Seal Hunting in Greenland has surely been inserted as a joke. The 'arrangement' of the book (if we can flatter it by using that word), is extraordinary. We certainly think that both author and publishers would have been well advised if they had allowed some capable ornithologist to go through the MSS. before publication; though possibly had this been done, the work would never have seen the light. A 'Book of Migratory Birds,' it is not, but a scrap-book of miscellaneous notes, chiefly of the birdy, birdy, talky, talky type, it may be we can only wonder at the possible nature of the 'valuable help' that has been given by the various gentlemen enumerated in the Preface, and we hope they are satisfied with the result. However, the author himself tells us that 'man is but mortal, and his best work is oft-times a sorry attempt.' Amen.

How to Know the Trees, by **Henry Irving** (Cassell & Co., 180 pp., 3/6 net) is of a very useful type, and the outstanding feature of this book is the series of excellent photographs of the trees and their various parts, by Mr. Irving, who has earned a good reputation for his botanical photographs. It will prove a useful guide to beginners anxious to identify the various trees in the field.

PROCEEDINGS OF PROVINCIAL SCIENTIFIC SOCIETIES.

The Huddersfield Naturalist and Photographic Society's Annual Report, 1909-10, is to hand, and contains brief local natural history notes by Messrs. C. Mosley, E. Fisher, W. E. L. Wattam, and J. W. H. Johnson. We observe that of one lecturer it is stated 'his slides were very good!'

The Proceedings of the Liverpool Naturalists' Field Club for the year 1910 contains a detailed report of the field excursions; the records, etc., being chiefly botanical. A photograph of the Botanical Referee, Mr. J. W. Ellis, appears as frontispiece. This Club has been in existence half a century.

In Vol. XV., part 3, of the **Thoresby Society's Miscellanea**, Mr. E. Kitson Clark has a paper on Leeds in Pre-historic Times. The author admits there is not much to be said on the subject, and his paper is illustrated by a photograph on which are figures of some 'pre-historic' implements. Some of these are certainly not implements at all, others are forgeries, and some are from Bridlington. Mr. Kidston Clark refers to the writer of a Hull Museum Publication on Forgeries and Counterfeit Antiquities, perhaps pardonably, as J. Sheppard!

The Transactions of the Perthshire Society of Natural Science, Vol. V., Pt. 2, 1909-10, contain 'Some Lessons from the Darwin Centenary,' by Dr. J. H. Lyell; 'Coleoptera of Kinnoull Hill,' by Mr. W. E. Sharp; 'Some Ectoparasites in the Museum, Perth' [these are all dead!], by Dr. J. Waterston; 'Perthshire Diptera,' by Mr. A. E. J. Carter; 'David Douglas [of] Scone, botanist, etc.," by Mr. R. Dow; 'Our Alpine Flora,' by the President (Mr. W. Barclay). There are also four valuable coloured maps of Perthshire, viz.: Orographical, Drift, Solid Geology, and Vegetation.

The 34th and 35th **Quarterly Records of the Hull Museum** (Publications Nos. 74 and 76) are to hand. (A. Brown & Sons, one penny each). In addition to the ordinary list of additions, there are illustrated articles (in No. 74) on 'An Old Jewel Casket from a Holderness Village,' 'Early Humber Steamships,' 'Staffordshire Pottery Figure of a Slave,' 'Hull Glass,' 'Wild Flowers,' and 'Neolithic Workshops near Bridlington'; and (No. 76) 'A Giant Crab,' 'Holderness Neolithic Axes,' 'Old Hull Waterpipes,' 'The Kiwi,' 'Scunthorpe Cinerary Urns,' 'Early Hull and London Ships,' etc., and a report of the opening of the Natural History Extension of the Museum.

The Proceedings of the Royal Irish Academy (Vol. XXIX., Section B, No. 2. London: Williams & Norgate, 1/6) are devoted to 'A Synopsis of the False-Scorpions of Britain and Ireland,' by our contributor, Mr. H. Wallis Kew. This is a work that has long been required by the students of the Arachnida. There is a careful and critical description of the various species of the British False-Scorpions, which are represented on three plates. With these excellent figures it should not now be a difficult matter to identify the various species. Formerly it required reference to an extensive literature before identification could be certain. We should like to congratulate Mr. Wallis Kew on this admirable piece of work.

The Annual Report of the **Manchester Microscopical Society** for 1909 has recently been issued (140 pp., 1/6), and is further proof of this energetic society's activity. The list of additions to the society's library and collection is particularly gratifying. The volume contains Prof. J. Hickson's presidential address on 'The Origin of Sex'; and papers on 'The Red Seaweeds,' by Mr. L. W. Waechter; 'The Frog,' by Mr. J. W. Dunkerley; 'The Scab Diseases of Potatoes,' by Mr. T. G. B. Osbourn; 'Evolution of Plants,' by Mr. C. Lambert; 'The Ultra-Microscope and Dark Ground Illumination,' by Prof. W. W. H. Gee; 'Charles Darwin: his Life and Work,' by Mr. H. G. Willis; and 'A Few Notes on Glycerin,' by Mr. C. Turner. Several of the papers are illustrated. There is also a report of the Society's rambles.

NEWS FROM THE MAGAZINES.

Prof. McIntosh has a valuable paper on 'The Toothed Whales,' in *The Zoologist* for March.

Mr. V. H. Blackman has a paper on 'Nucleus and Heredity' in *The New Phytologist* for March.

With *La Feuille des jeunes Naturalistes* (April-May, 1911), are six plates with excellent representations of various species of *Limacidae* and *Helicidae*.

A report on 'The 1909 Irruption of the Crossbill as observed in the British Isles,' by Messrs H. F. Witherby and C. J. Alexander, appears in *British Birds* for April.

The parts of the *Harmsworth Natural History* recently published are devoted to the birds, and are particularly well illustrated, both by coloured plates and figures in the text.

We regret to notice the record of the death, in South Africa, of Mr. O. C. Silverlock, formerly an assistant master at the Heath Grammar School, Halifax, and a member of the Yorkshire Naturalists' Union. Mr. Silverlock was on the Zambesi in a canoe, and was capsized by a hippopotamus and drowned.

We are glad to see Part III. of S. S. Buckman's *Yorkshire Type Ammonites* (W. Wesley & Sons, 3/6). It includes admirable plates with illustrations of *Ammonites birdi*, *depressus*, *figulinus*, *omissus*, *aureolus*, *vortex*, and *turriculatus*, with descriptive letterpress. Mr. Buckman is evidently doing this work conscientiously.

In the April *Entomologist's Monthly Magazine*, Mr. G. H. Verrall gives 'Another Hundred New British Species of *Diptera*.' This is merely a list of names, adjoining some of which are 'n. sp.' In the same journal Messrs. C. Davies Sherborn and J. H. Durrant give a bibliographical 'Note on John Curtis's British Entomology.'

Even *Punch* is being influenced by the growth of the Nature Study movement, and occasionally has a natural history item. The following is from No. 3633 of that journal, under the heading, 'A Pretty Compliment': - 'A correspondent informs us that at the last scientific meeting of the Zoological Society, Mr. Oldfield Thomas described a collection of mammals from Eastern Asia, and stated that, in recognition of the help given by the Duke of Bedford in forming this collection, he proposed to name a new species of Shrew after the Duchess.'

In *Knowledge* (No. 511), reference is made to Dr. Dammermann's recent investigation concerning the *saccus vasculosus*, a dependence of the brain peculiar to fishes. A remarkable downgrowth or infundibulum from the tween-brain or region of the optic thalami bears the very interesting pituitary body, but it also gives off a posterior diverticulum called the *saccus vasculosus*. In many fishes this lies, along with the pituitary body, in a pit of the skull called the *sella turcica*. We are not surprised to learn that Dr. Dammermann proposes to call this a 'Benthic' or Depth Organ.

The following rather tall story is given by a correspondent in a recent issue of *Nature*: - A fox in Cambridge was seen by a farmer to be collecting the sheep's wool caught in the thorns and branches. 'When he had gathered a large bunch, he went down to a pool at the junction of two streams, and, turning round, backed slowly brush first into the water, until he was all submerged except his nose and the bunch of wool which he held in his mouth. He remained thus for a short time, and then let go of the wool, which floated away; then he came out, shook himself, and ran off.' The wool was secured, and found to be full of fleas, which had gradually crept up the fox's body and head to prevent themselves from drowning.' We think the farmer might have presented the fox with a small-tooth comb.

JUNE, 1911.

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THE NATURALIST.

A MONTHLY ILLUSTRATED JOURNAL OF
NATURAL HISTORY FOR THE NORTH OF ENGLAND.

EDITED BY

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WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF

J. GILBERT BAKER, F.R.S. F.L.S., GEO. T. PORRITT, F.L.S., F.E.S.,
Prof. P. F. KENDALL, M.Sc., F.G.S., JOHN W. TAYLOR,
T. H. NELSON, M.B.O.U., WILLIAM WEST, F.L.S.,
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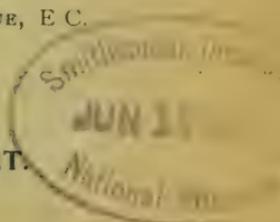
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T. SHEPPARD, F.G.S., The Museums, Hull.

NOTES AND COMMENTS.

THE VANDALISM OF COLLECTORS.

Under this title Mr. S. L. Bensusan writes in Cassell's Magazine for May, and opines that 'it is not altogether for the good of the world at large that nature study has developed so rapidly of late.' Whilst there is much in the article with which all naturalists will agree, we are certainly of the opinion that the increased interest now being taken in natural history is beneficial in many ways. 'Collecting,' as such, is not now encouraged, and never before have the mammals, birds, insects and plants been so well protected as they are to-day. Influential Societies, land-owners, the police, and last, but by no means least, the teachers in our schools are all doing much to preserve our native fauna and flora. The camera, too, is an excellent aid, and enables a naturalist to confirm his records without 'collecting' the specimens themselves.

THE VALUE OF COLLECTIONS.

Mr. Bensusan goes on to say that the position is 'the more serious because the area of uncultivated ground in these islands is very small, and the collector is ubiquitous.' We do not deny that there are collectors who are doing harm; and there always were, and probably always will be. At the present time, however, his opportunities are not so great: his chances for 'exchanging,' or worse still, trading, are less and less; and the value of his work is not now gauged by the number of eggs or insects or plants in his collection. The collector's craving can, now-a-days, be met, as suggested by Mr. Bensusan, by developing into 'the amiable harmless philatelist,' without 'exterminating' anything. Whilst on the question of the harm that is doubtless done by collectors pure and simple (if such terms can apply to collectors!) we are in agreement with Mr. Bensusan; we certainly are of the opinion that the present increased interest in Nature is more beneficial than harmful, and, therefore, differ from him in considering that the great interest nowadays in nature study is, on the whole, to be regretted.

BRADFORD PHILOSOPHICAL SOCIETY.

The Bradford Philosophical Society has come to an end. Its history has been one of falling and rising again. The original society was founded in 1808, but its term of existence was not known exactly. A fresh start was made in 1823, but that society was eventually nipped in the bud by the then vicar of the town, who was afraid that philosophical lectures were disturbing. Another start was made with renewed vigour in 1839, but the new society only lasted four or five years. In 1864 another effort was made, under the secretaryship of

Professor Miall, and that society lasted till 1876. Largely through the exertions of Dr. Willis, a new start was made in 1884. That society has gone on flourishing until a few years ago, and it is only during recent times that it has fallen from its prosperity.

THE WONDERS OF FILEY.

From the daily press we learn that 'a fall of sandstone in the cliffs of Hebberstone Bay on the Yorkshire coastline near Filey has disclosed a rich collection of fossils. Delicate ferns, bellumites (sic), ammonites, with nautilus, oyster, mussel and cockle shells, perfectly petrified, are so thickly strewn on the faces of the fallen blocks, several of which are tons in weight, that a chisel can scarcely be placed between them. Many of the bellumites (sic) are nine inches and a foot (sic) in length, but the softness of the sandstone in the newness of its exposure permits of many of them being easily worked out by a knife. There are hundreds of separate fossils in each of the blocks. The district has long held a peculiar interest for geologists.' With this last sentence we fully agree, and it is likely to continue to hold 'a peculiar interest,' so long as this particular journalist remains there.

York District Bird Notes.—The following is a list of dates of arrivals of most of the local summer visiting species, and in the majority of instances, the dates of appearance are even later than last year:—

Ring Ouzel . . .	March 10th	Redstart . . .	May 13th
Swallow . . .	April 22nd	Blackcap . . .	"
Lesser Whitethroat	"	Garden Warbler	"
Chiff Chaff . . .	April 28th	Wood Warbler . . .	"
Willow Warbler	"	Sedge Warbler . . .	"
White Wagtail . . .	"	House Martin . . .	"
Swallows (numbers)	"	Sandpiper . . .	"
Cuckoo . . .	"	Yellow Wagtail . . .	May 14th
Landrail (one) . . .	"	Turtle Dove . . .	"
Nightjar . . .	May 6th	Wheatear . . .	"
Swift (several) . . .	May 11th	Sandmartin . . .	May 21st
.. (numbers) . . .	May 13th		

I heard the first Snipe 'drumming' on March 11th, and on March 16th I noticed a flock of about sixty Wild Geese (species uncertain), flying over Huntington in a south-east direction, at the time there was half a gale blowing from the north-east. The Whimbrel occasionally visits this district during May, when passing north on its annual journey to its nesting haunts, a pair being seen feeding on some ploughed land at Wigginton, on May 15th.—SYDNEY H. SMITH, York, May 23rd, 1911.



Fig. 1.



Fig. 2.



Fig. 3.

Unio kendalli, n.sp., Lower Estuarine Series, Saltwick, Yorks.

A NEW SPECIES OF UNIO FROM THE YORKSHIRE ESTUARINE SERIES; WITH NOTES ON OTHER FORMS.

J. WILFRID JACKSON, F.G.S.,
Manchester Museum.

(PLATE XIV.).

WHILST my paper on *Unio distortus*, etc., from the Upper Estuarine Beds of Gristhorpe, Yorks.,* was being published, I received from Prof. P. F. Kendall a number of interesting fossil Unios, obtained from a well-defined horizon in the Lower Estuarine Series of Saltwick, near Whitby. The first specimen was found by Mr. J. W. Stather, F.G.S., in a fallen block of stone, but on a subsequent visit Prof. Kendall discovered the actual bed in which the shells occur, and several examples were obtained.

On the kind invitation of Prof. Kendall I joined his geological expedition to the Yorkshire Coast at Easter, and spent some time with him in examining the various exposures of Estuarine strata along the coast. We collected a large series of Unios from the Saltwick exposure, as well as others from two other points, Brow Alum Quarry and Haiburn Wyke, further south.

The Unio-bed at Saltwick lies about 27 feet above the Dogger, and the shells themselves appear to be confined to a band of shaly material, 6 or 7 inches in thickness, underlying a bed of sandstone. By far the greater number of examples were found on their sides, with both valves closed; others had the valves wide apart, but still adherent along the hinge-line. Only one example was seen in a vertical position, and this was enclosed in an ironstone nodule. The majority of the specimens collected were in the form of casts.

With the possible exception of an obscure form from the Lower Estuarine beds, near Peak, which will be referred to later, the Saltwick Unios appear to be the earliest authentic specimens of the genus in the British Isles. Another interesting and important feature is that some of the better preserved examples possess traces of umbonal sculpture.

As the form appears to be quite new, I have much pleasure in associating with it the name of Prof. Kendall as a slight appreciation of the excellent work he has done in Yorkshire and elsewhere.

With reference to the obscure form from near Peak, the material at my disposal is unfortunately not very satisfactory. The first example was found some years ago by the Rev. B. C. Constable, of Stockport, in the Brow Alum quarry, on

* 'Naturalist,' Feb.-Mar., 1911, pp. 104-107, 119-122, pl. IX. and X.

the south side of Robin Hood's Bay. This specimen, however, has been mislaid, and is, therefore, not available for examination.

During Easter week, Prof. Kendall and I visited this quarry and succeeded in finding three further examples. The *Unio*-bed here is only 18 inches above the top of the Dogger, and underlies a 'seat-earth' with rootlets, on the top of which is a very impure coal-seam. The specimens obtained are, unfortunately, too imperfect for accurate specific determination, but in general appearance they somewhat resemble a small variety of the Saltwick form. One specimen is interesting in possessing traces of two or three strong liræ on the posterior slope of one of the valves, radiating from the umbo to the posterior margin. Whether this can be regarded as sculpture or not is uncertain. It may, of course, be due to crushing, as the shell shows signs of having undergone some lateral pressure. Until further and more perfect examples are obtained it will, perhaps, be wiser to defer the description of this form.

Some specimens of a *Unio* were also obtained from the Lower Estuarine beds at Haiburn Wyke. They were discovered on breaking up a large ironstone nodule containing plant remains, the most abundant of which was *Coniopteris hymenophylloides* (Brong). Unfortunately, all the examples obtained are young individuals, none exceeding three-quarters of an inch in length. The form is oblong oval, rounded anteriorly, angulated above posteriorly, base and hinge-line curved. The test is covered by numerous fine concentric growth lines, and on the posterior area are, apparently, traces of sculpture in the form of very slight radiating nodules or puckerings.

Phillips, in his 'Geology of Yorkshire,'* quotes a *Unio* from Haiburn Wyke, as follows:—'*Unio insperatus* Phil. M.S., a small oval species. Upper Shale, White Nab. Ironstone, in Lower Shale, Haiburn Wyke.' No description or figure is given, and I have been unable, so far, to discover the type on which Phillips founded the species. Dr. Kitchin has kindly submitted to me two specimens of an obscure *Unio* from the Lycett Collection in the Geological Survey Museum, Jermyn Street, London. These were catalogued as '*Unio insperatus* Phil., from Sandstone Shale, at White Nab, Scarborough.' Thinking these might be Phillips' types, I again communicated with Dr. Kitchin, who replied that there is no proof that Phillips saw or named the specimens, or that the identification with his species either by Lycett or somebody else, had his (Phillips') approval, or was sufficiently soundly based. It is presumed that when the Lycett collection was purchased for

* 3rd. Ed., 1875.

the museum the name *Unio insperatus* accompanied the two specimens. It is just possible, however, that they were so named at a later date.

These White Nab Unios partake somewhat of the shape of *Unio kendalli*; but are much smaller. Both examples, being casts, it is difficult to give a decided opinion before seeing further specimens, as the salient characters are far too obscure. The same argument will apply equally to the immature forms from Haiburn Wyke. Both these forms, therefore, must be left in abeyance for the present.

DESCRIPTION OF THE NEW SPECIES

Unio kendalli n. sp.

(Plate XIV., figs 1 to 3).

External characters:—Shell elongately oblong, tumid; anterior end moderately short, rounded; posterior end much produced, gradually decreasing in tumidity towards the gonium, above which the border is obliquely truncate; hinge-line fairly straight, about two-thirds the maximum length of the shell; basal-line curved. Gonial ridge rather indistinct. Umbones prominent, not contiguous, placed well forward; umbonal region covered by a number of strong parallel and slightly wavy ridges, crossing the growth-lines obliquely. Lunule and ligament distinct. Growth-lines well-defined, in some specimens very pronounced.

Internal characters:—Anterior adductor scar fairly deep and placed well forward; anterior pedal protractor scar small, situated posteriorly and ventrally to the above; anterior pedal retractor scar also small, occupying a position contiguous to the anterior adductor impression near its upper margin. Posterior adductor impression shallow and hardly noticeable on the cast. Pseudocardinal (*i.e.*, antero-lateral) teeth and postero-lateral lamellæ well-developed.

Dimensions:—Length, $2\frac{7}{8}$ inches; height, $1\frac{1}{2}$ inches; thickness, $1\frac{1}{4}$ inches.

Geol. Horizon:—Lower Estuarine Series, 27 feet above the Dogger.

Locality:—Saltwick, near Whitby, Yorks.

Remarks:—The characters on which the above description is based are spread over several specimens in various stages of preservation. One pair of valves (fig. 2), which are gaping, exhibit very clearly the peculiar sculpture adorning the umbonal region. The ridges appear to radiate from a point just anterior to the umbones and cross the growth-lines on the flank at an oblique angle. After passing over the gonial, or posterior, ridge they cross the upcurving growth-lines almost at right-angles. Here, on this specimen, they become

disjointed with occasional short ridges intercalated between the longer ones. On another specimen (fig. 3) these shorter ridges are connected with the longer ones by means of an upward loop. Unlike modern European *Unios* the sculpture is not confined entirely to the nepeonic stage, but is continued well into the neanic stage, more especially on the posterior slope. This sculpture is quite unlike the ordinary concentric, doubly-looped variety met with on modern European *Unionidæ*; but appears to me to be more nearly, though not absolutely, related to the zigzag-radial type of Asiatic forms—*Nodularia*, *Pseudodon*, etc., whose areas are crossed by similarly disposed ridges. Unfortunately, no examples have been so far found which are sufficiently preserved at the anterior end to show the sculpture on that area.

Several of the casts, after careful treatment, revealed the muscular impressions, especially the anterior ones, very clearly (fig. 1). Compared with modern forms, the positions occupied by the anterior pedal protractor and retractor scars, in their relation to the adductor scar, are not markedly different, excepting perhaps that the retractor appears to occupy a slightly lower position than in most modern examples.

After careful development along the hinge-line of some of the casts I was successful in exposing some interesting evidences of well-marked pseudocardinal teeth and strongly-developed poster-lateral lamellæ. The latter, two in the left valve, and one in the right, are long and fairly straight, extending from behind the umbo almost to the postero-dorsal angle. The pseudocardinals consist of one large tooth in the right valve, which appears to be clasped by two processes in the left valve. The type of dentition is not unlike that of *Unio batavus*, *Margaritana margaritifera*, etc., etc., but not like that developed in *Unio pictorum*, *U. tumidus*, etc., where the pseudocardinals are distinctly lamellar in character. Moreover all the specimens of these latter species which I have examined possess *two* distinct anterior lamellæ *in each valve*.

One of the casts (fig. 1) shows what appears to be an abnormality in the anterior dentition of the right valve. Here a well-marked triangular shelf-like process is present, bounded on its two lower sides by deep grooves. Either one of the pseudocardinal teeth of the left valve was unusually large, or the anterior portion of the hinge-line has been crushed down and thus somewhat distorted the dentition. The latter seems the most probable, as none of the other casts I developed show this peculiarity.

Judging from the impressions of the growth-lines and beak-sculpture present on some of the casts, the shell was evidently thin-tested.

DESCRIPTION OF PLATE XIV.

Unio kendalli n.sp.

(Lower Estuarine Series, Saltwick, Yorks.)

FIG. 1.—Specimen showing the general form of species; also the anterior muscular impressions. (Nat. Size).

FIG. 2.—Pair of partly gaping valves (slightly inclined), showing the visible sculpture on the umbonal region picked out in white. The outer white line is a complete growth-line. (Slightly under Nat. Size).

FIG. 3.—Dorsal view of a pair of closed valves, showing lunule, ligament, and umbonal markings. ($1\frac{1}{2}$ times Nat. Size).

(Types in the Manchester Museum).

—: o :—

Some interesting 'Structural Notes on **Taunton Castle**' have been written by Mr. J. H. Spencer, and issued in pamphlet form, (12 pp., 4d.), by the Somersetshire Archæological, etc., Society.

The Report of the **Colchester Museum** of Local Antiquities for 1910-11, has again an encouraging list of acquisitions—Roman and mediæval antiquities, 'By-gones,' etc.; practically all of which are of local interest. At this museum photographs of all the more important exhibits are to be obtained at one penny each.

The **Report and Proceedings of the Manchester Field Naturalists and Archæologists' Society** for the year 1910 (95 pp.) shews that the society is in a flourishing condition, and the Report itself has greatly improved in appearance, and more care has also, apparently, been exercised in the selection of advertisements. The Report is principally a lengthy account of the Society's excursions and meetings, and has a strong botanical flavour.

The **Fifty-Eighth Report and Transactions of the Nottingham Naturalists' Society for 1909-10** (published 1911, 46 pp.) are almost entirely geological, and, with one exception, the papers refer to Nottinghamshire. Dr. H. H. Swinnerton has a paper on 'The Bunter Sandstone of Nottinghamshire and its Influence upon the Geography of the County'; Dr. L. Moysey describes 'Some Rare Fossils from the Coal Measures of Nottinghamshire'; Mr. A. T. Metcalfe writes on 'The Great Earth-Movements (Post Cambrian) of the North-West Highlands of Scotland'; and there is a list of 'Fossil Plants from the Nottinghamshire Coal Measures,' extracted from Mr. E. A. Newell Arber's paper in the Yorkshire Geological Society's Proceedings.

The **Fourteenth Report of the Southport Society of Natural Science for 1908-10** (published 1911, 99 pp., 1/6), contains a short but interesting address by Mr. W. H. Stansfield, on 'The Ice Age in [North] Britain,' which seems to be about the only paper bearing upon the area of the Society's work. There are notes on ancient Egypt, Flying Machines, Comets, Climbing Plants, 'Herbart', Water, and the late Dr. G. W. Chaster (with portrait). We cannot congratulate the editors upon the way the 'Report' is arranged; the abstracts of papers are mixed up with balance sheets, lists of members, lists of officers, etc., etc., giving the report a very unattractive appearance. Each of the various sections has a separate balance sheet (amounting to 8/- or 9/- each), which is printed on a separate page, whilst here and there a whole page is occupied by the mere title of a lecture. Much of this space might be saved if the titles of the lectures given were placed in one part of the report; and the volume would be improved in appearance and value if the lists of officers, etc., were put together; the same remark applies to the balance sheets, reports of sections, and abstracts of papers.

A CENTURY'S CHANGES IN THE SHEFFIELD DISTRICT FLORA.

C. F. INNOCENT.

RATHER more than a century ago Jonathan Salt formed a herbarium, and wrote a catalogue of 'Plants observed to grow wild in the neighbourhood of Sheffield,' of which town he was a native and a resident; the herbarium is now in the Sheffield Public Museum, and the Catalogue is in the Library of the Sheffield Literary and Philosophical Society. The habitats are given for nearly all the plants except those most common, and therefore, it seemed desirable to ascertain the changes which had occurred in the local flora during the nineteenth century as far as was possible from the records. After some years' work I find that of 729 species of local plants in the herbarium and the catalogue, 166 species may be looked upon as now entirely or almost extinct.

It is evident that if the conditions of existence in any locality remain the same, so also will the local plants; but the conditions can remain absolutely the same in theory only, so that the continuance of species in a locality is due to their ability to survive variation from the so-called 'optimal condition,' and the greater the range of endurance the greater the survival value of the plant. I have found that some uncommon plants are still growing in the habitats recorded by Salt, such as *Cardamine impatiens* at Matlock on the Derwent bank.

It has been thought that the flora changes even if the conditions remain the same, but they do not so remain; the conditions change with every floral new-comer.

In a marsh, at Aldwark, Rotherham, Salt discovered *Carex elongata*, for the first time in England, and from the same marsh he recorded *Stellaria glauca*, *Oenanthe Phellandrium*, *Carex curta*. The marsh is still in existence, and at the present time grow there:—

<i>Nasturtium amphibium.</i> <i>Oenanthe Phellandrium.</i> <i>Hottonia palustris.</i> <i>Lysimachia nummularia.</i>	|	<i>Iris pseudacorus.</i> <i>Carex vulpina.</i> <i>C. acuta.</i> <i>C. vesicaria.</i>
<i>Glyceria fluitans.</i>		

Nasturtium, *Lysimachia*, and *Iris* are apparently new-comers since Salt's time, for if not, he would probably have recorded them, and if they are new-comers their arrival changed the conditions of existence for the older inhabitants.

But it appears that the decrease in species in the Flora of this district is on the whole due to man; his influence is both direct and indirect. For the plants may be directly exterminated by man himself or they may be destroyed by the effects of his activities, such as the extended use of machinery, and the repeal of the Corn Laws.

If this is so, an increase or a decrease of population-density will be somewhat proportionate to the decrease or survival of plant species. The population-density in the Sheffield district is correlated to the geological systems, and the persistence of species is most marked upon the Carboniferous Limestone of Derbyshire where the density of population has been adversely affected by the decay of the lead-mining industry; and probably the extension of coal-mining eastwards, into the Triassic and Permian tracts, will seriously affect their floras.

The direct destruction of plants may, I think, be conveniently divided into destruction by (1) children; (2) herbalists; (3) garden and flower-lovers; and (4) nature-students.

Children, happily, prefer known and generally common species of which they can gather a great many individuals: to children, the decrease of *Arum maculatum* is perhaps due.

Herbalists are probably responsible for the disappearance of many more plants than is commonly supposed, for there is still a great use of native herbs in the West Riding. A leading Sheffield herbalist, recently deceased, lamented that his collectors, owing to ever-decreasing supplies had to go constantly farther and farther afield. A writer, in 'The Naturalist,' some years ago, recorded the gathering of large quantities of *Arctostaphylos uva-ursi*, by a party of herbalists, in a North Derbyshire valley, and its disappearance from Salt's recorded habitat is probably due to this cause. To the herbalists are no doubt due the decrease locally of such usually common plants as:—

<i>Chelidonium majus.</i>	|	<i>Erythraea centaurium.</i>
<i>Agrimonia Eupatoria.</i>	|	<i>Stachys betonica.</i>
<i>Sanicula europæa.</i>	|	<i>Euphrasia officinalis.</i>

Lovers of gardens are principally responsible for the disappearance of ferns, which form cheap and useful shade plants, and of many plants showy in character and sentimental in association, in this district, such are:—

<i>Aquilegia vulgaris.</i>	|	<i>Primula vulgaris.</i>
<i>Digitalis purpurea.</i>	|	<i>Narcissus pseudo-narcissus.</i>

Nature-students are probably responsible for the decreases in *Pinguicula vulgaris* and *Drosera rotundifolia*, and in the orchids generally.

To man directly in one or other of the above classes may be ascribed the disappearance of some seven species of orchids, and:—

<i>Viscum album.</i>	|	<i>M. pulegium.</i>
<i>Pulicaria dysenterica.</i>	|	<i>Marrubium vulgare.</i>
<i>Arctostaphylos uva-ursi.</i>	|	<i>Galanthus nivalis.</i>
<i>Hyoscyamus niger.</i>	|	<i>Polypodium phegopteris.</i>
<i>Mentha piperita.</i>	|	<i>Asplenium viride.</i>

In manufactures the hand and water-power of former

times were largely replaced during the nineteenth century by steam-driven machinery, with its coal-smoke, and this is the most baneful influence with which the plants have had to contend.

Coal smoke is deleterious to the plant in various ways. It obscures the sun, and thus decreases the vital activity of the green plant; observations in Bradford, Leeds, and Sheffield have shown that the sunshine and daylight are from 30 per cent. to 60 per cent. greater in the suburbs than in the centres of the cities. Smoke also deposits sticky matter on the leaves, thus choking them, and it impurifies the rain water; the remarkable results of this have been shown by experiments at the University of Leeds in continuously watering cultures of grasses with rain from different parts of the city.

It is possible that the impurities from coal-smoke enter the soil and attack the roots, and possibly, the deposit affects the pollen grains of flowers.

Smoke is not a direct, but rather an insidious enemy, weakening the plant for its individual part in the struggle for existence.

The disappearance of *Campanula hederacea* from the city is probably due to smoke, which, however, seems to have only a very small effect on *Saponaria officinalis*, *Artemisia vulgaris*, *Tanacetum vulgare*, *Matricaria inodora*, *Linaria vulgaris*.

A century ago the old open-, or common-field system of agriculture was surely, if slowly, coming to an end, but the effects of its disappearance were not yet evident in those improvements in farming, only possible under the new system; and one of the results of which we see to-day in the disappearance of many plants of rough cultivation. Few people realize the extent to which land-drainage has been carried out under the separate ownerships and tenures of the last century; this drainage has affected not only the bogs and marshes, but also the woods and fields, and the longest list of extinctions in the district is that of the hygrophilous and hydrophilous species;

The unfortunate water plants have also had to contend with the pollution of rivers arising from the increase of population and manufactures.

Water plants exterminated from the district by the two above causes, or others unknown, are:—

<i>Hypericum elodes.</i>	<i>Potamogeton lucens.</i>
<i>Oenanthe crocata.</i>	<i>P. densus.</i>
<i>Gnaphalium uliginosum.</i>	<i>Juncus uliginosus.</i>
<i>Comarum palustre.</i>	<i>Blasmus compressus.</i>
<i>Callitriche autumnalis.</i>	<i>Isolepis setacea.</i>
<i>Veronica scutellata.</i>	<i>Scirpus pauciflorus.</i>
<i>Scutellaria minor.</i>	<i>Schlevochloa distans.</i>
<i>Hydrocharis morsus ranæ.</i>	<i>Triodia decumbens.</i>

and some half-dozen species of sedge.

Salt's great hunting ground for the rarer hydrophiles was Potterick Carr to the South-East of Doncaster, the drainage of which has caused the following species to be added to the list of extinctions:—

<i>Ranunculus lingua.</i>	|	<i>Alisma ranunculoides.</i>
<i>Myriophyllum verticillatum.</i>	|	<i>Lemna trisulca.</i>
<i>Helosciadium inundatum.</i>	|	<i>Stratiotes aloides.</i>
<i>Utricularia vulgaris.</i>	|	<i>Sparganium natans.</i>
<i>Myrica gale.</i>	|	<i>Isolepis fluitans.</i>
<i>Ceratophyllum demersum.</i>	|	<i>Carex dioica.</i>
		<i>C. ampullacea.</i>

These marsh plants may be considered as examples of a class of extinctions due to decreased distributional area, and this will be most harmful to seed-propagated plants, especially annuals; the smaller the relative area the more difficult is effective seed dispersal and the continuance of the species, and in such a case the wider the seed dispersal of the plant, the worse it will be for it.

The break-down of the old method of agriculture enabled the farmers to respond to the demand for corn caused by the Napoleonic wars and the increase of population, but the repeal of the Corn Laws later led to the decrease of the land under corn, and the cornfield weeds, necessarily annuals, suffered from this decrease of distribution area, but in addition to this, they were growing under cultivation conditions, which involved the selection of the seed most free from weeds. It is not surprising, therefore, that the cornfield weeds form a large group of extinctions and decreases as follows; (1) extinctions:—

<i>Papaver argemone.</i>	|	<i>Linaria elatine.</i>
<i>Fumaria capreolata.</i>	|	<i>Mentha arvensis.</i>
<i>Trigonella ornithopodioides.</i>	|	<i>Lamium amplexicaule.</i>
<i>Bupleurum rotundifolium.</i>	|	<i>Galeopsis ochroleuca.</i>
<i>Caucalis daucoides.</i>	|	<i>Lithospermum arvense.</i>
<i>Torilis nodosa.</i>	|	<i>Lolium temulentum.</i>

and (2) decreases:—

<i>Ranunculus arvensis.</i>	|	<i>Chrysanthemum segetum.</i>
<i>Lychnis Githago.</i>	|	<i>Achillea Ptarmica.</i>
<i>Scleranthus annuus.</i>	|	<i>Bartsia odontites.</i>
<i>Scandix pecten-venervis.</i>	|	<i>Galeopsis versicolor.</i>
<i>Centaurea cyanus.</i>	|	<i>Echium vulgare.</i>

The cornfield weeds which are now found in most abundance appear to be those which have a much wider range than cornfields, merely, such as Corn Spurrey, Scarlet Pimpernel, and Climbing Persicaria.

[Note.—As the discovery of the functions of earth-worms is generally ascribed to Darwin, it is worth noting that Miller's 'History of Doncaster,' published A.D. 1804, contains a letter from Gilbert White of Selborne, with reference to Potterick Carr, explaining the use of earthworms in rendering soil fertile].

Salt found every British species of thistle in this district, which is eloquent of the state of agriculture in his time. The thistles now missing are :—

<i>Carduus tenuiflorus.</i>	|	<i>Cnicus pratensis.</i>
<i>C. marianus.</i>		<i>C. heterophyllus.</i>
<i>Onopordum acanthium.</i>		

The old conditions of cultivation are imperfectly understood, but large tracts called ‘commons’ appear to have been unallotted open pastures, etc., and to their so-called ‘inclosures’ the following extinctions are probably due :—

<i>Cerastium semi-decandrum.</i>	|	<i>Gnaphalium sylvaticum.</i>
<i>Antennaria dioica.</i>		<i>Scirpus cæspitosus.</i>
<i>Carex ovalis.</i>		

On Lindrick Common the destruction of the upstanding plants, such as gorse, by a golf club, has benefitted the uncommon stemless thistle *C. acaulis*, which is now abundant there.

Another group of some ten extinctions is that of the cultivation escapes, which Salt included among the wild flowers, and which it is unnecessary to list.

In the last century many woods have been destroyed, and the local newspapers of the time contain numerous advertisements of oak trees suitable for shipbuilding; these were for those ‘wooden walls,’ necessitated by the ambitions of Napoleon Bonaparte. With the woods have gone also the shade plants, their associates, and the survival value of those that remain is decreased. The following plants are extinct in this way :—

<i>Stellaria nemorum.</i>	|	<i>Orobanche major.</i>
<i>Hypericum androsæmum.</i>		<i>Hordeum sylvaticum.</i>

In the course of ages many kinds of flowering plants have been developed, varying in habitat, life period, fertilization, seed number, seed dispersal, and in many other ways.

As to the life duration, known for every British plant, I guessed that it would be more useful for a plant to be a perennial, and a rather tedious ‘count-up’ shows that there were in the district in Salt’s time 543 Perennials, 36 Biennials, and 150 Annuals, and there have disappeared 134 Perennials, 9 Biennials, and 25 Annuals. The greatest survival value then belongs not to the Perennials but to the Annuals, and indeed are not most of our intruding and prosperous aliens (which become denizens) annuals.

Again, is it more advantageous to produce few or many seeds? I was only able to work this out with the Crucifers. Only two species have disappeared from the immediate neighbourhood of Sheffield, viz. : *Lepidium campestre*, with two, and *Teesdalia nudicaulis*, with four seeds, while many-seeded genera like *Capsella* and *Brassica* still abound.

Among the Labiates *Lycopus europæus* is the only species,

common in Salt's time and uncommon in ours, for the decrease of which there is no apparent reason ; *Salvia verbenaca* has also disappeared from the district ; both these plants have only two stamens, unlike the other British labiates, which all possess four.

Temperature has probably increased, and rainfall decreased, and our few surviving species of Atlantic type are now only found in the valleys away to the West, some of which have a rainfall nearly double of that of the City.

Another group of plants which has disappeared from Sheffield, and whose existence here a century ago, is as astonishing as their disappearance, is the psammophilous xerophiles ; they are found to-day on the Triassic sands to the East, such are :—

<i>Teesdalia nudicaulis.</i>	|	<i>Ornithopus perpusillus.</i>
<i>Moenchia erecta.</i>	|	<i>Vicia lathyroides.</i>
<i>Cerastium semi-decandrum.</i>	|	<i>Potentilla argentea.</i>
<i>Malva rotundifolia.</i>	|	<i>Alchemilla arvensis.</i>
<i>Trigonella ornithopodioides.</i>	|	<i>Festuca bromoides.</i>

For the following disappearances I am unable to suggest reasons :—

<i>Malva moschata,</i>	|	<i>Nepeta cataria.</i>
<i>Eryum tetraspermum.</i>	|	<i>Allium vineale.</i>
<i>Lactuca virosa.</i>	|	<i>Gagea lutea.</i>
<i>Cichorium Intybus.</i>	|	

The subject of species introduced since Salt's time has not, of-course, been dealt with, but such introductions must have had some effect on the original inhabitants.

Some time ago Mr. Sheppard kindly directed my attention to an article in the 'Bradford Scientific Journal,' by Mr. Rosse Butterfield, on the plant extinctions and decreases in the Bradford district. Mr. Butterfield gave a list of 7 plants which have been exterminated ; and of 23 which have decreased in the Bradford district. Some of them do not occur in the Sheffield district, and for others I have no evidence ; but as to the rest, 2 of Mr. Butterfield's extinct species are also extinct in this district, and 6 of his decreasing species are extinct with us, and 7 of them are also decreasing : there are, therefore, the same effects in Bradford as in Sheffield, and in one case (*Erythraea Centaurium*), at any rate, the cause is the same.

In conclusion, it is unlikely in the case of many of the species, that the one cause which I have suggested is alone responsible for their disappearance, and probably several adverse influences have been at work ; it is hardly possible yet for us to know why certain species have been defeated in the battle of life, but some day it ought to be possible to draw up a table of the survival value of plant characters.

THE CHEMISTRY OF SOME COMMON PLANTS.

P. Q. KEEGAN L.L.D.,
Patterdale, Westmorland.

DAFFODIL (*Narcissus pseudo-narcissus*)—The host of golden daffodils that people the underwoods, and stretch in lines along the margin of a bay in the early springtime, serves to awaken a love of nature following upon the dead waste of winter. The plants are hardy, not particular as to soil, and will thrive in damp places partially shaded by trees. The bulbs have well developed mycorrhiza, even when grown in garden soil. It is a slow growing plant with relatively small assimilatory powers, starch being absent from the leaves, save occasionally only around the vascular bundles of their lower parts. The benzene extract of the dried overground parts amounted to 3.1 per cent., and contained a moderate quantity of carotin and fat-oil with wax and cholesterin. The alcoholic extract contained a distinctive tannoid yielding vivid yellows with alkalis, chloride of tin, and aceto-Hcl; also some cane sugar, and resin, but no phloroglucin or scillain. There was much pectosic mucilage, very little reserve starch, and a good deal of oxalate of calcium. The ash of the leaves contained 61.4 per cent. soluble salts, 10.1 lime, 3.6 magnesia, $5P^2O^5$, $4SO^3$, and 9.8 chlorine, with considerable manganese, and much soluble carbonate. The flowers are tintured by carotin in homogeneous plastids, and also by a dissolved pigment which is the tannoid afore-mentioned. The bulb and fruits contain scillain, and also an alkaloid. The flowering bulb contains a good deal of starch, and substances, giving the usual alkaloid reactions. It may be gleaned from the above analysis that the daffodil resembles the non-siliceous grasses in many respects. There is the same sort of fatty matter, resin and tannoid, but there is much less starch, a more watery constitution, and a vigorous deassimilation of the albumenoids as evinced by the abundance of carbonates in the ash. But whereas in some of the grass tribe this process evolves a red pigment in the floral parts, in the daffodil it halts therein at the tannoid, *i.e.*, the yellow-imparting stage.

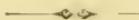
GOOSEFOOT (*Chenopodium Bonus-Henricus*)—It is difficult not to sympathise with the distribution of this remarkable species. It cannot keep away apparently from humanity. Near hamlets and villages, by old churches and monasteries, on roadsides and waste places, and near dwellings it flourishes, and even some remote sheepfolds are occasionally favoured with its presence. It belongs to a salt and drought-loving order. The root stock is thick, fleshy, and many-headed, with an anomalous structure; it contains starch and nitrates, but no tannin. The leaves are of a 'hard' green colour,

and consist only of palisade and water tissue, which accounts for the 'soapy meal' coating their lower sides. The whole leaves on 17th June yielded only 1.3 per cent of wax with much carotin. A great quantity of chlorophyll was extracted by hot alcohol, also traces of a tannoid like quercetin, some sugar, and much resin dissolving brown to red-brown in sulphuric acid. There was very much pectosic mucilage (epiderm is non-slimed), no reserve starch, but a great deal of oxalate of calcium which persistently precipitated as crystal-sand, and not in well-formed crystals. The ash of the overground parts of the plant contained 58.8 per cent. soluble salts, 4.3 silica, 9.9 lime, 4.1 magnesia, 7.3 P^5O^2 , 3.3 SO^3 , and 7.2 chlorine; there was some manganese, and very much soluble carbonates. The above analysis represents that of a powerful nitrate plant nourished quite independently of mycorrhiza or bacteria, hence its distribution may be explained by its keen and eager need and demand for nitrogenous refuse, such as animals supply. The starch produced is readily resorbed, and the fact that only the lower portions of the stem exhibit a red or pink colour (like rhubarb), indicates that it is there where the chief drain on the nitrogenous nuclei of the albumenoids takes place, which it need hardly be said, is the very reverse of what happens in numerous other plants.

SEA PINK (*Armeria maritima*)—This delicate and beautiful seaside plant is brimful of personal associations. In lonely places by the sandy seashore it hangs out its lovely array of pure pink tassels from amidst cushions of sharp grass-like leaves. On lofty mountains, too, it fixes its seat in the crevices of hard rock. Its morphological characters are those of halophytes, viz., reduction of transpiration surface, profile position of the leaves, abundant hairs, mucilage-cells, water-tissues, etc. It is easily cultivated, and is near the Primroses, or the Ribworts according to some authors. On 5th June, the dried overground parts yielded 1.5 per cent. of wax with some carotin, but no fatty matter apparently. There was considerable tannin which was precipitated greenish-black by iron salts, also precipitated gelatine, bromine water, and tartar emetic, and yielded a phlobaphene by dilute acids; also some cane-sugar and resin were found, but no phloroglucin or bitter principle. A large quantity of mucilage was extracted chiefly by dilute soda, but there was no reserve starch or oxalate of calcium. The ash of the plant (unwashed) contained 25 per cent. soluble salts, 33.3 silica and sand, 11.1 lime, 5.3 oxide of iron, 6.1 P^2O^5 , 5.4 SO^3 and 5.3 chlorine; there was some manganese, but little carbonate. Making the silica percentage here to be about 15, the other percentages must be raised about one-sixth. Here, then, we have a plant which produces true tannin and not tannoid merely, and which, moreover, seems un-

usually free from the ordinary organic acids, and thus (though both plants are perennial) the contrast between it and the Goosefoot is very striking. The pigment of the petals is not well developed, and this, notwithstanding the fact that tannin abounds in all the vegetative organs. In October the roots contain a tannin which gives a beautiful blue-black precipitate with peracetate of iron, also they have a little free phloroglucin and phlobaphene, but no starch or sugar.

CLEAVERS (*Galium aparine*)—This is a well-known weed of the hedgerows, and of corn crops on lightish loams, and deep open soils, rarely seen on heavy land, but it flourishes on stony places in close company with clusters of nettles. Prickles (*trichomes*, *i.e.*, outgrowths of the epidermis) are developed on the angles of the stem, margins of the leaves, and all over the fruit. It is a strong nitrate plant with great transpiration, and no mycorrhiza. On 15th July the whole dried plant yielded 1.4 per cent. carotin and wax without any fat-oil; there were mere traces of tannin or tannoid, but a good deal of glucose and cane sugar, also a resin, but no phloroglucin; there was much mucilage, quinic acid, and considerable proteid, reserve starch and oxalate of calcium. The tops extracted in June with cold water yielded much rubichloric acid, also tannin, quinic acid, and a little cane sugar. The ash contained 48.3 per cent. soluble salts, 5.9 silica, 20.3 lime, 5.7 magnesia and manganese, $4P^2O^5$, $2.3SO^3$ and 3.9 chlorine; there was very much soluble carbonate. Experiments as to the presence of vegetable rennet in the fresh tops gave negative results, though the milk-coagulating faculty of the sap seems undoubtedly to exist in warm climates. The roots contain some glucoside, which dyes red like madder, and the seeds are used as a substitute for coffee. Clearly we have here an organism with energetic assimilatory power, and whose albumenoid on deassimilation produces abundant organic acid (citric and oxalic mainly), and also higher derivatives of benzene.



Great Grey Shrike in East Yorks.—One of these birds has been, during the past fortnight, frequently noticed at Lowthorpe. My informant describes the bird well, and reminds me that one was picked up dead under the telegraph wires, between Bridlington and Burton Agnes, some ten winters ago, the skin of which I have. The bird in question has been frequenting a certain fence, and has been seen more than once to take a mouse from its stand on the topmost twig of a hedgerow ash tree, as my correspondent writes, 'more easily and quickly than a kestrel hawk could have done.' The bird is now doubtless further on its way to its breeding grounds in the north.—
W. H. ST. QUINTIN, 15th May, 1911.

EXTINCT ANIMALS OF EAST YORKSHIRE.*

T. SHEPPARD, F.G.S., F.S.A. (Scot.).

PARTLY as a result of the construction of railways, cuttings for drains, excavations for gravel for road repairing, for making railway embankments, for concrete for dock works or for building lighthouses, but principally from the inroads of the sea along the thirty miles of coast between Bridlington and Spurn, we have been able to ascertain the geological structure of East Yorkshire fairly well. Incidentally it has been possible to gather quite a large series of bones, teeth, antlers, horns, and other remains of animals which once existed in the district. These occur in various ways. Sometimes they can be found in the old sand-dunes where they have been left by the hyaenas or other carnivorous animals. In these cases the bones usually occur close together, though in a more or less fragmentary condition, and several species may be found within a small radius. At other times they are found singly, in the Boulder Clay, where they have been left as erratics by the ice; or they may exist in the gravel mounds, in a more or less water-worn condition; or the whole skeleton of a red deer or other animal may be found just as it had died in the peat bog, centuries ago.

As regards age; the bone-bearing deposits of East Yorkshire may be placed under three heads, viz., (1) Pre-Glacial; (2) Glacial, and (3) Post-Glacial, and it is noticeable that, as we might expect, the earliest deposit contains a great proportion of animals very different from those with which we are now familiar, whilst the most recent bed includes the remains of animals more approaching those living in the district to-day.

With regard to the Pre-Glacial beds; we must carry our minds back to that far-off time before England was invaded by glaciers during the great Ice Age. At that period there was no Holderness. A line of chalk cliffs, not discoloured by any glacial material, extended from Bridlington, through Driffield, Beverley and Cottingham to Hessele, and on into Lincolnshire. It was cut through by the Humber, which was then an important outlet. This cliff line averaged one hundred feet in height, and at its foot was a sandy beach which then at any rate, was above the reach of the water; sand dunes were formed, and upon these the hyaenas had their meals. Whilst there are no sections inland, sections have been exposed at each extremity of this cliff line, with interesting results. At Sewerby, near Bridlington, excavations were made over

* Read before the Vertebrate Zoology Section of the Yorkshire Naturalists' Union.

twenty years ago, by Mr. G. W. Lamplugh, with the aid of a grant from the British Association. The existence of the old cliff line had already been indicated by the action of the sea, but Mr. Lamplugh's object was to ascertain the proper sequence of the beds. First of all, at almost the level of the present beach, was the old pre-glacial shore, with its Pholas-bored boulders, oyster shells, etc. Upon this rested the dunes of blown sand, upon which most of the bones were found; and above this, again, was a great deposit of Boulder Clay, left by the glacier, which covered and preserved everything. The bones were usually very fragmentary, and generally bore the marks of the teeth of the hyaenas. Remains were found of the Mammoth (*Elephas primigenius*), the straight-tusked elephant (*Elephas antiquus*), Rhinoceros (*Rhinoceros leptorhinus*), Hippopotamus (*Hippopotamus amphibius*), the Horse (*Equus caballus*), the Irish Elk (*Cervus megaceros*), Bison, and Water Vole. In addition, remains were found of birds, a snake, and cod-fish, as well as a number of shells. Since Mr. Lamplugh's investigations, portions of tusks, teeth, etc., have occasionally been washed out by the sea, but nothing appears to have been added to the list of species given.

Some years later the late George Cook made some excavations at Hessle, near the Humber, for the purpose of obtaining sand, and he excavated many thousands of tons of chalk, gravel and sand.

The work extended over some years, and I paid frequent visits from first to last, and obtained a fairly extensive collection of mammalian remains. A little later the North Eastern Railway Co. widened the railway at Hessle, close to the Humber Bank, but only one fossil bone (Horse) was obtained from this excavation. Many years previously, when the railway was first made, the late Professor Phillips obtained a number of bones of Horse, Elephant, etc., which he placed in the Museum at Hull, where my collection is also housed. These animal remains found at Hessle include those of the Mammoth, Rhinoceros, Horse, Red Deer and Reindeer. The bones also give evidence of the presence of the hyaena; but, as in the case at Sewerby, no actual remains of that animal were found.

The first impression one might get at a glance at this list of animals is that it represents a tropical fauna; but this is not the case. The elephants in those days were clothed with long woolly hair, and the rhinoceros was similarly protected against the cold. The reindeer is certainly evidence of a northern climate.

The next chapter in the geological history of the district relates to the Glacial period, when great sheets of ice from

Scandinavia and the Lake District came along our coasts and deposited great heaps of morainic rubbish, which in places are two hundred feet or more in thickness. This filled up the old preglacial bay, it entirely covered up and obliterated the old cliff line, choked up river channels, and plastered the slopes of the chalk wolds to the west. The ice brought with it bones, teeth and tusks of animals that may have died upon it, or the remains of which may have been gathered up in its course. Such specimens occasionally occur in the boulder clay, quite haphazard, and are frequently picked up on the beach, having been washed out of the cliffs by the sea. The boulder-clay specimens are often glacially striated.

Another good series of remains occurs in the line of gravel hills, which extends across Holderness, some of which have been and others are still being excavated. This series of mounds really represents a moraine of the great North Sea glacier, and in addition to containing glaciated rocks, and countless marine shells from the beds of the North Sea, includes a number of remains of the walrus, as well as of many land animals.

It is interesting to note that a precisely similar assemblage occurs at Spitzbergen, and has been described by Mr. E. J. Garwood in the "Geographical Journal" for April 1897, page 367. Mr. Garwood there says: "An interesting point to notice is the mode of advance of these [Spitzbergen] glaciers, the top layers, shearing over the lower ones, advance more rapidly, until they overhang to such an extent that they break off, forming a "talus" of ice below; over this the glacier advances, finally over-riding the moraine completely. Glaciers advancing in this manner do not, therefore, push forward loose material lying in their path, but flow over it. The lower layers of ice, embayed behind this obstacle, are, however, dragged over it by the upper advancing layers, and bring up with them fragments of the raised beach frozen into their under surfaces. Dr. Gregory and myself found no difficulty in collecting fragments of driftwood, shells, and bones of whales, mixed with pebbles, which had been raised several hundred feet above the level of the beach in this manner."

At Spitzbergen, then, there is at the present day a process going on in all probability precisely similar in character to that which took place in Holderness long, long ago; the results in each case being identical. This is all the more interesting when it is borne in mind how far both examples are separated, both in time and distance.

The animal remains found in these Holderness gravel pits include the Mammoth, straight-tusked Elephant, Irish

Elk, Reindeer, Red Deer, Bison (*B. priscus*) *Bos primigenius*, Ox, Rhinoceros (*R. leptorhinus*) and Walrus. Occasionally some of the bones show teeth marks, possibly of the hyaena. Sometimes the bones are quite angular; at others they are so much water-worn as to resemble pebbles, and identification is impossible.

The Boulder Clay proper has yielded tusks and teeth of the mammoth, some of which have been of very large size. The fact that they are frequently glacially striated indicates that they may have been brought a considerable distance. From the enormous number of mammoth teeth which have been found on the Holderness coast, it is pretty clear that this great woolly elephant must formerly have been a fairly frequent visitor to this district.

The Boulder Clay fauna is not so varied as that of the glacial gravels, and, in addition to the mammoth, seems to be confined to Rhinoceros (*R. tichorhinus*), and the straight-tusked elephant (*Elephas antiquus*). The former record is based upon a single tooth which I found at Dimlington a little while ago, and the latter species is represented by a molar found at Withernsea, recently identified in our collection at Hull by Professor W. Boyd Dawkins. Both have been recently described in "The Naturalist."

Another mammaliferous deposit occurs at Elloughton, near Brough, on the top of a hill about one hundred feet in height, at a short distance from the Humber. This hill is capped by two beds of gravel, an upper one of local origin, and a lower one, containing many West Riding boulders. It is in the lower gravel that the animal remains occur. It was first described by Mr. Lamplugh in the Yorkshire Geological Society's Proceedings, and afterwards, as a result of further excavations and discoveries, in the same Society's publication by the present writer.

Mr Lamplugh described an elephant's tusk in the gravel, which was ten feet in length, but it was not possible to move it. More recently a fairly large quantity of bones and teeth have been obtained, and many of these, through the kindness of the owners, I was able to dig out myself.* In addition to the teeth, horns and tusks, such unexpected items as an elephant's vertebra, and other bones not usually met with, have been obtained, probably owing their preservation to the bed of Oolitic mud in which they often occur. The Elloughton list includes Mammoth, straight-tusked Elephant, Red Deer, Bison, Ox and Horse.

Another interesting deposit occurs at Bielbecks, near Market Weighton. This was first discovered nearly a

* See Proc. Yorks. Geol. Soc., 1896, pp. 221-231.

century ago by the late W. H. Dykes, of Hull, who sought the aid of the late Professor Phillips, and it was described by Messrs. Harcourt, Salmond and Phillips in the "Philosophical Magazine" for 1829. Some hundreds of cart loads of marl had been removed with the object of improving the adjacent sandy soil, and amongst it were found a large number of bones of Lion, Rhinoceros, Bison, Mammoth, Irish Elk, Red Deer, *Bos primigenius*, Horse, Wolf and Duck. These bones were divided between the York and Hull museums. For nearly a century little was known of this deposit beyond the original very excellent descriptions. A short time ago the British Association gave a grant in order that more might be ascertained respecting its nature, and some extensive excavations were made under the supervision of some local geologists. The position and relative order, as well as the extent of the beds, were ascertained, and a large number of bones of Bison and Elephant were found. These the British Association handed over to the museum at Hull.

Resting upon the glacial deposits of East Yorkshire are a number of Lacustrine or old lake beds, containing many fresh-water shells, and occasionally fish remains. These meres are now all dry, with the exception of Hornsea Mere, and are exposed on the coast, or in the sides of drains or artificial cuttings inland. There are many evidences that Holderness was once covered by meres and presented a similar appearance to that of the Norfolk Broads of to-day. In the peat beds the remains of the red deer are plentiful; whole skeletons, and fine pairs of antlers being not at all uncommon. The list from these beds includes *Bos primigenius*, *Bos longifrons*, Red Deer, Irish Elk, Reindeer, Horse, Beaver, Dog or Wolf, Birds (including Duck), Perch and Pike. Remains of the Lion and Mammoth have been recorded as from the Holderness peat, but it has been shown that these records were made in error.*

In connection with these peat beds it should be recorded that Mr. Clement Reid has recently described the compact peaty material, known as "Moorlog," which is frequently brought up from the Dogger Bank by the trawlers. Mr. Reid has carefully examined this material by the aid of the microscope, and drawn up an extensive list of animal and plant remains found in it. The list indicates that at one time the North Sea was similar in appearance to that of the Norfolk Broads of to-day, and he suggests that there has probably been a land connection between England and the Continent long after the ice had melted away. This being

* 'The Naturalist', April, 1904, pp. 102-104.

so, the presence of the reindeer in our peat beds might be accounted for, as that animal would be able to make its way across this swampy district. Mr. Reid's suggestive investigations give food for thought as to the former physical conditions of the Eastern part of England.

For lists of the various remains from East Yorkshire as well as for a Bibliography of the various papers in which they are described, reference may be made to the "Classified List of Organic Remains from the Rocks of the East Riding of Yorkshire," by Mr. H. C. Drake and the present writer, published in the "Proceedings of the Yorkshire Geological Society," Vol. XVII., part 1, 1910, pages 4-71.

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'The *Love of the Honey Bee*' is given in a contemporary as the title of Mr. Tickner Edward's well-known volume.

We regret to record the death of James Dodgson, who was treasurer of the Craven Naturalists' and Scientific Society since its formation, and was its President during the last two years.

In the discussion to Prof. Garwood's paper on 'The Lower Carboniferous Succession in the North-west of England,' recently read to the Geological Society, we learn that one suggestion, which accorded with Dr. Vaughan's view, that the *Thysanophyllum-pseudovermiculare* Band at the top of the *Athyris-glabristria* Zone should be placed well up in C₂, would become a strong probability were it certain, as the Author adduced evidence for believing that the *Spirifer-pinskeyensis* Beds are separated from the overlying *Athyris-glabristria* Zone by the conglomerate exposed in Pinskey Gill. We are prepared to believe it.

We learn from *The Yorkshire Post* that in regard to the suggested museum for the Spen Valley, Mr. J. G. Cooke, of Ben Rhydding, and his brother, Mr. W. Cooke, of London, owners of Healds Hall, Liversedge, have intimated that they are prepared to hand over the hall, together with about fifteen or twenty acres of land, for a public park, museum, and permanent home of the Spen valley Literary Society for ever. The offer is made on condition that the local authorities of Cleckheaton, Liversedge, and Heckmondwike undertake its upkeep. The hall, which is a large building of considerable local interest, is located on a commanding site not far from the Heckmondwike boundary, and it has long been looked upon by the Literary Society as a suitable home for their museum, which, for lack of proper accommodation, has been in danger of removal from the district.

We would advise the editor of the *Lancashire Naturalist* to change his printers, as, from a typographical point of view, the journal is not creditable. The April number, which arrived very late, is badly 'got up,' and includes a note to the effect that 'the *top line* page 401, vol. 3, should follow the *bottom line*, page 399.' The cover is as amateurish a piece of 'setting' as we have seen, and, amongst the misprints thereon, we notice 'h/story,' 'pieased,' 'Mt' (for 'Mr. '), and 'communications.' Mr. Haws also will deal with 'Microscopic matters.' Inside, some of the pages are headed with the name of the journal; some have the title of the article; some have nothing at all; some agents are 'Mr.'s' others are not; figures are used for letters, italic letters for Roman, and vice versa; there are types from wrong founts, and spaces in words where spaces should not be; plural verbs are given with singular nouns; and points appear where they should not, and are omitted where they should appear. Some words appear in italics which should not (*e.g.*, *Bryum Association* on page 3, and *var.* on page 6, etc.), and vice versa; and there is a quantity of broken type.

SOME MOSSES NEW TO THE WEST RIDING, ETC.

C. A. CHEETHAM,
Old Farnley.

DURING the last few months, Mr. F. Haxby and I have paid several visits to Inglebro', to examine the less frequented parts of the mountain, and have been amply repaid by the discovery of quite a distinct set of mosses, such as one associates with the Lake District mountains where the rocks are of an older type, with less sandstones, and more quartzite and volcanic rocks. No doubt the situation has a good deal to do with the question, for in this particular spot the rocks face north-west to north, and the spores will be more often deposited here from the hills above Cautley and from the Cumberland mountains.

The following is a list showing the type of mosses :—

<i>Andreaea alpina</i> Smith.	|	<i>Grimmia torquata</i> Hornsch.
<i>Diphyscium foliosum</i> var. <i>acutifolium</i> Lindb.	|	<i>Anæctangium compactum</i> Schwaeg.
<i>Campylopus atrovirens</i> De Not.	|	<i>Zygodon lapponicus</i> B. & S.
<i>Fissidens osmundoides</i> Hedw.	|	<i>Tetraplodon mnioides</i> B. & S.
	|	<i>Webera elongata</i> Schwaeg.

And the Hepatic—*Anthelia julacea*.

This list might be very considerably enlarged by the inclusion of other species equally well-known on other parts of Inglebro' and the higher mountains.

Andreaea alpina Smith was only doubtfully recorded for Inglebro' previously. It occurs in fair quantity and good growth.

The *Diphyscium* variety is new to Inglebro', its only other habitat in West Yorkshire is at Cautley Spout.

Campylopus atrovirens grows on the older rocks in the Ingleton Gylls below, but we had not seen it previously on the sandstones up the hill.

Fissidens osmundoides has only been reported from Cautley previously.

Grimmia torquata is not typical. I thought at first it was *G. junalis*, and I fancy that it is the *G. junalis* reported by B. Carrington from Inglebro'. Mr. A. Wilson and Mr. W. E. Nicholson both agree that it is *G. torquata*, and this is an additional species to West Yorkshire.

Anæctangium compactum. There are some fine patches of this moss. Other West Yorkshire records are Whernside and Rawtheydale. This is new to Inglebro'.

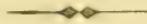
Zygodon lapponicus. This is very scarce, and in small patches, it is quite new to Yorkshire, not having been seen even in Upper Teesdale, the happy hunting-ground for Yorkshire alpinists.

Tetraplodon mnioides I had only seen once before on Inglebro'.

Webera elongata. Mentioned previously rather doubtfully, is to be found in fair quantity.

On another occasion we visited the higher limestone rocks on Simon Fell, the easterly shoulder of the mountain. Here we got *Thuidium philiberti* Limpr. This moss has not been found in England before, its habitat being the highest Scotch mountains. Messrs. Wilson and Wheldon have kindly confirmed this identification. Once we were driven by snowstorms to take refuge below in the Ingleton Gylls, and there found *Rhabdoweisia denticulata* B. and S., the other West Yorkshire locality for which is Cautley Spout. Mr. Haxby has since found it near Warfe on the lower slopes of Moughton Scar. We also found *Pterogonium gracile* Swartz here.

To leave these rocks and cross the Craven faults for the rough grits south of Clapham Station is to get on a very different type of mosses, and up Keasden beck the change is well seen. Here *Catherinea crispa* James grows with *Trichostomum tenuirostre* Lindb., both these being new to the Lune drainage.



BIRDS.

Abundance of the Nightingale in Shropshire.—The present season is remarkable for the extraordinary influx of Nightingales into Shropshire. The normal range of this species is confined to the Severn valley, south of Shrewsbury, though in certain years (e.g., 1902 and 1905), a few birds have occurred in scattered localities to the N. and N.W. of that area. This year the Nightingales are unusually numerous in their regular habitats—a friend of mine heard or saw twelve in a ramble of about three miles between Coalport and Broseley—whilst already I have heard of many in various places quite outside their known range in the directions indicated above. It would be well for Yorkshire naturalists to keep a special look-out for the Nightingale to the N. and N.W. of Doncaster, in order to ascertain how far beyond its normal range the species extends this season. Even if the result is negative, it will be interesting as showing that the unusual immigration affects only the western side of the kingdom.—H. E. FORREST, Shrewsbury.

Nightingale near Collingham.—A pair of Nightingales have taken up their abode in a small coppice on the banks of the Wharfe at Linton. The cold weather prevailing at the time of migration may have prevented more than an odd pair or so penetrating into Yorkshire, although letters from friends in the regular haunts of these birds confirms Mr. Forrest's statements above that they are unusually numerous.—R. FORTUNE.

YORKSHIRE NATURALISTS AT HAREWOOD PARK.

THE members of the Yorkshire Naturalists' Union assembled in good numbers on May 13th at Harewood Park, by permission of Lord Harewood. Brakes conveyed the party from Arthington Station, and in the Park the various sections found much of interest. Most of the work was carried on in the vicinity of the lake, upon which numerous waterfowl breed, and around which plants thrive in profusion. Here, amid the fine trees, and sheltered by the hills, the fauna and flora have every chance to flourish, and have the further advantage of being practically unmolested. Perhaps the most interesting feature on this mere was the colony of whooper swans. The Great Crested Grebe, Shoveller, Mallard, and Canada Goose were also present in numbers. There is likewise a heronry at Harewood, and though small, it was gratifying to find that the herons were increasing in numbers. Around the margin of the mere the gorgeous blooms of the marsh marigold, anemone, and bluebell delighted the hearts of the botanists. After tea, at the Wharfedale Hotel, a meeting was held, under the presidency of Mr. G. T. Porritt, F.L.S., of Huddersfield. Reports on the day's investigations were given by Messrs. Cheetham, Winter, Croft, Sheppard, Hutton, Porritt, Fortune, Booth, and Gaunt. Twenty new members were elected, and the Brighouse Naturalists' Society was affiliated with the Union.

HYMENOPTERA.—Mr. J. F. MUSHAM records:—*Vespa vulgaris*, *Psithyrus campestris* Panzer, *Andrena cineraria* Linn.

ARACHNIDA.—Mr. Falconer writes:—I had previously on two occasions spent a week (but a fortnight later in point of time) in the vicinity of Harewood, and a fair number of spiders is already on the list for the district. Some of them as Yorkshire species, are very rare; one, *Tmeticus adeptus* Camb. ('Proc. Dorset Field Club,' Vol. XXVII., 1906), the type specimen, being a unique female; *Oxyptila flexa* Camb., an adult female, *Episinus truncatus* Walck, an immature male, and *Theridion pulchellum* Walck, both sexes, being the only records for the county. With the intention of securing, if possible, more examples of these, Mr. Winter and I, starting early, visited the localities at East Keswick and Woodhall, where they had previously occurred. We met with little success, only one female of the last-named being obtained in a new locality, but the extra journey was not altogether fruitless. *Theridion bimaculatum* Linn, a local spider, was found amongst grass, at the former place, and a fine male, *Baryphyma pratensis* Bl., elsewhere in the county known only, and that very rarely, in the East Riding, was taken from flood drift entangled amongst the trunk twigs of a tree on the left bank of the

Wharfe, at the latter place. Harewood Avenue, through which we passed on our way back, yields one or two good spiders. In the park itself, spiders abounded on the trees and bushes, and amongst the herbage on the banks of the mere, though, unfortunately, many kinds were as yet immature, and undeterminable specifically. Adults of *Theridion pallens* Bl., *Linyphia peltata* Wid., *Bathyphantes dorsalis* Wid., and immature examples of *Tetragnatha solandrii* Scop. were especially plentiful in such situations, and several specimens of *Epeira triguttata* Fabr. (provisionally so-named, no adults having yet been taken in Yorkshire), were beaten from the yew trees. Examples of *Coclotos atropos* Walck, *Amaurobius fenestralis* Stroem, *Phyllonethis lineata* Clerk, and *Lycosa amentata* Clerk, were handed in by Messrs. Margerison, Rhodes, Hastings and Gardiner.

Having regard to their known distribution in the county, the best finds were undoubtedly *Tmeticus affinis* Bl., a rare British spider, of which the type specimens came from Hornsea Mere, where it has since been taken by Mr. T. Stainforth, *Clubiona brevipes* Bl., *Enidia cornuta* Bl., *Edothorax dentatus* Wid., *Styloctetor penicillatus* Westr, and the *Baryphyma pratensis* Bl., already mentioned. Altogether, seventy-two species of true spiders, including three new to the West Riding, three harvestmen and one pseudoscorpion were met with.

In the following complete list, the species new to the district are marked with an asterisk, and those new to the West Riding with a dagger; those which occurred at all the places visited have no locality assigned to them:—

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|---|---|
| <i>Harpactes hombergii</i> Scop. E. Keswick. | <i>T. bimaculatum</i> Linn. E. Keswick, two immature ♀♀. |
| <i>Segestria senoculata</i> Linn. Harewood Park. | <i>T. pallens</i> Bl. |
| <i>Oonops pulcher</i> Temp. | <i>T. pulchellum</i> Walck. One ♀, Harewood Park. |
| <i>Clubiona reclusa</i> Camb. E. Keswick. | <i>Phyllonethis lineata</i> Clerck. |
| <i>C. comta</i> C. L. Koch, one ♂, E. Keswick, and <i>C. brevipes</i> Bl. Harewood Park, one ♀. | <i>Robertus lividus</i> Bl. |
| <i>C. holosericea</i> DeGeer. Woodhall and Harewood Park. ♀♀ | <i>Stemonyphantes lineata</i> Linn. ♀, E. Keswick. |
| <i>Dictyna uncinata</i> Westr. E. Keswick, imm. example. | <i>Linyphia montana</i> Clerck. <i>L. peltata</i> Wid, and <i>L. clathrata</i> Sund. |
| <i>Amaurobius fenestralis</i> Stroem. | <i>Leptyphantes blackwallii</i> Kulcz, and <i>L. tenuis</i> Bl. Common. |
| <i>Cryphoea silvicola</i> C. L. Koch. One ♀. Harewood Park. | <i>L. ericaeus</i> Bl. One ♂, and <i>L. flavipes</i> Bl. One ♂, Woodhall, both. |
| <i>Coclotos atropos</i> Walck. | <i>Bathyphantes concolor</i> Wid. <i>B. nigrinus</i> Westr. and <i>B. dorsalis</i> Wid. |
| <i>Theridion sisyphium</i> Clerck. Harewood Park, immature examples. | <i>B. approximatus</i> Camb. Harewood Park, five ♂, one ♀. |
| <i>T. denticulatum</i> Walck. Harewood Park, both sexes, adult and immature. | <i>B. parvulus</i> Westr. One ♀, Harewood Park. |

- Poeciloneura variegata* Bl. Woodhall.
- † *Tmetiscus affinis* Bl. Harewood Park, three of each sex.
- Macrargus rufus* Wid. Two ♂, Harewood Park.
- Porrhomma microphthalmum* Camb One ♀, Harewood Avenue.
- Microneta viaria* Bl.
- Maso sundevallii* Westr. Woodhall and Harewood Park.
- Gongylidium rufipes* Sund. E. Keswick and Woodhall.
- Edothorax fuscus* Bl. E. Keswick.
- E. retusus* Westr. Harewood Park.
- E. agrestis* Bl. Harewood Park.
- E. dentatus* Wid. Harewood Park, five ♂, seven ♀.
- Erigone dentipalpis* Wid. Harewood Park.
- Neriere rubens* Bl. E. Keswick.
- N. rubella* Bl. Woodhall, one ♀.
- Enidia cornuta* Bl. One ♂, Harewood Park.
- E. bituberculata* Wid.
- Dismodicus bifrons* Bl.
- Diplocephalus latifrons* Camb. Harewood Avenue and Park.
- D. fuscipes* Bl. One ♀, E. Keswick, and *D. permixtus* Camb. Harewood Park, ♀♀.
- D. picinus* Bl. Woodhall, Harewood Park and Avenue.
- Entelecara erythropus* Westr. One ♀, Harewood Park.
- Styloctetor penicillatus* Westr. Two ♀♀, Harewood Park.
- Topinocyba pallens* Camb. One ♀, Harewood Park.
- Baryphyma pratensis* Bl. One ♂, Woodhall.
- Walckenaera acuminata* Bl. Harewood Park.
- Cornicularia cuspidata* Bl. E. Keswick.
- C. unicornis* Camb. One ♀, E. Keswick.
- Tetragnatha solandrii* Scop. Woodhall and Harewood Park.
- Pachygnatha degeerii* Sund. E. Keswick and Harewood Park.
- P. clerckii* Sund. Harewood Park
- Nesticus cellulanus* Clerck. One ♀. Harewood Park.
- Epeira cucurbitina* Clerck. E. Keswick, Woodhall and Harewood Park.
- E. triguttata* Fabr. Several immature examples, Harewood Park.
- Oxyptila trux* Bl. E. Keswick.
- Philodromus aureolus* Clerck. Harewood Park.
- Tarentula pulverulenta* Clerck. One ♂, Harewood Park.
- Pirata piraticus* Clerck. Harewood Park.
- Lycosa pullata* Clerck. E. Keswick.
- L. amentata* Clerck. Woodhall and Harewood Park.
- Neon reticulatus* Pl. 2 immature examples. Harewood Park.
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- Platybunus corniger*.
- Nemastoma lugubre* O.F.M. E. Keswick, Harewood Avenue.
- Oligolophus morio* Fabr. Woodhall, Harewood Park.
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- Obisium muscorum* Leach.

Messrs. Hastings, Rhodes and Margerison assisted in collecting.

MYRIAPODA.—Mr. Falconer writes:—The following Myriapods were collected along the route followed by the arachnologists:—*Lithobius forficatus* Linn, *Geophilus flavus* De Geer, and *Julus terrestris* Linn, common and generally distributed. *Glomeris marginata* Villers, E. Keswick and Woodhall; *Julus sabulosus* Linn, E. Keswick.

To these Mr. Margerison adds *Lithobius variegatus*, *Geophilus longicornis*, and *Polydesmus complanatus*.

One specimen of the *Geophilus* was coiled over its eggs, under a stone. Newport says that she 'sits' from the time of producing the eggs until the young emerge.

MOLLUSCA.—Mr. JOHN F. MUSHAM writes that the Park was fairly investigated, with the result that fifteen species were observed, the more noteworthy being:—*Agriolimax agrestis*

var. *reticulata*, almost exclusive ; *Arion circumscriptus*, *A. subfuscus* var. *aurantiaca* (Loc), *Zonites nitidus* ? *Anodonta cygnea*, and *Unio pictorum* occurred in the large lake.

SPONGIA.—Mr. A. R. Sanderson noted the fresh-water sponge, *Spongilla fluviatilis* in profusion.

BOTANY.—Mr. C. A. Cheetham writes :—A fairer sight would be hard to find than that provided by the Marsh Marigold and sedges in the swamps, and the Blue Bells and Anemones with the modest Woodsorrel and Yellow Weaselsnout in the woods. Some very deeply coloured masses of Anemones and Woodsorrel offered subjects for discussion.

Around the shore of the lake the naturalized plants provided an added interest ; Solomon's Seal growing in the turf, the mighty inflorescence of Gunnera on the shore edge, and the long semi-floating rhizomes of the Sweet Flag in the lake all looking quite happy in their new home.

To a 'splitter' delighting in varieties and forms the Marsh Marigold held out open arms, some clumps had the sepals all imbricate, others had them widely separate, and again in others the sepals were nipped up at the top, giving them a very narrow appearance.

Amongst the few species of sedges noted, one singled out the great masses of *C. paniculata* so well known in the neighbouring valley at Adel. Growing in the moist spaces midst these sedge clumps, the little waterblinks were bravely flowering.

The mosses were of a similar nature, nothing startling but quietly interesting ; some parts of the turf being carpeted with *Mnium affine* and in others *Climacium dendroides* in place of the usual *Mnium horneum*, and on the partly submerged tree trunks or more especially the dead ones around the lake, *Aulacomnium androgynum* held up its little stalks with knobs of gemmae at the apex, whilst on similar trees in the woods was *Tetraphis pellucida*, with its nest of gemmae filling this place.

With the waterblinks the pear-shaped capsules of *Physcomitrium pyriforme* were to be seen in quantity. A list of some forty species of mosses was handed to the Leeds Naturalists' Society for inclusion in their records of this district.

Mr. A. R. Sanderson writes that he gathered two specimens of Mycetozoa, viz., *Trichia varia* and *Reticularia lycoperdon*, and the polypore *P. squamosus*.

GEOLOGY.—Mr. S. Margerison reports that he and Mr. Gaunt saw a large gritstone glacial boulder, which is known as the 'Greystone', in the south-east portion of the Park. He did not measure it, but it would be at least 10 ft. by 6 ft. by 6 ft., i.e., well over 20 tons in weight.

T. S.

Naturalist,

FIELD NOTES.

BIRDS.

White-tailed Eagle on Hackness Moor, near Scarborough'.

During the visit of the Yorkshire Geologists to Scarborough at Easter, a large bird was seen near the woods at Hackness being mobbed by Rooks and Jackdaws. It was at an estimated altitude of five hundred feet. On Monday, May 1st, a White-Tailed Eagle was seen feeding on a lamb at Birch Hall, near Bickley, on the other side of Langdale End. A keeper shot it, and found that it was a *Haliaeetus albicilla*, about three years old. It has been sent to the taxidermist to be set up. This bird has been seen in the Hackness district during the past three years, and Capt. Johnstone gave orders to his keepers not to shoot it, as no evidence of any damage had been seen by them. It is probable that the bird which the Yorkshire geologists saw at Easter, is the same that was shot on May 1st, as the large bird which the keeper had seen in the district during the past three years has not been seen since that date.—HARRY WITTY, Scarborough, 27th May, 1911.

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COLEOPTERA.

***Blethisa multipunctata* L. in East Yorks.**—I found a single specimen of this beetle under a stone on the banks of the river Derwent at Bubwith, on March 8th, of this year. It did not attempt to escape when uncovered, probably due to the cold weather. Further search under stones and among flood refuse and in the short grass has so far revealed no more specimens. *Elaphrus riparius* L. and *E. cupreus* Duft. occur near by. The only previous record for the East Riding (as far as I am aware), is the existence of specimens in the Spence Collection (Hull Museum), which may have been taken in the Hull district. The Rev. W. C. Hey (Trans. Y.N.U., 1885), says: 'Another of the Askham Bog rarities, but not taken for many years.' The Bubwith locality is not more than twelve miles, as the crow flies, from Askham Bog. For further particulars of this interesting beetle see Mr. Bayford's article in 'The Naturalist,' 1904, pp. 280-282.—W. J. FORDHAM, Bubwith.

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NEUROPTERA.

Cumberland Neuroptera and Trichoptera.—I have recently examined on behalf of Mr. G. B. Routledge, some Neuroptera and Trichoptera taken in Cumberland, and most of them in the immediate vicinity of Tarn Lodge, Headsnook, Carlisle. As so little is known of the distribution of these insects in that county, and as most of them are additions to

the short list published in this journal ('Nat.', January 1910, p. 29), I place them on record:—*Chloropecta grammatica*, *Micromus paganus*, *Hemerobius nervosus*, *H. micans*, *H. marginatus*, *H. stigma*, *H. subnebulosus*, *Nemoura meyeri*, *Phryganea striata*, *P. obsoleta*, *Limnophilus nigriceps*, *L. auricula*, *L. centralis*, *L. sparsus*, *Stenophylax permistus*, *Lepidostoma hirtum*, *Ecclisopteryx guttulata*, *Drusus annulatus*, *Wormaldia subnigra*, *Plectrocnemia conspersa*, *Hydropsyche instabilis*, and *Rhyacophila dorsalis*. Of these, perhaps the most interesting are *Phryganea obsoleta* and *Limnophilus nigriceps*, neither of which has as yet been recorded for Yorkshire.—GEO. T. PORRIT.

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MOSSES.

***Tortula vahlii* (Schultz) Wils. in North Lincolnshire.**— I had the pleasure of gathering this rare English moss, the home of which is the Mediterranean region, at the beginning of this month, on the banks of the Waltham Beck, in the parish of Cleethorpes, a short distance before it emerges into the mouth of the Humber. It is confined to a narrow strip on the right bank, about a hundred yards long and six feet wide. It is growing on the mud dredged from the bottom of the beck. The water is here tidal, and an examination of the bank some distance above the lock, failed to detect the moss. The left bank was also examined without success. Mr. G. Allison, of Grimsby, also searched the beck bank, for a mile and a half from its source, at the foot of the Lincolnshire Wolds, without meeting with it. Its previous distribution in the British Isles, so far as recorded, is West Sussex and Surrey in the south, West Gloucester and Hereford in the West, and Cambridgeshire. This discovery extends its range much further north. Mr. W. Ingham, of York, has confirmed my determination of it.— J. J. MARSHALL, Grimsby.

REVIEWS AND BOOK NOTICES.

Life of William MacGillivray, by **W. MacGillivray** (222 pp., John Murray, 10/6 net).

MacGillivray was a grand example of the old type of 'all round' naturalist, and his name is still a household word, amongst ornithologists. He was born in 1796, and died fifty-six years later; consequently the present 'life' is somewhat tardy, but it is none the less welcome on that account. The narrative is a good one, and many besides naturalists will benefit from a perusal of these pages. Prof. J. Arthur Thomson contributes a charming chapter—'MacGillivray's Scientific Work—an Appreciation.' There are reproductions of several of MacGillivray's careful drawings of birds, including that of the Great Auk. On page x, the name of Mr. W. P. Pycraft is wrongly spelt.

Naturalist,

A History of Barmby Moor from Prehistoric Times, by **W. D. Wood Rees**, Vicar. Pocklington, 1911. 109 pp., 3/-.

In sending us this pamphlet, the author asks us to cast it aside if it is not worth favourable mention, as he would rather it were buried in oblivion than 'dam'd' with faint praise. We feel flattered to hear that if the book is not noticed in this journal it may be 'buried in oblivion,' and as we can hardly give it even faint praise, it is a little difficult to know what to do. However, as only a small edition has been issued, and half of this has been sold, it is just within the bounds of possibility that a new edition may be called for at some future time. This being so, we beg to offer a few suggestions for the benefit of the author. In the first place, instead of consulting Taylor's 'Book of British Fossils,' William Andrews' works, Moule's 'English Counties,' and 'Placito De Quo Warranto,' he should read Cox's 'How to write the history of a Parish,' the Geological Survey Memoirs for the district, and, for the natural history, the publications of the Yorkshire Naturalists' Union. None of these appear to have been seen. The words 'A History' in the title should read 'A Scrapbook,' in order to more accurately define the contents. The portrait and autograph of the author as frontispiece should be omitted, as it may give the impression that the author is rather proud of this 'history,' whereas, as a matter of fact, he refers to it as 'puny.' Part of the book is addressed to his parishioners, and part to 'my readers.' It should be addressed to the one or the other throughout, or to neither. There is no evidence that the weight of the glaciers during the great Ice Age caused them to 'sink in,' and melting, leave their heterogeneous deposits deep in the clay.' The 'red deer jaws,' figured on page 2, are jaws of a cart-horse, with some of the teeth in their wrong places. The description of the illustration should therefore be deleted, as well as the accompanying letterpress. The red deer was not 'very much larger than a horse,' and in examining the skeleton in the York Museum, the author did not trouble to read the label, or he would have found out it was 'Irish Elk'; a very different animal. 'The Scripture and Primæval Lore,' quoting the piffle about 'bronze, translated brass, is mentioned forty-three times. Iron is mentioned only four times,' in the Bible, should be omitted, as it conveys nothing. There are no such things as 'five-flanged' and 'docketed' axes; somebody's handwriting has not been distinct. The Sancton urns are Saxon, not British, and they do not contain 'silver-grit.' Geologists do not call thunderbolts 'divivative oolitic belemnites,' and do not know 'coral mussels,' and would spell rhynchonellæ and Hippopodium properly. We should want much more evidence before accepting the statement that the foundations of 'two rooms, nearly square,' found on the site of the new vicarage, were an 'Ancient British Cottage.' Under the heading 'The Roman Road,' we expected to find a little more than the statement that the author was 'very proud and thankful' he helped the surveyor to trace it. There should be more about the part played by the village inn in the old coaching days: the Barmby Moor Inn being a halting place for the horses. An old oil-painting of the inn exists in a Yorkshire Museum, and was described in one of its publications. 'Our dear old parish church' appears to be a new one. The modern custom of throwing confetti at weddings may be 'meaningless, foolish and annoying,' but if the present writer were ever able to have the opportunity of choosing, he would prefer confetti, even if the chickens did go without a feed. The vicar only 'fancies' that kissing under the mistletoe is still in vogue at Barmby: he ought to make certain. Nuremburg tokens are found everywhere, and the one found at Barmby had nothing to do with Nuremburg pilgrims going to the shrine at Wilberfoss. There are five different newts recorded for Barmby in this 'History'—two more than appears in the Yorkshire list; and the author says he finds a reference to the hedgehog in 'Harl. MSS.' We wonder what that is, as it is not referred to in the 'list of Books and MSS. consulted.' The quotations from George Wales' 'Book of Charms' is

no proof that he was a 'staunch churchman.' From what we are told about him, he was more likely to have been a hypocrite. In case the volume might be wanted at any time for reference, it should be lettered on the back.

The Evolution of Kingston-upon-Hull, as shewn by its Plans, with illustrations. By **Thomas Sheppard, F.G.S., F.R.G.S., F.S.A.(Scot.)**, Curator Municipal Museums, Hull. Printed and published for the Hull Corporation by A. Brown & Sons, Ltd., Savile Street and George Street, Hull, 1911. Price 3/6 net.

This small book of 204 pages furnishes one more proof that size is not necessarily an index of quality or value. Many a bulky volume on some topographical subject has been published, which has not contained as much vital and indispensable matter as is to be found here. We can readily understand that there will be those who, on first looking into its pages, will experience a feeling of disappointment, because the subject has not been treated in the manner which first suggests itself to their minds. Further reflection, and a more careful perusal of the work itself, will change that first flush of disappointment into a feeling of settled appreciation. The title expresses exactly the contents of the book, and no more. Every kind of map, whether hypothetical sixth century, rude sketch, sectional or careful survey, is included, and there can be very few, if any, at least of importance, which have escaped Mr. Sheppard's researches; and it is a very gratifying feature to find that most of them have found their way to the Hull Museum. We can imagine few pleasanter ways in which to spend an afternoon, or a succession of afternoons, than to be surrounded with these plans, and, with this book at hand assisting us, to trace bit by bit the gradual growth of the Hull that was, into the Hull that is. Especially interesting it ought to be to the Hull man who loves his city, and wishes to know what is known of the various changes it has undergone. Very possibly Mr. Sheppard may not agree with our opinion that this is one of his best; at any rate it is a work which it will be difficult to amend, and cannot be superseded. It is an indispensable work of reference well done; and both author and publishers are to be congratulated for their respective shares in it.

The amount of careful, methodical, and tedious work involved in the preparation of the volume can only be estimated by those who have engaged in similar work, and therefore know the difficulties that attend the accumulation of the material, and the very slow rate of progress. The author has achieved a notable success by resisting the many temptations to discursiveness, and allowing the plans to tell their own tale. Here and there, when necessity demands it, we have a few well-chosen words, a concise sentence or two, which illuminate the whole, and renders it easily intelligible.

The etymology of place names is a subject on which doctors differ widely, and that of the two places whose etymology are given is no exception to the rule. That of Drypool in particular seems open to objections both on botanical and rational grounds. A careful reading of the work has produced a very lean crop of errors—four in number—and of these it is possible that two are intentional. This, of itself, is eloquent testimony to the care with which the work has been seen through the press. On page 37, '2894 feet' should read '2844 feet.'; on page 92, 'Hargrave' should be 'Hargreave,' and both in the Index and on page 139, 'Penitentiary' is misspelled 'Penetentiary.' This latter may be the spelling on the map from which it is quoted, but as the word does not appear in quotation marks, it is included amongst the errors. Special praise should be bestowed on the index, which is a very full one, and, so far as we have tested it, is a model of what an index should be. The get-up of the book, its handy size, and clear clean type, are alike all that could be desired. The plates, although well reproduced, are sometimes so much reduced as to be tantalizing indications of the original, and, curiously enough, are not extra to the text, but paged continuously with it. Eminently a book to read and use, and should have a wide circulation.—E.G.B.

THE NATURALIST

A MONTHLY ILLUSTRATED JOURNAL OF
NATURAL HISTORY FOR THE NORTH OF ENGLAND.

EDITED BY
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THE MUSEUMS, HULL;

AND
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WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF
J. GILBERT BAKER, F.R.S. F.L.S., GEO. T. PORRITT, F.L.S., F.E.S.,
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T. H. NELSON, M.B.O.U., WILLIAM WEST, F.L.S.,
RILEY FORTUNE, F.Z.S.

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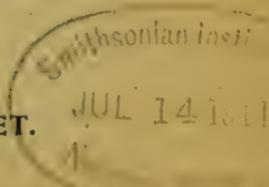
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NOTES AND COMMENTS.

'THE NATURALIST.'*

The whirl of sea-birds' wings, old Flamboro's chalk,
 Grey sands of Easington, bird-haunted Spurn,
 Whence migrant birds of passage make return,
 When seasons change, glad summer wanes, and roke
 Of dim sea-mist invades the pleasant walk
 By cliff and sand, when turgid sunsets burn
 In regal glory, and the wild waves churn
 To whitened foam, as fragments of rent oak
 Are cast upon the shingly, weed-strewn strand,
 Proof of the sea's wild rage and restless might,
 Of tragedy that underlies all life!—
 In thought, amid such scenes, I see you stand,
 Rejoicing in old Nature's morn and night ;
 The grandeur of her stormy moods, her frequent strife!

MELANISM IN AMPHIDASYS BETULARIA.

In *The Entomologist* for June, Mr. S. H. Leigh writes on 'A Biological Enquiry into the Nature of Melanism in *Amphidasys betularia*.' In this he considers that the theory of 'protection' should not be pressed too closely at present, for there are many well-known cases in which dark varieties of moths are found in localities far removed from the influence of smoke, and where they most probably rest upon light-coloured objects. For example, at Silverdale and Grange, in North Lancashire, the black (*doubledayaria*) form is prominent, where formerly it was very rare or absent, and where the atmosphere is as free from smoke and the natural objects (trees, stones, etc.), as clean now as at any previous time.

WHY BOTANISTS ?

If the average person be asked, 'what object have these botanists in view?' he will probably give one of the following answers:—1. To 'get something' by it. 2. To cure this or that complaint; 3. To amuse themselves. 4. To prove design in the works of nature. With regard to 1, it may be said that pecuniary loss is more likely than gain; to 2, that the result may be disappointing; to 3, that (in these days especially) other forms of amusement are more attractive; and to 4, that design (in the ordinary sense) is not 'proved' by the fact, that effects are the results of causes. We would rather agree with More, a philosopher of the 17th century, of whom we read in

* A sonnet dedicated to a well-known Yorkshire naturalist, taken from a volume, 'Christmas Leaves,' recently issued to a few friends from the press of Mr. Edward Lamplough.

Dr. Peile's 'History of Christ's College,' as follows:—"As a student in Cambridge he was possessed of an almost immoderate thirst for knowledge. His tutor, Rob. Gell, doubtful whether he were moved by vain-glory, questioned him one day as to the motive which prompted his eagerness. His answer was prompt and short, 'That I may know.' 'But, young man,' said Gell, 'what is the reason that you so earnestly desire to know things?' To which he instantly returned, 'I desire, I say, so earnestly to know, *that I may know*. There was no other answer; knowledge was an end in itself." We do not wish to know the difference between one flowering plant, moss, alga, fungus, or another, for any of the above reasons; *we* 'desire to know, that we may know.' And so it is with truly scientific men, in whatever branch of study. *They* desire to know, that they may know.—W. F.

NEW SHILLING BOOKS.

A very gratifying sign of the times is the way in which really important books on natural science are being published at the low price of one shilling each; and almost invariably these are printed with good type, on good paper, and well and neatly bound in cloth; and, in addition, they contain the work of our leading authorities. We have already referred to some of these books recently. On our table there are a number of others.

TRAVELS ON THE AMAZON.

A first place must be given to Dr. A. R. Wallace's well-known classic, with the above title. The work was originally published over half a century ago, and the present is practically a reprint, revised. There is no need to inform our readers of the enthralling interest of this story of a naturalist's wanderings, and its great bearing upon the theory of evolution. What we cannot understand is how Messrs. Ward, Lock & Co. can produce a volume of nearly 400 pages, with a strong and artistic cover, for a shilling.

THE LORE OF THE HONEY BEE.

Some little time ago we were very favourably impressed with Mr. Tickner Edwardes' volume, with the above title, which contained such a wealth of information in reference to the honey bee, and we were permitted to reproduce one of the many remarkable illustrations which there appeared. Though the book only made its appearance in 1908, it quickly ran into three editions, and now Messrs. Methuen have reprinted it at a shilling. With the exception of the illustrations, it appears to contain all that is in the original edition.

THE ANIMAL WORLD.

Messrs. Williams and Norgate are publishing a wonderful series of new books, in the 'Home University Library of Modern Knowledge' series. They have 256 pages each, with illustrations. That with the above-mentioned title is by Prof. F. W. Gamble, F.R.S., to whose excellent work we have previously had the pleasure of referring. After an Introduction by Sir Oliver Lodge, the book contains chapters on the structure and classification of animals, their movements, distribution, food, methods of breathing, colours, senses, associations, life history, heredity and variations, etc.

EVOLUTION OF PLANTS.

In the same series Dr. D. H. Scott, F.R.S., deals with the evolution of the various forms of plants, in a series of eight entertaining chapters. Here again the basis of the theme is the Darwinian theory, and the 'fossil record'; then in turn the flowering plants, seed plants, ferns, club-mosses, horse-tails, and sphenophylls are dealt with, the volume closing with a useful glossary and bibliography. There are several illustrations, though we are not quite sure whether *Bennettitites marylandicus* (fig. 8) will not be mistaken for a map of part of the moon's surface!

EVOLUTION.

Still in the same series we have a charming summary of this great subject, by Prof. Patrick Geddes and Prof. J. Arthur Thomson; the former being responsible for the botanical, and the latter for the zoological. Here the evidences brought forward by the explorer, palæontologist, anatomist, embryologist and physiologist are in turn reviewed. There are also chapters entitled 'Great Steps in Evolution,' 'Variation and Heredity,' 'Selection,' 'Organism, Function, and Environment,' etc. For those desirous of pursuing the matter further, an excellent bibliography is given.

PLANT LIFE ON LAND.

Under this title the Cambridge University Press has published a further volume in its 'Cambridge Manuals of Science and Literature' series. Its full title is 'Plant Life on Land considered in some of its biological aspects,' and is by Prof. F. O. Bower, F.R.S. Here again we find 'Evolution' plays a prominent part. The author deals with 'Present Day Botany—a Contrast,' 'The Beach and Rocks,' 'The Bracken Fern,' 'The Flower and Metamorphosis,' 'Pollination and Fertilization,' 'Plant Population,' 'Sand Dunes,' 'Golf Links,' etc. There are several fine illustrations, some, from photographs, being unusually interesting.

HISTORY OF GEOLOGY.

Mr. Horace B. Woodward's recent History of the Geological Society of London perhaps clearly indicates that he was the most likely person to write a concise 'History of Geology,' and an admirable volume with this title has been published for the Rationalist Press Association by Messrs. Watts & Co., London, for the low price of one shilling. A student, or would-be student of geology, will find this book most useful. It contains some quaint information in reference to the early theories regarding the history of the earth. There are also interesting biographical notices of some of the pioneers of the science. Amongst these we do not notice the name of Thomas Hawkins, who worked amongst the saurians in the thirties; though Mary Anning is mentioned; nor Frederick Dixon, who published good work on the 'Cretaceous and Tertiaries of Sussex' in the 'fifties.

GEOLOGY: CHAPTERS ON EARTH HISTORY.

Messrs. Milner & Co. (Halifax and London) have issued a further volume in their remarkable 'Twentieth Century Science Series.' It is by Mr. G. Hickling, of the Manchester University, and has eight chapters, dealing with 'The Origin of the Earth,' 'Volcanoes and Earthquakes,' 'The Solid Rocks,' 'Earth Sculpture,' 'The Sea Floor,' 'Mountain Building,' 'The Physical History of Britain,' and the 'History of Life on the Earth.' There are several excellent illustrations, and these, together with the 136 pages, and stout cloth cover, make an excellent shilling's worth. This, together with Mr. Woodward's volume just referred to, would give any intelligent person a very good start in geology.

'BUTTERFLIES AND HOW TO IDENTIFY THEM'

is the title of a neat little well illustrated volume published by C. H. Kelly, London (64 pp., 1/-), and written by the Rev. S. N. Sedgwick. It includes chapters containing useful general information in reference to the butterflies; numerous illustrations (some coloured) of eggs, larvæ, pupæ, and the male and female butterflies. Lists of the species are given, with their food-plants, period visible, locality, etc., and then follows a list of all the British species, classified under the heads of 'No.,' 'Name,' 'Imago,' 'Larva,' 'Pupa,' 'Food-plant,' and 'Locality.' There are some blank leaves at the end for notes.

THE BRITISH MUSEUM (NATURAL HISTORY).

At the recent meeting of the Yorkshire Naturalists' Union at Castleton, the following resolution was unanimously passed, on the proposition of Mr. G. T. Porritt, seconded by Mr. T. Sheppard:—'That the Yorkshire Naturalists' Union strongly

protests against the ground which has for so long been set apart for the extension of the Natural History Museum at South Kensington being used for any other purpose, and urges the Government to reconsider its proposal with reference to it.' The resolution was necessary on account of a recent attempt to appropriate the land for other purposes than those for which it was intended. There is no doubt that the whole of the unoccupied part of the site will be required in the near future, for the accommodation of the Natural History Department. Copies of the resolution have been sent to local Members of Parliament, who have kindly promised to give the matter attention, and also the the Trustees of the British Museum, and to the Prime Minister, who have acknowledged their receipt.

DESTRUCTION OF BIRDS.

Mr. W. H. St. Quintin, the Chairman of the Yorkshire Wild Birds' Protection Committee, has written to the press appealing on behalf of the rarer birds. In this he points out that it does not in the least follow that because a bird of prey is a large one, it is necessarily highly destructive to game. The honey buzzard lives entirely on insects and their larvæ. The kite and the buzzards feed mainly on mice and rats, moles, lizards, and frogs, and an occasional young rabbit; the golden and the sea eagle chiefly on the remains of dead animals. But, granted that occasional damage is done on a shooting, he would still appeal for the bird, who may next week be hundreds of miles away, if, as is so often the case, his unexpected visit is paid in spring or autumn. Our larger species are sadly reduced, and the sight of them gives pleasure to almost every one; scarcely any one would admit that he would wish the splendid creatures to be utterly exterminated! But with some of them it is a very near thing indeed. The white tailed or sea eagle has not reared young in the British Isles for several years, though a few very old individuals survive in the extreme north. The kite is only prevented from being absolutely wiped out by the strenuous effort of certain landowners and others in their last district. The osprey, till last year, had not reared young in Great Britain for several seasons. He greatly fears that it was one of the young birds that met its death at the hands of a shooter near Pickering last autumn.

Dr. A. Keith contributes an interesting note on the teeth of Palæolithic Man, to *Nature* (No. 2169).

In *The Zoologist* (No. 839), the Rev. Hilderic Friend describes a new earthworm (*Dendrobæna merciensis*) from Derbyshire. In the same journal (No. 838), Mr. J. M. Charlton describes the birds of the Northumberland coast, and it is also recorded that the Corncrake is by no means decreasing in the Scarborough district, although it seems to be getting much rarer in other parts of England.

ANEMONES ON THE YORKSHIRE COAST.

JOHN IRVING, M.D.,
Scarborough.

OF marine fauna to be found on the Yorkshire coast, between tides, down to extreme low water level, anemones occupy the first place as living objects of beauty. A selected dozen, or two, of each species placed in clean sea-water in a suitable vessel or vessels, soon fix themselves and make a rich display of colours and patterns scarcely conceivable by those who have only viewed solitary specimens. This is the surest method of comparing, and determining varieties which are often numerous and remarkable. Occasionally it may be of great service in discovering new species, which, in the 'button' state, simulate commoner forms. By way of example, take cave anemones, *Sagartia troglodytes*, so common at Scarborough and Filey. A group of thirty or forty of these, in a fair-sized photographic dish, covered with clear sea-water, when opened out, exhibit marvellous diversity, and, under scrutiny, possibly a 'daisy,' *Sagartia bellis*, or an 'orange-mouth,' *Sagartia venusta*, may be seen among them, which would have been overlooked in ordinary circumstances.

Yorkshire has not been credited with its full quota of species, probably through lack of persistent research and close observation. If I remember rightly, the snow anemone, *Sagartia nivea*, was recently found at Spurn, and recorded in 'The Naturalist.' *Sagartia pura* though not very common, is found at Scarborough, and at Redcar. In August 1910, I saw numerous specimens of the scarlet-fringed anemone, *Sagartia miniata*, attached to the Scarborough light-house pier, in association with *Saxicavae*. Their resemblance to the 'buttons' of small-sized *Tealia crassicornis* might have ended in their being left undisturbed, but for promptings of curiosity, I tried to dislodge one. The immediate and free discharge of *acontia* betrayed them. Again, in April last, at the end of Filey Brig, at spring tide low water, I came across the same species, practically in hundreds, fixed to huge limestone blocks, occupied by *Saxicavae*, the red noses of which harmonized well with these rather inconspicuous anemones. So far as I know, *Sagartia miniata* is new to our list, and has never been mentioned as occurring on the Yorkshire coast, despite the fact that it is so firmly established. Our coast may not be able to compete with more favourably situated south coast regions in regard to anemones, but there seems to me to be ample scope for improvement.

—: o:—

The collection of lepidoptera formed by Mr. S. J. Capper, of Liverpool, has been purchased, and is in the hands of a dealer for disposal.—*The Entomologist*, No. 576.

THE VERTEBRATE FAUNA OF HAREWOOD.

R. FORTUNE, F.Z.S.

At the Harewood Meeting of the Yorkshire Naturalists' Union, the Vertebrates Section was well represented. Seventy-eight species of vertebrates were observed, viz. :—six Mammals, sixty-eight Birds, three Fishes, and one Amphibian.

Much interest was taken in the fine specimens of Waterfowl on the lakes, especially in the magnificent herd of Whooper Swans. Several pairs of Great Crested Grebes were nesting quite in the open, there being a total absence of cover on the big lake where these birds are. The Chiffchaff, an exceedingly scarce and local bird in Wharfedale, was seen and heard. Many species of birds had nests containing either eggs or young. It was very satisfactory to find that the Herons were increasing in numbers, and about ten nests were occupied, all containing young birds.

On the keepers' 'gibbet' were three Crows, four Jackdaws, one Kestrel, one Jay, and three Sparrow Hawks.

As there are practically no records for this district, a full list of the species seen is given.

<p style="text-align: center;">MAMMALS.</p> <p>Mole. Weasel. Stoat. Field Vole. Hare. Rabbit.</p>	<p>Grey Wagtail. Meadow Pipit. Tree Pipit. Spotted Flycatcher. Swallow. Martin. Sand Martin. Creeper. Greenfinch. Sparrow. Chaffinch. Lesser Redpoll. Yellow Bunting. Reed Bunting. Skylark. Starling. Jay. Jackdaw. Crow. Rook. Swift. Green Woodpecker. Great Spotted Woodpecker. Kingfisher. Cuckoo. Long-Eared Owl. Tawny Owl. Sparrow Hawk.</p>	<p>Kestrel. Heron. Canada Goose. Mute Swan. Whooper Swan. Shell Duck. Mallard. Shoveller. Pochard. Tufted Duck. Pintail. Ring Dove. Stock Dove. Partridge. Pheasant. Waterhen. Coot. Lapwing. Sandpiper. Great-Crested Grebe.</p> <p style="text-align: center;">FISHES.</p> <p>Eel. Trout. Pike.</p> <p style="text-align: center;">AMPHIBIAN.</p> <p>Frog.</p>
<p style="text-align: center;">BIRDS.</p> <p>Missle Thrush. Song Thrush. Blackbird. Robin. Redstart. Whitethroat. Lesser Whitethroat. Blackcap. Garden Warbler. Gold Crest. Chiff Chaff. Willow Warbler. Wood Warbler. Sedge Warbler. Hedge Sparrow. Dipper. Great Tit. Blue Tit. Wren. Pied Wagtail.</p>		

The first portion of the entomological collection formed by the late J. W. Tutt, was sold in London recently, and fetched poor prices, notwithstanding the fact that there were many of the actual specimens upon which his varietal names were founded.

MOSSES AND HEPATICS AT CASTLETON, N. YORKS.

W. INGHAM, B.A.,
York.

IN the Saturday's route on the recent excursion of the Yorkshire Naturalists' Union at Castleton, it may be of interest to note that in connection with the 'Vegetation of Swiddens in North-East Yorkshire,' published by Mr. Elgee in 'The Naturalist,' Jan. and Feb., 1910, the following Mosses and Hepatics first appear on the moor between the dead stems of bracken.

The blackish, flat, and thin patches are a Liverwort, *Lophozia inflata*, which invariably assumes a blackish colour under dry conditions, such as are found on the Swiddens. Under wet conditions, and by the side of water, this plant becomes vivid green.

The only Sphagnum seen in such dry places was *S. papillosum* var. *confertum*, a Bog or Peat Moss that shortens and crowds its branches under the 'Swidden' conditions.

The only true moss seen was *Webera nutans*, which occurs everywhere on moorlands, whether they be wet or dry, and is the typical moss expected to appear first after the heather has been burnt.

Those Members present will remember the beautiful appearance of another moorland moss, *Polytrichum commune*, which occurred in large crowded patches. The bright sunshine brought out the golden colour of the numerous hairy calyptras of the capsules to such an extent as to justify the popular names given to this moss, viz.: Moor Silk and Great Golden Hair Moss.

The middle of Ewe Crag Slack is filled with a peat moss, *Sphagnum recurvum*, which under very wet conditions such as it delights in, is vivid green, but under the hot sun of this excursion, most of it was brown.

By the side of this Slack an interesting moss, *Tetraplodon mnioides*, was found, growing on the bones of a sheep. One patch of moss taken off had still the skin of the sheep attached to it. This species depends for its growth entirely upon the remains of domestic animals.

Another moss found in this valley was *Breutelia arcuata*.

The *Polytrichum commune* mentioned above is the var. *perigoniale*, which is recorded in Yorkshire only from Strensall Common. During the Monday's ramble, a narrow Slack, along the top of Fryup Head, was visited. Of course it was dry as a result of the very hot weather. It was occupied by one of the Harpidioid Hypna, a moss with the name *Hypnum fluitans*, group *Amphibium*, var. *Jeanbernati*. This moss accommodates itself well to circumstances. When the water is plentiful it floats on the surface, and under dry conditions it lies on the bed of the Slack. By the side of this Harpidium was a large vivid green mass of the Liverwort, *Lophozia inflata* var. *laxa*.

YORKSHIRE NATURALISTS ON THE CLEVELAND HILLS.

THE Members of the Yorkshire Naturalists' Union spent Whit week-end in the Castleton district on the Cleveland Hills, made classical by the late Canon Atkinson's 'Forty Years in a Moorland Parish.'

The party made an early start on Saturday morning, under the guidance of Messrs. Elgee and Punch, and visited the ganister quarries on the slopes of the moor. Here the exceedingly pure siliceous rock is quarried, during which process Mesozoic plant remains are found, including *Williamsonia* leaves and fruit—a species named after a well-known Yorkshire pioneer, the late Professor Williamson. From here the moors were crossed, and a long day's tramp brought the party to the top of Freeborough Hill, via White Cross Swangs and Dimmingdale Quarry.

From the top of the curious conical Freeborough Hill a glorious view of the surrounding country was obtained, and the many extraordinary physiographical features caused by the extra-morainic lakes during the great Ice Age, as demonstrated by Professor Kendall, were clearly indicated. The archæologists took an interest in the enormous tumuli, the burial places of British chiefs, which here surmount the hills in numbers.

The botanists, under Dr. Woodhead, had much to occupy their attention, the numerous rare and beautiful flowers in the slacks and valleys being particularly attractive. The various types of vegetation were also well indicated, and not the least interesting feature was a pure sphagnum bog, though a small one.

On arriving back at Castleton the party were entertained to tea by Mr. and Mrs. Punch, whose charming Alpine rock garden was greatly admired. In the evening a meeting was held, under the chairmanship of Mr. Punch; and Mr. F. Elgee, of the Middlesbrough Museum, read a suggestive paper on 'The Peat Beds and other Superficial Deposits of the Eastern Moorlands,' which was followed by a discussion.

On the following days the excursion was continued, in a broiling sun.

Long tramps over moor and fell occupied the daytime, whilst the evenings were spent in the discussion of local geological problems, or in the study of the heavens by means of the excellent 10-inch reflector in Mr. Punch's fine observatory, the sky being perfect for observation.

Some of the more enthusiastic members of the party, forming the archæological section, took a 16 miles' walk one evening after tea to examine the remains of a nunnery, the whole of which could have been carried away on a wheelbarrow. This section also paid considerable attention to the many curious grooves cut into the stonework in various parts of the village. These are in a perpendicular position, five or six inches in length, and about two inches wide and deep, tapering at each end. They greatly resemble the markings at the sides

of old church doors, which are said to have been made in very early times by sharpening spears and arrow heads before battles. One of these grooves was in the stone at the sides of the Union's headquarters, the Robin Hotel, which is dated 1671. It was ascertained from an old inhabitant that half a century ago it was the practice of the schoolboys to 'make sand' by rubbing a piece of stone against the soft sandstone blocks of which the houses and walls were built. Thus another antiquarian mystery was solved.

On the Monday morning the party followed the course of the trout-laden stream in Danby Dale as far as the residence Mr. G. A. Macmillan, who kindly conducted the members around his well-arranged gardens. From here the party went over the moors via Great Fryup Head and George Gap Spa to Trough House, thence over broken ground to Fryup Head, through Little Fryup Dale, by Danby Castle, and back to Castleton. In this long and varied route all the sections found something to occupy their attention. A slight detour was made to visit Danby Church, where the late Canon Atkinson preached for many years.

After tea a meeting was held, at which the representatives of the various sections gave reports on their investigations. Mr. J. J. Burton, F.G.S., presided. Votes of thanks were passed to Lord Downe, Lord Boyne, Mr. Macmillan, Mr. R. B. Turton and others, for kindly giving permission to visit the estates, and to Messrs. J. J. Burton, F. Elgee and J. W. R. Punch for acting as leaders. Mr. Elgee was especially thanked for the excellent local arrangements. An important resolution was unanimously passed, strongly protesting against the utilisation of the ground which has for so long been set apart for an extension of the natural history museum at South Kensington, for any other purpose; and urging the Government to reconsider its proposal with reference to it.—T.S.

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Photography for Bird Lovers, by **Bentley Beetham, F.Z.S.** Messrs. Witherby & Co., London. 5/- net.

This book, in its nine chapters, deals in a thorough, efficient, and practical manner with all phases of bird photography. No space is wasted in dealing with the practice of photography itself, it being taken for granted that the reader is grounded in the rudiments of the science. Good advice, however, is given upon the choice of apparatus, though the remarks upon lenses might, with advantage, have been carried further. Photographing nests and young birds, the various methods adopted for concealing the camera and operator, are well explained; and some good hints are offered with regard to cliff work; and here the writer does not fall into the regrettable habit of some of his fellow-photographers, who delight to dwell upon the supposed dangers of this work. Interesting, if short, chapters are included upon colour-work and cinematography, though the latter is out of the reach of the ordinary amateur. Photographing birds in flight, and in captivity, are also dealt with in an efficient manner. The book is illustrated by some choice examples of the author's work, and can be thoroughly recommended to anyone interested.—R.F.

TWENTY-NINE YEARS' RAINFALL AT WETWANG.

HUGH ROBERT MILL, D.Sc., LL.D.

OBSERVATIONS of rainfall made daily at 9 a.m., were commenced in 1882 by the late Rev. Maule Cole at Wetwang, which is situated on the Chalk Wolds at an altitude of 235 feet above sea-level. The rain gauge was five inches in diameter, and set with its receiving surface one foot above the ground. The observations cover the twenty-nine years, 1882 to 1910, and the falls for each month, with the annual totals, are given, together with the greatest daily fall in each year. At the foot of the table are quoted the average monthly falls—(1) for the first ten years; (2) for the second ten years; and (3) for the last nine years. An examination of these three results seems to indicate a diminution in the annual rainfall, for the first decade gives an average annual fall of 28.06 inches, the second decade, 26.42 inches, and the last nine years, 24.15 inches. There is, however, no reason to suppose that this apparent diminution in the rainfall will continue. The past two years have both had falls much in excess of the average, and it is possible that they are the forerunners of a series of wet years, which would have a parallel in the years 1875 to 1883.

In a report on the rainfall of the East Riding of Yorkshire, which I prepared for one of the Water Supply Memoirs of the Geological Survey, it is stated that the rainfall of every one of those nine years was above the average, the excess amounting on the whole to 16 per cent., while in earlier years the rainfall had been much below the average. The average of the twenty-nine years' record is 26.28 inches, and there were fifteen years above, and fourteen below this average. Since the observations do not cover the long spell of wet years referred to above, it is probable that the true average rainfall would be somewhat greater. The computed average rainfall for thirty-five years at Wetwang is quoted in the Water Supply Memoir of 28.2 inches. The wettest year in the record was 1882, with 39.52 inches of rain, or 150 per cent. of the average amount. The driest year was 1905, with 17.21 inches, or 65 per cent. of the average.

The following table gives the average rainfall during the twenty-nine years for each month, together with the percentage which each month's fall is of the year's total.

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1.87	1.70	1.91	1.83	1.92	2.06	2.34	2.68	1.68	3.31	2.44	2.54	26.28
7.1	6.5	7.3	7.0	7.3	7.8	8.9	10.2	6.4	12.6	9.3	9.6	100.0

A.D.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Greatest Fall	Date
1882	2.50	1.51	2.17	5.21	1.61	4.22	4.46	2.17	1.40	5.55	3.59	5.05	39.52	1.61	Oct. 25
1883	2.65	2.91	1.18	1.89	2.09	4.54	2.89	1.57	4.95	3.65	2.69	2.10	33.14	1.63	June 29
1884	3.39	1.74	2.41	2.32	1.11	.86	2.38	1.58	1.64	1.38	1.62	2.78	23.24	.94	Feb. 1
1885	1.84	2.15	1.82	1.69	2.10	2.50	1.84	2.13	3.44	6.75	2.19	.96	29.44	1.91	Oct. 23
1886	3.83	.91	2.73	1.90	4.88	.63	3.57	2.10	1.29	3.19	2.14	3.73	30.87	1.41	May 13
1887	1.54	.53	1.67	1.01	1.74	.08	1.35	1.36	2.69	2.89	2.39	1.90	19.18	.72	" 19
1888	.91	.99	2.89	2.39	.88	2.18	5.85	2.65	1.66	.98	3.74	1.79	26.93	1.02	Aug. 28
1889	1.41	1.79	2.84	2.80	2.46	.28	2.47	4.57	1.34	4.45	.77	1.11	26.32	1.45	Mar. 8
1890	2.21	1.32	1.51	.87	2.28	2.15	1.97	4.03	1.43	1.85	3.34	1.14	24.13	.95	Nov. 23
1891	1.26	.09	1.41	2.18	2.08	.91	3.35	3.89	1.22	4.24	3.54	3.65	27.78	.92	July 30
1892	1.43	2.09	1.98	1.64	3.08	3.65	2.55	2.62	1.22	6.53	1.79	1.16	28.86	2.10	Oct. 14
1893	1.23	3.47	.35	.57	2.38	1.48	2.54	1.47	1.54	1.96	3.60	2.46	23.09	.91	Nov. 18
1894	1.81	3.06	1.35	1.89	1.81	4.60	3.17	1.96	.79	4.33	1.36	2.89	29.04	1.24	June 4
1895	4.55	.34	2.50	1.44	.49	3.87	4.42	2.64	1.41	3.83	2.98	2.26	30.77	1.62	" 26
1896	.72	.80	2.45	.97	.63	2.35	1.24	1.91	3.09	5.04	1.50	4.27	24.99	.84	Oct. 11
1897	2.83	2.73	3.32	1.65	1.12	1.84	.63	3.92	2.63	1.65	2.57	2.51	27.43	1.03	Aug. 16
1898	.72	1.42	1.34	2.96	2.48	1.90	.60	3.47	.21	3.32	2.97	2.64	24.06	1.20	Nov. 23
1899	2.49	1.33	1.72	1.91	3.21	1.15	.86	.39	3.12	1.84	1.21	2.55	21.80	1.20	Sept. 29
1900	3.01	3.07	.64	1.36	.90	1.93	1.43	6.47	.84	3.68	3.16	3.7	30.22	3.19	Aug. 3
1901	1.62	2.17	2.02	1.65	.90	1.86	1.02	2.62	1.02	1.42	3.72	3.91	23.95	1.94	Nov. 12
1902	1.17	1.36	1.23	1.04	2.24	1.76	2.13	1.76	.63	2.72	1.57	2.40	20.04	.91	Dec. 1
1903	1.62	1.34	2.65	2.04	2.22	1.08	3.39	2.03	3.23	6.24	1.39	1.20	28.47	1.15	Sept. 10
1904	1.55	2.12	1.46	.92	1.33	.40	1.41	3.47	1.25	.45	2.10	1.99	18.47	1.41	Aug. 17
1905	.51	.92	1.73	1.27	.53	2.71	.94	2.96	1.47	1.37	2.57	.19	17.21	1.08	June 27
1906	2.05	1.49	1.73	.92	2.25	1.25	2.37	2.45	.87	4.45	3.44	2.03	25.34	.82	Oct. 17
1907	.75	1.37	1.30	1.46	2.95	3.02	1.47	2.49	.76	4.44	2.20	3.93	26.17	1.06	May 31
1908	1.49	1.96	2.80	2.48	1.89	.87	2.21	1.93	1.69	1.11	1.82	2.06	22.34	.71	July 8
1909	.78	1.43	3.93	2.81	1.30	3.25	2.80	4.02	1.28	3.32	1.09	4.35	30.40	4.42	Aug. 1
1910	2.21	2.78	1.02	1.85	2.84	2.44	2.46	2.93	.63	3.20	3.60	2.85	28.83	.98	Nov. 27
Average 1882-1891	2.15	1.40	2.07	2.23	2.13	1.84	2.91	2.61	2.10	3.49	2.60	2.42	28.05		
Average 1892-1901	2.04	2.05	1.68	1.60	1.70	2.46	1.84	2.75	1.59	3.36	2.49	2.84	26.42		
Average 1902-1910	1.35	1.64	1.98	1.64	1.95	1.86	2.13	2.67	1.31	3.03	2.20	2.34	24.14		

Perhaps the most striking feature of this table is that September, the driest month, is sandwiched between the two wettest months of the year; the high value in August is probably due to the frequency of thunderstorms.

In the main table, the amount of rain in those months during which 4·00 inches or more fell, is given in heavy type, and there were twenty-seven such months of heavy rainfall during the twenty-nine years. Of this number, October claims ten, August coming next with four. During the whole period covered by the observations, no such record occurred in February, March or November, and only one each in January, April, May and September. The wettest month was October 1885, when 6·75 inches was recorded.

In eleven months the rainfall did not amount to '50 inch, there being three instances in June, two in February, and one each in March, May, August, September, October and December. The driest month in the record was June 1887, with only .08 of rain.

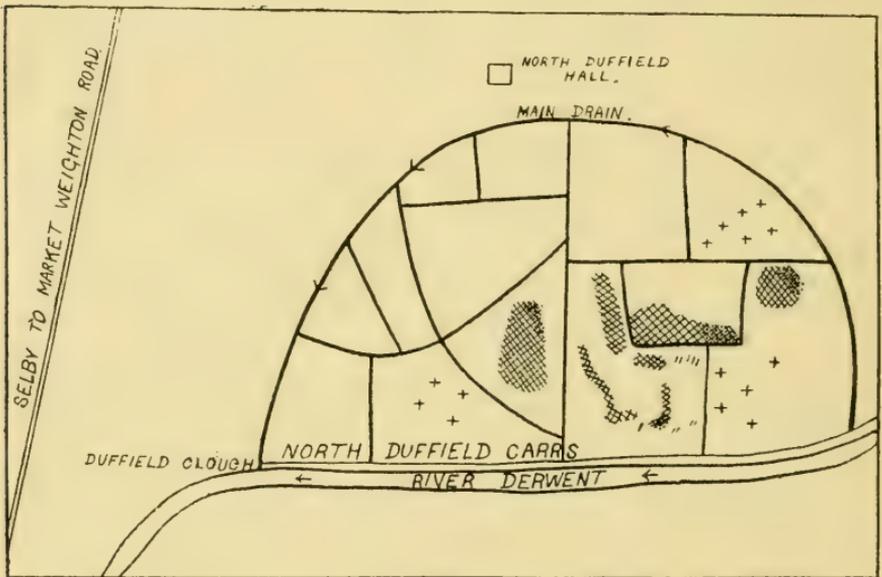
The last two columns of the main table give the greatest daily falls in each year, with the date of occurrence. This shows that the rainfall exceeded 2.00 inches, on only two days in the whole twenty-nine years' observations. The first instance was a fall of 2·10 inches on October 14th, 1892, and this single day's record represented 7·3 per cent of that year's total fall. This day was one of exceptionally heavy rain throughout the whole of Yorkshire, and formed the subject of a special discussion in 'British Rainfall,' 1892. The only heavier fall in the record was on August 3rd, 1900, when 3.19 inches or 10·6 per cent. of the whole year's fall was measured. Correspondingly heavy falls occurred in the east and north of England on that day, falls greater than any previously reported occurring at several stations in Yorkshire. Of the twenty-nine maximum daily falls, August, October and November each claim five, June had four, May three, July and September two each, February, March and December one each. The heaviest daily fall of the year never occurred in either January or April.

The importance of securing the establishment of new records of rainfall in the East and North Ridings is very great. While the West Riding is better supplied with rainfall stations than most parts of England, the other divisions of Yorkshire are worse off in this respect than almost any other county. Observations such as those carried out by the late Mr. Maule Cole are very simple, and of great value both to science and in practical matters. Full information as to instruments and free instructions can always be obtained from the British Rainfall Organization, 62 Camden Square, London, N.W.

ON THE OCCURRENCE OF *PEDICULARIS PALUSTRIS* L. EN MASSE.

W. J. FORDHAM,
Bubwith.

WHEN on the bank of the River Derwent, near Bubwith, East Yorks., on June 4th, Mr. E. Snelgrove of Sheffield and I were surprised to find large masses of *Pedicularis palustris* L., growing in the carrs by the river side. The purple here caused by this plant *en masse*, showed up well in its setting of golden buttercups, and was clearly visible from the turnpike road at a distance of half a mile. I visited the locality a few days after, when I sketched the accompanying plan, which is



The plan represents one mile in width.

+ (crosses) = isolated small colonies.

Crosshatching = *P. palustris* practically only plant in area.

Dots = other plants.

modelled on the six-inch ordnance survey. Being drawn to scale, it will give a better idea of the luxuriance of the plant than any detailed description. The drains are indicated on the maps, and the distribution and extent of the *Pedicularis* can be seen at a glance.

The outstanding colour of the surrounding vegetation was golden, owing to the presence of *Ranunculus acris* L. in the drier parts, and *Ranunculus repens* L., and *R. flammula* L. in the wetter parts. The drains were choked up with a luxu-

riant growth of rushes, sedges and horsetails, with here and there a more open space carpeted by an aquatic *Ranunculus* in some places, and by Water Violet (*Hottonia palustris* L.) in others. These drains are very dry this year, and are not cleaned out as well as they should be. However, it is the character of the vegetation of the meadow land that concerns us at present as the Lousewort did not occur in the drains at all. The areas shewn on the plan were practically solely covered by the *Pedicularis*, though there was abundant evidence that previously *Caltha palustris* L. had here held sway. Other areas, as indicated, were occupied by *Pedicularis palustris* as a dominant species, but various components of the surrounding vegetation were also to be found. The dominant plants at present (exclusive of grasses) in the carrs generally are *Ranunculus acris* L., *R. repens* L., and *Trifolium pratense* L. Previously, *Caltha palustris* L. and *Cardamine pratensis* L. had been dominant, and were fruiting.

The sub-dominant plants appeared to be :—

<i>Ranunculus flammula</i> L.	|	<i>Festuca pratensis</i> Huds.
<i>Lychnis flos-cuculi</i> L.		<i>Lolium perenne</i> L.
<i>Senecio aquaticus</i> Hill.		<i>Anthoxanthum odoratum</i> L.
<i>Rumex acetosa</i> L.		<i>Poa pratensis</i> L.
<i>Eleocharis palustris</i> Br.		<i>Phleum pratense</i> L.
<i>Carex paniculata</i> L.		and
<i>Carex acuta</i> L.		<i>Alopecurus geniculatus</i> L.

Other plants commonly occurring and very little less frequent than the preceding thirteen species were :—

<i>Lotus corniculatus</i> L.	|	<i>Spiræa Ulmaria</i> L.
<i>Sanguisorba officinalis</i> L.		<i>Enanthe crocata</i> L.
<i>Silaus flavesceus</i> Bernh.		<i>Plantago lanceolata</i> L.
<i>Rhinanthus crista-galli</i> L.		<i>Prunella vulgaris</i> L.
<i>Myosotis palustris</i> Hill and its var.		and
<i>strigulosa</i> Rchb.		<i>Equisetum palustre</i> L.

The following grasses, etc., were also obtained —

<i>Carex disticha</i> Huds.	|	<i>Festuca rubra</i> L., and
<i>Anthoxanthum odoratum</i> var. <i>villosum</i> Lois.		<i>Festuca pratensis</i> Huds. × <i>Lolium perenne</i> L.

Several of the above have been verified either by Dr. Drabble, F.L.S., or by Mr. J. F. Robinson.

I shewed the Lousewort to Mr. Wilfred Hutchinson, of Gunby, and he tells me that seventeen or eighteen years ago it appeared in abundance in the ings on their farm, which is about a mile and a half down stream on the other bank. It persisted for three or four years in diminishing numbers, and eventually died out, and he has not seen it since. He attributes this extinction to mowing the hay before the seed

was ripened. It also occurred at the same time in the Menthorpe Ings, opposite Gunby. I have this season found a few isolated plants in Bubwith Ings, on the other side of the river, opposite the large masses in North Duffield Carrs.

All the 'ings' and 'carr' land is annually flooded, generally in winter and early spring, but two years ago there were heavy floods after the hay had been cut, and a large part of the crop was ruined or floated away down stream. Mr. Hutchinson says that he thinks the plant was spread by these floods. He has watched the spread of *Tanacetum vulgare* L. for years in a like manner, and says that after heavy floods, it occurs sporadically in Gunby Ings. It has a permanent foothold here and there along the river bank. The elevation of the meadow land in the ings on either side of the Derwent is only about fifteen to twenty feet above sea level. I have not previously botanically worked the North Duffield Carrs, so I cannot state how long the plant has been there; but the data I have acquired this year will form an interesting basis for observations in future years.



BIRDS.

Bird Notes from Marsden.—On the 22nd September last, a good specimen of the Gold Crested Wren was brought to me. It had been picked up on the highway between Marsden and Slaithwaite. The bird had evidently met its death by flying against the telegraph wires. In October last, an immature specimen of the Kittiwake was shot at Booth Hey, Slaithwaite, and in November a Razorbill was shot in Wessenden Valley, Marsden. Both these birds were brought to me. The movements of small flocks of Common and Black-headed Gulls from the latter end of March and throughout April have been interesting. The Common Gulls were always flying west, whilst the black-headed species, numbering twenty-one, were always flying east. On the 1st May I observed two black-headed Gulls feeding at the local Sewage Works, and these birds have remained ever since. They come daily to the Sewage works for food, and apparently spend the rest of their time in the vicinity of the reservoirs in the Wessenden Valley, and on the moorlands by the Great Western Inn. When going through Drop Clough, Marsden, on the 9th April, I noted the arrival of a flock of Chiffchaffs, numbering fully a score. The birds remained for some little time before dispersing, and were constantly in song. Lapwings have been abundant on the Cupwith Moors, and I also flushed a Woodcock in the same locality on the 3rd June.—ALFRED DEAN, Marsden.

BIBLIOGRAPHY:

Papers and Records published with respect to the Geology and Palæontology of the North of England, (Yorkshire excepted), during 1909.

T. SHEPPARD, F.G.S., F.R.G.S., F.S.A.(Scot.).

Since 1884, particulars of the various geological monographs, etc., bearing upon the northern counties of England (Notts., Cheshire, Derbyshire, Lincolnshire, and to the north thereof, including the Isle of Man) have been published. Up to 1901 they were issued in *The Naturalist*, and the list for 1902-8 appeared in the *Transactions of the Yorkshire Naturalists' Union* part 34, for 1908.

The present instalment includes the entries for 1909, with the exception of the Yorkshire items. These are shortly appearing in a memorial volume to the late C. Fox-Strangways, which is being edited for the Yorkshire Geological Society by the present writer, and it seems unnecessary to duplicate the items.

A few entries omitted from previous lists are given below.

1902.

- D. H. SCOTT. Yorks.
On the Primary Structure of Certain Palæozoic Stems with the Dadoxylon Type of Wood. 'Trans. Roy. Soc. of Edinburgh.' Vol. XI., Part 2, No. 17.

1903.

- F. W. OLIVER and D. H. SCOTT. Lancashire and Yorkshire.
On *Lagenostoma Lomaxi*, the Seed of *Lyginodendron*. 'Annals of Botany.' Vol. XVII.

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FIELD NOTES.

BIRDS.

Sanderlings in the Calder Valley.—On May 20th, with two friends, I visited a small gullery (black-headed) at White Holme Reservoir, Blackstone Edge, a few miles from Hebden Bridge, and there saw a bird which I had no difficulty in recognising as a Sanderling. It was probably an example just about to attain its first real summer plumage. Shortly afterwards, the occurrence of Sanderlings in the district was reported at a meeting of the Ovenden Naturalists' Society, and through the courtesy of Mr. E. Roberts, who answered my enquiries, I am able to state that Sanderlings have been observed almost daily from the last week in April to June 8th, on a large sewage farm near Sowerby Bridge, by Messrs. Ralph Bates and H. Priestley. There were four birds until the first week in May, when two disappeared, but the other two remained until May 25th, and one was observed as recently as June 8th. This is the first record of the species in the half dozen years' existence of the Hebden Bridge Literary and Scientific Society.—WALTER GREAVES.

Increase in the Grasshopper Warbler and Corncrake in the West Riding.—Unfortunately, Mr. H. E. Forrest's interesting note (ante p. 232), on the abundance of the Nightingale in Shropshire, and to the north and north-west of its usual habitats, does not apply to this district, where I have never heard nor seen a Nightingale. The feature of this season, however, in the return of the smaller summer-migrants, is the increase of Grasshopper Warblers—the rarest of our local warblers. There is a pair at Ben Rhydding (where I have not known it to occur previously), and I hear of three more pairs, all the four being within an area that could be covered in twelve miles 'as the crow flies.' The comparative significance of these four pairs can better be judged when I state that I have never before known more than one pair in the same area in any one season, and that usually three or four years at the least elapses between the visits of even a single pair. The Corncrake, which has been decreasing for several years now, until it has almost become a rare bird here, has, I am pleased to say, returned in rather greater numbers this season.—H. B. BOOTH, Ben Rhydding.

Mr. E. C. Senior, assistant at the Leeds Art Gallery, has been appointed curator of the Art Gallery and Museum at Doncaster.

The Caradoc and Severn Valley Field Club held its 'long meeting' this year in Yorkshire, from June 12th to 17th. Headquarters were at Harrogate; and York, Bempton, Knaresborough, and Aldborough were also visited. Messrs. Benson, Grabham, Fortune, and Sheppard acted as guides.

REVIEWS AND BOOK NOTICES.

A Text-Book of Zoology, by **Prof. T. J. Parker, F.R.S.**, and **Prof. W. A. Haswell, F.R.S.** Vol. I., pp. XXXIX + 839. Vol II., pp. XX. + 728. (London: Macmillan & Co., Ltd., 1910). Price 36s. net.

It is thirteen years ago since the first edition of 'Parker and Haswell' appeared, and although the book was at that time warmly welcomed, probably few conceived the great influence the book would exercise amongst students of zoology. To both teacher and student alike the work has become indispensable, and it would scarcely be an exaggeration to say that the training of most zoologists of recent years has begun with the solid foundation of 'Parker and Haswell.'

A new edition of such a work is therefore of special interest and importance, as in a progressive science like zoology, new discoveries are being constantly made, and an opportunity is given of correcting the errors that persist in creeping into the most carefully edited of books. Bearing on this point a comparison of the second with the first edition shews an addition of two-hundred pages of letterpress, and 70 illustrations; and the errors to which attention had been drawn by capable reviewers of the first edition have almost invariably been corrected.

From the point of view of the student the scheme of the volumes is exceptionally good. The Phyla of the Animal Kingdom, from the Protozoa to the Chordata, are divided into classes, and a 'type,' or, as the book prefers it, 'example,' of each is described in detail. This is followed by an account of the distinctive characters and classification of the Class, the systematic position of the example, and the general organisation of the Class.

The method of studying a group of organisms by a 'type,' so much in vogue in the teaching of biology, has its dangers, in that the student is apt to get too stereotyped an impression of the organisation of the members of animal or plant groups, and so to consider every organism but the 'type' as exceptional. These dangers, however, are largely obviated by the plan of the present volumes.

Considering the size of the work, errors are exceedingly few. We notice that in the phylogenetic tree, on page 525 of Vol. I., the Gephyrea and Hirudinea are still shewn as springing from the common stem, which gives rise to the Polychæta and Oligochæta, although there seems little doubt that the Hirudinea are modified Oligochæta, and similar links exist between Gephyrea and the Polychæta. To the specialist, the work may not seem sufficiently advanced, but recourse must be made by such to the 'Cambridge Natural History' or some similar work.

On the score of illustrations the book cannot be too highly recommended. These are clear and well-chosen; are conveniently placed near the letterpress to which they relate; and are numerous, amounting in all to 1241. It is a pity, however, that no indication is given of the size of the object drawn. As to the printing and general get up of the volumes it need only be said that Messrs. Macmillan & Co. are the publishers. The work should certainly be in the library of every local natural history society.

The **Birmingham and Midland Institute** has issued its useful Records of Meteorological Observations taken at Edgbaston, 1910, by Mr. Alfred Cresswell (2/-). The observations are tabulated, and published in a very methodical manner.

From the **Horniman Museum** we have received a handbook to the cases illustrating stages in the evolution of the domestic arts. It is in two parts, sold at 2d. each. The first deals with Agriculture, the Preparation of Food, and Fire-making; the second refers to Basketry, Pottery, Spinning, Weaving, etc.

THE NATURALIST.

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NATURAL HISTORY FOR THE NORTH OF ENGLAND.

EDITED BY

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AND

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NOTES AND COMMENTS.

THE SPORTOPHYTE.

There can be no question that the Editor of *The Sportophyte* is, to use a not uncommon expression, 'a sport.' She tells us she 'delights in hazards of many kinds,' and also, still to use her own words, 'incidentally she has just been married.' To commemorate this incident, presumably, she has 'halved' the price of the 'Sportophyte,' though it has one page more than the previous 'volume,' which, oddly enough, was a 'double number,' whereas 'volume' II. is not. Yet when Volume I. was issued, the editor was a single number, whilst now she is but the 'better half' of another. And we are told that the second part should have appeared on April 1st!

BOTANISTS AT PLAY.

There are one or two amusing skits in 'volume'* II, and some severe criticisms. There is also some more 'rabbit-meat'. We learn (page 2)—

"Why these things are called Botany
Is more than I can tell;
Some German must have named them—
Perhaps to him they're *hell*."

The Editor goes on to explain that 'hell' is German: one wonders why the 'l's' on the very next page are upside down!

BOTANICAL GLEANINGS.

Amongst the items of botanical information gleaned from *The Sportophyte* we learn that a farmer expressed the wish that an experiment station would 'breed flat peas which won't fall off the knife as I eat 'em.' If there were no bacteria, a man might be nearly cut in two, and the wound would heal in an hour or two.' 'Food travels from cell to cell, to the Bachelor bundles.' [The Editor, having only been married a week or two when her 'volume II' appeared, doubtless resisted the temptation of referring to marriage being 'a cell']. 'A runner is a useful method of profligation.' We learn as a 'tail-piece,' that 'envelopes containing *contributions* should be *stamped* and addressed to the Editor, M. C. Stopes, Botanical Department, University College, England,' and we presume the same remark will apply to envelopes containing subscriptions (1/-).

AN INTERNATIONAL PHYTOGEOGRAPHICAL EXCURSION.

What is probably one of the most extensive as well as the most important botanical excursions ever arranged in the British Isles will take place during the present month. In

* This is a botanical joke. The booklet has 24 pages—and the price is $\frac{1}{2}$ d. a page.

recent years considerable discussion on points of nomenclature has been in progress between British and Foreign plant geographers. This culminated at the International Botanical Congress held in Brussels last year. The views of British ecologists were set forth in a pamphlet drawn up by the British Vegetation Committee, and also in a special pamphlet on the question of Plant Formations by Dr. Moss. These had great influence on the views of Continental ecologists, and it was thought desirable to bring together representative men to consider on the spot the various views regarding the chief plant associations. There can be no doubt that such an opportunity for exchange of ideas will be invaluable in helping to systematise ecological studies in general.

DISTINGUISHED FOREIGN VISITORS.

Invitations were consequently sent to a number of leading botanists, and among those who propose to attend are Prof. and Mrs. Clements (Minneapolis), Prof. and Mrs. Cowles (Chicago), Prof. Drude (Dresden), Prof. Flahault (Montpellier), Dr. Graebner (Berlin), Dr. Lindman (Stockholm), Prof. Massart (Brussels), Prof. Warming and Dr. Ostenfeld (Copenhagen), Prof. Schröter and Dr. Rübel (Zurich) and Dr. Weber (Bremen). These will be joined by the members of the British Vegetation Committee and others who have made special ecological studies in this country, and Dr. G. C. Druce, of Oxford, will also be present. It is a long time since so many men eminent in Plant Geography met together in this country, and no pains have been spared to render their visit both interesting and profitable. A business programme of eight pages has been issued, giving detailed information most likely to be of value to the visitors, and also a skeleton programme of the excursion, which commences on August 1st and ends August 30th. A map is included on which the route to be taken is clearly indicated, together with the dates on which the various places will be visited.

ROUTES.

The members assemble in Cambridge on August 1st and 2nd, where they will be entertained by members of the University, while the four following days will be spent on the Yarmouth Broads. On the 7th, the party will proceed to Derbyshire, visiting Monsal Dale and the Peak Moors, and then on to Manchester. On the 9th, the cotton grass moors of the Stanedge, and the various types of woodland about Huddersfield will be examined. From thence to Southport for the sand dunes, and on to Lancaster for the lowland peat moors. August 11th and 12th will be spent in the neighbourhood of Carnforth, Grange, Silverdale and Whitborrow, and on the 13th an ascent of Cross Fell will be made. Edinburgh will be reached on the

14th or 15th, and a visit then made to the Highlands, including the ascent of Ben Lawers. Journeying to Glasgow, the University and other places of interest will be visited, before crossing over to Dublin, which will be reached on August 20th. While in Ireland, visits will be made to Craigga More, Urrisbeg and Dog's Bay; to the West of Ireland, including Galway, Ballyvaghan and Ardahan, and then to Killarney, after which the party will proceed to Cork, and thence by steamer to Plymouth. Two days will be spent in Cornwall before going on to Portsmouth, which will be reached on the afternoon of August 30th. Here the party will settle down for a week with the British Association. During this extended tour, opportunity will be given to visit the principal plant associations of the British Isles, which have so far been studied, and the experience gained during the month so spent and the exchange of ideas on the many problems which will present themselves, should prove both valuable and stimulating to all who are fortunate enough to take part.

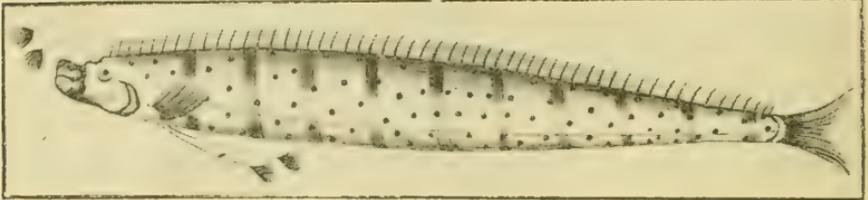
THE ISLE OF WIGHT.

Of interest to the naturalists attending the meetings of the British Association at Portsmouth is the volume recently issued under the editorship of Mr. F. Morley, F.L.S.* It has nearly six hundred pages, and is illustrated by a map and numerous photographs. In some respects, it runs on unconventional lines, especially the somewhat jocular introduction. Each section is by a specialist, and chapters deal with geology, meteorology, and the remains of early man; while in others lists are given of all groups of plants, from Fungi and Algæ to Flowering Plants, and of animals from Protozoa to Mammals. There are in all, records of 6982 species. Several northern naturalists, well known to our readers, have rendered assistance, *e.g.*, Messrs. G. S. West, in Algæ; C. Crossland, in Fungi; W. Ingham, in Mosses; J. A. Wheldon in Lichens; and W. J. Wingate, in Diptera. The introductory chapters to the groups, however, run chiefly on text-book lines and savour too much of the laboratory, and too little of the open air. One misses a first hand account of the physical features and vegetation. In the latter respect, however, the gap will be filled by Mr. W. M. Rankin, who has completed a survey of Hampshire and the Isle of Wight, and we understand has written a chapter on the vegetation and plant associations of the district for the Portsmouth 'Handbook.'

* A Guide to the Natural History of the Isle of Wight. London: W Wesley & Son.

BANKS' OAR FISH.

The illustration below is from a quaint and well-preserved water-colour drawing of Banks' Oar Fish, a specimen of which is in Middlesbrough Museum. The drawing is dated 1738,

*Ceil, Conin.*

'The Fish which is represented in the above drawing came on shore alive at Newlyn, in Mountsbay, Cornwall, on Saturday, the 23rd February, 1738. Its length exclusive of the tail was $6\frac{1}{2}$ feet; depth $10\frac{1}{2}$ inches; thickness $2\frac{1}{2}$ inches; and weight 40 pounds.'

and contains the description in contemporary handwriting, a copy of which is given. It is interesting to find this old record of the occurrence of this curious fish.

MONOGRAPH OF MOLLUSCA.

Part 18 of Mr. J. W. Taylor's well-known 'Monograph of the Land and Fresh-Water Mollusca of the British Isles' has recently been published, and deals entirely with the distribution, etc., of *Helix nemoralis* and *Helix hortensis*. In addition there are plates showing the varieties and distribution of *Helix aspersa*. One of these plates we are kindly permitted to reproduce (Plate XV.), and it will well illustrate the excellent nature of Mr. Taylor's work.

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We regret to notice a growing tendency to use the word 'organising,' in connection with Hon. Secretaryships. Are not all Hon. Secretaries 'organising' secretaries? If not, they should not be secretaries.

We have seen a circular prepared for a Nature Study Summer School in Yorkshire, on the front of which there is a photograph of a 'Nightingale's nest and eggs'. As a matter of fact there is no nest, and the eggs are certainly not those of a Nightingale, but are evidently those of a Nightjar. This seems rather a bad start!

A meeting of the Marine Biological Committee of the Yorkshire Naturalists' Union will be held at Scarborough, September 22-26. Accommodation may be obtained at a convenient boarding-house at 6/- a day, including the use of room for exhibits, etc. The Committee will be glad to welcome all members interested in the subject. There will be a temporary exhibition of marine life, shells, etc. Excursions have been arranged, and there will be discussions, papers, etc., in the evenings. It should prove extremely interesting. Scarborough is very rich in marine life; microscopic shells are more abundant than on any other place on the Yorkshire coast. Those who wish to attend should send in their names to Rev. F. H. Woods, Bainton Rectory, Driffield.

COCK PARTRIDGES 'MOTHERING' CHICKS HATCHED IN AN INCUBATOR.

R. FORTUNE, F.Z.S.,
Harrogate.

SOME interesting experiments have recently been successfully tried with Partridges upon an estate near Harrogate. The keeper had a number of cock birds which had been imported from Hungary, and were kept in pens. The keeper gathered a number of Partridge eggs from dangerous positions on the road sides, and hatched them in an incubator. The method adopted was to put the cock Partridge in a small coop, in a little clearing in a corn field, then from 15 to 20 chicks were placed in the coop with him, and they were left over night. In the morning the keeper, operating from behind a hedge, withdrew the sliding front from the coop by the aid of a long cord. Very soon the chicks commenced to run out, and in a short time they were followed by the old cock. I have watched several lots released, and have photographed one successfully. The old birds vary in their conduct: one will dash straight out of the coop into the corn, another will peer out cautiously then make straight into the corn, and another will hang about a bit before making to cover. In every case, however, the old bird commenced almost immediately to call the chicks to him, and they responded to the call at once. The last bird I saw released stayed in the coop quite ten minutes after the shutter had been withdrawn, the young ones running in and out all the time, then he came to the entrance, and, in a cautious manner, peered about him, and, without undue haste, made for cover, calling the chicks to him. This bird was seen the following day in the same place with the young ones following him, indeed, at the time he was brooding them, and upon corn being thrown into the clearing from behind the hedge, he immediately commenced picking it up. The experiment is most interesting, and, as far as I can see, is a complete success, and should solve a very difficult problem. It must be infinitely better than hatching the eggs under an ordinary fowl, and may help to again bring up the numbers of the best sporting bird in the world, which has sadly decreased of late years.

More piffle from the daily press. According to the *Western Daily Mercury* a cow was found to be suffering from an enormous swelling in the udder. The cause was at once attributed to the bite of a viper. 'The milk was accordingly set aside, and on looking at it some three hours afterwards the form of a snake was distinctly seen in the cream which had collected on the surface. There was an exact model of the reptile; the head, with the V mark, the eyes, and the tongue projecting from the mouth—perfect throughout to the tail. Moreover, by aid of a magnifying glass, the scales of the skin could be distinctly seen. All this was seen by Mrs. Heale, her two grown-up daughters, the servant girl, and the boy groom.' And so on.

PETRICOLA PHOLADIFORMIS LAM.

HANS SCHLESCH,
Copenhagen.

A SHELL which has received the attention of malacologists in recent years is *Petricola pholadiformis* Lam., a species found along the east coast of North America (the northernmost locality known being Prince Edward's Island), and the West Indian Islands, and it is everywhere very common.

In Europe it was first recorded from England (Cricksea, Essex) by William Crouch, 1890, and later was found by Cooper, at Burnham-on-Crouch in 1895, and at Shellness, Kent, in 1896, at Herne Bay in Kent, by Kennard, in 1896, and has been noted in many localities along the coasts of Essex, Kent, Suffolk, Norfolk and Lincolnshire (Mablethorpe, 1909, by Carter).

On the Continent the species was first found at Nieuport, Belgium, by Loppens, in 1899, and later was observed at several places along the Belgian coast (Coq-sur-Mer, 1900; Wenduyne, 1901; between Blankenberghe and Clemskerke, 1902; Ostend, 1903). From the French coast in the Channel it has only been noted from a few localities (Dunkirk, Calais, etc.), but north of this region it is certainly spread everywhere along the coast of Holland (Noordwijk, 1907), Germany (between Norderney and Juist, 1906, by Dr. E. Wolf, and from Romö, Sylt, Amrum, Föhr and the Hallingen by Cæsar Boettger). In Denmark, *Petricola pholadiformis* has been noted from the islands Fanö and Manö in 1907, by myself. Later I noticed it along the Danish North Sea coast (Blaavandshuk, 1908; Harboöre, 1909; Vigsö-bay, 1910; and lastly, this year, 1911, in large numbers at Svinklöv).

Petricola pholadiformis best likes still, shallow water, especially with a clayey bottom, and it seems remarkable, therefore, that it should have been able to cross the ocean. It is found in company with *Pholas candida* and *Zirphæa crispata*.



Transactions of the Hull Scientific and Field Naturalists' Club, Vol. IV., Part 3, 1911. 2/-.

This part just issued covers the work of the Society in 1908-10, and, besides giving evidence of a vigorous vitality, contains much interesting information on the many branches of science which come within the scope of its operations. Two articles occupying the lion's share of the space, deal with numismatics, a subject which has deservedly come to the front within recent years. The remaining three papers are on natural history subjects, and deal with diatoms, spiders and beetles. The addition of twenty-six new species to the list of East Yorkshire Spiders is especially noteworthy. The splendid results which have attended Mr. Stainforth's researches amongst the Arachnida, should be most gratifying to him and to his fellow-workers in the Club. They should also act as a stimulus to others to take up orders generally neglected, and thus add materially to our knowledge of the local fauna.—E.G.B.

THE BEARDED-TIT IN HOLDERNESS.

W. H. ST. QUINTIN, F.Z.S.,
Scampston, E. Yorks.

ALTHOUGH I believe there is no record of the existence, as a resident, of the Bearded Tit, in the East Riding, even before the drainage of Holderness it has often occurred to me that, if once started, there is no reason why they should not do well at Hornsea Mere, where the natural conditions seem so suitable.

Some members of the Yorkshire Naturalists' Union know that, with this object in view, I purchased last autumn a number of these birds from two London dealers, who have agents in Holland, and who often have Dutch marsh birds for sale.

I kept the birds in roomy out-door aviaries from November last, and my intention was to enlarge them on the mere as soon as Spring weather really arrived. I have often kept Bearded Tits, and find that, as a staple food, maw seed* suits them exceedingly well. But it is obvious that this is an acquired taste, and that before they were set free, it would be necessary to get them accustomed to such food as they would find on the Mere before insect life appeared. I had previously never found them notice the seeds of the Common Reed, which are stated by various authorities to be their main winter food. However, by rubbing out the reed seeds, and mixing them with the aviary food, I found, after a time, that my captives were taking to their natural diet; and for the first time, I began to feel confident that the experiment might succeed.

It was not till the 11th April that the weather seemed sufficiently mild for birds that had been kept in captivity so long, to have a good chance, so on that day I took six pairs over and two odd cocks, and set them free on the south side of the Mere, near the boathouse. I let them out of the travelling cage by degrees, but it was a little disconcerting to see the first little batch of five, after hopping about near the cage, which we had fixed up against an alder tree, take to the air, and, calling loudly, fly clean out of our sight, but luckily in the direction of the boggy wood at the Wassand end of the Mere, where there is a large extent of suitable ground, and we felt fairly confident that they would drop into this.

I was more careful about the others, and let them out by twos and threes, so that they might find their way gradually into the reed beds.

Since the middle of April I have heard from time to time, from our watcher, that he had seen some of the birds about,

* The seed of the Poppy.

and always in pairs, which, of course, was a good sign. But my satisfaction was great a few days ago, to hear from Ake that, on the 26th June, he had seen a pair of old ones followed by two or three young in the reed beds near the boathouse. I quite think that there may be other broods, but the cover is very dense, and until the leaf falls, we shall not know how far the experiment really has succeeded.

I am sure I need not impress upon my fellow members who may visit Hornsea Mere, the desirability of assisting in every possible way in the protection of this interesting little colony. It is some comfort to think that, being 'Continental,' no stranger will find it worth his while to interfere with these birds, as, of course, they possess no interest to a collector of British specimens.

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GAME BIRDS AND THEIR BROODS KILLED BY LIGHTNING NEAR HARROGATE.

R. FORTUNE F.Z.S.
Harrogate.

(PLATE XVI.).

DURING the night, between June 25th and 26th, this district, in common with many others, was visited by a heavy thunderstorm. In the morning a hen Pheasant and ten poults were found to have been struck by the lightning and killed. They were quite in the open, in the middle of a large seeds field, and had evidently 'jugged' down for the night.

Strange to relate, at a distance of 160 yards in a straight line, a Partridge was found to have been killed in the same way. This bird was sat upon her nest covering her chicks, which had only just been hatched—there were twenty of them. The keeper knew they were due to hatch off, and peering into the fence bottom, where the nest was situated, he at first thought the bird was still brooding, but a closer inspection showed she was dead, as were all the chicks.

Curiously enough, both birds appear to have suffered during the previous shooting season. The Pheasant had had a shot through one of her legs, the one prominent in the photograph, and the Partridge had lost an eye.

It must be almost a unique occurrence to find two game birds with their broods struck down in this way, and at such a short distance from each other.

A post mortem examination did not reveal the slightest trace of disease of any kind.

N.B.—Since the above was written, a Hare was found which had without doubt been killed in the same way.



Photo by]

[R. Fortune, F.Z.S.

Pheasant and 10 young ones killed by lightning, Plumpton near Harrogate, between 25th and 26th June.



Photo by]

[R. Fortune, F.Z.S.

Partridge and 20 young ones killed by lightning, Plumpton near Harrogate, between 25th and 26th June.

THE BIRDS OF WALNEY ISLAND.

A. HAIGH LUMBY.

IN this journal for 1907 (p. 270), Mr. Booth gave some notes on this subject. The Bradford Natural History Society has since paid two visits to the Island.

The 1908 visit was, in most respects, a replica of the preceding year, except that no eggs of the Sandwich Tern were seen, and there was probably only one pair of birds. The Lesser Tern was rather later in nesting. There was a very large flock of Sanderling, which had collected on the Island on its way north, and the marvellous harmony these birds exhibited in their intricate aerial evolutions was astonishing. The three species of Pipits were seen, but no Stonechats.

The Island was visited on June 10th this year, and the programme was practically identical with that of 1907 and 1908; and, with few exceptions, very similar conditions in the status of the various species of birds prevailed.

BLACK-HEADED GULL.—This still occupies a pre-eminent position as far as numbers are concerned, and this year there was apparently much less mortality amongst the young birds. This was no doubt due in some measure to the exceptional spell of fine weather during nesting time.

COMMON TERN.—Several healthy colonies of this species were noted; the largest of which was some distance from the headquarters of 1907 and 1908. This seemingly frail and defenceless bird is very pugnacious towards the Black-headed Gulls which approach the vicinity of its nest, and soon drives them beyond its boundaries.

ARCTIC TERN.—The shingle where this species builds its nest, or rather, lays its eggs, along with the Lesser Tern and Ringed Plover, was not worked very much, and only a nest or two of each were found. Owing to the difficulty in distinguishing between the Common and Arctic species in flight, nothing can be definitely reported as to the status of the latter, but the Lesser Tern and Ringed Plover were seen in good numbers.

SANDWICH TERN.—One of the most interesting surprises was to find this species established in two colonies, numbering together about eighteen nests. In 1907 only one nest with a single egg was seen, whilst in 1908 we failed to find a solitary example. As the date was only two days later than that of our visits in 1907, it is evident that the scarcity in that year was not due, as Mr. Booth suggested, to the bird not having commenced nesting, but rather to its tendency to shift its quarters from year to year.

The Sandwich Tern was once very common on Walney; but, probably owing to the frequent disturbance, it had deserted its old home in favour of the Ravenglass preserve, until, two years ago, when it re-appeared in its former haunts.

Every nest seen was surrounded by a white-washed circle of excreta, ejected by the birds whilst on the nest, a characteristic noticed in the case of the single nest found by the writer in 1907, which, however, was merely a depression or scratching in the sand, differing widely from the substantial structures of marram grass in this year's colonies.

ROSEATE TERN.—There still remains the possibility of the Roseate being on the Island, though no further definite evidence has been added to that given in 1907.

SHELDUCK.—Very common; in fact, more birds were seen than in former years, and there were plenty of burrows with down about them.

OYSTER CATCHER.—Common, and very noisy.

STOCK DOVE.—Several were seen about the burrows in the sand dunes.

STONECHAT.—After careful search the party was successful in discovering two pairs of this species—one feeding young in nest.

Altogether thirty-six species were noted on the Island or in the neighbourhood.

Our thanks are again due to our friends of the Barrow Naturalists' Society, and to the Duke of Buccleuch and his agent.



Lincolnshire Boulders.—Through the kind aid of the Rev. A. C. H. Rice, Rector of Horsington, in the Lindsey division of Lincolnshire, I have been able to examine a boulder in his parish, which I took to be a block from the Spilsby sandstone, similar to the boulder No. 1, in my note on Lincolnshire Boulders in 'The Naturalist' for 1909, p. 93, the position of which in situ has not been found. This additional boulder, which is highly fossiliferous, and very hard in texture, is 4 ft. 6 in. in length, 2 ft. wide, and about 1 ft. 6 in. deep. On the surface it is a mass of fossils, principally ostræas, with broken shell fragments and a fair number of belemnites. Prof. P. F. Kendall, to whom I sent the chippings, confirms my view of its origin, pointing out 'the usual lustre-mottling' of its class, and remarking on its containing more belemnites than he had hitherto met with in blocks of the same kind. The village of Horsington is some four miles north of the Stixwould Station, on the Great Northern line from Lincoln to Boston by the side of the Witham river.—F. M. BURTON, Highfield, Gainsborough.

NEW AND RARE YORKSHIRE SPIDERS.

WM. FALCONER,
Slaitwaite, near Huddersfield.

ALREADY during the present year, fourteen species of spiders have been added to the Yorkshire list, bringing the total for the county up to three hundred and ten, a number only exceeded in the case of Dorset, though very closely approached by both Northumberland and Cumberland.

For five of these additions, *Entelecara thorellii* Westr., fig. 4, *Hypselistes jacksonii* Camb., *Hypselistes* nov. sp., *Troxochrus ignobilis* Camb., and *Xysticus sabulosus* Hahn, Mr. J. W. H. Harrison of Middlesborough is responsible, and he will, in due time, record particulars of them. They are all from Eston in the North Riding.

Three others, with several species of some rarity, were obtained in the course of a day's collecting on June 3rd last, by Mr. W. P. Winter and myself, from Selby by way of the river bank and Riccall Common to Skipwith Common, the well-known naturalists' resort in the East Riding. The journey was undertaken with the express intention of investigating its arachnid fauna more fully than had been hitherto attempted. Circumstances favoured us; the dry sunny weather which had prevailed so long, by drying up the moister portions of the Common, and contracting the waters of the Mere, gave us easy access to places which, in a wetter season, would be unworkable. It was only possible, however, to search a small area in the short time at our disposal, and many more visits at every season of the year will be necessary before its spider population can be satisfactorily ascertained. The remaining five species new to the list occurred in various parts of the West Riding.

In the list, uninitialled entries indicate that the spider was of my own collecting.

I.—NEW TO YORKSHIRE.

Theridion impressum L. Koch.

An adult male and several immature examples of both sexes on furze bushes, Riccall Common, June 3rd. Recognised first as a British species by the Rev. O. Pickard-Cambridge, in 1903 ('Proc. Dorset Field Club,' Vol. XXIV., p. 162). it is now on record for Warwickshire, Dorset, Hereford and Cheshire.

Bathyphantes se'iger F. O. P. Cb. Fig. 3.

An adult female in damp ground between the road and the River Ouse, just above Selby on the E. Riding side, June 3rd. Previously this rare spider has occurred several times in Newtown Moss, Pen-

rith, and once at Watton in Norfolk. The example recorded above has been seen by Mr. Cambridge.

Diplocephalus castaneipes Sim.

Three adult females, June 9th, at the roots of herbage in a dried-up spot on the slope between Middle House and Malham Tarn, but nearer the former place.

This spider was first met with as a British species on the summit of Snowdon, where both sexes were taken by Dr. Jackson in 1905 ('Proc. Dors. Field Club,' Vol. XXVII., 1906, p. 91). It has since been found in the other three countries of the British Isles.

Diplocephalus protuberans Camb. Fig. 1.

An adult pair at the roots of grass on the left bank of Ainley Place beck, in Clough House Wood, Slaithwaite, May 10th, and a few days later, a couple of females in the same place. Originally in the male sex, described and figured by the Rev. O. Pickard Cambridge, in 'Proc. Zool. Soc.', London, 1875, p. 218, pl. XXIX., fig. 24, sub. *Erigone protuberans*. A single male of this spider, which had previously occurred in France, was, when found by Mr. R. S. Bagnall, in December 1906, among moss at Gibside, Durham, new to Britain. This example is recorded by Dr. Jackson, in 'Proc. Chester Soc.', 1907, Pt. 6, pt. 3, and the male palpus is there figured in various positions, Plate I., figs. 10-15. The above, therefore, is the second occurrence of the species, but the first record of the female in Britain.

The females I took apparently agree with the description given by Simon in his 'Arachnides de France,' Tome V., Partie 3:—'Epigyne: a semi-circular brownish plate, rugose and ciliate, convex in front, and a little depressed behind, entirely divided by a slender longitudinal striae marked on each side with an oblique curved depression not reaching the margin,' but certainly no one would recognise the species from his figure, which is the only one extant. I venture, therefore, to append a drawing of the epigyne, which is very distinct and characteristic, and not at all likely to be confounded with that of any other British spider.

Araconcus crassiceps Westr. Fig. 2.

An adult female from roots of grass in a dried-up place between Middle House and Malham Tarn,

July 9th, in company with *Diplocephalus castaneipes* Sim. Kindly identified for me by Dr. Jackson, who states that it agrees with the female he named from Penrith, and which was accompanied by a male of the species. This little known spider has occurred in Dorset, Northumberland, Newtown Moss, Penrith, the Isle of Arran, and shore of Loch Leven, Scotland; in Ulster and Connaught, Ireland.

Epeira sturmi Hahn.

An adult male in Clough House Wood, Slaithwaite, May, shaken out of grass surrounding an embedded stone. In this specimen, very little abdominal pattern is visible, and one palp is somewhat lighter

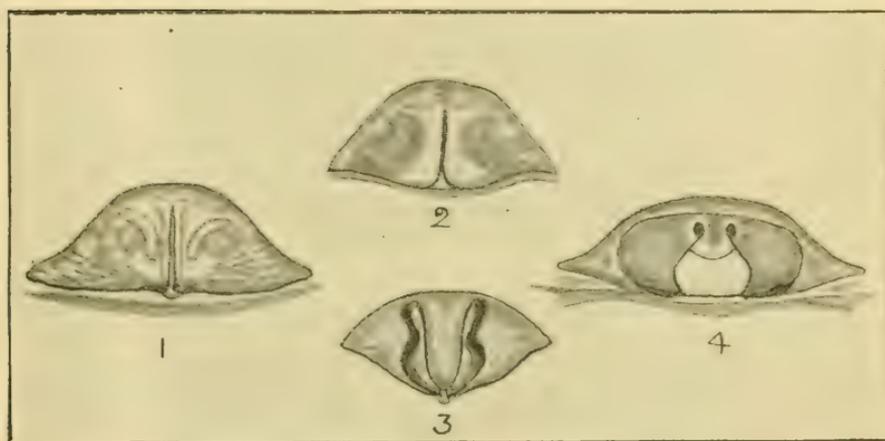


Fig. 1.—Epigyne of *Diplocephalus protuberans* Camb. ♀
 " 2.— " *Araeoncus crassiceps* Westr. ♀
 " 3.— " *Bathyphantes setiger* F.O.P. cb. ♀
 " 4.— " *Entelecara thorellii* Westr. ♀

in colour than the other. No conifers grow in the above-named wood. Also an adult female, and many juveniles of both sexes on yew trees, Deffer Park, Cawthorn, July, access to which was kindly granted me by J. M. Spencer Stanhope, Esq., Cannon Hall. I have on several occasions in various parts of the county met with immature examples of this spider, but the above recorded examples are the only adults so far obtained in Yorkshire, and confirm the identification of immature specimens taken in Deffer Wood, during the Yorkshire Naturalists' Excursion there, August 1909 (*Vide* 'Naturalist,' November, p. 395).

Previous to their discrimination by Dr. Jackson ('Trans. Nat. Hist. Soc. Northumberland, Durham and Newcastle-upon-Tyne,' New Series, Vol. III., pt. 2, pp. 9-14), two species were in England confounded under the name *E. triguttata* Fabr. So far, only *E. sturmi* Hahn. has been observed in the North of England.

Ero cambridgii Kulcz.

Three females, cliffs West of Marske, August 1910. Separated from British examples of *E. thoracica* Wid., by Kulczynski ('Fragmenta Arachnologica IX.', Jan. 1911, pp. 61-2, Plate B, figs. 79, 81, 82), this species has now been recognised in Dorset, New Forest, Cheshire, Yorkshire and Cumberland.

Pisaura mirabilis Clerck.

One female with egg sac near Keighley, Mr. Rosse Butterfield, June 1910, received for examination January 1911. Up to the time of writing, July, the only Yorkshire example, though the spider is usually a plentiful one, with a wide distribution at home and abroad. Yorkshire, however, is not the only place in which it has a similar curiously restricted range.

Pirata latitans Bl.

A few adults of both sexes in a damp spot on Skipwith Common, June 3rd, W.P.W., and W.F. Exactly a week later, Mr. Stainforth, Hull, collected a few females at Kelleythorpe, near Great Driffield. It is on record for many parts of England, and has recently been discovered in one locality in Ireland.

II.—RARE IN YORKSHIRE.

Dictyna latens Fabr.

Several examples of both sexes on furze bushes by the mere, Skipwith Common, W.P.W., W.F., New to the East Riding.

Theridion pictum Hahn.

Immature examples, Riccall Common, and many adults of both sexes, with last-named, Skipwith Common, W.P.W., W.F. Two females on record for West Riding.

Theridion bimaculatum Linn.

Immature female, Selby; one male, several females, Riccall Common; few females, Skipwith Common; W.P.W., W.F. New to East Riding. On record also for West Riding, near Leeds.

Linyphia pusilla Sund.

Three females, Ricall Common, W.P.W. and W.F.; one male, one female, Skipwith Common, W.F. On record for two localities in North Riding, and three other East Riding localities.

Leptyphantes tenebricola Wid.

Elam Wood, Keighley, one male, W.P.W.; two of each sex, Grass Woods, Grassington, W.F. A rare Yorkshire spider, but found in all the Ridings.

Bathyphantes pullatus Camb.

Selby, one female, and Riccall Common, one male, one female, W.P.W.; several males and females, Skipwith Common, W.P.W., W.F. So far, it has only been found in one other locality in Yorkshire.

Coryphæus distinctus Sim.

Selby, on Ouse Banks, four females, and Skipwith Common, one female. On record also for North Riding.

Porrhomma miserum Camb.

Three of each sex, Skipwith Common, W.P.W., W.F. A rare British spider, new to East Riding. On record also for the other ridings, but scarce.

Syedra innotabilis Camb.

One adult male amongst grass in Grass woods, Grassington, new to West Riding, the third Yorkshire example, the others having been taken near Skelton, North Riding.

Sintula cornigera Bl.

One male, Royal Clough, Pole Moor, Huddersfield. Nowhere a plentiful spider, and only five solitary specimens have, so far, been found in Yorkshire.

Gongylidiellum paganum Sim.

Rivock, near Keighley, one female, W.P.W.; Ainley Place, Slaithwaite, one female, W.F. Two other specimens, a male and a female, the first British examples, have previously occurred, also in West Riding. It has been recently met with in Ireland.

Enidia cornuta Bl.

Three males, eight females, Skipwith Common, W.P.W., W.F. On record for all the Ridings.

Eboria caliginosa Falcr.

In two bogs at roots of herbage, near Nont Sarah's, Scammonden—a new station. On April 14th, discovered in plenty, both sexes on summit of Scawfell Pike, in the Lake District, by Mr. Britten.

Cnephhalocotes elegans Camb.

Four males, nine females, Skipwith Common, at roots of grass in damp places, W.P.W., W.F. Yorkshire records few, except around Huddersfield.

Cnephhalocotes obscurus Bl.

One male, two females, Skipwith Common, with last-named W.P.W., W.F. Yorkshire records few, except around Huddersfield.

Walckenaera nudipalpis Westr.

One female, Skipwith Common. New to East Riding. The same remark applies also to this spider.

Ceratinella brevipes Westr.

Two females, Skipwith Common, W.P.W., W.F. New to East Riding. Another example has since been taken by Mr. Stainforth at Pulfin Bog, near Beverley.

Epeira patagiata C. L. Koch.

Three adult females, but immature males and females in plenty on furze bushes, near the mere, Skipwith Common, W.P.W., W.F. It has occurred in three other East Riding localities.

Lycosa nigriceps Thor.

Both sexes, Skipwith Common, W.P.W., W.F. New to East Riding and other Yorkshire records few.

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The Liverworts, British and Foreign, by Sir Edward Fry, G.C.B., and Agnes Fry. London: Witherby & Co. Pp. VIII. and 74. 1/6.

This little book is intended as a companion volume to 'British Mosses,' by the same author, and follows a similar plan, his object being to excite an interest in these lowly, but interesting plants. The forty-nine illustrations are the work of his daughter, Miss Agnes Fry, and serve to show the more important structures met with in the different groups. After describing a thallose and foliose liverwort, chapters follow on the Riccieæ, Monocleæ, Anthocereæ, Marchantieæ and Jungermanniæ, dealing with the more general characters of the groups. Other brief chapters deal with modes of reproduction; Elaters; Odour and Water Supply; Alternation of Generations; Classification and Distribution. The work is not intended for the specialist, and is written in the main in non-technical language. In attempting this great difficulties are encountered, and we think it would be better to explain and illustrate clearly the more important technical terms, and use them than try to find substitutes which are often misleading. To give only one or two examples: On page 4, he refers to the 'Archegone, or fertilized female cell' though on page 7, he says the archegone 'consists of the ovum or female cell, and a flask-shaped vessel containing it.' Rhizoids are usually referred to as 'rootlets' and 'root hairs,' terms which have a definite botanical meaning, and ought not to be applied in this loose way. It is by such usage that they lose their significance, and render necessary still more technical terms which it is desirable to avoid.

ENCHYTRAEIDS OF THE NORTH OF ENGLAND.

Rev. HILDERIC FRIEND, F.L.S., F.R.M.S.,
Swadlincote.

THANKS to the grant for researches among the Annelids of Great Britain which I have received from the Government, I have been able, during the past few months, greatly to extend our knowledge of this vast and important subject, upon which I have been engaged at intervals for upwards of twenty years. I have paid visits to Cumberland, Lancashire, Derbyshire, and other counties in order personally to collect material, and study the conditions under which the animals flourish, while I have been able also to observe the life-history of some of the species, and study the early stages and methods of development.

I propose in the present paper to place on record some of the results of my observations among one of the largest groups, known as Enchytraeids. With the exception of two or three genera, and a few aberrant species, the whole of the creatures in this family have colourless blood. They are often of microscopic dimensions, ranging from about three or four mm. to an inch in length, the largest species yet discovered (*Fridericia magna* Friend) being 35 to 40 mm. long, and having red blood. The species are ubiquitous. In Cumberland I found them by the mouth of the Solway, on the banks of the Eden, in the bogs, in woods, manure, damp earth, and indeed, wherever I looked for them. In Lancashire, the estuarine forms with red blood abound at St. Anne's, Lytham, and wherever streamlets run into the sea, or the sea sends up a little arm inland. In Yorkshire and Derbyshire they are to be found in ditches, woods, manure heaps, and elsewhere, the different species of *Fridericia* especially being very abundant. Except in those cases in which the blood is red, and the worms closely resemble the different Tubificids, the Enchytraeids are white, grey, yellowish, or clay-coloured. They all require the microscope for their determination, and, owing to the vast number of species now known, the want of certainty in the diagnosis of several, the scattered material which has to be studied, and the difficulty in interpreting some of the characters, the work is slow and arduous. Something like order is, however, at last emerging from the former chaos, and we are gaining a tolerably accurate knowledge of the species and their distribution.

The main external points are the shape of the head, the length of the body and number of segments, the position of the girdle and the number of the setae. Internally the shape of the brain, coelomic corpuscles, spermathecae, salivary glands or peptonephridia, the ordinary paired nephridia, the origin

of the dorsal vessel, and the position of the commissures are the main points to be observed.

In addition to the various reports which I have myself sent at different times to this and other journals, the principal contribution to the subject is from the pen of Mr. Southern, B.Sc., of Dublin. His 'List of Oligochaeta of Lambay' (*Irish Naturalist*, 1907, vol. XVI., 68-82, with two plates), and his 'Contributions towards a Monograph of the British and Irish Oligochaeta' (*Proc. Royal Irish Acad.*, 1909, Vol. XXVII., Section B, No. 8) are invaluable. Mr. Evans, F.R.S.E., of Edinburgh, has also done much for the Scottish species. It is not intended in this paper to attempt a systematic enumeration or classification, but merely to contribute some results of recent study. And, as the genus *Fridericia* is by far the largest and most difficult, we may begin with it. When Beddard published his 'Monograph of the Order Oligochaeta' in 1895, he gave the known species of *Fridericia* as twelve. 'Das Tierreich,' by Michaelsen, published in October 1900, placed it at twenty-one. In 1909 the number of known species had risen to 65, and it is still growing. Southern's 'List of British Species' contains nineteen different kinds, and allusions to others, which he regards as synonymous or doubtful. Only five, however, of these are recorded as genuinely English. Reference will be made to some of these as we proceed.

1. *Fridericia striata* Levinsen. Apperley Bridge, January 3rd, 1898. Reported by me to *Zoologist* for that year (p. 121). Found by me in Clifton Park, Cumberland, February 13th, 1896. This year I have worked the district around Penrith and Carlisle, and confirmed the record. Typical specimens were found at Newton Moss; also in Derbyshire, at the foot of the Piston Hills, not far from Ticknall, June 1911. Near Repton, May 13th, 1911. Notes on the variations have been made for my forthcoming monograph.

2. *F. bulbosa* Rosa. By the Eden, Carlisle, January 1898. Already found by me at Rugby, February 24th, 1896, and this year at Newton Moss, in March, Newark and Malvern in May; Cauldwell, near Burton, in July. I have also taken it in Sussex, and it is known to occur in Italy, Germany and elsewhere.

3. *F. bisetosa* Levinsen. I first found this species at the Wren's Nest, Dudley, April 24th, 1897, fairly abundant in moist earth impregnated with liquid excreta; and among my further notes I find records for Sutton Park, Birmingham, Easter 1899, Newton Moss, Penrith, March 1911, and various Derbyshire localities during the present year.

4. *F. perrieri* Vejdovsky. My earliest record is 'Under moss near Embleton Station,' *i.e.*, near Cocker-mouth, April 1896, and although I have reason now for questioning the

identity, I have this year found it in the same county at Newton Moss, and assured myself that the species is a native of the North of England. Newark, May 1911.

5. *F. galba* Hoffmeister. Dunchurch Road, Rugby, February 14th, 1896. In the light of Mr. Southern's suspicions I am keeping a sharp look out on this species, but my drawings made at the time, are undoubtedly referable thereto. Found the true species May 12th, 1911, near Repton.

6. *F. michaelsoni* Bretscher, is, without doubt, one of the most prevalent British species. My newest records are:—Newark, May; Repton, in Derbyshire, May; and Cauldwell, July 1911.

7. *F. lobifera* Vejdovsky. Cockermouth, January 1896; by the Eden at Carlisle, January 1898; Newton Moss, Penrith, March 1911, and Woodville, Derbyshire, November 1910.

8. *F. ratzei* Eisen. Brigham in Cumberland, February 18th 1896; Newton Moss, near Penrith, March; and Cauldwell in Derbyshire, July 1911. My notes refer chiefly to the type, but Southern finds var. *Beddardi* Bret., which occurs in Newton Moss, Penrith.

9. *F. alba* Moore. Cockermouth, January 1896.

10. *F. parva* Moore. Carlisle, January 1898. In view of the fact that recent researches have greatly extended our knowledge of this genus, and made certain alterations necessary, I give these records with reserve, since they might prove to belong to related species which had not, at that time, been differentiated.

11. *F. magna* Friend. I have not found this worm recently, but am glad to note that Southern and Evans have turned it up in Scotland and Ireland. It occurs in Sutton Park, Birmingham, and in various localities northward to Cockermouth.

12. *F. agricola* Moore. Cockermouth and elsewhere in the North of England. *Naturalist*, 1898.

13. *F. helvetica* Bretscher. First record for Great Britain. Collected by me in soil by the bridge at Acresford between Ashby and Burton, Derbyshire, July 2nd, 1911. Previously recorded for Zurich.

14. *F. longa* Moore. Smisby, near Ashby-de-la-Zouch.

15. *F. leydigi* Vejdovsky. Newark, May 1911.

16. *F. humilis* Friend. I have now to record a species which is new to England, and, so far as I can discover, new to science also. I have not yet been able to gain access to the descriptions of some of the newest additions to the genus, so that possibly one has escaped me, which agrees with the following:—

EXTERNAL CHARACTERS.—A small, transparent worm, not more than 5 mm. in length, of 35 segments. Adult in July. Head somewhat glandular. Setae invariably two in each bundle

behind, and four in front from segment two to sixteen. Middle pair rather more than half the length of outer pair. The hinder setae very strong, and standing out like thorns when the body is extended.

INTERNAL CHARACTERS.—Brain, with prominent convexity in front, but wanting the characteristic concave or convex posterior form, and varying greatly with tension, straight, rounded, or even hollowed by turns. Girdle transparent, destitute of the usual papillae, while the intestine of segments X.—XIII is wanting in the brown chloragogen cells. Two pairs of lateral setae present on segment XII (girdle), but none on the ventral surface. Ampullae of spermiducal gland about twice as long as broad. Three pairs of septal glands in segments 5—7. No copulatory glands near the girdle, but what may serve that purpose seems to exist on segment five (similar to that reported by me for *F. peruviana* Friend). Nerve much enlarged in first five segments. Nephridia seen with difficulty, owing to the large quantity of rounded, granular coelomic corpuscles. Nearly allied to *F. bulbosa*.

The two main characteristics studied are the salivary glands (or peptonephridia, and the spermathecae.) The salivary glands are bushy immediately behind the gizzard, with a single long extension which reaches the end of segment V., and is recurved. The spermathecae have a large ampulla opening into the intestine. It is about half as long as the duct, and the organ has no glands at the opening between segment four and five. Between the duct and the ampulla are a number of sessile glands, not like the usual diverticula: In segment three the commissures are strong. I have usually found them most strongly developed in other species in the fourth segment; but this point has been generally too much overlooked in diagnosis. Found in soil in a road gutter leading to a ditch at Cauldwell, Derbyshire, July 9th, 1911, and named *humilis* on account of its small size. *F. hegemon* Vejdovsky, and one or two others are found in England, but do not here concern us.

I may now turn to the genus *Enchytraeus*, from which the family derives its name. Southern gives eight species as British, of which he records only three as English. I have not published the results of my own researches in the past in great detail for various reasons, and the following notes are not to be regarded as exhausting the English species, since the references are to northern localities only.

17. *Enchytraeus humicultor* Vejdovsky. Between Whitrigg and Kirkbride, Cumberland, April 1896. In specimens found at Swadlincote, Derbyshire, November 1910, the head and first segment were glandular. Dorsal pores were undoubtedly present in specimens received from Croydon, March 3rd, 1911.

18. *E. argenteus* Michaelsen (= *E. parvulus* Friend). This was described by me as the Aster worm in 1897, from species taken at King's Hill, near Birmingham, on July 26th.

19. *E. pellucidus* Friend. Described by me in *Zoologist*, Series 4, Vol. III., 264. First found in Stockport; since found at Birmingham, May 1911, and elsewhere. Southern thinks it may be a variety of *E. albidus* Henle. At present, I do not accept the suggestion.

20. *E. albidus* Henle, is reported by Southern for Adlington in Lancashire.

21. *E. minimus* Bretscher. First described in 1899, it was entered by Southern as Irish in 1907, to be discarded by him in 1909, in favour of the next. I shall give reasons in due course for retaining both. First English record, Buxton, Serpentine Walk, May 27th, 1911. Foot of Piston Hills, Derbyshire, June 15th, 1911.

22. *E. turicensis* Bretscher. Already recorded for Ireland by Southern. Found near Woodville, Derbyshire, July 11th, 1911. First English record. So far as I can gather, no reference is made by authorities to the point of origin of dorsal vessel. In the case before us I traced it clearly from the setae of segment seventeen, whereas in *minimus* it rises in thirteen.

It thus appears that the major portion of the species of *Fridericia* and *Enchytraeus* already known as British are to be found in the North of England. The other genera will be dealt with in another paper. Meanwhile, I should be greatly obliged if naturalists would send me gleanings from different localities. If placed in small tin boxes filled with the leaf-mould, earth, manure, moss or seaweed in which they abound, they would travel safely.

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In a recent number of *Nature* the following note, in reference to one of our contributors, appears:—Mr. Robert Service, who has just died at Dumfries, was one of the best naturalists in Scotland. His profession of nurseryman and seedsman prevented his attending a University, and also involved close attention to business for every working day. Nevertheless, he knew intimately the haunts of every bird in the south of Scotland. Not only so, but he thoroughly understood mammals, fishes, amphibia, and reptiles. He was an excellent entomologist, and took an especial interest in bees and the larger Diptera. Most unfortunately, his published papers represent but a very small part of his wide acquaintance with birds and beasts of all kinds. He was never able to afford the heavy cost of publication which must, for some inscrutable reason, always be incurred in Great Britain if a book is of a scientific nature. Much of his work is included in the recent 'Birds of Dumfriesshire,' by Mr. S. H. Gladstone, but by far the greater part of it is lost. It is by no means unusual for working men to be naturalists, at least in Scotland; but Robert Service was far more scientific, and had a far wider knowledge than even Edwards and Dick, whose names are known to the general public. He managed somehow to keep abreast of modern authorities, in spite of the difficulties involved by residence in a small country town. His death is a serious loss to the natural sciences in the South of Scotland, and under present conditions it is a loss that cannot possibly be repaired.

NATURALISTS AT BARTON=ON=HUMBER.

THE members of the Yorkshire Naturalists' Union, with the members of the Lincolnshire Naturalists' Union, investigated that section of the North Lincolnshire shore between South Ferriby and Barton-on-Humber, on Saturday, July 1st.

On arriving at Barton the party divided into sections, according to the nature of their respective investigations, and joined again at the close of their day's work to record the results. The geologists had the guidance of Messrs. T. Sheppard and J. W. Stather.

They were particularly fortunate in seeing a recent exposure of considerable importance. This occurred on the bank of the estuary near South Ferriby Hall, and showed a part of the original pre-glacial bed of the Humber, recently made visible by a change in the course of the river. Another interesting feature was an exposure in Neocomian or Kimeridge Clay, which had recently been discovered by the secretary of the Union. This occurred quite close to the previously-mentioned section, and the large cake-like nodules which occur in the clay were all similarly striated on their upper surfaces. A number of Belemnites and other fossils, almost identical with those found in the Speeton clay in Filey Bay, were secured. The party also secured, from the chalk, teeth of two species of shark (*Ptychodus* and *Lamna*); vertebræ, and other bones of fishes, sea-urchins (*Discoidea cylindrica*), and various Brachiopods, etc.

The botanists had for their leaders, the veteran, the Rev. Canon W. Fowler (Winterton), and Mr. J. F. Robinson (Hull).

The old chalk quarries, the woods, and the Humber mud-flats proved to be charming botanical gardens, and the party saw the Bee orchis flowering in one of its few favourite localities. The teasel was also quite common—doubtless a survival from the time when this plant was grown for use in the Bradford stuff works. For mycology, Messrs. W. N. Cheesman (Selby), and C. Crossland (Halifax), were responsible. This section continued its work over the week-end.

The Fungi collected and brought to the meeting were few, but Mr. Crossland and Mr. Cheesman, who remained at Barton till Monday, had good success at the Blow-Wells and Ferriby Chalk Quarry. *Crepidotus Ralsii*, not before recorded for the county, was found on decaying wood in the quarry, and about thirty other species on the way to and from, or at, the Blow-Wells, including *Omphalia gracillima*, *Pholiota præcox*, *Soppitticella sebacea*, *Dasyphypha virginea*, and *D. fugiens*, *Periconia byssoides*, *Stemonitis fusca*, and *Lycogala epidendrum*.

For general entomology Mr. C. W. Mason (Barton) was responsible, but the weather was not favourable for his depart-

ment, though the coleopterists, under the leadership of Mr. T. Stainforth (Hull) and Dr. Wallace (Grimsby) were more fortunate. Conchology had its leaders in Messrs. W. Denison Roebuck (Leeds), and J. F. Musham (Selby).

Mr. J. F. Musham writes:—Attention was given to the dykes bordering the route, and to the Blow-Wells, ponds; then to quarries, and woods at the eastern extremity of the district. A short visit was also paid to similar ground near South Ferriby, which is in a different district (3 S.W. Lincs., whereas Barton is 3 N.E.).

The following is a complete list of species taken in division 3 N.E. (Barton); twenty-five in number; those marked * being new records for the division.

<i>Agriolimnaea agrestis</i> . (All of the pale summer form). Numerous.	* <i>Hygromia rufescens</i> . Type and white var. common.
<i>Arion ater</i> var. <i>marginata</i> .	" <i>hispidus</i> .
<i>A. hortensis</i> . Several.	* <i>Vallonia pulchella</i> .
<i>A. circumscriptus</i> .	* <i>Ena obscura</i> .
<i>A. intermedius</i> .	<i>Pupa cylindracea</i> .
<i>Hyalinia cellaria</i> .	<i>Cochlicopa lubrica</i> .
" <i>alliaria</i> .	<i>Succinia putris</i> .
" <i>nitidula</i> .	* <i>Limnæa palustris</i> .
<i>Pyramidula rotundata</i> . Several.	" <i>peveger</i> . Common.
<i>Helix nemoralis</i> var. <i>libellula</i> , 00300 and 12345. Both immature.	<i>Physa fontinalis</i> . Common.
<i>Helicella virgata</i> . A few dead.	<i>Planorbis contortus</i> . A few at the Blow-Wells.
" <i>caperata</i> . Common.	<i>Paludestrina jenkensi</i> . In great abundance at one spot.
" <i>cantiana</i> . Common.	

After tea, at Barton, a meeting was held at the George Hotel, and was presided over by the Rev. Canon Fowler, who is a past president of both the Lincolnshire and the Yorkshire Naturalists' Unions. Mr. G. E. Priestman (Ilkley) was elected a member of the Yorkshire Union.—T. S.

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FLOWERING PLANTS.

The Chemistry of the Cuckoo-Flower (*Cardamine pratensis*).—One of the heralds of the gay and jocund spring-time this plant undoubtedly is, though it does not worm itself into the affections quite so readily as the primrose, and other flowers that paint the meadows in the opening of the year. It affects wet localities in fields, but, unlike its near ally, the water-cress, is unable to hold its own as a water plant, it not being sufficiently plastic for the purpose. The root-stock is densely clothed with fibres without mycorrhiza, and there are numerous water-conducting tubes in all the plant. On 5th June the dried overground parts yielded 1.7 per cent. wax, with a little carotin and no fat-oil; the alcoholic extract was only feebly bitterish, and contained a tannoid similar to rutin or luteolin, but no

sugar, and only a small resinous residue. There was a large quantity of soluble proteid or enzyme, not much mucilage, no oxalate of calcium, and some starch in the fibre (51.4 per cent.) non-extractable by boiling dilute acid. The ash amounted to 8.1 per cent., and contained 41.9 per cent. soluble salts, 4.7 silica, 22 lime, 5.2 magnesia, 7.5 P^2O^5 , $13SO^3$, and 3.5 chlorine; there was no soluble carbonate, and only a little insoluble carbonate. The latter facts, together with the distinctive proteid reactions, and the large amounts of phosphate and sulphate indicate an extraordinary fixity and stability of the albumenoids. Hence the want of plasticity aforesaid, the absence of hybridity, the feebleness of floral colouration—in short, the incomplete deassimilation.—P. Q. KEEGAN, Patterdale.

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COLEOPTERA.

Salpingus æratus Muls.: an Addition to the County List.—On the 29th June I found a specimen of this beetle, under the bark of a felled oak in Little Park, near Great Houghton, about five miles from Barnsley. Although three other species belonging to this genus have been recorded from Yorkshire localities, this is the only one as yet recorded from the Barnsley district.—E. G. BAYFORD, Barnsley.

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The Prehistoric Boat from Brigg; Lincolnshire Tokens; Roman Coins from South Ferriby; Quarterly Record of Additions, Nos. XXXIV., XXXV. and XXXVI.: being Hull Museum Publications, Nos. 73, 74, 76, 77, 79 and 80.

The first mentioned of these instructive pamphlets refers to what Mr. Sheppard rightly calls 'one of the most interesting discoveries made in recent years.' This boat, made from a single oak trunk, is about sixteen yards in length, and in a fairly good state of preservation, although it has been on exhibit something like twenty-five years. The preservative treatment it has undergone since the Museum authorities had it presented to them by the original owner, should make it less liable to the havoc which time and continued drought must work, even on such a time-resisting wood as oak is considered to be. The description is exceedingly full and complete, and is accompanied by a series of excellent figures, which add immensely to the interest and value. Quite incidentally we are told that a careful examination of the original caulking of moss has been made by Mr. M. B. Slater, F.L.S., who has been able to detect no fewer than twelve mosses and eleven hepatics after the immense period of time which has elapsed since this pre-historic boat was made. Not the least of the marvels connected with this pamphlet is its price, which, as with the rest of those now noticed, is one penny.

The two pamphlets on tokens are full of interest to the numismatist, and also to the local historian. They are well-illustrated, and should have a wide sale. The remaining pamphlets are of a miscellaneous character, natural history, antiquarian, and local history being well represented. The connection with Wilberforce has attracted to the museum a number of articles bearing on the slave-trade. The value and importance of these additions will very soon make it imperative to issue a new catalogue, which might very appropriately refer the visitor to the special pamphlet which contains the necessary details of any exhibit of which he might wish to know more than its label may impart. This would be one way of giving them a deservedly wider publicity.—E.G.B.

FIELD NOTES.

BIRDS.

Strange Accident to a Song Thrush.—I had recently brought to me the body of a Song Thrush impaled upon a large thorn, which had penetrated through the bird's neck. It



Photo]

Song Thrush Impaled.

[R. Fortune, F.Z.S.]

was found nearly at the top of a high hedge. It is difficult to say how a large bird can have impaled itself in this manner.—R. FORTUNE, Harrogate.

Redshanks breeding at Spurn.—It is gratifying to learn that the protection afforded to the birds at Spurn has been the means of adding another species to the number of birds nesting there. The keeper employed by the Yorkshire Birds' Protection Committee, informs me that at least six pairs of Redshanks have nested there this season.—R. FORTUNE, Harrogate.

Decrease in Whinchats.—Mr. Boyes deplores the decrease in the numbers of Whinchats frequenting his district.* This decrease appears to have been pretty general. In this district they have been annually getting scarcer, and during the last year or two they have become almost scarce birds. Localities where one could always be certain of coming across them in fair numbers, have not had a single pair, and I should be well within the mark if I said that for every twelve pairs we used to have, there is now only one.—R. FORTUNE, Harrogate.

The Decrease in Landrails.—There can be no doubt that the Landrail is very much rarer than formerly, and, to my mind, as I pointed out very many years ago, the chief cause is the reaping machine. This supposition has received abundant confirmation during the last year or two, when I have seen various nests left bare by the mowing machine, and, in one or two cases, young birds cut to pieces. At the beginning of July, two nests (one containing ten eggs) were laid bare in one field, and two years ago in a little field belonging to the Corporation of Harrogate, at their Sewage Works at Ribston, three nests were laid bare. One had fortunately a tuft of grass left about it, and the sitting bird was very tame. I went over to photograph her, but she was absent, and did not again turn up. The reason transpired later in the day, when we found her dead body in one of the tanks. She had evidently got into the tank in some way, and being unable to rise again, was drowned.

Against this general decrease, I was delighted to hear the bird again in Sheepshank's fields, situated practically in the centre of our town, and adjoining the Railway Station. These fields used to provide harbour for a pair of Corncrakes every year since I can remember until about ten years ago, when they ceased to come.—R. FORTUNE, Harrogate.

Bird Notes from the Scarborough District.—I regret to say that the pole-trap is still in use in this district. A friend found one (the latter part of April) wired down to a post on the moors, about three or four miles beyond 'Bloody Beck' (in Harwood Dale district). Needless to say he broke the wire, and, as he was unable to break the trap, he brought it back to Scarborough with him.

The Wild Birds' Protection Act is a 'farce' in this district. Gangs of lads may be seen any day, especially on Saturdays and Sundays, many of them 'armed' with catapults, climbing the trees after nests, and doing a great deal of damage in Raincliffe Wood.

* In a recent number of 'The Field.'

CORNCRAKES AND CUCKOOS have been unusually numerous this year. I found two Cuckoos' eggs, one in a Meadow Pipit's nest, the other in a Lark's, both nests being situated within one hundred yards of each other.

The RED-LEGGED PARTRIDGE is also increasing in the district. I found in Raincliffe one nest with eleven eggs, another with nine eggs in the middle of a pasture field. This latter also contained one Pheasant's egg.

When visiting 'The Gullery' on the Whitby Moors, I was delighted to see a TEAL with seven young. The gullery had evidently been recently visited, as we found about eighteen empty nests, very probably it was by one of two human 'Herring Gulls' who visited it last year, and took away over one hundred and fifty eggs. We counted seven dead Black-headed Gulls; these, no doubt, being killed either by Herring Gulls or rats.—STANLEY CROOK, Scarborough, July 12th, 1911.

If Mr. Crook, or any reader of 'The Naturalist' who should come across a Pole Trap, would, instead of destroying it, or taking it away, write to me at once, giving precise instructions as to its whereabouts, I would, on behalf of the Bird Protection Committee, take immediate action in the matter. The same remarks apply to any offence under the Wild Birds' Protection Acts. At present, there is very little protection in the North Riding, but our Committee is in communication with the North Riding Council, and we hope to get a comprehensive order adopted this autumn. With respect to the Gullery named by Mr. Crook, we communicated with the owner at the beginning of the season. He undertook to do all in his power to protect the birds, but, owing to its situation near the road, and the fact that the birds are not at present scheduled, it is a difficult matter to afford it adequate protection.—R. FORTUNE.

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FISHES.

Large Trout and Carp.—On July 6th, 7th and 8th respectively, three large Carp were captured in the lake at Roundhay Park, Leeds. The weights were 7 lbs. 1 oz., 6 lbs. 1 oz., and 8 lb. 7 oz. The length of the first was 23½ inches, and its girth 16¼ inches. Another notable fish recently captured in Yorkshire, is a fine Trout, weighing 5 lbs. 8 oz. It was obtained from the Costa, by Mr. W. O. Hinchliff.—R. FORTUNE, Harrogate.

Eels Travelling on Land.—That eels can and do leave their natural element, the water, and travel occasionally on land through damp meadows, is well known, but that one

should be met with alive on a hard and dusty high road is certainly unusual. On the 28th of last month, when walking with two others on the road from Gainsborough to Corringham I found an eel stretched out at full length on the road side. It was quite a foot long, and covered with dust, as worms often are when they have tried to cross a road or path in the cool of the night and have failed. On taking it up by the tail, it showed signs of life, and gave a spasmodic jerk, apparently all it was capable of, and then became limp again. In a field near there is a pond, about one hundred yards from the place where the eel was when I found it, and from which it had doubtless come; and, on my putting it in, placing it in shallow water to watch its movements, it gave another spasmodic twist, and lay still. The cause of its being where I found it is, I think, to be accounted for. On the 24th June came that deluge of rain, following a long drought, which seems to have been prevalent throughout the greater part of England. In this locality it poured for twenty-four hours without ceasing, and, owing to the hard state of the ground, the accumulated water lay on the surface in sheets and pools for several days before it was absorbed. This, in all probability, had led the eel, on leaving the pond, to wander away from the meadow, across a hard asphalt footpath, on to the road which gradually became dusty again.—F. M. BURTON, Highfield, Gainsborough.

—: o :—

MOLLUSCA.

Unio margaritifer in confinement.—This pelecypod which we notice in our well-aerated mountain rivers, subject to occasional torrential flows, can be kept in confinement for a long time. Having noticed its habits in Scotland and the north of England, I thought I would try to keep some of them alive for a while. I have some living at present (and none have died) which I got from Ennerdale, nearly three years ago. I placed them in an earthenware vessel, holding about two gallons, and put them on a sink in my private room in the College biological laboratory, allowing the water to continually drop into the full vessel. A luxurious growth of bacteria, diatoms and many other minute algæ soon appeared, together with various rotifers, *Anguillula*, *infusoria*, etc. I then placed on the surface, a little *Ricciella fluitans* and *Lemna minor*, which rapidly increased, and have continued to grow ever since. At present, there is an abundance of *Nais* and a Tardigrade among the rich mixture of plants and minute animals about the surface. I may add that I have kept *Anodonta cygnea* and *Astacus fluviatilis* alive in a similar way for about a year; none of them died, but the experiment was stopped, as the necessity arose of using the animals for

dissection. In the case of *Astacus*, they were fed at intervals with earthworms.—WM. WEST, Bradford.

A Method of Obtaining the Glochidia of *Anodonta cygnea*.—Some years ago I had lent to me a specimen of a small fish which had been caught with some glochidia attached to it. As I wanted it to shew to some students, it occurred to me that it might be possible to obtain some without going fishing for them on the mere chance of obtaining this embryonic stage. In the early months of the year therefore, I collected a number of *Anodonta*, and placed them in two large bowls on sinks under taps, and allowed water to constantly drop into them. I then procured some dozens of minnows from the fishing-tackle shop, and put them with the molluscs. In a short time I found that all the minnows had plenty of glochidia on their fins and tails. I tried this experiment successfully several times.—WM. WEST, Bradford.

—: o :—

AMPHIBIA, etc.

***Hydra vulgaris* and the Tadpoles of *Rana temporaria*.**—In our biological laboratory it is a common thing to watch *Hydra* catch species of *Daphnia*, *Cypris* and *Cyclops*. I have even seen them gorged with the large red larva of *Chironomus plumosus*, the *Hydra*, when distended, only having room for half of it! (I have a *Scyllium canicula* with the hinder part of a fish in its stomach and gullet, and the other half projecting from its mouth). This Spring I had a fine lot of *Hydra vulgaris* in several large aquaria, and as I had previously had some batches of frog's eggs developing, I placed some of them, when about a fortnight old, in the various aquaria, some being three or more weeks old in later experiments. On looking a few hours later, I was astonished to see several of the tadpoles held fast to the sides of the aquarium, they kept now and then struggling to escape, and if any succeeded in doing so, which was seldom the case, they invariably succumbed eventually. These experiments were eagerly repeated by a number of students, who seemed more interested than when watching the larva of *Dytiscus* demolish tadpoles. The tadpoles were paralysed, they were too large to be engulfed, and they finally sank to the bottom, and did not reappear. In all the other aquaria where *Hydra* was absent, the tadpoles lived.

I may here mention that I have reared frogs from the eggs every year for a long time. I have also had some large tadpoles every year above twelve months old, so that I have been enabled to shew them to students at the same time as those but a few weeks old. In this case they were kept in aquaria without a landing stage.—WM. WEST, Bradford.

LINCOLNSHIRE CHALK FORAMINIFERA.

C. S. CARTER, *Louth.*

MR. W. HAMPTON has recently presented to the Louth Museum, a 'type' slide containing a series of foraminifera from the chalk near Louth. As the particulars of these do not appear to have previously been published, I give the following details.

The type slide is divided into one hundred numbered squares, and the list is made out on a printed form numbered to correspond.

Foraminifera—Type slide No. 12. L.C. Locality:—Louth, Lincolnshire. Date:—January 15th, 1889. Nature of Material:—Chalk Powder from Flints, Boswell Ride and Crowson's Pit. Charles Elcock, Belfast.

- | | |
|--|--|
| 1. <i>Orbulina universa</i> . Rare. | 19. (Section of some foram.). |
| 2. <i>Globigerina cretacea</i> . | 20. <i>Nodosaria</i> . |
| 3. " <i>marginata</i> .
Very rare. | [1-20 from Boswell's Ride].
[41-56 from Crowson's Pit]. |
| 4. <i>Textularia globulosa</i> . | 41. <i>Globigerina cretacea</i> . |
| 5. <i>Verneuilina triquetra</i> . | 42. " <i>bulloides</i> . |
| 6. <i>Nodosaria</i> fragments. | 43. " <i>marginata</i> . |
| 7. <i>Dentalina</i> . | 44. " <i>æquilateralis</i> . |
| 8. <i>Cristellaria rotulata</i> . | 45. <i>Orbulina universa</i> . |
| 9. <i>Planorbulina ammonoides</i> . | 46. <i>Textularia globulosa</i> . |
| 10. <i>Bulimina</i> [<i>? prestlii</i>]. | 47. <i>Dentalina</i> . |
| 11. <i>Textularia pupa</i> . | 48. <i>Vaginulina</i> ? Sp. |
| 12. " <i>prælonga</i> .
Not typical. | 49. <i>Textularia turris</i> . |
| 13. <i>Verneuilina triquetra</i> . | 50. " ? Sp. |
| 14. <i>Ramulina globulifera</i> .
Very rare. | 51. <i>Bulimina ovulum</i> . |
| 15. <i>Dentalina</i> . | 52-53. <i>Textularia</i> ? sp. |
| 16. <i>Lagena</i> (<i>marginata</i> ?) | 54. <i>Verneuilina triquetra</i> . |
| 17. <i>Frondicularia</i> (fragment
of large species). | 55. <i>Pleurostomella fusiformis</i> . |
| 18. <i>Pleurostomella fusiformis</i> .
Very rare. | 56. <i>Cristellaria rotulata</i> . |
| | 64. <i>Cythere</i> ? sp. |
| | 65. ? Diatoms. |
| | 66. <i>Cytherella williamsoni</i> . |

On the back of the slide, '61 to 80, Spicules, etc., etc.'

These numbers, 61 to 80, includes, besides those given in the list, fragments of small specimens of *Terebratulina lata*, fragments of Bryozoa and two specimens, very small, of *Porosphaera globulosa* ?

In addition are some separate slides, two being labelled, *Pulvinulina micheliniana*, Middle Chalk, Boswell Ride, and *Frondicularia elliptica*, Middle Chalk, Boswell Ride.

I ought, perhaps, to mention that 'Boswell Ride' is in the *Holaster planus* zone, and 'Crowson's Pit,' better known to us as Saturday Pits, is in *T. gracilis* zone.

In Memoriam.

JOHN MORGAN

WE are sorry to learn, as we go to press, of the death of Mr. John Morgan, of Worthing, who was in his eightieth year. Mr. Morgan was one of Nature's gentlemen. It was a privilege to know him. He regularly attended the meetings of the Museums Association, where he was much respected; and only a fortnight ago the writer had the pleasure of accepting his invitation to see some of the gems of his collection. Mr. Morgan was principally interested in shells and corals, and many provincial museums are indebted to him for valuable gifts.

— : o : —

Survival and Reproduction: A New Biological Outlook. By H. Reinheimer. London: J. M. Watkins. Pp. X. and 410. 7/6 net. 1910.

The object of this work is that in place of certain 'uncalled for generalisations which form the unscientific legacy of Darwin's otherwise invaluable work,' to institute a 'scientific enquiry into the effects of surfeit and infeeding' (*a*) as they directly affect the organism individually; *b*) the species; (*c*) the total biological community, and (*d*) as they indirectly produce reactions in the wider field of cosmic relation. In a former volume, the author gave a first instalment of a study of cumulative effects of nutrition and its teleological significance in general, and he now claims that modern biology provides 'interpretations of facts which are in the main inaccurate,' and that the 'important study of nutritional habits as they . . . affect reproduction and survival has been almost entirely neglected.' After careful perusal of the book, we fail to find any trace of a single original experiment or observation the author has made. He repeatedly falls foul of Darwinism, because 'natural selection' does not offer a complete explanation of organic evolution. In the author's opinion, nutrition is the key to unlock the door of this chamber of mysteries. The evidence against natural selection, we are told, is steadily accumulating, and a full explanation of its fundamental errors was not to be expected so long as the cumulative and teleological significance of nutrition remained unelucidated. It would be infinitely to the advantage of science if the energies of these people were devoted to elucidating some knotty problems involved, and contribute their quota to the great subject of which Darwin admittedly laid only the foundation. The author of the work under consideration, while drawing attention to an obviously important factor, does not appear to realise what an amount of work has been done on the subject of nutrition, nor in spite of it all how impossible it is to generalise and how unsafe to dogmatise from the facts known even to-day. His discussions are often couched in almost incomprehensible terms, some, like teleological status, and dysteleological behaviour, from their frequent occurrence, the author seems very proud of, and we are informed (!) that the 'precariousness of plant life is due to parasitic diathesis, and even the moss, shows reproductive nemesis resulting from' the same complaint. Further, 'the appearance of "sports" is frequently a matter of dissociation (disintegration of the intra-atomic or intra-cellular energy)'. The further elucidation in brackets would hardly seem to be necessary, but it gives the author an opportunity of using a highly technical if practically meaningless phrase.

NEWS FROM THE MAGAZINES.

The Lesser Shrew is thought to be much more common in Yorkshire than usually recorded.—*Zoologist*, No. 841.

Records of the Pied Flycatcher in Warwickshire and Northamptonshire appear in *The Zoologist* (No. 840).

The *Journal of the Board of Agriculture* for July contains an illustrated note on Blister Canker (*Nummularia discreta*) of apple tree.

Mr. E. G. Bayford writes on 'Electric Light as an attraction for beetles and other insects,' in *The Entomologist's Monthly Magazine* for July.

No. 1 of Vol. V. of *British Birds* is chiefly occupied by a report 'On the Distribution of the Nightingale during the Breeding Season in Great Britain.'

Mr. F. H. Butler has a paper on 'The Natural History of Kaolinite,' in *The Mineralogical Magazine*, No. 73. In this he describes a specimen of fine-grained Kinder Scout Grit from Bamford Edge, Derbyshire.

We learn from 'Pegasus,' a Bradford High School Journal, that when a class of girls was asked 'What do the monsoons do with their moisture when they come to the Western Ghats?' one opined—'drop it and run.'

Mr. W. Hill's Presidential Address to the Geologists' Association appears in the Society's Proceedings, Vol. XXII., part 2. It is entitled 'Flint and Chert,' and appeals particularly to geologists in the north of England. It contains illustrations of Chert from Reeth, etc.

Mr. T. A. Chapman, writing in *The Entomologist's Record* (Vol. XXIII., No. 4), opines that the sooner we adopt the word 'Lepidopterology,' the better. Presumably we shall soon have 'Coleopterology,' 'Neuropterology,' 'Dipterology,' 'Hymenoptera-Aculeataology,' etc.

In *British Birds* for July, it is recorded that a female Wood Wren, caught by Mr. J. D. Pallerson at Goatland in 1910, while sitting in her nest with six young ones, and ringed by him, was again caught upon her nest this year, within eighty yards of last year's site, and re-marked.

After doubting the record of the Spotted Sandpiper in Yorkshire (see *The Naturalist*, Feb. 1911, pp. 100-101, and Hull Museum Publication No. 77, pp. 3-4), the editor of *British Birds* now admits that 'there can be no reasonable doubt that the bird was in fact shot at or near Hebden Bridge about 1899.'

In *The Annals of Scottish Natural History* (No. 78), Mr. W. Eagle Clarke records Blyth's Reed-Warbler at Fair Isle, an addition to the British Avifauna; and the occurrence of Temminck's Grasshopper-Warbler in Orkney. This species has only been recorded for Western Europe twice previously, viz., at North Cotes, Lincolnshire, in November 1909, and at Heligoland, in October of the same year.

Mr. H. Ling Roth's paper, read at Halifax recently, 'On the Use and Display of Anthropological collections in Museums,' appears in *The Museums Journal* (Vol. X., No. 10). Mr. W. B. Crump's paper on 'A New Method of Illustrating British Vegetation in Museums,' appears as the following issue of the same journal, as does also Mr. H. P. Kendall's paper on 'The Collection of Local Views for Museums.'

Writing to *The Entomologist* (No. 577) in reference to the small prices realized for the named varieties of lepidoptera formerly owned by the late J. W. Tutt, Mr. G. T. Porritt points out the obvious reason. With the exception of perhaps half-a-dozen interested British lepidopterists, no one uses many of the varietal names, nor cares anything about them. In some cases a varietal name is necessary, 'but that a slight shade of colour, an extra spot, or the widening or contracting of a band, should entail the special naming of forms differing so slightly from the type is absurd. The craze for such name-making has caused a good deal of ridicule.'

THE NATURALIST.

A MONTHLY ILLUSTRATED JOURNAL OF
NATURAL HISTORY FOR THE NORTH OF ENGLAND.

EDITED BY

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THE MUSEUMS, HULL;

AND

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WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF

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WILLIAM WEST, F.L.S.,

RILEY FORTUNE, F.Z.S.

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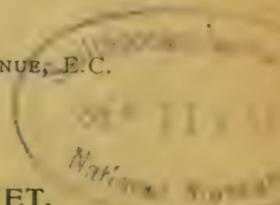
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YORKSHIRE NATURALISTS' UNION.

SECTION FOR MARINE BIOLOGY.

The Annual Meeting of the Marine Biological Committee will be held at Scarborough, on September 22nd to 26th. Arrangements have been made with the manager of Matthew's Boarding House, who has agreed to lodge and board the party at the rate of 6/- a day, including the use of a room for exhibits. Applications should be made to Rev. F. H. Woods, Bainton Rectory, Driffield, stating for how long accommodation will be required. It will be convenient if these are made as soon as possible. A short account of the Marine Biology of Scarborough by Dr. Irving will be found in another part of this number of *The Naturalist*. It may be added that Scarborough is extremely rich in microscopic mollusca. Great numbers of the empty shells are washed up on the sands; but it is very important to discover as far as possible the habitat of the living animals. Among the rarer and more interesting molluscs may be mentioned:—

Nuculana minuta.
Modiolaria marmorata.
Palliolum tigrinum.
Lima subauriculata.
Montacuta substriata.
Lasæa rubra.
Tapes virgineus.
Dentalium entale.
Lacuna parva.
Rissoa inconspicua.
Cingula trifasciata.
Capulus hungaricus.
Actis ascaris.
A. minor.
Pyrgulina indistincta.

P. interstincta.
Ondina obliqua.
Turbonilla lactea.
Eulimella nitidissima.
Bela rufa.
Hædropleura costata.
Clathurella linearis.
Actæon tornatilis.
Tornatina obtusa.
Philina scabra.
P. punctata.
P. catena.
Limacina retroversa.
Leuconia bidentata.

Some of these are deep sea molluscs, which are only washed up in their young state.

The committee would be glad to welcome all who are interested in any branch of Marine Biology.

THE EVOLUTION OF KINGSTON-UPON-HULL AS SHEWN BY ITS PLANS.

BY

THOMAS SHEPPARD, F.G.S., F.R.G.S., F.S.A. (Scot.),

Curator, Municipal Museums, Hull.

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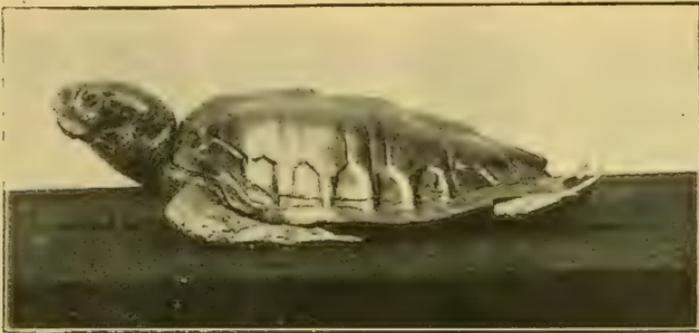
Also obtainable at 5 FARRINGDON AVENUE, LONDON, E.C.

A NEW YORKSHIRE REPTILE.

W. J. CLARKE, F.Z.S.

WHILE recently going through the collection of reptiles in the Scarborough Museum, I came across a turtle labelled ' Hawks-billed Turtle, taken alive on the North Sands, Scarborough, May, 1854.'

On examining the specimen I noticed that it possessed five costal shields which showed at once that it is not the Hawks-billed species. This circumstance, together with the heavy and massively built head led me to believe that I was examining a Logger-headed Turtle, *Thalassochelys caretta*, and I accordingly



Logger-headed Turtle.

took the accompanying photograph and sent it to G. A. Boulenger, Esq., of the British Museum, for confirmation.

He very kindly replies that ' the turtle is certainly a half-grown Loggerhead, ' and gives records of other occurrences in the British Isles by Dyce in 1861, Harvie Brown and Buckley in 1896, and Peale in 1898. There appears to be no other Yorkshire record for the species.

I received unexpected confirmation of the authenticity of the record on mentioning the matter to my father, Mr. R. Clarke. He tells me that the turtle was found stranded on the North Sands by a labouring man who lived in Abbey's Yard in St. Nicholas Street. He brought it home alive, and my father, who at that time occupied business premises in Abbey's Yard, saw the turtle while still living. Unfortunately he does not remember the name of its captor, nor what became of the specimen at that time, but evidently it found its way into the local museum, where it may now be seen in a good state of preservation.

REMARKABLE NIDIFICATION OF A KESTREL.

C. J. PATTEN, M.A., M.D., Sc.D.

ON Sunday, June 11th last, a tame Kestrel, which I have had for eight years, appeared to be in a remarkably lively mood. When let out of her wire enclosure she indulged in her usual trick of pouncing on my shoe, and biting at the leather repeatedly. When I shook her off, she followed me across the yard, and on presenting my gloved hand she dashed at it, at the same time dropping her wings like a curtain as though she were shielding her favourite mouse. Many other tricks which I have frequently found her indulging in were particularly well performed that morning. I was therefore exceedingly pleased

A

B

C



Photos by]

[C. J. Patten

- A.—Specimen from a clutch of wild Kestrel's eggs; the usual type.
 B.—Egg of Kestrel, laid after eight years of captivity, without pairing with a male bird.
 C.—Same egg as B, but viewed from above to show the broken pigmented zonular band. (All natural size).

that after my absence from home for the greater part of the preceding week I returned to find her so well and lively.

However, in the afternoon, a remarkable change came over her. She retired to a corner, and assuming an almost horizontal position, so that her head, back, and tail were almost parallel with the ground; she became so apathetic that I suspected poisoning from some of the food (a young rat caught in a trap) she had lately taken. Unable to rouse her, I carried her into my study, where she again crept into a corner and behaved similarly. She remained in this condition until 6-30 p.m., at which time I left her alone.

On my return at 10-30 p.m. she still appeared to be in the

Naturalist,

same condition. I tried to rouse her by pretending to attack her with my hand and by splashing her with cold water, but it was of no avail. A little later she began to utter a few faint squeaks at intervals. At 11-45 p.m. she gave a rather painful cry, and on going over to see what was the matter, I found she had laid an egg. Almost immediately she began to get lively, and so I had to exercise care lest she might seize the egg. Fortunately I succeeded in getting possession of it safely.

Remarkable as this case of ovulation may be, the egg itself is none the less so. Although the usual brownish-red egg (so profusely pigmented that no trace of white is visible) may sometimes be represented by one richly mottled on a yellowish-white or pinkish ground-colour, I have never before seen a Kestrel's egg such as this. It is milky-white in colour, *almost unspotted*, except at its larger end, where it is spotted and blotched with rich purplish-brown, intermixed with light greyish-purple, the whole pigmentation forming a broken zonular band. The egg might be compared to an enlarged model of a Greenfinch's egg, in which the ground-colour has lost its faint greenish hue. The texture of the shell is fine and thin, but sufficiently strong to allow of the contents being extruded by means of the blow-pipe. The egg is less rounded than usual at the smaller end, and resembles in shape an ordinary domestic fowl's egg. In size it is perfectly normal, viz.: length, 3.9 cm.; breadth, 3 cm.; the average measurements given for the Kestrel's egg by Saunders being: length, 4 cm.; breadth, 3.1 cm. That is to say my Kestrel's egg is 1 mm. less than the normal in length and in breadth.

It seems impossible to offer an explanation for this strange case of ovulation. But I may perhaps be allowed to refer to one point in connection with the bird's diet just before she laid the egg. During my absence from home, which lasted four days, the bird was given sufficient food for that time, but it was all distributed on the first day. When I returned, the greater part was untouched, the reason being that the warm weather had affected the food sufficiently to render it adverse to the bird's palate. Hence the hawk fasted for three days. On my return I gave her a plentiful supply of fresh ox spleen and liver which she gorged herself with, and this highly nutritious hearty meal, coming after a fast, and at the onset of a warm change in the weather, may have toned her to such a physiological state that her ovaries became sufficiently active to induce ovulation. Such an explanation is vague and theoretical, and I give it only for what it is worth. The photograph was taken before the egg was blown, in order to secure the best results before slight fading of the pigment, subsequent to blowing, ensued.

COMPOSITION OF THE UPPER PERMIAN LIMESTONE IN SOUTH YORKSHIRE.

J. W. H. JOHNSON, B.Sc.

CONSEQUENT upon a discussion at the meeting of the Yorkshire Naturalists' Union at Askern, in July, 1906, respecting the composition of the Upper (bedded or laminated) Permian Limestone in the south of Yorkshire, the writer analysed some specimens kindly obtained for him by Mr. Geo. Grace, B.Sc., with the following results:—

	Kra Ora Quarry, Tickhill (Bottom Bed).	Tickhill, towards Stainton (Extreme top bed).	Dearne Valley Railway, Loversal Road (Top bed).	Dearne Valley Railway, Loversal Road (Half way down).
Organic and volatile matter.	nil	0.67	2.80	nil
Siliceous matter.	2.89	4.94	1.32	0.94
Oxides of Iron and Aluminium, ($\text{Fe}_2\text{O}_3\text{Al}_2\text{O}_3$).	2.25	2.30	1.29	0.94
Calcium Oxide (CaO).	29.85	29.68	30.29	30.36
Magnesium Oxide (MgO.).	19.60	18.10	19.94	20.90
Carbon dioxide (CO_2).	45.35	43.80	43.80	46.84
	<hr style="width: 100%;"/>	<hr style="width: 100%;"/>	<hr style="width: 100%;"/>	<hr style="width: 100%;"/>
<i>Molecular ratio</i> , MgCO_3	99.94	99.49	99.44	99.98
CaCO_3 .	$\frac{1.00}{1.088}$	$\frac{1.00}{1.171}$	$\frac{1.00}{.986}$	$\frac{1.00}{1.036}$

The quantities of calcium and magnesium oxides given above represent only the amounts present as carbonates, care having been taken to avoid as far as possible any decomposition of the silicates of these bases.

The specimens were of firm texture, with the exception of the one from the top bed in the Dearne Valley Railway cutting, which was somewhat friable, and also much yellower in colour than the others.

For the purpose of comparison, the analysis of the Lower (massive) Permian Limestone, as selected from Bolsover in Derbyshire for the Houses of Parliament, may be stated. It had the following percentage composition:—

Moisture, 3.3; Silica, 3.6; Oxides of Iron and Aluminium, 1.8; Calcium Oxide, 28.6; Magnesium Oxide, 19.1; Carbon-dioxide 43.6; *Molecular ratio*, $\frac{\text{MgCO}_3}{\text{CaCO}_3} = \frac{1.00}{1.067}$

The composition of the Permian Limestone varies very considerably in different localities, ranging from that of a normal dolomite containing equal molecular proportions of magnesium and calcium carbonates to that of a limestone containing but a few per cent. of magnesium carbonate. The molecular ratio of these two substances present in the above samples shows that the limestone in this area is dolomitic and resembles closely that of a normal dolomite.

NEW PLANT LOCALITIES IN NORTH-EAST YORKS.

J. G. BAKER, F.R.S.

Kew.

Sinapis nigra. Banks near the sea at Robin Hood's Bay.
Hypericum dubium. Lane above the Old Hall at Fylingdale.

Acer campestre. Same station as the last.

Rosa mollis. Lane near the railway station in Commondale.

Rosa lutetiana. Appears to be the only Canina form about Castleton and Robin Hood's Bay.

Rubus corylifolius. Abundant at Robin Hood's Bay.

Rubus dasyphyllus. Woods, Commondale and Fylingdale.

Drosera rotundifolia. Amongst *Sphagnum* in damp spots on the Moor below Castleton.

Epilobium angustifolium. Moor above Ravenscar and abundant on slag-heaps at Grosmont and Glazedale.

Hieracium boreale. Moor above Ravenscar.

Solidago Virgaurea. With the last.

Anagallis tenella. Damp moors below Castleton.

Mimulus luteus. Roadside near Huckaback Farm, Castleton.

Pedicularis sylvatica. With the last.

Tricentalis europæa. Woods in Baysdale.

Salix pentandra. Lane near Commondale station.

Bromus asper. Woods in Commondale and Fylingdale.

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The Report of the Perthshire Natural History Museum for 1910-11 contains a list of additions during the year, an account of the changes made in the arrangement, etc., of the specimens, and a summary of the meteorological records made by the Curator.

At the Twenty-second Annual Conference of **The Museums Association** held at Brighton, from July 10th-14th, the following papers, etc., were read and discussed:—President's Address, by H. M. Platnauer (York); 'Notes on recent Developments at the Brighton Museum,' by H. S. Toms; 'National Art Loans to Municipal Galleries,' by Mr. J. A. Charlton Deas; 'Pastimes for Curators,' by Mr. T. Sheppard (Hull); 'Boxes for Herbarium Specimens,' by Mr. A. M. Rodger (Perth); 'The Purpose and Arrangement of an Index Museum,' by Dr. Joseph A. Clubb (Liverpool); 'Open-air Folk-Museums,' by Dr. F. A. Bather, F.R.S.; 'Photographic Record,' by Mr. Arthur Smith (Lincoln); 'Evolution in Archæology: Dating by Style,' by Mr. R. A. Smith; 'Outlines of a scheme for a Folk Museum, with special reference to East Sussex,' by Mr. W. Ruskin Butterfield; 'Proposed Extensions at the Norwich Museum,' by Mr. F. Leney; 'The Evolution of English Pottery: suggestions for a type collection,' by Mr. H. Stuart Page; 'The Functions and Scope of a Municipal Art Museum,' by Mr. E. Rimbault Dibdin (Liverpool); 'The Organization of Art Exhibitions,' by Mr. Henry D. Roberts. Visits were also paid to the Booth Museum, the Aquarium, the Museums at Hastings, Worthing, etc.

THE SEEDLING STRUCTURE OF *DRYAS OCTOPETALA*.

A. EVELYN MELLOR, B.A.

Dryas octopetala is one of the rarer Alpine plants of Britain, and in its only station in West Yorkshire, Arncliffe Clouder, is well-known to northern botanists. There it occurs in great abundance, and its habitat is very characteristic of its occurrence in other parts of Europe. It almost invariably establishes itself on overgrown limestone pavements, or on scree that have become fixed by the roots and rhizomes of other species, but *Dryas* itself does not act as a pioneer, nor as an early scree binder. In older pavements there is a tendency for it to give way before tussock-forming grasses. At Arncliffe it appears to be slowly spreading, owing, probably, to the long style, which becomes feathery after fertilization, persists in the fruit and acts as a means of wind dispersal.

In the present paper it is intended to deal only with the structure of the seedling, which is preliminary to a detailed investigation of the life history of the genus, now being undertaken by Dr. T. W. Woodhead, to whom I am indebted for the materials on which these observations have been made, and for help in arranging them for publication.

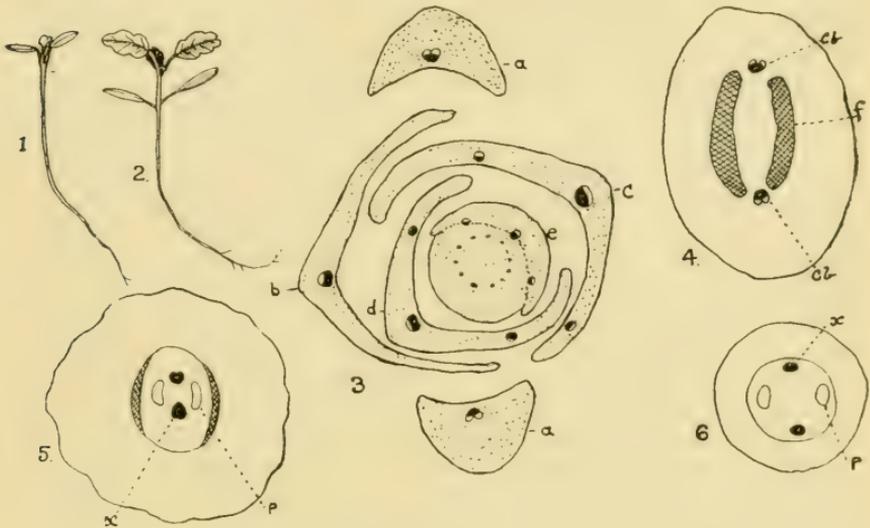
Recently much work has been done on seedling structures by Misses Sargent (1), and Thomas (2, 3 and 4), and Messrs. T. G. Hill (5), Tansley (2 and 3), and others, with the object of determining whether a study of seedling anatomy would throw any new light on the problem of phylogeny.

Miss Thomas, in her paper on the 'Theory of the Double Leaf-Trace,' (4), shews that the special point of interest is the manner in which the veins, passing from the cotyledons, through the hypocotyl, to the root, form the structure characteristic of the root stele. In a primitive type, such as a typical *Cycas*, four vascular bundles pass from each cotyledon into the root. On their way, the wood and bast of which they are composed, become re-arranged in such a way as to give rise to a tetrarch root, *i.e.*, one with four groups of wood alternating with four groups of bast. That the Cycads are ancient and primitive is generally acknowledged, and the root of a typical *Cycas* is tetrarch. Recent investigations have been made on the seedlings of allied groups and their structures compared. Amongst Gymnosperms which have two cotyledons, as the *Taxaceæ*, *Cupressineæ*, and some of the *Taxoideæ*, a bundle goes from each cotyledon and gives rise in the root to a cylinder composed of two groups of wood alternating with two groups of bast, *i.e.*, a diarch root. It is concluded that the diarch type has been derived by reduction from the more primitive tetrarch type.

It therefore seemed probable that if these investigations

were extended to the seedlings of *Monocotyledons* and *Dicotyledons*, some further light might be thrown on their origin and relationships, the elaborate researches of Miss Sargant (1) being directed especially to the origin of *Monocotyledons*.

Attention was paid mainly to orders and genera which were believed to possess primitive characters. Among the *Dicotyledons*, after examining a number of seedlings, Miss Thomas decided that the tetrarch type was characteristic of the *Leguminosæ*, *Rosaceæ*, *Euphorbiææ*, *Aceraceæ*, *Balsaminaceæ*,



EXPLANATION OF FIGURES.

- 1.—Young seedling of *Dryas octopetala*.
- 2.—Older seedling with first foliage leaves.
- 3.—Transverse section through bud of seedling. *a* cotyledons, *b* first foliage leaf, *c, d* and *e* younger leaves.
- 4.—Section of hypocotyl. *f* vascular cylinder, *cb* bundles from cotyledons.
- 5 and 6.—Sections of root with alternating groups of wood (*x*) and bast (*p*).

Malvaceæ, and occurred in *Casuarina* and some of the *Polygonaceæ* and *Amentiferæ*. Among the *Sympetalæ*, it was found in the *Convolvulaceæ*, *Sapotaceæ*, and *Cucurbitaceæ*.

The diarch type was, with the exception of the orders just named, characteristic of the *Sympetalæ* examined, and also of the *Ranales*, *Rhæadales*, *Urticales*, *Piperales*, *Umbellifloræ*, while it is found in some *Polygonales* and *Centrospermæ*.

From this we see that the *Ranales*, commonly regarded as primitive in many of their characters, have generally a diarch type of root, but an intermediate type has been met with, having four phloem groups and two xylem groups in the hypocotyl. On the other hand, the seedlings of *Rosaceæ* examined have a tetrarch root. It is to the latter order that *Dryas octopetala* belongs, and an examination of its seedling shewed

that it did not seem to be tetrarch as the Rosales commonly are, and up to the present time I have seen no trace of more than two protoxylem groups in the root. The behaviour of the cotyledon traces on entering the hypocotyl seems to conform absolutely with the diarch type as described and figured by Miss Thomas (4).

Fig. 1 shews a young seedling similar to the one from which sections for examination were made. For these I have to thank Miss M. M. Brierley, who cut serial microtome sections of entire seedlings.

Fig. 2 shews an older seedling; the plumule has further developed and bears its first foliage leaves.

The first section below the growing point of the plumule shews a ring of cells with crowded contents, some groups of which are more clearly defined and are doubtless the procambial strands. These continue downwards, and at a lower level (Fig. 3) the stem is clasped by three foliage leaves (*e*, *d*, *c*), each with one central and two lateral bundles. A fourth foliage leaf (*b*), the first above the cotyledons and so the oldest, has only one bundle in its leaf stalk, and that a central one. The ten bundles from these foliage leaves pass into the stem and join the cauline strands to form the vascular cylinder. This divides into two crescent shaped masses (fig. 4, *f*) just where the cotyledons (fig. 3, *a*) join the hypocotyl, and into the gaps thus formed the double bundles of the cotyledons pass (fig. 4, *cb*). From this point downwards the plumular traces become gradually reduced, and eventually die out altogether, while the cotyledons pass towards the centre. There the opposite groups of wood meet to form the xylem plate of the root, and the two phloem groups from each cotyledon divide and re-unite in such a way as to form two lateral groups in the root. (Fig. 5). The four alternating strands of xylem and phloem can be clearly seen close to the tip of the root (fig. 6), the spiral thickenings of the two protoxylem groups standing out very distinctly in oblique sections.

From this it appears that the root of *Dryas* is diarch and not tetrarch, as are the seedlings of the same order examined by Miss Thomas, and that while many members of the order conform to the primitive type, *Dryas* shews reduction such as we find in many *Ranales*.

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NOTES ON THE STATURE, ETC., OF OUR ANCESTORS IN EAST YORKSHIRE.*

BY THE LATE J. R. MORTIMER.

THIS subject should be of sufficient interest to induce those who now occupy the district to endeavour to ascertain the characteristic physique and customs of their remote ancestors. Were they giants, dwarfs, or a mixture of types very much like ourselves? Some light may be cast upon this interesting question by referring to my 'Forty Years Researches.' From 300 burial mounds of the neolithic and bronze periods I have disinterred the remains of 893 bodies of which 322 had been cremated and 571 inhumed. From the former little can be gathered as to the physical conditions of the individuals when alive; but of the latter interesting information can be obtained, such as their varying statures, their different types of head, the position in which the body had been placed in the grave, as well as the various articles which accompanied the interments.

I possess the measurements of 106 skeletons of this period, of which 35 (33 per cent.) possessed long skulls with a mean breadth index of 70.7 and an average computed stature of 66 inches; 29 (30.7 per cent.) had short skulls with an average breadth index of 84.2 and a mean computed stature of 64.3 inches; while 40 (38 per cent.) are intermediate and have an average breadth index of 77.7 and a computed stature of 64.4 inches. The breadth index of the three types of skull ranges from 65.4 to 92 and even up to 98.5.† These measurements include males and females indiscriminately. The greatest computed stature in this series of skeletons is 72.8 inches, and the least stature is 56.4 inches, the average stature of the three types is 64.9 inches. Coming down to more recent times—the Early Iron Age—which probably began in England about 500 B.C., we find in East Yorkshire a race of settlers physically much below their predecessors of the Stone and Bronze periods. These men were of a smaller stature and possessed more uniformly long heads. I have the measurements of the bones of 59 males and females of this later period. Of these 42 (71 per cent.) are long heads with a medium breadth index of 72.2 and a computed stature of 62.5 inches, while only 2 (3.4 per cent.) are short heads with an average breadth of 81, and a computed stature of 61.9 inches; while 14 (23.7 per cent.) are intermediate, with a medium breadth of 77 and a computed

* Read at the Portsmouth Meeting of the British Association.

† But this remarkably short skull must not be regarded as belonging to the Bronze Age, as it was accompanied by a piece of corroded iron, the size of a large nail—probably an iron fibula—See 'Forty Years' Researches,' p. 235, Barrow C. 46.

stature of 63.2 inches. The extreme breadth indices of the adult skulls of the Early Iron Age in this neighbourhood are 68 and 81.5, and the stature ranged from 54.4 inches to 67.2 inches. The average height of the three types of persons is 61.5 inches only.

Relating to Romano-British times the human remains I possess are fewer and less certain in racial character than those from the two preceding periods. Nevertheless, the few crania obtained from the graveyard at Blealand's Nook, near Fimber Station, at the crossing of the two Roman roads, are mainly long in form. They were associated with much broken pottery, and may be safely assigned to this period. These crania and the measurements of the long bones much resemble those of the Early Iron Age and probably are mainly descendants from that period.

Still later, our Anglo-Saxon ancestors are in strong evidence. Their remains are unquestionable, and more numerous in the East Riding than are those of the Romano-British period. They usually occur at cemeteries, and at times a British barrow or entrenchment has been utilised for the purpose. The skeletons are often accompanied by easily distinguishable Anglo-Saxon relics. I have the measurements of the bones of 61 bodies, of which 31 (50.5 per cent.) had long heads with an average breadth index of 72.3, and a computed stature of 65.7 inches, 7 (11.4 per cent.) possess short heads with a medium breadth index of 81.1 and a computed stature of 64 inches; while 23 (37.7 per cent.) had intermediate heads with an average breadth index of 77 and possessed an average computed stature of 63.6 inches. In the whole 61 skulls the breadth index varies from 70 to 83.3, and the stature from 58 inches to 78 inches, and both these extremes are associated with long heads.

The average stature of the 61 males and females indiscriminately is 64.4 inches. This series of Anglo-Saxon skulls somewhat resembles that of the Early Iron Age (though possessing a greater cubic capacity), being more uniform in type than the skulls from the Neolithic and Bronze periods. The average stature, however, is greater than that of the Early Iron Age by the startling difference of 3.4 inches, and closely approximates the stature of the men of the Stone and Bronze periods. It is very interesting to find from the measurements I have obtained from the barrows of the combined Stone and Bronze periods (we cannot in East Yorkshire safely separate the two), that the people are more mixed in cranial features than are those of the three later periods, and, judging from their bones, they were a little taller and physically stronger. This indicates that even at this early period the inhabitants of this part of Yorkshire were a mixed community, of fine physique, and as diverse in type of head and of stature as are the people of to-day.

There is no trace of a long or short headed race having first occupied this district.

During the Neolithic, Bronze, and the Early Iron periods, the raising of mounds to mark the resting-place of the dead person seems to have been generally practiced. No more enduring structure could have been devised than these huge earthen mounds of the Neolithic and Bronze ages. The mound at Skipsea Brough, the large one at the foot of Garrowby Hill, and Duggleby Howe, and others, will, if spared by the hand of man, long out-live the pyramids. These monuments are a lasting proof that Early man shared with his descendants the desire to do homage to the great and good by erecting a memorial to their memory. Proof is also afforded of his belief in a future life by the fact that he occasionally provided for it by having food, ornaments, tools, and even very rarely his chariot and whole animals buried with his body. Even his companions have occasionally been killed and placed in the grave.

From these facts it is apparent that his future life was expected to be similar to that from which he had just departed. It is probable that occasionally these early people indulged in cannibalism, and we have proof of this in the remains of food, consisting of portions of the human body as well as parts of animals, found deposited with the dead. This is perhaps not so very surprising as it is apparent that at one time or other, almost every race of man has practised cannibalism, and the practice would long survive in their revered funeral ceremonies.

During the Early Iron Age the grave mounds were smaller, more uniform in size, and more closely grouped in larger numbers, than during the earlier periods. These later mounds generally contain one, or occasionally two inhumed bodies; but in no instance has there been any trace of a cremated interment, neither has there been any sign of cannibalism or human sacrifice in any of them. Here we have a great advance in civilisation. Yet the belief in a future state seems to have survived, as food vessels containing the bones of pig, goat, and occasionally entire animals, as well as chariots, dress fastenings, and ornaments, have been buried with the dead.

Later, during the Romano-British times, judging from the few discoveries belonging to this period, the custom of placing the flexed body in an oval grave much resembles the method adopted during the Early Iron Age. There were notable differences, however, as in the association of two extended bodies and two cremated ones, the absence of pottery and of the remains of food in the graves; neither were there any traces of mounds covering the closely grouped graves.

To come to a still later period, the Anglo-Saxon remains are the latest in East Yorkshire that we are able to distinguish.

These people buried their dead frequently in cemeteries, often enclosing British barrows and other earthworks, but I have never found any indication of their having erected a grave mound.

Like the earlier races they were pagans when they settled in this part of Yorkshire, and buried their dead in narrow, shallow graves in various positions, from a much doubled-up to an extended attitude, and in some graveyards they are interspersed with cremated burials. They likewise seem to have had a belief in the hereafter. This is proved by the frequency with which the dead were supplied with articles of everyday use, such as weapons, tools, ornaments, pottery, and even food.

These notes, together with the accompanying table, show that the inhabitants of East Yorkshire in the very earliest times were neither giants nor dwarfs, but men possessing stature very similar to those of the present day. Their heads were of the most diverging types, ranging from the extreme long to the extreme short skull. No trace has been observed of a race of a higher or a lower stature, nor of a race of long or short heads having *first* occupied this district. This is also the view of Dr. W. Wright, to whom I am much indebted for the measurements of the greater number of these skulls.

As previously mentioned, several hundred years later, during the Early Iron Age, there was in East Yorkshire a very different race of settlers; smaller men, of a stature and cranial type far more uniform than those previously existing. These were evidently settlers from over the sea, and were not descendants of a family of the tall long heads of the earlier settlers.

Still later, in pagan Saxon times, the stature rises and closely approaches that of the inhabitants of the Stone and Bronze periods, but their cranial types are much more uniformly long.

After these Saxons were converted to Christianity their pagan customs were slowly abandoned, and they became of less interest to the antiquary. Had it not been for the heathen beliefs and customs of our ancestors we should have known much less than we do now of early man and his mode of life during these remote periods.

In performing his pagan rites he was unconsciously recording the history of his time.

In conclusion. Though we of this twentieth century are descendants of the various races that have lived before us, yet we do not show a greater diversity in stature and in type of skull than did our most distant fore-fathers of the Neolithic and Bronze periods. Thus, the conclusion to be drawn seems to be that the blending of the different types of mankind must have taken place in very early days.

No. of Skulls of both sexes.	LONG SKULLS.			SHORT SKULLS.			MEDIUM SKULLS.			The Computed Stature of three types ranges from		Mean Stature of three types.
	No. of Long Skulls.	Mean Breadth Index.	Com- puted Stature.	No. of Short Skulls.	Mean Breadth Index.	Mean Com- puted Stature.	No. of Inter- mediate Skulls.	Mean Breadth Index.	Mean Com- puted Stature.	Index of the three types ranges from	Stature to	
106	35 (33%)	70.7	NEO 66 ins.	LITHIC 29 (27.4%)	AND 81.2	BRONZE 61.36 ins.	40 (38%)	77.7	64.4 ins.	65.4 to 92	56.4 ins. to 72.8 ins.	64.9 ins.
59	42 (71%)	72.2	62.5 ins.	EARLY 2 (3.4%)	IRON 81	AGE. 61.9 ins.	14 (28.7%)	77	63.2 ins.	68 to 81.5	54.4 ins. to 67.2 ins.	61.5 ins.
61	31 (50.8%)	73.3	65.7 ins.	7 (11.4%)	ANGLO-SAXON 81.1	PERI 64 ins.	23 (37.7%)	77	63.6 ins.	70 to 83.3	58 ins. to 78 ins.	64.4 ins.

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From the **Ruskin Museum**, Sheffield, we have received the recently published Annual Report. It is apparent that this museum still has many visitors, and in the winter the Curator delivered lectures bearing upon Ruskin's work.

The Fortieth Annual Report of the Committee of the Public Libraries, Art Gallery, and Museums of the Corporation of **Rochdale**, includes statistics of attendances at the Museums, a list of the ' talks ' given, and nearly a page of additions to the Museum, a few of which are of local interest.

ENCHYTRAEIDS OF THE NORTH OF ENGLAND.

Rev. HILDERIC FRIEND, F.I.S., F.R.M.S.,
Swadlincote.

By means of some new methods which I have been able to adopt with the aid of a Government Grant, I have recently worked out a number of small species of Enchytræids which had hitherto largely escaped observation. It may be well in the present paper to take a somewhat careful survey of another genus belonging to this family, and I therefore select *Henlea*. This genus was created by Michaelsen in 1889, the name being derived from that of Henle, an early authority in Zoology. It includes certain species which had previously been entered under such generic titles as *Enchytræus*, *Archienchytræus*, and *Neoenchytræus*, together with certain more recent discoveries. Beddard, in his valuable 'Monograph of the Order Oligochaeta,' 1895, gives four species as well-known, and alludes to some others as doubtful, but, though they were all known to be European, there is not a hint that any species of *Henlea* was to be regarded as British. I was the first to draw attention to the fact that the genus was represented in these Islands, as a reference to this Journal and the *Essex Naturalist* for 1896 will shew.

In 1900, when 'Das Tierreich' was published, Michaelsen enumerated five species, and gave four others as uncertain. The uncertainty was generic, not specific. It is true the four which he withholds from full recognition were not as carefully described as they would be to-day; but Eisen, who published the descriptions in 1878, is a first-rate authority, and two of his species were admitted. I believe that in time it will be possible to fit all his species into their proper places. Since 1900 new species have been added by Bretscher, Beddard, Southern, and myself, so that the genus is now assuming considerable proportions. The species, which are fully determined, will be set forth in the order in which they were discovered by myself in this country.

It may be helpful to students, if, before cataloguing the species, I state the distinguishing marks of a *Henlea*. Beddard has drawn attention to the fact that we have, perhaps, a somewhat heterogeneous assemblage of species here, but that can be corrected as our knowledge grows. First there are certain negative characters, such as the absence of dorsal pores—always present in *Fridericia*—the absence of diverticula from the spermathecæ, and the absence of a dorsal vessel behind the girdle. Salivary glands or peptonephridia may or may not be present. The oesophagus is sharply marked off from the intestine about the eighth segment, in which, or in one of the adjoining segments, the dorsal vessel arises. The setæ differ in

number, form, and arrangement, according to the species, resembling in turns those of *Fridericia*, *Buchholzia*, *Pachydrius*, and *Enchytraeus*. In some species there are oesophageal glands at the commencement of the intestine, in others they are wanting. These must be clearly distinguished from the septal glands which are always present.

1. *Henlea nasuta* Eisen. The synonymy is fully given in 'Das Tierreich,' x. 69. It appears as *H. leptodera* Vej. in Beddard and elsewhere. First British record, Friend in 'The Naturalist,' 1896, p. 298. I first made the acquaintance of this species in May, 1892, when I found it between Idle and Woodhouse Grove, Yorkshire. During the same year I received it from Mr. Allen, a Plaistow correspondent, who collected it in Essex. In 1896 it was again discovered by me near the Goods Station at Cockermouth, and more recently I have obtained it from other localities. In 1909, Southern recorded it for Ireland. It is about 20 mm. long and 1.2 mm. broad, the number of segments varying from about 50 to 65, while the setæ may sink in number to 2 and rise to 7, the average number being 4-6. The dorsal vessel arises in the 8th segment, in front of which the oesophagus enters the intestine. There are two oesophageal glands, and the brain is a little longer than broad, with a concavity in front. This species has been found in Siberia, Denmark, Germany, France, and Italy, and is readily recognized by its two oesophageal glands.

2. *Henlea ventriculosa* D'Udekem. Found in May, 1892 at Idle, near Bradford, Yorks. Received the same month from Essex, through Mr. Allen of Plaistow. In 1896 found at Cockermouth under moss by trickling water. (Friend in 'Essex Naturalist,' 1896, Vol. IX., p. 110). Found by Southern in various parts of Ireland. ('Irish Naturalist,' 1907, Vol. XVI., p. 70). It is 15 to 20 mm. in length, and averages 60 segments. There are four oesophageal glands. The salivary glands are usually rudimentary or inconspicuous, whereas in the last named species they are well-developed.

3. *Henlea puteana* Vejdosky was first described in 1877 as an *Enchytræus*, but was transferred to this genus in 1889 by Michaelsen. It is at once distinguished, as Beddard remarks, by the presence of two pairs of spermathecæ. This is a unique characteristic; no other *Enchytræid* having yet been found which possesses the peculiarity. They are in segments IV. and V. The dorsal vessel arises in segment IX. I found the species in Ledbury Churchyard, on Easter Monday, April 17th last. Unfortunately, owing to my absence from home, I was unable to examine the material in detail, and the putrid state of the decaying vegetable matter soon caused the worms to die.

Henlea dicksoni Eisen, of which two specimens have been found by Southern in Lambay, and *Henlea hibernica* Southern are as yet unknown in England.

4. *Henlea rosai* Bretscher. This worm was first described in 1899, in time to be included in 'Das Tierreich,' p. 70, where the description may be found. I discovered it for the first time on May 27th, 1911, at Buxton, in company with *Enchytræus minimus* Bretscher. My notes are as follows:—Rather larger than *E. minimus*, possessing 35 segments, pellucid, with brown intestine, which is sharply marked off from oesophagus in the seventh segment, where the chloragogen cells begin. Three pairs of septal glands, no oesophageal glands, pulsating vessel in the seventh and adjoining segments. Ampulla or funnel of sperm-duct, which is found with the girdle in segments XI. and XII., about twice as long as broad. First nephridia in 6/7, the duct passing out from the posterior portion. The spermathecae composed of a simple duct, without diverticula or glands. There may be an enlargement or swelling of the duct about the middle, or not. The brain is rather broader than long (my camera lucida drawings give the ratio 18:15), concave in front and convex behind.

Found among vegetable debris by a wall in the Serpentine Walks, Buxton.

5. *Henlea perpusilla* Friend. On July 9th, 1911, I collected some alluvium from a ditch near Cauldwell, some four or five miles from Ashby-de-la-Zouch and Burton-on-Trent. It proved to be rich in Enchytræids of the minuter kinds, and yielded a species of *Henlea* which had not, so far as I can discover, been previously described. In a few points it is of peculiar interest. I examined several specimens with great care, and found certain variations which seem to be always occurring in this variable group. Thus, while there was always a pair of nephridia in 6/7, I found in one instance that the first pair occurred in 5/6. Again, these organs differ in shape and arrangement. In the anterior portion of the body the duct springs near the septum, while the hinder portions of the worm shew the duct of the nephridia passing out from the rounded posterior. This indicates the importance of noticing the structure of organs at different points. There is probably some bionomic as well as taxonomic value in the difference. I have carefully noted and drawn the setæ of the head and tail, since these also vary as much as the nephridia do. They vary in number from three to six, very rarely seven or eight; and in front the ventral bundles usually have one more seta than the lateral. Here are the numbers as found in a typical specimen:—

SETÆ FROM HEAD OF *H. perpusilla* FRIEND.

Segment.		Lateral.		Ventral.
II.	..	3.4	..	4.5
III.	..	4.4	..	5.5
IV.	..	3.4	..	5.6
V.	..	6.4	..	4.6

Segment.		Lateral.		Ventral.
VI.	..	4.4	..	5.5
VII.	..	3.4	..	5.4
VIII.-XI.	..	4.4	..	4.4

The dorsal vessel arises in the ninth segment, and the vessel pulses forwards to the sixth. No salivary glands or oesophageal glands present. The brain is concave before and convex behind, hardly twice as long as broad. The sperm funnel or ampulla is about of the same relative proportions, and the duct is very small but long. The head is sometimes slightly glandular, and the girdle extends from the beginning of the twelfth to the setæ of the thirteenth segment. There are no setæ on the twelfth segment in the adult worm. There are three pairs of septal glands in 4/5-6/7, and the coelomic corpuscles are large, oval, or discoid. The front commissures of the dorsal vessel join the bifurcated ventral vessel just behind the first set of setæ. We need much more detailed observations on this point than have hitherto been made, as the vessels in the anterior regions shew widely different arrangements, and these will have to be included in future systematic descriptions.

This species is closely related to *Henlea tenella* Eisen, in which, however, the brain is about as long as broad, the anterior and posterior being notched.

6. *Henlea lampas* Eisen? In 1878 Eisen described several new species of *Archienchytræus* from Siberia and elsewhere. They are placed with diffidence by Michaelsen under the genus *Henlea*. So long ago as 1898 I found some specimens of an Enchytræid at St. Anne's-on-Sea, Lancashire, which agree with Eisen's description of *Archienchytræus lampas* very closely. In those days descriptions were not so perfect as now, but I record this species because I believe it belongs here; and if further research should show that it is wrongly placed, we shall have an authentic early record for some other British species. When we remember how recently the study of this large group of worms has been taken up systematically in this country, and that the number of *Henleas* at present known to science does not exceed a dozen, the list here supplied is certainly not an unsatisfactory one. Will readers help to make it more complete by sending specimens to 110 Wilmot Road, Swadlincote, from various localities, at home or abroad.

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We have received Vol. II., No. 3 of **The Journal of the East Africa and Uganda Natural History Society**. Longmans Green & Co. 78 pp., 5/4. It contains a valuable series of papers on the Birds in Uganda Forests, Distribution of Game, Anthropometry, Geological notes, and other items of interest to naturalists. There are a number of illustrations of Uganda game, etc., one of a Cape Buffalo (the record head), being particularly interesting.

BOTANISTS ON THE PENNINES.

G. CLARIDGE DRUCE, M.A., F.L.S.

THE International Phyto-geographical Excursion through the British Isles, which has been so skilfully organised by Mr. A. G. Tansley of Cambridge, after visiting the Norfolk Broads and the Derbyshire Dales, paid a visit to Crowden on August 8th, under the guidance of Dr. Moss.

The party, which included Prof. Drude of Dresden, Prof. Graebner of Berlin, Prof. Massart of Brussels, Prof. Ostenfeld of Copenhagen, Prof. Schroeter of Zurich, Dr. Lindman of Stockholm, Prof. Cowles of Chicago, Prof. Clements of Minnesota, etc., walked up Crowden Great Clough where *Orchis maculata* L. var. *præcox* Webster was found in flower, while the form of *Juncus effusus* with condensed inflorescences was common, a plant often recorded as *J. conglomeratus*; the smooth stem of the former, however, easily distinguishes it from the latter which has ribbed stems.

On the Black Chew Head Moors the abundance of *Rubus chamæmorus* was a special feature of the peat deposits. On the way down Chewbrook Clough the true *Rumex Acetosella* L. was noticed, the common British form being *R. angiocarpus* Murbeck, and near Greenfield was *Alchemilla vulgaris* var. *minor* Huds.

The company was entertained at dinner in the evening at the Midland Hotel, Manchester, by Prof. Weiss and Dr. Lang of Manchester.

On Wednesday the 9th, the members drove from Greenfield Station in motor-cars, kindly lent by members of the 'Cave' Club of Huddersfield, under the guidance of Dr. T. W. Woodhead, to Saddleworth Moors. At Wessenden Head a new variety to Britain of the heather *Calluna vulgaris* var. *Erikai* was pointed out by Dr. Graebner, a variety named after his wife by Prof. Ascherson of Berlin. On Honley Moor *Ulex Gallii* was noticed in fine flower.

At Honley the members were entertained by Miss Siddon to a lunch, after which they motored to Honley Old Woods, where *Melampyrum pratense* var. *hians* Druce, and a hybrid Birch between *alba* and *tomentosa*, were observed. West Wood and Heywood were visited by kind permission of the Earl of Dartmouth. Near the latter place a new variety of *Polygonum aviculare* was pointed out by Dr. Lindman.

Woodsome Woods and the interesting Hall were also inspected. In the woods the alien *Geranium endressi* was noticed, with a splendid display of the fern *Dryopteris cristata* Druce.

The Party then motored to Huddersfield, where they were entertained at dinner by the 'Cave' Club, at the George Hotel.

A hearty vote of thanks was moved to the President and club members by Prof. Drude, Mrs. Cowles, and Mr. A. G. Tansley, to which the president (Mr. J. Sykes) eloquently replied, bearing his testimony to the excellence of Dr. Woodhead's scientific work in their midst. The health of Mr. Ramsden (the Secretary of the club) was proposed by Mr. Claridge Druce of Oxford, and the time being advanced the party left for Manchester on their northern journey.

PROCEEDINGS OF PROVINCIAL SCIENTIFIC SOCIETIES.

The Sixty-second Annual Report of the Museum and Library of **Ipswich** is further evidence of Mr. Woolnough's enthusiasm, there being several additions in all the departments. We notice the offer of a series of mammalian remains has been deferred on account of no cases being available.

From **The Hastings and St. Leonards Natural History Society** we have received 'Occasional Publication No. 5,' which deals with Thomas Muffett, Naturalist, and a 'Docter in Physick,' in the seventeenth century. The pamphlet is by Mr. W. A. Mullens, and contains many quaint ornithological items.

The Annual Report of the Birmingham Natural History and Philosophical Society for 1910 contains particulars of the various exhibits at the Society's meetings; lists of lectures, etc. The society evidently makes the exhibition and description of natural history specimens a strong feature at its meetings. We agree that is very desirable.

In the **Quarterly Journal of the Geological Society** (No. 265), Mr. R. L. Sherlock has a paper on 'The Relationship of the Permian to the Trias in Nottinghamshire,' in which he makes comparison with the series in Yorkshire, Durham, etc. Mr. E. Bolton describes several new species of insects from the South Wales Coalfield.

The Seventy-seventh Annual Report of the Bootham School (York) Natural History, etc., Society is to hand, and shews that there are still many enthusiastic nature students in this school. One scholar opines that 'a bird in the bush is worth two in the hand.' We learn that 'A. W. Graveson is the botanist of the year, and his collection has now reached the marvellous total of 1012 species, as against 800 last year.'

The Journal of the Torquay Natural History Society (Vol. I., No. 3, pp. 87-146, 1/-) contains abstracts of the various lectures delivered before the society, and also some notes of local value. Amongst these are 'Devonshire Tokens'; 'The Seaweeds of Torbay'; 'New Light on the Bovey Beds,' by Mr. A. J. Jukes-Browne; and the 'Lepidoptera of the District,' by H. Lupton. There is an Obituary Notice (with photo) of the late Alexander Somervail.

Part LXXXII. of the Yorkshire Archæological Journal contains an illustrated report on 'The Roman Forts at Elslack,' by Mr. T. May; and an account of 'Opening of Two Barrows in the East Riding,' by J. R. Mortimer. These barrows were close to Sledmere, and illustrations of the vases, etc. found, are given. There is a note on 'Roman Remains at Whorlton,' in which we learn that some broken pottery found in the churchyard proved to be Roman. 'This find,' says the vicar, 'proves occupation, so I have now the satisfaction of having proved Whorlton (whatever Roman name it had) to have been a Roman settlement.' Personally we don't think the enthusiastic vicar has proved his case.

YORKSHIRE NATURALISTS AT INGLETON.

IT is a long time since the enthusiasm of the members of the Yorkshire Naturalists' Union was so thoroughly damped as it was on the occasion of their August Bank Holiday meeting at Ingleton. A very representative gathering assembled on Friday evening, and the previous spell of glorious summer weather gave every reason to believe that the Bank Holiday was to be a perfect one. However, as the best laid schemes of both the smaller and larger mammalia 'gang aft a-gley,' so, to a large extent, was the week-end at Ingleton marred by a continuous downpour of rain, as remarkable as it was severe.

During Friday night the rains, fortunately, had swollen the rills and streams feeding the two rivers which flow through the village, and make its 'scenery,' which is duly labelled and partitioned off, and charged for. With the help of the Saturday's rain, too, these rivers were well in flood, and the waterfalls were magnificent. We even forgot the rain and damp clothes and bad tempers as we gazed at the grand flow of waters, which must have somewhat resembled the *Godore* of the poem.

Clothed with mackintoshes, top-coats, patent waterproof trousers, umbrellas, and a variety of headgear, a motley party started on the Saturday morning, to carry out the day's programme; and carried it out, though all the 'waterproof' coverings were of no avail, and all arrived at headquarters—the Ingleborough Hotel—in the evening, thoroughly soaked through. According to the programme, the party duly proceeded 'via Dale Beck to Keld Head, and thence to Yordas Cave at the head of Kingsdale, and along the Scars of Greygarth, past the Gingling and Rowting Pot Holes, and thence via Thornton Force to Ingleton.'

There were two dry intervals, both delightful. The first was at Kingsdale Head Farm House, where, through the kindness of Mr. Robinson, the owner, a substantial tea was provided for the party, who also had the advantage of a fine, hot fire. And this is August! The other was in Yordas Cave a grand hole in the Carboniferous Limestone, down which, at one end, the waters poured in a cataract. The view inside this cavern, made possible by the aid of magnesium wire, was glorious. The modern method of artificial lighting was very different from that formerly used, when a primitive rush-light contrivance was held up to the ceiling by means of a long pole. The remains of one of these appliances was observed in the cave, and proved very heavy to carry.

On Saturday evening, Mr. J. J. Burton presided at a meeting, when Mr. Cosmo Johns gave an interesting account of some of the geological features of the district, in the light of recent research.

On Sunday, the downpour was such that the members were saved the trouble of arranging any programme. Probably on no previous occasion has a party of Yorkshire naturalists been so completely hotel-bound.

Monday morning the glass showed no change, and proved to be correct. By noon most of the party had had enough, shook the mud and sludge from off their feet, and departed. We believe the few who braved it out were able, later in the day, to see the sky. A few, a very few, new arrivals came upon the scene. The usual meeting was abandoned, as there were so few to meet.

Mr. WILLIAM CASH sends the following list of shells collected by him:—

<i>Vitrina pellucida.</i>	fine specimen of a translucent white colour, thus differing from the normal var. <i>alba</i> ; I should suggest the name var. <i>crySTALLINA</i> if it prove to be new).
<i>Vitreæ crystallina.</i>	
„ <i>helvetica.</i>	
„ <i>alliaria.</i>	
„ <i>nitidula.</i>	
„ <i>pura.</i>	
<i>Zonitoides nitidus.</i>	<i>Cochlicopa lubrica.</i>
<i>Euconulus fulvus.</i>	<i>Azeca tridens.</i>
<i>Punctum pygmæum.</i>	<i>Jamina secale</i> (on limestone ledges Constitution Hill, rather plentiful).
<i>Sphyradium edentulum.</i>	<i>Marpessa laminata.</i>
<i>Hygromia fusca</i> (with sweepnet on herbage near Pecca Waterfall).	<i>Pirostoma cravenensis.</i>
<i>Hygromia granulata.</i>	„ <i>bidentata</i> (= <i>rugosa</i>).
<i>Hygromia hispida.</i> Swilla Glen, near entrance.	<i>Succinea putris</i> (on sloping, marshy ground near Pecca Falls).
<i>Acanthinula aculeata.</i>	<i>Carychium minimum</i> and several <i>Vertigos</i> (all in or near the Swilla Glen).
<i>Arianta arbustorum.</i> (young; by sweepnet on marshy ground near the Pecca Falls).	<i>Balea perversa.</i>
<i>Helicogena aspersa</i> (finely marked).	<i>Vertigo alpestris.</i>
<i>Cepœa nemoralis.</i>	<i>Ena obscura.</i>
<i>Gonyodiscus rotundata.</i> Near the steps in Swilla Glen (one very	<i>Pyramidula rupestris.</i>

PHANEROGAMIC BOTANY.—Mr. J. BEANLAND writes:—Notwithstanding the week-end meeting, August 5th to 7th, the investigation of Kingsdale by the Yorkshire Naturalists' Union still remains to be done. The cyclonic state of the weather for two days made it impossible to enter the woods, and any notes made from the paths is no criterion of their contents. The following, however, were noted in walking through:—

<i>Thalictrum minus.</i>	<i>Crepis paludosa.</i>
<i>Circœa lutetiana.</i>	<i>Melampyrum pratense.</i>
<i>Lythrum Salicaria.</i>	<i>Origanum vulgare.</i>
<i>Rhamnus catharticus</i> (fruit).	<i>Calamintha clinopodium.</i>
<i>Galium sylvestre.</i>	<i>Carex pallescens.</i>
<i>Eupatorium Cannabinum.</i>	<i>Equisetum hyemale.</i>
<i>Carlina vulgaris.</i>	

A few clumps of white ling were seen, and the fruits of Mountain Ash and Guelder Rose were never more prominent.

On Monday the remnant of the members ascended Ingleborough under fairly favourable conditions, and the following plants were noted among others:—

<i>Actæa spicata.</i>	<i>Arenaria verna.</i>
<i>Sagina nodosa.</i>	<i>Thlaspi alpestre</i> var. <i>occidentale.</i>
<i>Sedum villosum.</i>	<i>Lycopodium selago.</i>
„ <i>Rhodiola.</i>	„ <i>clavatum.</i>
<i>Saxifraga oppositifolia.</i>	„ <i>alpinum.</i>
„ <i>hypnoides.</i>	<i>Selaginella selaginoides.</i>

Saxifraga Geum was brought in from Hurtle Pot, and reported to be in flourishing condition.

Mr. C. CROSSLAND writes:—The mycological section was represented by Messrs. M. Malone and J. W. H. Johnson. They collected over sixty species of fungi; thirty-nine of which were agarics. Considering the past dry scorching weather, this may be considered satisfactory. The drop of rain on Saturday and Sunday stirred up the Coprinii, five species being seen on the Monday. Nothing out of the ordinary was met with.

The following are new records for the N.W. division:—

<i>Mycena peliculosa.</i>	<i>Galera mycenopsis.</i>
<i>Omphalia pyxidata.</i>	<i>Bolbitius fragilis.</i>
<i>Omphalia sphagnicola.</i>	<i>Psathyra obtusata.</i>
<i>Galera campanulata.</i>	<i>Russula semicrema.</i>
„ <i>hypnorum.</i>	<i>Russula abutacea.</i>
„ var. <i>sphagnorum.</i>	

NEUROPTERA AND TRICHOPTERA.—On Monday, Mr. G. T. PORRITT spent several hours in the vicinity of the river at Ingleton, but, owing to the strong wind, and the swollen state of the waters, consequent on the heavy rains of the two previous days, little could be done. A very interesting trichopteron, however, turned up in *Neureclipsis bimaculata*, of which the only previously recorded Yorkshire specimens were taken by Mr. Porritt, on the river Ure at Masham, on the Yorkshire Naturalists' Union's Excursion there on August 5th, 1901, just ten years ago. *Mormonia hirta* was common, and *Silo pallipes* and other species were about. The only neuropteran of note was *Hemerobius orotypus*, which occurred by beating the trees on the steep slope rising from the left bank of the river. *Leuctra klapaleki* abounded, of course; and a large dragon-fly was on the wing, but it did not come near enough for its identity to be established.—T. S.

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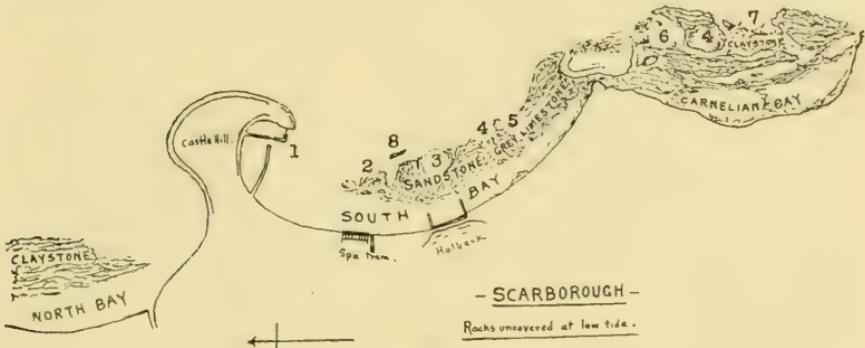
The Scunthorpe Urban District Council has appointed Mr. T. Sheppard F.G.S., of Hull, expert adviser to the Scunthorpe Public Museum.

Mr. R. Newstead has been appointed to the newly-established Chair of Entomology at the University of Liverpool.

MARINE BIOLOGY AT SCARBOROUGH.

JOHN IRVING, M.D.,
Scarborough.

IN anticipation of the visit of the Marine Biological Committee of the Yorkshire Naturalists' Union to Scarborough, September 22-26, an outline of the rocks, with a few notes upon the distribution of the fauna, may interest members unacquainted with the locality. The diagrammatic sketch of exposures, to be found at extreme low tides, roughly indicates centres of practical importance. Concentration upon the laminarian zone will probably yield good results to a diligent worker, but he must keep his eyes open to the vagaries of a swiftly inflowing tide. Obviously 'finds,' *i.e.*, new records for the district, are more likely to be obtained in the neighbourhood of the laminaria



Diagrammatic Sketch of Exposures.

than at higher levels. On July 28th, at the point marked (3) on the map, I picked up a beautiful specimen of the Crested Eolis, *Antiopa cristata*, a deep-sea form not included in the Yorkshire list of nudibranchs. Subaqueous rock-ledges, whose harbours are often covered with living organisms and may harbour some rare species, should be detached by hammer and chisel for close examination. Large, partially propped up, stones in pools frequently exhibit special forms of life attached to their under surfaces when turned over by a crowbar.

Although the three bays have much in common, South Bay, with its wide expanse of sheltered rocks and pools, is the easiest to work. Sandstone and grey limestone rocks, much bored by *Pholas crispata*, are readily broken up horizontally into layers, by hammer and chisel, thus exposing many holes, empty, or tenanted by the original borer, tapes, cave anemones, or worms. Perhaps the best South Bay region is (3)

opposite Holbeck Gardens, where tide-pools erode and undermine the sandstone, and deep-sea forms seek refuge. Zoophytes—*Sertularia*, *Plumularia*, *Bicellaria*, *Tubularia*, *Obelia*—are abundant here, sometimes in association with sponges, of which Scarborough records ten or more species. Here, too, may be found numerous echinoderms, crustaceans, nudibranchs, and dahlia anemones.

Particular attention is directed to another desirable site (2)—a group of rocks and reefs opposite the cliff tramway, seldom available for inspection except during September spring tides—where the collector is sure to meet with living material in plenty and in variety. Colonies of *Alcyonium digitatum* are occasionally found here, also compound ascidians, in addition to polyzoa, sponges, nudibranchs, crustaceans, worms, and three or four species of anemones.

The wall of the light-house pier (1) accessible by boat, lodges scarlet-fringed and plumose anemones. An outlying, laminarian clothed, reef (8) only get-at-able by boat, has never been investigated, at any rate in recent years, and should repay an hour's visit.

Pools and runnels between tide levels supply the usual assortment of molluscs, crustaceans, echinoderms, sponges, worms, etc., with here and there specimens of *Ascidia mentula*, or clusters of *Fragarium elegans*, or patches of *Botryllus*. *Scyllæa pelagica* has been found on three separate occasions, at (5), on stones in shallow water, though it is stated to be rare between tides. Then (4) both in South Bay and Cornelian Bay represents good places for hunting crustacea.

Claystone rocks predominate in North Bay. Near low water this light blue clay may be examined for *Pholas candida*, its only habitat, save that of a similar patch of soft claystone sandwiched among the outer reefs of Cornelian Bay. In other respects North Bay is well-stocked with most of the species that abound in South Bay.

Cornelian Bay is quite as prolific in marine fauna as South Bay, but the rocks—sandstone, limestone, and shale—are rough and somewhat difficult to negotiate. Work amongst the outer reefs must be rapidly done without any miscalculation in regard to a returning tide. Large sea-urchins, *Echinus sphaera*, and fifteen-rayed sun stars, *Solaster papposa*, abound between points marked (6) and (7), while at (7) living specimens of *Trochus zizyphinus* can be secured, and apparently nowhere else in any of the bays.

Different sea-weeds will naturally provide certain organisms that feed on them, or harbour in them, and Scarborough bays are not lacking in red, brown, and green sea-weeds.

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In *La Feuille des jeunes Naturalistes* (No. 490), M. L. Vignal has 'Quelques observations sur les *Limnæa stagnalis* Linne,' with illustrations.

In Memoriam.

JOHN ROBERT MORTIMER.

It is appalling to think of the inroads recently made by the hand of death into the front rank of our scientific men. The pages of this journal alone have included records of many of our leaders of scientific thought; many whose places will never be filled; and the most recent of these is J. R. Mortimer, of Driffield.

So recently as May last, *The Naturalist* contained an account of his life's work, which was accompanied by a portrait and a list of his memoirs and papers.

Only a very short while ago, on seeing him at Driffield, we spent a pleasant afternoon together, talked over many things, and arranged for the publication of yet another of his works. A few days ago I received a cheerful letter in reference to what has proved to be his last paper, which he had asked me to read for him at the Portsmouth meeting of the British Association; though in his letter he referred to his growing weakness. This paper appears on another page, and deals with a subject that particularly appealed to him.

And then, though in his eighty-seventh year, the news of his death on August 19th, came unexpectedly. After one has seen a fine personality such as that of Mr. Mortimer, almost weekly, for many, many years, and after one has regularly received letters from him for nearly a quarter of a century, it seems difficult to believe that he will never be seen again, never talk over the many matters in which he was so interested, and that one will hear from him no more.

Perhaps more so than is the case with anyone else, the present writer owes much to Mr. Mortimer. When quite a schoolboy he was encouraged by Mr. Mortimer's help. Many an afternoon he has spent in the Driffield Museum, when the owner gave hour after hour in describing the objects and explaining how they were obtained. Twelve years ago we passed many Sundays together—the only time then mutually convenient—the result of which was the publication of the *Illustrated Descriptive Catalogue of his museum*. A few years later I succeeded in persuading him to publish his 'Forty Years' Researches in British and Anglo-Saxon Burial Moulds,' which he did conditionally on my seeing it through the press. After two years' hard work the volume appeared, and was additionally valuable for the hundreds of illustrations from the charming drawings made by his daughter, Miss Agnes Mortimer. This work will ever remain a monument to his memory. But in addition there is the collection of pre-historic objects itself, which will, we have every reason to believe, be kept intact, and

speak far more forcibly than can anything else of the great work which Mr. Mortimer accomplished.

Probably no one in England has done so much for the elucidation of the pre-historic antiquities of his district as has Mr. Mortimer. No one has worked so well, so thoroughly, and so exhaustively; and certainly no one has so carefully preserved the records that were obtained.

Unquestionably Mr. Mortimer's worth will be much more appreciated in the future even than it is to-day. Few, very few, yet realize the extreme value and importance of his collections.

In Mr. Mortimer I have lost the oldest, kindest, and most unassuming of my scientific friends; and, with very many others, I shall miss the fine tall figure which for over half a century has been so well known in all parts of East Yorkshire.—T. S.

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FIELD NOTES.

MAMMALS.

Curious Food for a Ferret.—We were recently ferreting in the garden here for rats, and had put a ferret into a hole under a fallen tree. The ferret got hold of something, and on being pulled out was found to be devouring a huge brown slug, which it was with difficulty made to drop. The moment it was released, it dashed at the remains again, with apparently the keenest relish, and speedily finished them.—C. ASH, Saxton Vicarage, Tadcaster.

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BIRDS.

The Golden Oriole in Yorkshire.—On Sunday, the 9th of July, a friend and I observed a male Golden Oriole, at a distance of ten yards, at Hackness near Scarborough.—S. CROOK, Scarborough.

Instances of Late Nesting near Scarborough.—On August 6th, on Mr. W. Gibson's land at Thorne Park, Hackness, I found a young Snipe, unfledged; and on August 14th I found young Swifts still in the nest, also a Swallow's nest with one fresh egg, all at Hackness.—STANLEY CROOK.

The Decrease in Whinchats and Redstarts.—Referring to Mr. R. Fortune's remarks (ante p. 298), the decrease of the Whinchat during the last few years has been general in this part of the country. The following records were made on two excursions of the Bradford Natural History Society to Winterburn Reservoir, near Gargrave, in the years 1907 and 1911. '1907, May 25th—Whinchats extremely abundant, between

thirty and forty birds noted on the banks of the reservoir.' '1911, May 27th—In spite of the former abundance of the Whinchat around this reservoir, we only noted two pairs—one of which had a nest of six eggs in a tussock of coarse grass.'

Mr. Boyes accuses the mowing-machine and modern methods of cutting the grass early, as the chief causes of the diminution of the numbers of the Whinchat in the neighbourhood of Beverley. But other causes must apply in this neighbourhood. Reservoir embankments and rough enclosures on the edges of the moor are the chief haunts of the Whinchat here. They are unchanged to-day, being just as they were a score of years ago, or more. Possibly the decrease in its numbers may be due to a succession of wet and cold summers, but it seems more likely to be attributable to incidents on its journeys during migration, or whilst in its winter quarters. Certainly no local change in its breeding quarters here has tended to alter its status in this neighbourhood.

The Redstart is also decreasing locally. A dozen years ago I did not know any place in this district where the Redstart was so abundant as just above Denton. Now, however, I can only find one, or at the most two, pairs, where ten years ago I could have seen a dozen pairs at the least. As with the Whinchats, the local conditions do not appear to have altered at all.—H. B. BOOTH, Ben Rhydding.

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MOLLUSCA.

Vivipara contecta near Halifax.—While dredging for shells at Dam Head, Shibden, near Halifax, in July, 1910, I took three specimens of *Vivipara contecta*. As this was a new record for the Halifax parish, I was interested to find the species in some quantity this season 1911. The specimens were taken along with *Limnæa stagnalis* and *Planorbis albus*.

The dam is a small sheet of water, collected from a hillside spring, and used for domestic purposes by the cottagers near. Some anglers have introduced some trout, roach and gudgeon, but all the fish have been introduced from local streams, so that it is hardly likely the shells have been brought by that means. *Vivipara vivipara* is very plentiful in the canal some two miles away. *Anacharis canadensis* is very common in the dam, but still this has been put in from local sources. Some of the shells are very much eroded, which, I suppose is due to the action of the gases given off by the decaying animal and vegetable matter. Messrs. W. Cash and J. W. Taylor have verified the record.—J. H. LUMB, Halifax, Aug. 17th, 1911.

In the *Entomologist's Monthly Magazine* for August, *Deilephila galii* is recorded at Boston, Lincs.; *Plusia moneta* in Nottinghamshire; and *Libellula fulva*, abundant, at Askern, in Yorkshire.

NEW BOOKS ON GEOLOGY.

Complete Mineral Catalog, compiled by **W. M. Foote**. Twelfth Edition. 320 pp. The Foote Mineral Co., Philadelphia.

This catalogue is exceptionally well prepared, and is illustrated by 300 figures and plates. Though ostensibly a trade catalogue, it will be found particularly useful to teachers and museum curators.

Yorkshire Type Ammonites. Edited by **S. S. Buckman, F.G.S.** Part 4. Wesley & Sons, 1911.

We are glad to see that this useful work is progressing. The present part contains ten excellent plates and 'Descriptions Nos. 31-37.' The specimens described and figured are *Ammonites semiselatus*, *cornutus*, *quadricornutus*, *fabricatus*, *radiatus*, *arctus*, and *nautiliformis*. The plates are from photographs by Mr. J. W. Tutchter, and are all that can be desired.

The Miner's Guide, by **F. P. Mennell, F.G.S.** London: Gerrard, Ltd. viii. + 196 pp. Price 4/- net.

This is 'a practical handbook for prospectors, working miners, and mining men generally,' and is admittedly a compilation. It is 'practically a third edition of the author's "Rhodesian Miner's Handbook,"' and deals principally with mining as carried on in South Africa. There are a number of diagrammatic and photographic illustrations, and most of the points likely to be of service to prospectors are brought forward.

Lessons on Soil, by **E. J. Russell, D.Sc.** Pp. 132 + xvi. Cambridge University Press, 1911. Price 1/6.

In this excellent little elementary treatise Dr. Russell has brought together nine well written and well illustrated chapters, dealing with 'What is the Soil made of?' 'What Lime does to Clay,' 'The Dwellers in the Soil,' 'The Soil and the Countryside,' etc. The diagrams illustrating experiments, etc., are particularly well prepared, and will appeal to the beginner, as will also the fine photographs of typical landscapes, etc.

Pebbles, by **E. J. Dunn, F.G.S.** Melbourne: G. Robertson & Co. 122 pp. + 76 plates.

The director of the Geological Survey of Victoria has produced a remarkable book on a simple subject, not the least interesting feature of which is the extraordinary series of pebbles figured by the half-tone process, on no fewer than 76 plates. Upon these are figured pebbles of every possible description—round, oval, egg-shaped, cylindrical, faceted, banded, perforated, striated, carved, decorated, and lichen-covered. He deals with the sizes, shapes, forms, materials, and variations of pebbles, their methods of transport, their uses to man, etc. The principal surprise to us is that of such a simple subject the author has been able to say so much. The 250 illustrations are very fine.

Causal Geology, by **E. H. L. Schwarz**. London: Blackie & Sons, Ltd. viii. + 248 pp. 7/6 net.

The author of this book has spent some years on the geological survey of the colony of the Cape of Good Hope, and whilst there met with many curious geological phenomena, which are described in 'Causal Geology.' We learn that 'this work is an important contribution to the science of geology, and particularly to the discussion of the Planetismal Hypothesis of Prof. T. C. Chamberlain.' The author postulates that 'The rocks on the surface of the earth are in constant motion; the force of cohesion in rocks is insufficient to keep them rigid when in large masses; the area of the surface of the globe is not a diminishing one; the surface of the earth is uniform in average texture throughout; and the earth is growing by the addition of meteoric matter, and the composition of the earth as a whole is represented by the average composition of this matter.' The work is illustrated by a series of photographs and diagrams, all bearing upon the geology of South Africa. Whether, however, the author makes out a good case we must leave our readers to judge for themselves, after they have read the book.

The Palæontographical Society's Volume LIV. contains a number of valuable monographs. Dr. R. H. Traquair gives a further instalment of his work on the 'Carboniferous Ganoid Fishes'; Dr. A. Smith Woodward describes the 'Fossil Fishes of the English Chalk (Part VI.)'; Mr. Henry Wood's work on the 'Cretaceous Lamellibranchiata of England' is continued in a monograph on *Inoceramus*; Mr. R. I. Pocock describes the 'Terrestrial Carboniferous Arachnida of Britain'; Drs. Gertrude Elles and E. M. R. Wood have Part VIII. of their 'British Graptolites.' Altogether many hundred specimens are figured and described. We notice there are a few vacancies on the list of members, and we would strongly advise any of our readers interested to subscribe to this excellent publication. Full particulars can be obtained from Dr. A. Smith Woodward, at the British Museum (Natural History).

Field Note Book of Geological Illustrations, by **Hilda D. Sharpe.** Manchester: Sherratt & Hughes. 52 pp.

Beyond the title-page and a 'Preface' (1 page), and 'Table of Contents' (3 pages), this volume is practically entirely composed of reproductions of photographs of geological sections, with a few diagrams, and tables showing the classification of minerals, rocks, etc. There is also a physical map and a geological map of the British Isles, and several blank pages for notes. From the preface we gather that the object of the book is not to replace text books, but to supplement them, and the collection of photographs is got together to aid students on their excursions or holidays. They illustrate various geological phenomena, etc., but beyond being more handy in book form we do not see that they have any advantage over the sets of prints issued by the British Association Geological Photographs Committee. Though the letterpress is reduced to a minimum there is a fair list of errata.

The Student's Lyell. Edited by **John W. Judd, C.B., LL.D., F.R.S.,** second edition, 1911. London: John Murray. lvi.+645 pp. 7/6 net.

There are very many who can look back with pleasure upon the time when they perused 'Lyell,' and in doing so seemed to be infected with the same enthusiasm that was obviously that of the author; and, notwithstanding the fact that as time goes on and more up-to-date text-books are published, it is still a pleasure to refer to Lyell, which somehow seems to stand aloof from them all. Unfortunately, and fortunately, science does not stand still, and each year a whole army of workers in the geological field brings home the fruits of their labours, and adds them to the general store of knowledge. In this way the classics fall behind. Were it only possible, without in any way injuring the charm of the original work, to bring it up-to-date, the volume might yet remain ideal. In the case of Lyell this has been done, and no one is better fitted for the work than Professor Judd, who knew Sir Charles so well. In the present edition the editor has given a history of the events which led up to the production of Lyell's epoch-making work, particularly in regard to its bearing upon the 'Origin of Species,' which Huxley justly asserted to be the logical sequence to the 'Principles of Geology.' By a series of notes all the more important geological discoveries and conclusions are incorporated in this new edition.

The Coast Scenery of North Devon, by **E. A. Newell Arber, M.A., F.G.S.,** etc. London: J. M. Dent & Sons. xxiv.+261 pp. 10/6 net.

We have frequently had occasion to refer to Mr. Newell Arber's work in these pages. But in almost every instance the work has been more or less severely palæo-botanical and technical. In connection with his work on his favourite subject Mr. Arber has paid frequent visits to glorious Devon, but, apparently, he has occasionally been able to take his eye from his microscope and pocket lens, and view the world from a broader point

of view. He was necessarily forced to admire the glorious coast scenery with which his palæo-botanical work brought him in contact, including the varied and picturesque cliffs between Portlock and Boscastle. Every feature in the diversified and picturesque bays and promontories was possible of explanation; and in this volume, besides reproducing a wonderful series of photographs of cliff and cave, the author has carefully described the why and wherefore thereof. A perusal of the work shews that Devon produces a wonderful variety of features, some easily understood, others more difficult of explanation. But the author has studied the subject very carefully, and in plain English gives the results of his observations. The book is by no means technical, but it a really fascinating narrative of the geological history of the coast. In the first part Mr. Arber describes in detail the six principal districts into which this area is divided, and in the second he refers more fully to the special points of geological interest. In addition to the photographs, there are a number of diagrams, a bibliography, and a good index.

The Ice Age in North America and its Bearings upon the Antiquity of Man, by **G. Frederick Wright, LL.D., etc.** Fifth Edition. Oberlin, Ohio; xxii. +763 pp.

There can be no question that the present enthusiastic school of glacialists has been largely influenced by American writers, in the fore rank of which is Prof. Wright. And of his many books, 'The Ice Age in North America' is the best. It is twenty years since the first edition was published, and it at once 'took its place.' Certainly, all the views expressed therein were not generally accepted, but from that time there has been a continually increasing army of students of glaciation, which has contributed largely to our knowledge of the glacial conditions formerly obtaining in the New World. A perusal of the Bibliography at the end of the present edition is evidence of the enormous accumulation of facts and theories since the appearance of the first edition. Amongst the names noted are those of many of the leading scientific men of Europe and America.

The great increase in the number of pages in the new edition is alone evidence of the additional matter brought forward by Dr. Wright, but when we come to examine the volume in detail it is apparent that every care has been exercised in taking new evidence and new facts into consideration. The excellent work of Prof. Williams and Mr. Frank Leverett especially has provided much new material; but, perhaps, the greatest changes have taken place in those chapters dealing with the evidence of human remains connected with the glacial period. In this direction our American friends have worked in a way that causes astonishment amongst English geologists. Anyway the great mass of evidence brought forward seems to have been seriously and conscientiously summarised by Dr. Wright, who carefully puts the case both for and against the existence of man in America during the great Ice Age. This part of the work alone is of great value from the clear way in which the various evidences are reviewed; but the volume will command a sale far beyond even the enormous area with which it deals, and certainly many of the chapters are of great general interest. We have particularly in mind those dealing with the Depth of Ice; Glacial Erosion and Transportation; Drumlins; Glacial Dams, Lakes, etc.; The Loess; Flight of Plants and Animals during the Glacial Period; Europe during the Glacial Period; The Cause of the Glacial Period; The Date of the Glacial Period, etc.

It is certainly a matter for congratulation that a busy man such as we know Dr. Wright to be should be able to keep abreast with the enormous literature on the subject with which his book deals, and be able from time to time to give geologists so admirable a summary of the progress made with regard to the study of one of the most remarkable periods in the history of the earth, viz., the Ice Age.

NEWS FROM THE MAGAZINES.

The *Irish Naturalist* (Vol. XX., No. 7) contains a paper on 'The British Utriculariæ,' by Mr. G. C. Druce.

British Birds (Vol. V., No. 2), contains a memoir on the late Robert Service, which is accompanied by a portrait.

The Animal's Friend (G. Bell & Sons, 2d. monthly) has been sent to us. It contains many illustrations, stories relating to Pets, etc.

Prof. W. W. Watts' Presidential Address to the Geological Society, on 'Geology as Geographical Evolution' is printed in the Society's *Quarterly Journal* (No. 266).

Mr. W. N. Cheesman, F.L.S., favours us with a reprint of his 'Contribution to the Mycologic Flora and the Mycetozoa of the Rocky Mountains,' from the *Transactions of the British Mycological Society*.

Part 36 of *Harmsworth's Natural History* (7d.) deals with marine life in its various interesting forms, and contains the best illustrations we have yet seen in this publication. The sea-anemones, etc., are particularly well represented.

In *The Zoologist* (No. 842), Capt. Stanley S. Flower gives an account of his visit to various European Zoological Gardens and Natural History Museums. There is a favourable notice of the Brighton Aquarium, and the Halifax 'Zoo,' of which latter two illustrations are given.

In the *Geological Magazine* (No. 565) Dr. Henry Woodward figures a specimen of *Eryon richardsoni* from Dumbleton Hill, Gloucestershire. Mr. R. C. Burton has also a note on the 'Occurrence of Beds of the Yellow Sands and Marl in the Magnesian Limestone of Durham.'

In *Man* (Vol. XI., No. 9), Dr. Duckworth and Mr. L. R. Shore give a 'Report on Human Crania from Peat deposits in England.' These are from Lincolnshire, Lancashire, Norfolk, and Cambridgeshire. The collection shews a very great diversity of cranial form.

Hull Museum Publications (No. 78), being the Thirty-seventh Quarterly Record of Additions (40 pp. A. Brown & Sons, one penny), has illustrated notes on a bronze dagger from Lincoln, Undescribed Yorkshire Tokens, a slavery jug, Chippendale chairs, a fifteenth century sword, old ironwork, old Hull whaling ships and steamships, etc.

Mr. W. C. Simmons has an interesting note on 'The Granite Mass of Foxdale, Isle of Man; with some notes of Dendritic Markings in Microgranite Dykes,' in the *Geological Magazine* for August. Apparently one of the first references to this granite mass was in *The Naturalist* for 1894. In the same magazine Dr. H. Woodward describes a carapace of a crustacean from the ironstone nodules of Sparth Bottoms, Lancashire, under the name of *Anthrapalæmon grossarti=russellianus* var. *holtii*.

In *British Birds* for August, an Alpine Ring Ouzel, 'seen in the flesh' in Sussex, is described as a New British Bird. In view of past events, we are inclined to agree with the author that this occurrence, 'for the first time on record in Great Britain, is scarcely surprising.' In the same journal, another writer regrets that a peculiarity in the feathers of the Water Rail, which he recently described as a new observation, was pointed out by a Rev. Bird in the Norfolk Society's Transactions, so long ago as 1895.

In *Knowledge* (No. 516), is a profusely illustrated article by Dr. Gradenwitz dealing with the fine series of gigantic models which Carl Hagenbeck, of Hamburg, has set up in his park. One immense lizard is shown preying upon another, while a group of Saurians, resembling caricatures of the rhinoceros, are shown disporting themselves in the water; the whole effect in all cases being heightened by the natural surroundings in which the models are placed. In the same journal Prof. F. Cavers writes on the 'Biology of Lichens.'

NORTHERN NEWS.

Mr. Bernard Smith has 'Some Notes on the Topography of North-East Nottinghamshire' in Vol. XIV. of the Transactions of the Thoroton Society, recently issued.

We have received some parts of a small journal 'Camping, the Official Organ of the Amateur Camping Club'. It contains notes, etc. of interest to those who enjoy a holiday under canvas.

Dr. E. Thurlow Leeds, has an interesting paper on 'Examples of Late Anglo-Saxon Metal-Work,' in the *Annals of Archæology and Anthropology*, Vol. IV., part 1, issued by the University of Liverpool.

A monthly magazine has an article on its coloured plate entitled 'Small Tortoiseshell Butterfly.' The plate itself, however, is described as 'Blindworm, or Glowworm'. It certainly does not represent a butterfly.

We have been favoured with a reprint from the *Proceedings of the Royal Irish Academy* dealing with the 'Pseudoscorpions of Clare Island.' It is by our contributor, Mr. H. Wallis Kew. Apparently pseudoscorpions are unusually scarce on the island, though it is what might be expected from the nature of its physical features.

From Mr. J. E. Stead, F.R.S., we have received a remarkably complete monograph on 'Cleveland Ironstone and Iron,' a paper read before the Cleveland Institution of Engineers, February 7th, 1910. This is illustrated by photographs shewing the microscopic structure of the beds, etc. There is also a valuable series of analyses of the rocks.

Mr. H. M. Platnauer's Presidential Address to the Museums Association at Brighton is printed in the *Museums Journal* (Vol. II., No. 1). In the same magazine Mr. C. O. Waterhouse writes on 'The Insect Room in the British Museum (Natural History).' He not unnaturally complains of the present inadequate accommodation for the national collection of insects.

Amongst others who have recently passed away we regret to notice the name of Mr. G. W. Murdoch of Bentham. Mr. Murdoch was the editor of the Natural History Column of the *Yorkshire Weekly Post*. He was a member and a strong supporter of the Yorkshire Naturalists' Union, and frequently gave the Union and this journal favourable mention in the various newspapers with which he was connected. He was a naturalist of the true sort, and a keen upholder of those who helped to protect the birds and mammals of our island.

What is a 'Giccadd of house cricket'? One is figured in a 'natural history' contemporary, but is not described. The same journal refers to a recently formed 'F. S. B. K.' (Faithful Society of Birthday Keepers), and suggests that 'branches might be formed all over the country,' with *Crickhowell* as a centre! We quite agree that 'the scheme seems entirely worthy of adoption as a branch of the B. E. N. A.', whatever that may mean. The idea seems worthy of extension, and as a further branch we might suggest a N. S. G. F. N. B. S. (No Sour Gooseberries [or 'grapes'] For Naughty Boys' Society)!

In connection with the recent correspondence in reference to the suggestion that part of the ground available for extension of the Natural History Museum at South Kensington should be utilized for another purpose, we were surprised to see in *Nature*, under the signature of a leading scientific authority, a statement to the effect that 'The Natural History Museum, dealing with the works of nature, is already an old institution, and has largely completed its general collection.' This may apply to the meteorites, with which the writer in *Nature* may possibly be familiar, but it certainly does not apply to the collections generally, which are anything but 'complete.'

THE NATURALIST.

A MONTHLY ILLUSTRATED JOURNAL OF
NATURAL HISTORY FOR THE NORTH OF ENGLAND.

EDITED BY

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THE MUSEUMS, HULL;

AND

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WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF

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JOHN W. TAYLOR,
WILLIAM WEST, F.L.S.,

RILEY FORTUNE, F.Z.S.

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YORKSHIRE NATURALISTS' UNION.

ANNUAL MEETING OF THE ENTOMOLOGICAL SECTION.

(President:—ARTHUR WHITAKER).

Two meetings will be held at the Leeds Institute, Cookridge Street, Leeds, at 3-30 p.m. and 6-15 p.m., respectively, on Saturday, October 28th, 1911.

BUSINESS (at the afternoon meeting):—

To consider and pass the sectional reports for 1911, and to elect officers for 1912.

EXHIBITION OF SPECIMENS. (In addition to specimens of general interest lepidopterists are especially requested to bring good series of *Polia chi* and *Amphydasis betularia*. Exhibitions of specimens of other orders of insects are very earnestly invited).

At the evening meeting several short addresses on entomological topics will be contributed by different members.

All members and associates of the Yorkshire Naturalists' Union are invited to attend and to bring any interesting notes or observations made during the past season. In order that a correct and complete account of all exhibits may be included in the report the Secretaries particularly request that each may be accompanied by a descriptive note.

Will Officials of the Affiliated Societies kindly notify their Members.

Secretaries:—Lepidoptera, A. WHITAKER and B. MORLEY; Hemiptera and Diptera, W. DENISON ROEBUCK; Neuroptera, Orthoptera, and Trichoptera, G. T. PORRITT; Coleoptera, H. H. CORBETT.

THE EVOLUTION OF KINGSTON-UPON-HULL AS SHEWN BY ITS PLANS.

BY

THOMAS SHEPPARD, F.G.S., F.R.G.S., F.S.A. (Scot.),
Curator, Municipal Museums, Hull.

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NOTES AND COMMENTS.

THE BRITISH ASSOCIATION.

As we were going to press with our last number, the British Association for the Advancement of Science met at Portsmouth. From almost every point of view the gathering was distinctly disappointing. Perhaps the number of members attending is the best evidence of the success of a meeting. The attendance was very poor indeed. And, with a few brilliant exceptions, those present could hardly be said to be even fair representatives of British scientific workers. A few years ago it was possible to find practically everybody of importance, scientifically, at this annual congress. At Portsmouth, scores of usually prominent members were conspicuous by their absence.

THE SECTIONAL MEETINGS.

Possibly partly as a result of the circumstances mentioned, the sectional meetings were, for the most part, dull and uninteresting. Many of the contributions brought forward were by no means new; and in none of the sections was there any really remarkable paper or announcement. Even the address of the President, Sir William Ramsay, largely dealt with the question of the future of Britain's coal supply—a matter which was thoroughly discussed by the Association a few years ago. And Dr. H. R. Mill, in his public lecture on 'Rain,' added to the general cheerfulness by informing us that we must expect more rain than usual during the next few years!

THE SOCIAL SIDE.

Those who care for this sort of thing were fairly well catered for. There was a really brilliant reception at the South Parade Pier on the Thursday evening; the mildness of the weather enabling the members to walk under the stars, and listen to the strains of the bands. This appealed to the ladies, and we believe the gentlemen enjoyed it. One did. There was a Garden Party at the Victoria Park, and also one at 'Brankesmere,' the 'mere' being real, with two boats upon it. At this function all the ladies' dresses were described in the local press. There were visits to dockyards, pumping stations, gas works, destructor works, and sewerage pumping stations. There was also a fine display of submarine boats and torpedo boat destroyers. There was an excursion to the Isle of Wight, but red tape probably prevented many from taking part.

ACCOMMODATION.

The reception room, in the Connaught Drill Hall, answered its purpose, though rather resembling a banner-strewn barn. The sections were housed with varying success: the geologists

had the top room in the municipal buildings, where there was no lift, and the daily diminishing attendance at the section was a result of the survival of the fittest. Early in the morning of the first day the journals were 'off,' and in the almost entire absence of notices, etc., the Conference of Delegates and other meetings were held before those who ought to have been present were aware. As regards apartments, the experiences were very varied!

THE HANDBOOK.

The 'Handbook and Guide' is perhaps the most disappointing for many years. The York (384 pp.), Dublin (450 pp.), and Sheffield (506 pp.) handbooks were about uniform, and it was hoped that subsequent handbooks would match them in size, if not in thickness. The Portsmouth volume, however, is considerably smaller in each of its 250 pp., and it has none of the fine coloured geological and other maps which were such useful features in the volumes mentioned. The whole of the geology, botany and zoology of the district, including the Isle of Wight, occupies less than forty small pages.

THE STUDY OF PURE SCIENCE.

Sir William Ramsay concluded his presidential address by putting in a plea for the study of pure science, without regard to its application. He stated 'the discovery of radium and similar radioactive substances has widened the bounds of thought. While themselves, in all probability, incapable of industrial application, save in the domain of medicine, their study has shewn us to what enormous advances in the concentration of energy it is permissible to look forward, with the hope of applying the knowledge thereby gained to the betterment of the whole human race. As charity begins at home, however, and as I am speaking to the *British Association for the Advancement of Science*, I would urge that our first duty is to strive for all which makes for the permanence of the British Commonwealth, and which will enable us to transmit our posterity a heritage not unworthy to be added to that which we have received from those who have gone before.'

THE SCIENTIFIC WORKER.

Similarly, Mr. W. Bateson, in his address to the Agricultural Sub-section, pointed out that the man who devotes his life to applied science should be made to feel that he is in the main stream of scientific progress. If he is not, both his work and science at large will suffer. The opportunities of discovery are so few that we cannot afford to miss any, and it is to the man of trained mind who is in contact with the phenomena of a great applied science that such opportunities are most often given. Through his hands pass precious material, the outcome some-

times of years of effort and design. 'To tell him that he must not pursue that inquiry further because he cannot foresee a direct and immediate application of the knowledge he would acquire, is, I believe, almost always a course detrimental to the real interests of the applied science. I could name specific instances where in other countries thoroughly competent and zealous investigations have by the short-sightedness of superior officials been thus debarred from following to their conclusion researches of great value and novelty.'

THE STUDY OF ZOOLOGY.

In his Presidential address to the Zoological Section, Prof. D'Arcy W. Thompson referred to the present position of the study of zoology. He pointed out that so far are biologists from being nowadays engrossed in practical questions, in applied and technical zoology, to the neglect of its more recondite problems, that 'there never was a time when men thought more deeply or laboured with greater zeal over the fundamental phenomena of living things; never a time when they reflected in a broader spirit over such questions as purposive adaptation, the harmless working of the fabric of the body in relation to environment, and the interplay of all the creatures that people the earth; over the problems of heredity and variation; over the mysteries of sex, and the phenomena of generation and reproduction, by which phenomena, as the wise woman told, or reminded, Socrates, and as Harvey said again (and for that matter, as Coleridge said, and Weismann, but not quite so well)—by which, as the wise old woman said, we gain our glimpse of insight into eternity and immortality. These then, together with the problem of the Origin of Species, are indeed *magnalia naturæ*; and I take it that enquiry into these, deep and wide research specially directed to the solution of these, is characteristic of the spirit of our time, and is the pass-word of the younger generation of biologists.'

OUR LOST ETHNOLOGICAL OPPORTUNITIES.

To the Anthropological Section, Dr. W. H. R. Rivers pointed out how largely science had suffered as a result of our lost opportunities. 'It is cruel irony that just as the importance of the facts and conclusions of ethnological research is becoming recognised, and just as we are beginning to earn sound principles and methods for use both in the field and in the study, the material of our science is vanishing. Not only is the march of our own civilisation into the hitherto undisturbed places of the earth more rapid than it has ever been before, but this advance has made more easy the spread of other destroying agencies. In many parts of such a region as Melanesia, it is even now only from the old men that any trustworthy in-

formation can be obtained, and it is no exaggeration to say that with the death of every old man there and in many other places there goes, and goes for ever, knowledge, the disappearance of which the scholars of the future will regret as the scholars of the past regretted such an event as the disappearance of the library of Alexandria.

THE NEED FOR ETHNOGRAPHICAL RESEARCH.

There is no other science which is in quite the same position. The nervous system of an animal, the metabolism of a plant, the condition of the South Pole, for instance, will a hundred, or even a thousand, years hence be essentially what they are to-day, but long before the shorter of those times has passed, most, if not all, of the lower cultures now found on different parts of the earth will have wholly disappeared, or have suffered such change that little will be learnt from them. Fortunately the need for ethnographical research is now forcing itself on the attention of those who have to deal with savage or barbarous people. Statesmen have begun to recognise the practical importance of knowledge of the institutions of those they have to govern, and missionary societies are beginning to see, what every wise missionary has long known, that it is necessary to understand the ideas and customs of those whose lives they are trying to reform. Still, we must not be content with these more or less official movements. There is ample scope, indeed urgent need, for individual effort and for non-official enterprise. It is not all who can go into the field and do the needed work themselves, but there are none who cannot in some way help to promote ethnographical research. We have before us one of those critical occasions which must be seized at once if they are to be seized at all; the occasion of a need which to future generations will seem to have been so obvious that its neglect will be held an enduring reproach to the science of our time.'

TEACHERS AND EDUCATION.

In his address to the Educational Science Section, the Rt. Rev. J. E. C. Welldon, himself once a schoolmaster, stated:— 'It happened to me at one time to examine for a special purpose all the lives recorded in the "Dictionary of National Biography"; and the number of the persons who were there stated to have been more or less constantly engaged in tuition was not less surprising than pleasing to an old schoolmaster. Apart from such persons as were born, in the proverbial phrase, with a golden spoon in their mouths, it is safe, I think, to assert that one out of every three or four eminent Englishmen has at some time or other been a teacher. Nor is this the truth in England or in Great Britain alone; it is true everywhere. Not to

speak of lifelong educators or of persons whose principal work was done in education, there occur to me the names of such men as Isocrates, Aristotle, Origen, St. Jerome, Cardinal Wolsey, Erasmus, Milton, Rousseau, Thomas Paine, Dr. Johnson, Diderot, Cardinal Mezzofanti, Mazzini, President Garfield, Emerson, and Carlyle, who were all content at one time or other to make a scanty living by teaching. Perhaps the fact that so many persons have taken up education simply as a means of livelihood is the reason why there have been so many educational failures. In no profession have good men and good women done so much lasting harm, or have done it so often without being aware of it, as in education. For an educator like a poet is born; he is seldom made; if he is deficient in discipline or insight or sympathy, they are hard to win by practice, harder still is it to win the passion for young souls; yet the educational profession demands enthusiasm above all other qualities, and I used sometimes to say to young candidates for office at Harrow that, unless a man honestly felt he would sooner be a teacher of boys than a Cabinet Minister he would not be a master altogether after my own heart.'

THE ATTRACTIVENESS OF PALÆOBOTANY.

In the Botanical Section Prof. Weiss pointed out that the great attractiveness of Palæobotany, and the very general interest which has been evinced in botanical circles in the progress of recent investigations into the structure of fossil plants, are due to the light they have thrown upon the relationship and the evolution of various groups of existing plants. It was the lasting achievement of Williamson to have shown, with the active co-operation of many working-men naturalists from the Lancashire and Yorkshire coalfields, that the structure of the coal-measure plants from these districts can be studied in microscopic preparations as effectively as has been the case with recent plants since the days of Grew and Malpighi. Indeed, had Sachs lived to continue his marvellous historical account of the rise of botanical knowledge up to the years 1880 or 1890, he would undoubtedly have drawn attention to the remarkable growth of our knowledge of extinct plants gained by Binney and Williamson from the plant remains in the calcareous nodules of English coal-seams, and by Renault from the siliceous pebbles of Autun. We are not likely to forget the pioneer work of these veterans, though since then investigations of similar concretions from the coal deposits of this and other countries have been undertaken by numerous workers and have revealed further secrets from that vast store of information which lies buried at our feet.

The possibilities of impression material had indeed been practically exhausted in 1870, and further advance could only

come from new methods of attacking the problems that still remained to be solved. The most striking recent instance of the insufficiency of the evidence of external features alone was Professor Oliver's demonstration of the seed-bearing nature of certain fern-like plants, based on microscopical comparison of the structure of the cupule of *Lagenostoma*, with the fronds of *Lyginodendron*, after which discovery confirmatory evidence speedily came to hand from numerous plant impressions examined by Kidston, Zeiller, and other observers.

ASPECTS OF MODERN PETROLOGY.

Mr. Alfred Harker presided over the Geological Section, and reviewed the present position of petrology. In his introductory remarks he pointed out that the application of microscopical and special optical methods, initiated some fifty years ago by Dr. Sorby, gave a powerful impetus to the study of the mineral constitution and minute structure of rocks, and has largely determined the course of petrological research since that epoch. For Sorby himself observation was a means to an end. His interest was in the conclusions which he was thus enabled to reach relative to the conditions under which the rocks were formed, and his contributions to this problem will always rank among the classics of geology. The great majority of his followers, however, have been content to record and compare the results of observation without pushing their inquiries farther; and indeed the name 'petrography,' often supplied to this line of research, correctly denotes its purely descriptive nature. A very large body of facts has now been brought together, and may be found, collated and systematized by a master-hand, in the monumental work of Rosenbusch. Beyond their intrinsic interest, the results thus placed on record must be of the highest value as furnishing one of the bases upon which may eventually be erected a coherent science of igneous rocks and igneous activity.

THE INDEX ANIMALIUM.

The Committee appointed in reference to the Index Generum et Specierum Animalium reported that since the 1910 Report, systematic search through literature has proceeded up to the letter E. Further, a group of especially troublesome and difficult books has been dealt with, *e.g.*:—Oken's 'Isis,' 41 vols., 1817-48; Froriep's 'Notizen,' 102 vols., 1821-50; Ersch and Gruber, 'Allgem. Encyclopædie,' 103 vols., 1818-50, and many other volumes have been indexed out of the general order as asked for or required—as, for instance, the works of Jacob Huebner, which are now in Mr. Sherborn's hands, in hope that he may obtain some further information as to the dates of their publication. The search for rare literature con-

tinues, and Mr. Sherborn desired to thank Dr. Karpinski for obtaining for him the second volume of the *Trudui* of the St. Petersburg Mineralogical Society, 1831; Dr. Bashford Dean and Mr. O. F. Cook for a complete set of 'Brandtia,' 1896-97, both of which works will find a resting place in the British Museum (Nat. Hist.) when done with. He also desired to thank Mr. Tom Iredale for much valuable help in obscure bird genera. Zoologists cannot speak too highly of the valuable work Mr. Sherborn is doing for the Committee.

BOTANICAL PHOTOGRAPHS.

The Committee reported that in accordance with the wish expressed by the Committee of the Botanical Section at the Sheffield Meeting of the Association, the second list of photographs collected by the Comitée had been printed and distributed to the botanical members of the Association. This list includes mainly single plants or groups of plants either in their natural habitat or under cultivation. Owing to special circumstances it had been impossible this year to prepare and publish a list of the ecological photographs which have so far been collected. It is hoped that this may be done next year, and with this object in view, the Committee asked to be re-appointed.

THE WILTING OF MOORLAND PLANTS.

In a paper read to the Botanical Section, Mr. W. B. Crump stated that the purpose of investigations carried out in the summer of last year was to arrive at the physiological water-content of moorland soils. This was done by determining the water still remaining in the soil when wilting definitely set in. A preliminary set of experiments made in 1906 had already given fairly satisfactory results, and a knowledge of the main difficulties and precautions; but they were neither numerous enough nor started sufficiently early in the season to justify publication. The initial difficulty in the case of moorland plants is to decide when wilting occurs. The indications common in mesophytes, such as flaccidity, drooping or total collapse, are absent; withering creeps on so gradually that one is at a loss to decide where to draw the line. Experience, gained by the sacrifice of some of the plants, furnished a clue in some cases; and in several species, notably *Molinia* and *Eriophorum angustifolium*, a more precise test was found in the rolling or folding of the leaves. About sixty specimens were obtained and established in pots, ranging from $4\frac{1}{2}$ to $7\frac{1}{2}$ inches, during March and April 1910, before the renewal of growth had set in. At the end of June about forty were growing satisfactorily and these were protected from rain by a light screen from July onwards. When it was apparent that wilting had set in, the peat or soil was sampled from among

the roots and air-dried. A digest of the results obtained was given.

A PALÆOZOIC FERN AND ITS RELATIONSHIPS.

In a paper by Dr. D. H. Scott it was pointed out that the simpler Palæozoic Ferns (Primofilices of Mr. Arber, Cœnopterideæ of Professor Seward) have received much attention of late, especially in the fine memoirs of M. Paul Bertrand. *Zygopteris Grayi*, a species founded by Williamson in 1888, on somewhat imperfect material, occurs both in roof and seam nodules of Lancashire coalbeds, but is very rare. Besides the specimens described by Williamson, there is a much better one, the sections of which are partly in his collection; this has been figured by the author in 1900, by M. Paul Bertrand in 1909, and by Mr. Kidston in 1910, but never adequately. Last year a fine series of sections of an entirely new specimen from Shore Littleborough was received from Mr. Lomax. The new specimen shews the general characters of the *Z. Grayi* type; a five-rayed stellate stele, the corresponding $\frac{2}{5}$ phyllotaxis, leaf-trace bundles with axillary shoots, scale-leaves or aphanophylls, and adventitious roots. The characteristic internal xylem, consisting of narrow tracheides embedded in parenchyma, is particularly well shown, both in the main stem and in the axillary stele. This specimen affords clear evidence that it belongs to the genus *Ankyropteris*, as defined by P. Bertrand. The leaf-trace and foliar bundle show perfectly the peripheral loops of small-celled xylem characteristic of *Ankyropteris*. The loops begin to be differentiated long before the leaf-trace separates from the stele. This confirms P. Bertrand's own view; he found peripheral loops in the best Williamson specimen, where, however, they are very obscure compared with those in the Shore plant.

BROWN SEAWEEDS OF SALT MARSHES.

Miss Sarah M. Baker, in referring to this subject, stated that the capability of giving rise to marsh forms seems to be shared by all the brown seaweeds inhabiting the upper parts of rocky shores. *Pelvetia canaliculata*, *Fucus spiralis*, *Ascophyllum nodosum*, and *Fucus vesiculosus*, all show marsh varieties or species. The reason that *Fucus serratus* and *F. ceranoides* have no representatives in the marsh habitat is probably their intolerance of desiccation. The physical and chemical environment factors on the marsh being much more complex and varied than on a rocky shore, one would expect a corresponding variation in the structure of its plant. The most marked characteristics of the common marsh species are a great tendency to spiral twisting or curling of the thallus—and vegetative reproduction. That this latter feature is not directly caused by the marsh habitat is shewn by exceptional

species where reproduction is normal. The zoning between the brown seaweeds of a marsh is often very striking; but the factors governing it must be far more complicated than those operating on the seashore. The extensive mattings of brown seaweeds often found on English marshes have a decidedly beneficial effect on the phanerogams. It seems possible that *F. volubilis* may act as a pioneer in the establishment of salt marshes in certain cases.

MOMENTUM IN EVOLUTION.

Professor Arthur Dendy stated that in 1909 'Dr. Smith Woodward called the attention of the Geological Section to the fact that many groups of the animal kingdom in the course of their evolution have shewn a strongly marked tendency to enormous increase in size, often accompanied by the development of grotesque and apparently useless excrescences. Comparative anatomists have long been familiar with analogous phenomena in such cases as the extraordinary development of the beak and helmet in the hornbills and of the tusks in the babirusa. In all the cases cited, and in many others which could be adduced, either the entire body or some particular organ appears to have acquired some sort of momentum, by virtue of which it has continued to grow far beyond the limit of utility, although perhaps in some cases a new use may be found which will assist the species in maintaining itself in the struggle for existence. An enormous increase in mere bodily size, however, seems in the long run to be always fatal to the race, whose place will be taken by smaller and more active forms. Is there any justification in recent developments of biological science for the belief that a race of animals may acquire a momentum of the kind referred to which may ultimately lead it to destruction? Is there some brake normally applied to the growth of organs and organisms, and if so, are there occasions on which the brake may be removed with results which ultimately prove fatal?' The author then gave reasons for answering both these questions in the affirmative.

MEAN SEA-LEVEL.

Captain E. O. Henrici pointed out that in the report of the Royal Commission on Coast Erosion it is stated that there is some evidence that the land on the coasts of Northumberland and Durham is sinking relatively to the sea. The only method of determining whether this is so or not is by means of accurate observations of mean sea-level with reference to marks on shore. The sea-level is, however, constantly altering, not only with the tides, but also with the winds, height of barometer, and rainfall. Accordingly, in order to determine what is mean sea-level it is necessary to take observations over a long period of years. Observations at some two dozen stations

round the coasts of Great Britain were taken by the Ordnance Survey in 1859, but they were carried over much too short a period to enable any conclusions to be drawn as to earth movements. There exist some fifteen recording tide-gauges round the coast of Great Britain, but as they are installed to obtain tidal records for navigation purposes, no great degree of accuracy is required, and it is probable that the work of reducing their records to mean sea-level would not be justified by results.

The determination of the relative value of the height of mean sea-level as determined by levelling between the different gauges was carried out in 1860, but it is possible that there may be an error of a foot in the determination of the height of the zero of a tide-gauge as compared with Ordnance datum, and there may also be an error of a foot in the determination made by the Ordnance Survey of the height of mean sea-level as compared with the zero of the tide-gauge. The values of the height of mean sea-level above Ordnance datum varied from 0 to nearly 2 feet, with an average of .65 feet above. These variations are about what is to be expected from errors of observation, and do not afford any evidence that mean sea-level is not constant round our coasts.

THE BISHOP'S STORTFORD HORSE.

We have previously referred to the fact that the so-called prehistoric horse found by the Rev. Dr. Irving at Bishop's Stortford was probably quite a modern beast. Dr. Irving, however, has dug further, and tells us that 'a considerable addition was made to previous prehistoric "finds," and a Holocene molluscan fauna was discovered in the bog silt. The silt was in places strewn with shelly débris, and it was only with the greatest care that complete specimens could be secured for identification. Of these, the following have been identified by Mr. B. B. Woodward, F.G.S., of the British *bidentata* Museum* (Nat. Hist.): *Helix nemoralis*, *Hygromia (Helix) hispida*, *Vitraca nitidula*, *Succinea putris*, *Pyramidula rotundata*, *Helix arbustorum*. *Clausilia* was, I think, also found, but unfortunately got crushed at the Museum before it was identified. A small bivalve was fairly frequently met with, which I have identified at the Jermyn Street Museum as *Pisidium*. Of the fossil [sic] shells mentioned above, it may be pointed out that six at least of them have been noted in the Holocene deposits at Staines; six have been described from the Barnwell Gravels; and three are described by Von Hauer as characteristic of the diluvial loess of the Rhine and the Danube.' Reasoning from the geological data, Dr. Irving 'was led at an early stage of

* We have never heard of this particular institution, but it is so described by Dr. Irving.—ED.

the investigation to conclude that the formation of this bog must have taken place in early post-glacial times; that inference seems to be confirmed by the palæontological [sic] evidence.' It seems to us that the so-called 'geological' and 'palæontological' evidence merely confirms the recent date of the horse's skeleton.

FOSSIL PLANTS FROM YORKSHIRE.

At a recent meeting of the Cambridge Philosophical Society, Mr. H. H. Thomas read a preliminary note recording the Discovery in the Estuarine Shales of the Yorkshire Coast of the spores and sporangia of *Coniopteris hymenophylloides* and *Todites williamsoni*. In the case of the former species further evidence is afforded for the inclusion of this Jurassic type in the Cyatheaceæ, while the spores of *Todites* are shewn to be almost identical with those of the recent *Todea barbara*.

THE BIRDS OF THE BRITISH ISLANDS.

We should like to congratulate both author and publisher upon the fact that this work is complete; the final parts having recently been issued. Part 19 deals with the divers, petrels, grebes, etc., and contains seventeen plates from drawings by Lilian Medland. Part 20 includes particulars of rare and accidental visitors recorded since the earlier parts of the work were produced. There is also an admirable 'Scientific Index,' an 'English Index,' an extensive and exceedingly useful glossary, and a Bibliography relating to British Birds, brought down to the year 1900, by W. H. Mullens. This contains a few items we should not have expected, whilst a few works, such as Clarke & Roebuck's 'Vertebrate Fauna of Yorkshire,' are not included. A substantial list of subscribers concludes the work. There are five volumes in all, containing nearly 1000 pages, and over three hundred plates. The excellent paper, large type, and the size of the pages (12" x 9"), leave nothing to be desired.

The Elements of Mining and Quarrying by Sir C. le Neve Foster, D.Sc., F.R.S. Second Edition, revised by S. H. Cox. London: C. Griffin & Co. xviii. + 323 pp. Price 7/6 net.

In view of the extraordinary ability and facilities for the work possessed by the late Sir Charles le Neve Foster it is not surprising that the treatise which he published a few years ago should have become out of print; and certainly few could have been found more fitly to bring the book up to modern requirements than Prof. Cox. The book is practically in its original form, though many of the diagrams and tables have been brought up-to-date, and a few errors in the first edition have been corrected. There is no doubt that every practical mine and quarry owner should have the book on his shelves. There are numerous illustrations, those referring to machinery and appliances being particularly numerous.

BEARDED TITS AT HORNSEA.

OUR usually quiet and unobtrusive contemporary, *British Birds*, breaks into a mild attack of hysteria in the issue for September 1st, though possibly in view of this particular date there may be some excuse for *British Birds*! In an article signed 'The Editors'* an extraordinary and unexpected attack is made upon Mr. W. H. St. Quintin for his attempt to introduce the Bearded Tit at Hornsea Mere.† This bird is perfectly harmless: it will not eat the fish in the Mere; it will not interfere with the heronry; it is not likely to kill off the grebes or the swans, and the sea-fishermen have no reason to complain of its ravages. The few insects and wild seeds that it devours will not be missed; if, indeed, they will not be better lost. On the other hand, the appearance of this beautiful and most interesting little songster will give an added charm to this famous bird sanctuary, and will delight the hearts of naturalists, and any others who appreciate their natural surroundings.

But *British Birds* will have none of it. It is recorded 'with great regret, that Mr. W. H. St. Quintin has been at great pains to introduce Bearded Tits at Hornsea Mere This passion for interfering with Nature possessed by aviculturalists [sic] is likely to do serious harm to the scientific study of ornithology, and is, in its way, almost as bad as the destruction of rare breeding birds and their eggs by those afflicted with the "British-taken" mania.' These statements and comparisons, of course, are pure piffle. There is absolutely no connection between them; and the introduction of the Bearded Tits at Hornsea no more 'interferes with Nature' than the appearance of *British Birds* interfered with the other natural history journals already existing. Both *British Birds* and the Hornsea Bearded Tits are welcome; both are likely to do good, if properly looked after, and although Mr. St. Quintin is dubbed an 'aviculturist,' he is in addition a first rate zoologist and naturalist, and is as interested in the scientific study of ornithology as are many who profess to be looking after the interests of British birds.

'The Editors' go on to say that 'this introduction of Bearded Tits from the Continent is nearly as bad as the attempt to introduce Willow Grouse; and it can only be hoped that Mr. St. Quintin's aliens will be banished in some way or other . . . we trust these imported birds will follow their hereditary instincts, and that they will not return.' Again, of course, there is no comparison between the Bearded Tits and the

* *i.e.*, H. F. Witherby; assisted by F. C. R. Jourdain and N. F. Ticehurst.

† See 'The Naturalist', Aug. 1911, pp. 279-280.

Willow Grouse. We fancy, however, we can see why the editors rise in righteous indignation against Mr. St. Quintin's harmless experiment. They state 'in a number of occurrences reported from time to time in our [*British Birds*] pages, it has been impossible to say if the bird referred to was a genuine migrant, or an escape from captivity, and this doubt as to a vagrant being a genuine wild bird or not, increases as more people keep birds in semi-captivity, without even a ring on their legs, or let them loose intentionally.' Exactly, but why should the poor beggars be ringed or clipped or marked in any way? Surely if, in the near future, a Bearded Tit is recorded anywhere in the neighbourhood, or even out of it, the probability will be that it is one of the Hornsea specimens. And if not, what matter? The Bearded Tit is a British breeding bird, and will therefore not be likely to appear in the pages of *British Birds* as still another 'New British Bird.' We quite agree with our contemporary that several records have appeared in its pages which 'it has been impossible to say if the bird referred to was a genuine migrant or an escape from captivity.' That has been our opinion too, though we do not remember having seen this stated when the record was made. It has usually been a 'new British bird,' seen in the flesh somewhere in Kent or Sussex, or thereabouts. We are relieved to learn now that the editors at last share the opinion of so many of their readers and throw doubt upon the records.

In any case, is this recording 'new' occurrences advancing science even as much as introducing the Bearded Tit at Hornsea, where its habits can now be watched? Personally we consider that the mere swelling of the present long list of British birds by records of single individuals that have either fallen or been pushed in Kent, or thereabouts, is not 'science' any more than is the addition of a new button or postage stamp to a collection of those trifles.

Our London friends can be assured that Yorkshire ornithologists are as enthusiastic, careful, and as 'scientific' as any in the country, as a perusal of the pages of 'The Naturalist' and 'The Birds of Yorkshire' will shew. And in introducing the Bearded Tit at Hornsea Mere, they are not likely to 'interfere with nature,' anything like so much as when London ornithologists pay hurried collecting, or, as they would say, 'observing', visits to our county.

In any case, Mr. St. Quintin's experiment seems quite as scientifically valuable as is the action of a 'naturalist' who hauled from its home the first young Bittern known on the Broads for many, many years, tucked it under her arms, carried it off, and imprisoned it for the night in order to exhibit it before 'witnesses,' and to photograph it. Yet this questionable 'scientific' action is unblushingly described in the leading

article in the very same journal that contains the astounding after-dinner editorial effusion on the innocent little Bearded Tits at Hornsea!—T.S.

The **Journal of the Northants Natural History Society and Field Club for 1910** (parts 121-124) contains a valuable series of records relating to the county. Of particular interest is Mr. Beeby Thompson's illustrated 'History of the Water Supply of Northampton'; Mr. G. Claridge Druce contributes 'Northamptonshire Plant Notes,' and there are useful records of birds, insects, shells, antiquities, etc., and extensive meteorological tables.

The Annual Report of the **Yorkshire Philosophical Society** for 1910 is much more interesting than usual, and includes reprints of Dr. Tempest Anderson's papers on 'The Decay of Stone Antiquities' (*Museums Journal*), and 'The Volcano of Matavanu in Savaii' (*Quart. Journ. Geol. Soc.*). Mr. C. Wakefield describes the coins of Edward the Confessor in the Society's collection (with plate); Mr. T. May has a further well illustrated paper on the 'Roman Pottery in the Museum'; and there is an illustrated report on the proposed new lecture theatre, which will be a great gain to the Society, and for which it will be indebted to Dr. Anderson.

Lincolnshire Naturalists' Union Transactions, 1910. [Pub. 1911]. Pp. 159-234. This publication contains some important contributions to the natural history of Lincolnshire. Mr. G. W. Mason contributes Part IV. of 'The Lepidoptera of Lincolnshire,' in which he includes the whole of the records of the 'Micros.' The Rev. A. Thornley and Dr. A. Wallace give a 'fourth paper' on Lincolnshire Coleoptera; there is a report on the 'field meetings,' a portrait and 'description' of the Rev. J. Conway Walter; a record of living examples of *Pisidium supinum* by Mr. J. F. Musham, and a note on 'The 1909 Irruption of the Crossbill as observed in Lincolnshire,' by the Rev. F. L. Blathwayt; and there is the Presidential Address of Mr. W. Denison Roebuck. This first refers to the year's work, and then is a bibliographical summary of the geology, botany, zoology, etc., of the county. In this it is refreshing to find to what a large extent *The Naturalist* has contributed to the Natural History of the county, though we are afraid the president has not seen the journal recently or he would not have stated that 'to within a short while ago' it contained much Lincolnshire information. There are also more workers on the geology of the county than the two gentlemen he names, and there are more public museums than the one at Lincoln. This part of the proceedings, however, will probably be known as the *glabra* number. It seems that during 1910, *Limnæa glabra* was found near Scunthorpe, on the occasion of the joint meeting of the Yorkshire and Lincolnshire Unions; as was duly recorded in *The Naturalist* at the time. The record, moreover, was not the first for the county. The find seems to have made a great impression. It is referred to on pages 161, 162, 163, 164, 231, and 233. Sometimes it is referred to as *Limnæa*, and sometimes as *Limnæa*. The secretary refers to the occasion as the '*Limnæa glabra* flash,' but surely one must have been looking through very wide-angle conchological spectacles to opine that the discovery of the shell, etc., has 'proved one of the most interesting pieces of work done for a long time.' In some respects there is room for improvement in this report; we have previously expressed a doubt as to the right of 'fungi' and 'boulders' to be regarded as 'sectional officers,' as we have also in regard to the accuracy of the spelling of 'phanogamic.' The figure **o** is still used indiscriminately as the letter **O**, and *vice versa*; as many as seventeen such errors occurring in a single page. Part of the Presidential Address is printed in purple ink, which may or may not be effective, but is certainly unusual. There is also again nothing to shew what part of what volume this publication is.

THE STUDY OF FUNGI BY LOCAL NATURAL HISTORY SOCIETIES.*

By HAROLD WAGER, F.R.S.,
Formerly President of the British Mycological Society.

THE following notes refer to the methods and possibilities of the study of Fungi by local Natural History Societies, and indicate some of the more promising lines of investigation which can be profitably taken up. It is quite true, in this as in other studies, that the path is beset with difficulties, both from the strictly utilitarian point of view and the more purely scientific one, but a more carefully organised study of this very large and important group, merits far more attention on the part of students of natural history than has yet been accorded to it.

There can be no doubt that very valuable assistance can be given by Natural History Societies all over the country in the elucidation of some of the more important problems which arise. I need only refer to the strikingly successful work of the Mycological Committee of the Yorkshire Naturalists' Union in the study of Yorkshire Fungi as an example of the kind of work which can be carried on by local societies. This Committee has been at work for more than twenty years, and during that time a number of the more important districts in Yorkshire have been systematically investigated, and in 1905 a list of some 2626 species had been compiled, based upon no fewer than 16,700 records. Since then the list has been considerably increased; new records are continually being added both by individual observers and at the Annual Fungus Forays, and many new county and a few new British species are added each year. All groups of the Fungi are included in this list, but more attention has been given to the larger Fungi than to the microscopic forms in the study of which much remains to be done.

The total number of species known to occur in the British Fungus Flora is more than 5000, and this is doubtless far from being a complete list. Careful and systematic investigation would unquestionably result in many more species being discovered. That of these considerably more than half have been found in Yorkshire alone, is a tribute to the earnestness and zeal of this Committee.

I mention the work of this Yorkshire Committee because it seems to me that it is the most definite and systematic attempt which has been made to place the study of the British Fungus Flora on a systematic basis, and because it indicates so clearly

* A paper read before the Conference of Delegates at the meeting of the British Association in Portsmouth, 1911.

what valuable work can be done by a local Committee when organised and patiently carried on for a series of years; but it must not be forgotten that much valuable work on similar lines has been carried out by other Natural History Societies, and by the British Mycological Society.

The charming coloured drawings* by Mrs. William Stebbing, Mrs. T. R. Stebbing and Mr. Charles Crossland, give some idea of the large variety and beauty of many of the forms, which will be a revelation to those who have paid little or no attention to this group of plants. The stereoscopic photographs* by Mr. Alfred Clarke, show what possibilities are open to the student in the direction of accurate and life-like representation of the form and structure of fungi, and of groups of fungi in their natural surroundings, and, together with the beautifully executed artistic photographs,* the work of Mr. Peck, show how valuable photography may be in giving us faithful and accurate records for future reference. It is possible that before long the fascinating process of photography in colours will be called in to aid us in our studies, and we shall then have not only permanent records of form and structure, but also, what is equally important to the student of fungi, permanent records of the extraordinary variation in colour of which so many species are susceptible.

The attentions of Natural History Societies have been mainly directed towards recording lists of species for various localities. These lists have been compiled in various ways; sometimes a mere list of the names has been given; others give details of the habitats and stations in which the species are found; and sometimes the characteristics of the more important species have been added. The list published by the Yorkshire Mycological Committee is arranged in accordance with the five County Divisions, or vice-counties of Yorkshire, as employed by H. C. Watson in his 'Topographical Botany.' It gives for each species the district, the habitat, the date when first found, and also some useful notes on the distribution of various forms, their biological characteristics, their edible or poisonous nature, and their economic importance in respect of diseases of crops and garden plants.

So far as the larger fungi are concerned, it is probable that we now have, as a result of the observations made by societies and individual observers in various parts of the country, a fairly complete list of the species and varieties to be found in Great Britain. But there is still room for a more detailed study of the counties and vice-counties and the preparation of a single list drawn up either on the lines of Watson's great work for flowering plants and ferns, or possibly on a more natural

* These were exhibited at the Conference.

basis of regional areas. This is one direction in which most useful work might be done. If the numerous societies would collaborate in a well-organised survey of our Fungus Flora, it seems to me that a most valuable list might be produced, and material obtained for the elucidation of many important ecological and biological problems. But we want more information than is contained in Watson's 'Topographical Botany.' If possible, notes should be made for each species, of its habitat, the nature of the soil, the geological formation, whether the species is parasitic or saprophytic, whether found regularly every year or sporadic only, whether it is a seasonal form or found throughout the year, whether associated constantly with other fungi or with definite plants or plant associations, or independent of these. Such observations as these might be undertaken by the various societies and sent to a Central Committee consisting of mycologists in various departments, to be tabulated and arranged. Just as the rainfall records are taken by the observers all over the country and sent to the British Rainfall Association, so systematic observations on the occurrence and distribution of the fungi, carried out on a definite plan, in accordance with rules drawn up by a Committee of the leading mycologists, might lead to extremely important results, and to the publication of charts and lists of great value.

There is ample scope for members of Natural History Societies in the study of the Micro-Fungi and their life histories, and much remains to be done among those imperfect forms which are probably only stages in the life cycle of a single species, which are frequently regarded as distinct forms. The life histories of many of the species of Uredineae, for example, have been successfully worked out by members of local societies.

The importance of examining Fungi in their natural surroundings cannot be over-estimated. If we are to obtain solutions of some of the most interesting problems concerning them, they must be studied as living organisms, and under all sorts of conditions. Observations on their form and structure must be made in order to throw light on their life history, and the relations of the various forms to one another, and not merely from the point of view of classification. As far as possible, they must be studied under the conditions of experimental investigation. But good systematic work is necessary for the elucidation of biological problems, and may prevent, to some extent, vagueness and aimlessness in their investigation. These are frequently the faults of over imagination and speculation, just as dullness and boredom are frequently the results of over much systematic work in which no attention is paid to the deeper problems of life and development.

In recording and comparing the species found in different districts, many interesting lines of investigation would be opened up. The geographical distribution of the Fungi, and their relationships to one another and the environment have been scarcely considered. Many who are experienced in the field, could no doubt give a fairly complete list of the species to be found in the various plant associations such as a meadow, a moor, an oakwood, beech wood, pine wood, marsh, etc., but this has never, so far as I am aware, been systematically done. How do the species in any given locality vary from year to year? What are the dominant species? What species occur only rarely? What species are common to more than one formation? How do the species vary in a given locality according to the seasons? In a pine wood, an oak wood, or any other formation, how do the species follow each other from one season to another? How is their succession connected with the environment, and what are the conditions under which they appear? The nature of the soil, the water content, the temperature may all take a part in determining the species which may prevail at any given time. What again is the actual effect of a long dry summer followed by a wet autumn or of a wet summer and a dry autumn, or of the various other combinations and samples of weather which is such a conspicuous feature of our climate? We have some rough idea of the effects of these various factors, but we have no precise or definite information concerning them. A complete answer to such questions doubtless demands elaborate investigation, but even rough and ready methods would be valuable at the present stage, and would give us a clue to the more elaborate methods which it may be necessary to adopt later, to arrive at a satisfactory solution of the problems.

In common with all other plants the nutrition of the Fungi and the development of their form and structure are to some extent, controlled by external conditions. What are the controlling forces, and how do they act? The Fungi are extremely variable. To what extent may the variations be brought about in response to external stimuli? What are the factors in all these changes of form and colour which are exhibited by so many of the Fungi? What are the limits of variation in size of any given species? How is the variation in colour associated with the environment, the presence of light, moisture, food supply? To what extent have gravity, light, temperature, moisture and variation in nutrition the power to cause a modification of the Fungus form?

Gravity plays an important part in maintaining the pileus in the horizontal position which is, according to the researches of Professor Buller, necessary for the efficient distribution of the spores. In some species light appears to be of importance

as a stimulus to the production of the pileus. We have very few recorded observations on these problems.

Variation in the food supply evokes a very definite modification in the Fungus body, as Klebs, many years ago, showed was the case with *Saprolegnia*, but experimental observations upon the more highly differentiated forms are much needed. Thus it has been shown that the tendency to fruit formation in some of these larger forms may be retarded by changing or weakening the food supply, and somewhat similar effects may be produced by variation in the supply of moisture. Temperature is also known to play an important part in modifying the form and development of the Fungus body. All these problems require further investigation, and it is particularly desirable that observations conducted in the field, under the natural conditions of the environment and food supply, should be made.

To turn to the more utilitarian aspect of the study of the Fungus. There is still much to be done in the study of Fungus diseases and their life histories. To plant breeders this is of the utmost importance, and there is ample scope for largely increased observation in the field.

Then there is the question of edible and poisonous Fungi. This may be a small matter to many of us, but it seems to me of sufficient importance to warrant a more attentive study. It is to be regretted that so large a quantity of excellent food, in the form of edible species of Fungi, should be allowed to decay for want of a little knowledge to enable one to distinguish them from the poisonous or injurious species. A very considerable number of species—Cooke says certainly seventy or eighty common species—may be safely eaten. Those who have never tried the common puff balls, various species of *Hygrophorus*, *Lactarius deliciosus* (the delicious milk-mushroom), *Tricholoma personatus*, (Blewits), *Fistulina hepatica*, (beef-steak fungus), species of *Coprinus*, *Boletus edulis*, the Morel and many others, have yet much to learn as to the possibilities of this food supply.

It would be a most useful work if Natural History Societies would institute the examination and methods of discrimination of the common species of edible and poisonous Fungi, by holding exhibitions, and giving demonstrations of their structure and of the scientific characteristics by means of which they may be distinguished. As Dr. Cooke points out, 'there are no general rules capable of universal application whereby edible may at once be distinguished from poisonous fungi.' There are some general characteristics which may be helpful, but, (and again I quote from Dr. Cooke), 'no method is so safe as that which consists in mastering the characteristics of a few species, especially when pointed out by one who is practically

conversant with them, and increasing the number with experience.'

When we consider the ubiquitous nature of the Fungi, their constant association with all kinds of putrefaction and decay, the part they play as fermentative agents, in the production of diseases both of animals and plants, the ease with which they are disseminated through the air or carried about in various ways, their edible and poisonous qualities, their destructive effects on timber, it is easy to understand how important such a systematic survey as that suggested may be in helping us to a more complete and detailed knowledge of the various problems which arise.

Here, in fact, is a piece of scientific investigation in which there can be no manner of doubt that Local Natural History Societies can take a very valuable share, which, in many of its aspects, is certainly not too difficult nor too indefinite for amateurs, who are prepared to give some little time to the study. Many of the problems are precise, and can be definitely stated, and if, as one of the results of these notes, the delegates of the respective societies return next year with details of the formation of new Mycological Committees, and of work already accomplished, I am quite sure they will be welcome, and we shall feel that our deliberations have not been in vain.

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We learn from the *Museums Journal* that at a meeting of the Gorsedd at the Carmarthen Eisteddfod Dr. W. E. Hoyle was admitted as an Ovate with the bardic name 'Amgueddfab.' As it means 'Son of the Museum' we presume it is complimentary.

On a fine plate in an Entomological Contemporary there is printed 'N.B.—The makers of the block, from which the plate was printed, in attempting to improve, as they thought, the wing-veining, have made it incorrect, and it must be ignored.' Why not have made a fresh block?

From Messrs. Gurney & Jackson we have received Parts 6-7 of Major Barrett-Hamilton's *History of British Mammalia*. These deal exclusively with Bats, Moles, and Hedgehogs. There is also a fine coloured plate of the Lesser Shrew. Major Barrett-Hamilton is continuing this work in the thorough way indicated in the earlier parts.

Messrs. Flatters, Milborne & McKechnie, of Manchester, publish an interesting little Quarterly, *The Micrologist*. It contains many fine illustrations of microscopic objects, such as sponge spicules, sections of parts of plants, etc. For the most part these have outline keys printed on transparent paper, which are placed immediately before the plates. The part before us (Vol. I., Part 5) has an interesting article on the 'Wheat Plant,' by Mr. Abraham Flatters. There are also notes on Sponges, etc.

The *Sketch* (September 13th, 1911, p. 307) makes an effort to discourage prospective attempts at swimming the Channel by a page of indifferent photographs of drawings of Cephalopoda. We may re-assure any intending swimmers, they are not in the least likely to be troubled by any of these creatures. Several are deep water forms, only found in the depths of the open sea; of the remainder the size is measured in inches rather than feet, and they are shore forms. One, by the way, is drawn from a spirit specimen of a female Argonaut without the shell.

VARIATIONS IN TEETH OF WHELK.

JOHN IRVING, M.D.,
Scarborough.

NEARLY seventy years ago microscopic examination and comparison of teeth of glossophorous mollusca were suggested as important reliable aids to identification of species and their classification. Conchologists prefer, and are likely to adhere to, accepted shell methods rather than tackle the tedious process of dissecting out *radulæ* and preparing them for observation under the microscope. Nevertheless, in variant forms,

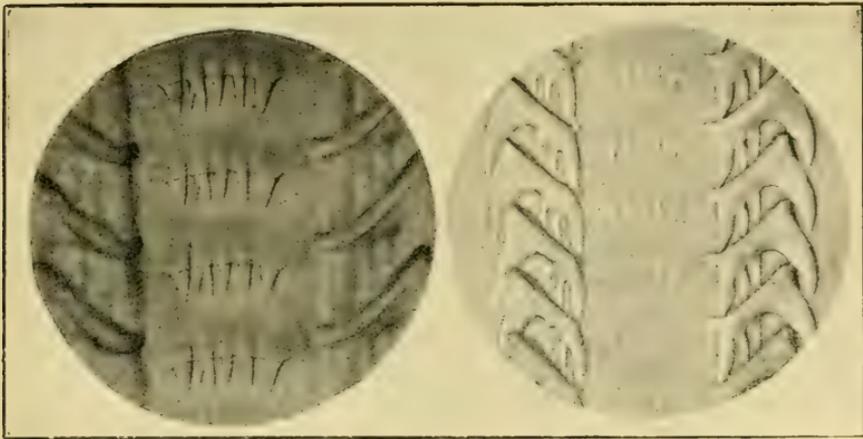


Photo-micrograph—
Central Teeth of Whelk.

Photo-micrograph—
Lateral Teeth of Whelk.

apparently allied, any doubt as to species might be definitively resolved by microscopic comparison of tooth-ribbons. Each species has, or is supposed to have, an *odontophore*, peculiar to itself, adapted to its mode of existence. Given any well-known mollusc, and another showing some external difference to it which involves a possible departure from type, investigation of teeth ought to clear up the difficulty of decision. If *radulæ* are identical, species from which they are extracted are likewise identical notwithstanding divergence in shells. It should not be forgotten, however, that abnormalities may occur in microscopic teeth, or in the manner of their disposition, for which allowance ought to be made in exceptional instances.

One of the best recognised tooth-ribbons is that of the Whelk, *Buccinum undatum*, whose teeth are usually illustrated

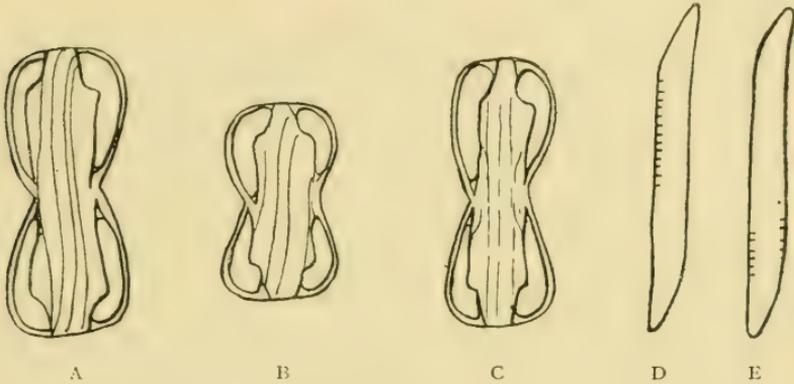
in books by pen-and-ink drawings not always true to life. A central set of five, six, or seven, small uniform 'V's' hanging from a straight line separated by blank spaces from lateral plates bearing three, rarely four, tusks, may furnish a general idea of the palatal arrangement sufficient for identification, but features of some importance are lost through absence of detail. Two photo-micrographs, one sharply focussed on smaller central teeth, and another on larger lateral tusks, are reproduced: they do not quite tally with the printed sketches referred to. Whelks are carnivorous animals capable of boring through shells of other molluscs. Their teeth correspond to their needs, and are structurally diverse from those of vegetable feeders. The 'centrals,' more or less round tapering to sharp points, are very seldom strictly uniform. Counting from left to right, teeth pointing downwards, the first and fifth in each transverse row are practically alike and about twice as broad as the slender third. The fourth, slightly bevelled at its tip, is longer than the third, while the second, distinctly and abnormally bifurcated, bears some resemblance to fangs of human teeth. This forked condition cannot be considered as partial fusion of two teeth seeing this second tooth arises from a single socket. All five teeth seem to be firmly fixed in five clearly-defined deep sockets, and not merely surface-set on a plate. Such an alveolar implantation, combined with a small degree of curvature makes for rigidity and strength. A curious and most interesting circumstance is the marvellous faithfulness with which all the peculiarities of any one transverse row are repeated in every other row, distant or near—a proof, if need be, that the entire series develops, in sequence, from one and the same moulding source providing and pushing forward a continuous supply to replace inevitable loss caused by tear and wear in front. Though the group of central teeth is obviously placed away from the 'laterals,' yet no blanks are manifest in the photo-micrograph, for each socket-plate bridges, on both sides, the distance between, and is apparently attached to the longitudinal ligaments which connect the outer teeth. These conspicuous side teeth are remarkable for size, position, and character. Angled and sculptured for efficiency and resistance, it is open to any microscopist to regard each massive plate either as one tooth or four. Four fang-like processes certainly spring from a solitary base, but as base and processes together constitute one unjointed piece a natural conclusion is that as a whole it acts as one tooth. Probably the straight innermost projection serves as a pivot during circular excursions of the great external tusk while the two lesser fangs, as supports, insure steady rhythmic working. At any rate the pivot may be a clue to one function in which the tooth is used as a shell-perforating tool.

AMPHIPRORA PALUDOSA W.Sm. AS A WEST RIDING DIATOM.

J. W. H. JOHNSON, B.Sc.
Thornhill.

IN November, 1909, an examination of the aquatic flora and fauna of a small watercourse near Wakefield revealed a sudden diminution in the vegetation. This diminution occurred immediately below the junction of a feeder carrying water from a colliery.

The flora above this junction was characterised by large masses of *Ceratophyllum demersum*, *Elodea canadensis*, and quantities of filamentous algæ. At this point the larger forms of vegetation disappeared entirely, but some distance below small quantities of *Enteromorpha intestinalis* were observed, and later *Cladophora glomerata* occurred in quantity.



Figs. A-C, *Amphiprora paludosa* W. Sm., x 500, Thornhill.
,, D, E, *Nitzschia clausii* Hantzsch, x 1000, Althwarke Dike.

The stream soon joins another watercourse of equal size, and the aquatic flora then rapidly recovers its former condition.

Mud taken from this barren stretch yielded a few living specimens of the diatom *Amphiprora paludosa*, which appears to be quite new to the West Riding Flora. This diatom, which is recorded in Van Heurck's 'Diatomaceæ' as a 'brackish' species, was not found in the upper portion of the stream.

The occurrence of this diatom associated with *Enteromorpha* suggested the possibility of an unusual saline condition of the water in this area.

Determinations of the salinity (NaCl) showed that the feeder contained as much as .9 per cent., and that the stream below the junction contained .5 per cent. of this constituent,

and was therefore much more saline than the upper portion which only contained .008 per cent.

These results suggested a possible intimate connection between the salinity of the pit water and this uncommon diatom.

A little later I took the opportunity to examine a similar water used for cooling purposes at Thornhill, and was agreeably surprised to find the same diatom again, and this time in much larger numbers; associated with it was *Nitzschia Clausii* Hantzsch, of which Van Heurck says, 'A de l'analogie avec les petites formes du N. obtusa,' being 40 μ . long by 4 μ . broad, and has 9-10 carinal dots and 32 striæ in 10 μ .

The effect of using this water for condensation raised the temperature to 96° F., thereby causing a considerable amount of concentration of the saline constituents of the water. The evaporation was so great that a large deposit of calcium carbonate was formed at the bottom of the cooler where the diatoms were found.

Since then I have found *Amphiprora paludosa* in similar situations both at Dinnington and Beighton, near Sheffield.

The other diatom *Nitzschia clausii*, Figs. D and E, $\times 1000$, I again found in large quantities almost pure in Aldwarke Dike, near Rotherham. This water has also been used for cooling purposes, and had at the time a temperature of 84° F.

The presence in these *small and obscure* watercourses of such a strikingly characteristic diatom as *Amphiprora paludosa* in the West Riding seems to suggest that it is only in such places that the degree of salinity necessary for the development of this species can be artificially maintained.

It will be interesting to notice how future West Riding localities bear out this suggestion, and if possible to determine the other factors affecting its distribution.

It is also worthy of note that in West's 'British Freshwater Algæ,' *A. paludosa* is said 'to be often found in fresh water, sometimes in great abundance in *small ponds and ditches*.'

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In the **Report of the Castle Museum Committee (Norwich)** for 1910, is a photographic illustration of a splendid specimen of the egg of a Great Auk, acquired by Mr. James Reeve, F.G.S., in 1910, and presented by him to the museum upon relinquishing his active duties as Curator. The egg is one of the finest known to collectors; it is mentioned by Hewitson in 1856 as having been bought by Mr. H. F. Walter in 1850 from Dr. Pitman, who obtained it from Herr F. E. Brant, the dealer at Hamburg. It is evident from the illustration, which is actual size, that the marbling is very rich, and having been kept from the light, it is very little faded. The Report likewise contains an illustration of a Great Auk, from a restoration by Mr. Reeve. There is also a record of the year's additions, lectures, etc.

THE WATER-CONTENT OF ACIDIC PEATS.*

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W. B. CRUMP, M.A.

RECENT ecological researches all emphasise the importance of edaphic factors in determining the distribution of plant associations, and the complete lack of exact data based upon quantitative experimental work. While the nature of the soil and the richness or poverty of the soil-water in nutrient salts are factors of primary importance, the water-content would seem to be of equal importance. As regards this soil-water it is recognised that some of it, possibly much of it in acidic or saline soils, is not available to plants, so that the determination of the available, or what Schimper has termed the physiological, water is also desirable. The last point is considered in another paper [see page 343], the other factors are eliminated by selecting a series of habitats exclusively on siliceous rocks with the soil-water deficient in soluble salts, but always more or less acidic through the presence of humus acids. As the alkaline peats differ in all these respects and support totally different vegetation, their consideration is reserved.

The peats examined were all obtained on the moorlands of the Southern Pennines, and mostly in the neighbourhood of Halifax. The sample was selected from the zone of active root absorption, and if not apparently homogeneous it was divided into layers. It was taken during dry weather—never within a few days of any rainfall—with the purpose of obtaining the minimum value. The water-content is exclusively the water that evaporates when the peat is exposed to the air at or about 15° C., and the results are expressed in terms of such air-dry peat. The peat was then oven-dried and subjected to combustion to determine the humus and mineral residue. This not only graded the peats, but eventually furnished the solution of the problem. Without a knowledge of the humus-content the water-content was meaningless, and the analyses widely discordant. But the ratio $\frac{\text{Water-Content}}{\text{Humus-Content}}$ reduces them to order. This is most evident in dealing with successive layers of the same section, e.g., a peat containing 170 per cent. of water lies immediately above a sandy sub-peat with only 30 per cent., and the fine rootlets of bilberry penetrate both. But the ratio, or water co-efficient, is practically the same for each, viz. 3.0 and 2.9. So, again, the ratio will reveal superficial drying by its low value when the actual water-content may be very high.

The ratio $\frac{\text{Humus}}{\text{Mineral}}$ is also a convenient way of expressing the humus-content of the peat.

* Abstract of Paper read at the Portsmouth Meeting of the British Association, the full text of which will appear elsewhere shortly.

CONCLUSIONS.

I. The Pennine peats form a homologous series, each homologue being sufficiently distinguished by its water and humus-contents to separate it from other members of the series.

II. These homologues correspond with the following recognised plant-associations:—

- (1). *Pure Eriophorum Moor on deep peat* (19 analyses).—Characters: Peat very pure and uniform; water, 300-600 per cent.; humus, above 80 per cent.; ash, purely vegetable, very low, under 2 per cent.; water co-efficient, 6.0.
- (2). *Rocky edge of Eriophorum Moor* (4 analyses).—*Vaccinium Myrtillus* or *Empetrum* dominant. Characters: Peat still very pure, not so deep; water, 250-300 per cent.; humus and ash, as before; water co-efficient, 3.0.
- (3). *Transitional Eriophorum Moor* (13 analyses).—A mixed association of *Eriophorum*, *Vaccinium Myrtillus*, *Pteris*, *Calluna*, *Molinia*, etc. Characters: peat moderately deep, still pure, but not so uniform and comparatively dry; water, 100-200 per cent. (average 160 per cent.); humus, 50-80 per cent. (average 64 per cent.); mineral residue now containing rock debris, 10-40 per cent.; water co-efficient, 2.6.
- (4). *Calluna Moor* (28 analyses).—Characters: peat shallow, impure. Two types may be distinguished: (a) wet, with *Erica Tetralix* present; water, 60-100 per cent. (average 90 per cent.); humus, 20-50 per cent.; water co-efficient, above 2.5 (average 3.3); (b) typical, water, average 85 per cent.; water co-efficient, 2.0-2.8 (average 2.3). The coarse sandy sub-peat, with quartz grains, contains an average of only 25 per cent. water, but water co-efficient remains between 2.5 and 3.5.
- (5). *Molinia Moor* (9 analyses).—This presents the only contradiction of current views both as regards water and humus-contents, for the peat is quite as pure as that of the *Calluna* moor, but distinctly drier. Characters, deeper than *Calluna* peat, but never pure. Water, 30-80 per cent., average 56 per cent.; humus, about 30 per cent.; water co-efficient, under 2 (average 1.93).

III. The series constitutes an edaphic formation.

NOTE.—The consideration of *Heath Pasture* is omitted.

YORKSHIRE NATURALISTS AT HUDDERSFIELD.

THE two hundred and thirty-third meeting of the Yorkshire Naturalists' Union was held at Huddersfield, for Harden Moss, Honley Moor, and the surrounding district, on September 9th. It was a typical Millstone Grit country, with its cloughs and moors, and bogs and scars. There were representative leaders in all branches, except mollusca, the reason being that for some inexplicable cause, the conchologists had arranged an excursion of their own on the same date.

At the close of the excursion, tea was taken at the Wood Cottage Hotel, Harden Moss, after which was a general meeting for comparing results of the day's work. This was presided over by Mr. G. T. Porritt. Votes of thanks were passed to the landowners and leaders, and particularly to Mr. W. E. L. Wattam for making the local arrangements.

Reports were given by Messrs. Woodhead, Waterfall, Cheetham, Broadhead, Whitaker, C. Mosley, Morley, Porritt and Falconer. We have since received the following records of the day's work:—

VERTEBRATE SECTION.—Mr. W. Whitaker reports that the only mammals observed were the Field Vole, Common Shrew, and Rabbit. Twenty-five species of birds only were noted, and these were chiefly the commoner kinds, the most interesting being the Gold Crest, Grey Wagtail, Twite, Red Grouse and Magpie. Summer migrants were very little in evidence, the Swallow, House Martin and Willow Warbler being the only ones seen.

The Trichoptera and Neuroptera taken in Harden Clough by Mr. G. T. Porritt, included a dark form of *Stenophylax stellatus*, *Rhyacophila obliterated*, *Lcuctra klapaleki*, *Hemerobius lutescens*, *H. orotypus*, *H. subnebulosus*, and *H. atrifrons*, the last-mentioned being new to the Huddersfield district.

COLEOPTERA.—Mr. Charles Mosley writes:—Beetles were very sparse; both in point of species as well as in individuals, with the single exception of *Anchomenus angusticollis*, which was abundant, there being frequently as many as a dozen or more under one stone. Other species found were *Pterostichus madidus*, *Carabus violaceus*, *Loricera pilicornis*, *Notiophilus biguttatus*, and *Philonthus finctarius*. Several trees and stumps were found full of borings, possibly of a *Rhagium*, and some coleopterous grubs were seen in fungi and dung.

WOODLICE.—Mr. Mosley worked the Clough assiduously for these creatures, but only succeeded in finding one species, *Oniscus asellus*, and that, too, sparingly. One of the specimens measured fifteen millimetres in length.

ARACHNIDA.—Mr. Falconer writes:—When the investigation of the arachnid fauna of a district, as in the case of Huddersfield, is left to one individual whose efforts are neces-

sarily limited in time and space, there will be not only localities which escape attention, but also every probability that hitherto unnoticed species will turn up in them. Portions of the route traversed were in this category, and Mr. W. P. Winter obtained one spider, *Linyphia montana* Clerck, and one harvestman, *Phalangium opilio* Linn, new to the district, but both, however, common enough elsewhere. He also secured one male *Diplocephalus protuberans* Camb., the second Huddersfield, and third British record.

Spiders as individuals were abundant, though many species which might naturally have been expected to occur, were absent. Several others, however, rare either in the district or elsewhere, were met with. At Dolly Clough—*Leptorhoptrum huthwaitii* Camb.; in Honley Old Wood, *Linyphia montana* Clerck, *Leptorhoptrum hardii* Bl., *Centromerus expertus* Camb., and *Diplocephalus protuberans* Camb., the second and third also in Harden Clough; at Wilshawby reservoir, *Pachygnatha listeri* Sund.; at Harden Clough, *Oreonetides firmus* Camb., *Centromerus arcanus* Camb., *Enidia bituberculata* Wid. (second Huddersfield station), *Troxochrus hiemalis* Bl. (in greater quantity than heretofore), and *Oligolophus palpinalis* Herbst., and *Nemastoma chrysomelas* Herm., two of the rarer phalangids.

During the day sixty-seven species of spiders, seven harvestmen, and one pseudoscorpion were taken, and, as usual, several non-arachnological members of the party, Messrs. Porritt, Cheetham, Morley, etc., handed in examples.

In the following list, the commoner and more generally distributed forms are omitted:—

SPIDERS.

- Antistea elegans* C. L. Koch. 1 ♀.
Thick Hollin's Moor.
Pholcomma gibbum Westr.
Drapetisca socialis Sund.
Linyphia montana Clerck.
Leptyphantes minutus Bl. 1 ♂.
Harden Clough.
Bathyphantes parvulus Westr. 1 ♀.
Harden Clough.
Hilaira excisa Camb.
Oreonetides firmus Camb. 1 ♀.
Centromerus expertus Camb. 1 ♂,
1 ♀.
C. arcanus Camb. 6 ♀.
Leptorhoptrum huthwaitii Camb.
2 ♂, 3 ♀.
L. hardii Bl. 1 ♂, 1 ♀.
Edothorax agrestis Bl. 1 ♂, 1 ♀.
Harden Clough.
Enidia bituberculata Wid. 2 ♀.
Neriene rubella Bl. 2 ♂. Honley
Old Wood.

- Diplocephalus permixtus* Camb. 1 ♂,
Thick Hollin's Moor.
D. protuberans Camb. 1 ♂.
Troxochrus hiemalis Bl. 10 ♂,
11 ♀s.
Walckenaera nudipalpis Westr. Hon-
ley Old Wood, 1 ♂.
Ceratinella brevipes Westr. 1 ♂,
2 ♀, Harden Clough.
C. brevis Wid. 1 ♀, Honley Old
Wood.
Nesticus cellulanus Clerck. Honley
Old Wood.
Pachygnatha clerckii Sund.
P. listeri Sund. 1 ♀.

HARVESTMEN.

- Phalangium opilio* Linn. 1 ex-
ample, Dolly Clough.
Oligolophus alpinus Herbst. Har-
den Clough.
Oligolophus palpinalis Herbst. 1 ♂,
Harden Clough.
Nemastoma chrysomelas Herm. 2
examples, Harden Clough.

BOTANY.—Mr. W. E. L. Wattam reports :—The long continued drought was responsible for so few plants being noted in blossom. The first party, under the leadership of Dr. T. W. Woodhead, succeeded in finding *Melampyrum pratense* var. *hians*, and also the hairy form of heather, *Calluna vulgaris* var. *incana*. The new British heather *Calluna vulgaris* var. *Erikai*, was not recorded from the moorland areas under investigation, but in all probability it will be found to occur on the intervening moorland between Harden Clough and its known habitat, Wessenden Head. The immense rush zones of *Juncus effusus* were assiduously worked for *Juncus conglomeratus*, but this particular rush was not found, and, as Dr. Woodhead subsequently pointed out at the meeting, with the aid of a graded series of specimen inflorescences of *Juncus effusus*, mistakes might easily arise in recording *conglomeratus*, unless special attention was paid to its distinguishing characteristic, the ribbed stem, the stem of *Juncus effusus* being smooth. The majority of the plants mentioned in the excursion programme were met with, and in addition, *Stellaria neglecta* (Weihe), *Epilobium palustre*, *E. angustifolium*, *Solidago Virgaurea*, *Juncus bufonius*, and *Glyceria fluitans*. An interesting form of *Ranunculus repens*, having foliage and flowers much reduced, was noted in the bog areas alongside the stream. Many trees of *Pyrus Aucuparia* were heavily laden with ruddy fruit, and *Quercus sessiliflora* and *Castanea vulgaris* were also noted in fruit.

The chief ecological features were pointed out, and ably explained by Dr. Woodhead, and his remarks thereon were greatly appreciated.

Mr. Charles Mosley adds :—Although *Quercus sessiliflora* is the dominant species of oak in the Clough, it was interesting to note several trees of *Q. pedunculata*, some heavily laden with fruit, and one presented a peculiar elongated form of leafage. On the homeward journey, about half-way between Harden Moss and Holmfirth, I found, in a coppice, a tree of *Q. intermedia*, in fruit.

MOSES.—Mr. C. A. Cheetham writes :—One noticeable feature in connection with the mosses was the number of absentees, the walls being altogether untenanted, and the common species of *Tortula*, *Barbula*, *Bryum* and *Hypnum* usually found on walls, were absent. The stream bed at Dolly Folly fall was the first place investigated, and shewed two mosses that were features of the watercourses seen during the day viz., *Hypnum ochraceum* and *Hyocomium flagellare*. Others were *Fissidens pusillus*, *Brachythecium rutabulum*, *Hypnum falcatum*, *H. palustre*. Further along the hillside a spring yielded *Hypnum cordifolium* and *H. cuspidatum*. On crossing the valley and entering the woods on the shale, *Catharinaea*

undulata, *Dicranella heteromalla*, *Mnium hornum* and *Plagiothecium elegans* were the chief mosses. Above these woods was a quarry, and a soft, friable sandstone band was noticed, with *Webera prolifera* on it. This moss seems to grow on these loose materials until the growth and the sand intermixed with it gets too heavy, and bring down the mass, which is, however, soon reproduced on the new surface by the immense quantities of gemmæ produced on this plant.

At Harden Moss the lower woods were entered, and some fine masses of *Pterygophyllum lucens* in fruit were gathered, with *Plagiothecium denticulatum*, *P. sylvaticum* and *P. undulatum*. On the moors above, *Philonotis fontana* and *Dicranella squarrosa* brought a lighter shade on the streamside, the peculiar capsules of *Tetraphis brownianum* were seen hanging downwards from dripping rocks, and on a peaty bank was *Dicranella cerviculata*. Soon a more montane type of mosses was reached, such as:—*Oligotrichum hercynicum*, *Blindia acuta*, *Racomitrium fasciculare*, *R. aciculare*, *Zygodon Mougeotii*; and in the woods at the top of the Clough, midst masses of *Z. Mougeotii*, a large tuft of the rare *Fissidens osmundoides* finished off the list. Altogether, forty-two species were collected.

FUNGI.—Mr. W. E. L. Wattam writes:—Mr. C. H. Broadhead and Mrs. Whiteley were the chief contributors to this section, and several undetermined species were forwarded to Mr. Charles Crossland for determination. The following is a complete list of the fungi met with:—

<i>Ithyphallus impudicus</i> (L.).	<i>Boletus flavus</i> With.
<i>Amanita rubescens</i> (Pers.) Fr.	<i>B. chrysenteron</i> Fr.
<i>Laccaria laccata</i> (Scop.).	<i>B. luridus</i> Schæff.
<i>Entoloma sericeum</i> (Bull.).	<i>Polyporus squamosus</i> (Huds.) Fr.
<i>Galera hypnorum</i> (Batsch).	<i>P. betulinus</i> (Bull.) Fr.
<i>Stropharia semiglobata</i> (Batsch).	<i>P. varius</i> Fr.
<i>Anellaria separata</i> (L.).	<i>Polystictus versicolor</i> (Huds.).
<i>Coprinus atramentarius</i> Fr.	<i>Stereum hirsutum</i> Fr.
<i>Lactarius quietus</i> Fr.	<i>Sepedonium chrysospermum</i> Fr.
<i>Paxillus involutus</i>] (Batsch).	

T. S.

— : o : —

The **Manchester Museum** has recently issued a useful 'General Statement of the Work of the Museum' (10 pp.); a 'Catalogue of the Egyptian Antiquities of the Twelfth and Eighteenth Dynasties,' by A. S. Griffith (Mrs. Johns; 76 pp., 1/6), and an 'Outline Classification of the Animal Kingdom,' by Prof. S. J. Hickson (30 pp., interleaved, 6d.). The last named is of particular value to museum curators.

From the **Norwich Museum** we have received the Third Annual Report of the Norwich Museum Association. This association was formed as an educational auxiliary to the museum, and is doing excellent work. Public lectures are given on such subjects as 'Aphides and how to keep them in check,' 'Bees and their diseases,' 'The Pruning of Fruit Trees,' various sections of the Museum collections, etc.

Naturalist.

FIELD NOTES.

MOSESSES.

***Bryum Warneum* Bland in the Humber Estuary.**

Mr. G. Allison, of Grimsby, has recently brought me specimens of this rare *Bryum* for verification.

He gathered it on the Humberstone Sandhills, where it occurs in profusion, on wet sand, in similar surroundings to those of previous records: Tent's Moor, Fife; shore at Southport; Coatham Marshes, Yorkshire; and a few more places, generally near the sea.

It belongs to the *Cladodium* section of *Bryums*, and is frequently associated with *B. calophyllum*, *B. lacustre*, and *B. Marrattii*. We are now searching for the other members of the group. It is a very good addition to the Moss Flora of Lincolnshire.—J. J. MARSHALL, Grimsby.

—: o :—

The Annual Report for 1910-11 of **The National Trust for Places of Historic Interest and Natural Beauty** contains an excellent record of work accomplished, chief amongst which must be mentioned the acquisition of Grange Fell and the Borrowdale Birches, One Tree Hill in Kent, Coombe Hill, etc. These are to be preserved for the public for all time. The Trust still needs £6200 for Colley Hill, £75 for the Old Priest House at Muchelney, and £220 for the Chantrey Chapel at Buckingham. The Report is well illustrated, and copies will doubtless gladly be sent on application to the Secretary, 25 Victoria Street, Westminster.

British Fungi and Lichens, by G. Masee. 551 pp., G. Routledge & Sons, price 7/6.

This remarkably useful book is written by Mr. G. Masee, Royal Gardens, Kew, and contains forty beautifully coloured plates by his daughter, Miss Ivy Masee. In addition there are twenty-one illustrations in black and white, exhibiting the structure, and other features of fungi generally. The volume meets a long felt want, and has appeared at a very opportune time of the year. Part I. consists of a General Introduction—Terms used in describing Fungi—Classification—How to Study Fungi—When and Where to Collect—Collecting and Preserving—Edible and Poisonous Fungi—Diseases Caused by Fungi—etc. Part II. opens with a synopsis and characteristics of the various Genera forming the family Agaricaceæ, followed by a short but pithy description of each species, occupying pp. 65-353. The Polyporaceæ, Hydnaceæ, and remaining groups of Basidiomycetes, including the Gastromycetes, are similarly dealt with. Then follow short accounts of the features exhibited in the various groups comprising the Ascomycetes, and a chapter on Lichens.

The names of the species are not encumbered with the initials of authorities, which have no interest to the amateur. The descriptions are crisp and concise, the use of abstruse terms which would require the use of a glossary has been skilfully avoided, and many explanatory notes are given which are usually absent in the more technical works on the subject.

The plates are interspersed throughout the descriptive text exactly in the places where they are most useful. Coming as it does from hands of long and wide experience with fungi, alike in field and laboratory, it is calculated to be of great service to the rapidly increasing number of students of fungi. The book is well got up in every way, and does credit to both writer, artist, and publisher. The words 'See Frontispiece' are printed on Key to Plate II, instead of Plate I. No. 4 on the Key to Plate XV. should be *Hygrophorus virgineus* and not *H. pratensis*, which is No. 1 on the same plate. Unfortunately the publisher has omitted the date of publication.

PROCEEDINGS OF PROVINCIAL SCIENTIFIC SOCIETIES.

The **Board of Agriculture and Fisheries** has recently issued leaflets dealing with Pruning Fruit Trees, Fruit Bottling, and 'Couch' or 'Twich.'

The **Animals' Friend Society**, (York House, Portugal Street, Kingsway, London), has issued a pamphlet '**The Hunted Otter**,' by Mr. J. Collinson. It refers to the cruelty of otter hunting, and gives some information in reference to the natural history of the species. The pamphlet is sold at 2d.

Vol. V., No. 2, of the **Caradoc and Severn Valley Field Club** (pp. 91-172) is a record of the Society's meetings and excursions for 1909-10. The abstracts of papers deal with Lake Dwellings, Plants of Palestine, Shrewsbury Castle, The Origin of Wheat, etc.; and 'Two Old Shropshire Naturalists.'

The **Thirty-fourth Annual Report and Proceedings of the Lancashire and Cheshire Entomological Society** is smaller than usual, as the Society is saving its funds for the publication of an important monograph. There is a record of the exhibits at the Society's meetings, a plate shewing *Hydroecia crinanensis* and its ova, and a portrait of Mr. P. F. Tinne.

From the **Belfast Museum** we have received publication No. 26, 'The Scope and Value of an Irish Provincial Museum,' by Mr. Alec. Wilson, which is 'printed with Irish Ink on Irish Paper.' This pamphlet is illustrated by plates, shewing the evolution of the spiral, etc.; and No. 27, the 'Quarterly Notes,' No. 18 (one penny) which deals with tokens, medals, and querns.

The **Transactions and Journal of Proceedings of the Dumfriesshire and Galloway Natural History Society**, N.S., Vol. XXII., for 1909-10 (256 pp.), has recently appeared and contains particulars of the papers read at the Society's meetings, and full reports of the excursions. The subjects dealt with are both local and general; and antiquities, geology, botany, zoology, meteorology, etc., come within the scope of the Society's work. We cannot refer to all the papers, but Mr. J. A. Fairley's 'Autobiographical Notes, by Thomas Murray, etc.,' Mr. R. Wallace's 'Geology of the Cluden Basin,' the late R. Service's 'Notes on the Starling,' and Mr. W. H. Armistead's 'Trawling in the Solway,' call for special notice.

The **Eighty-eighth Report of the Whitby Literary and Philosophical Society** contains particulars of a few additions made during the year; meteorological tables; a list of the 'Oolite Fossil Plants found in the Whitby Cliffs, together with the Museum numbers of the specimens, exhibited in the Whitby Museum,' which we understand is the work of Mr. T. Newbitt. There is also a 'description of a small ironstone smelting furnace found on the moors near Whitby.' This is put forward as the probable origin of the many so-called British Dwellings, etc., in the neighbourhood. As a frontispiece is an admirable illustration of *Hangia beanii* taken from Mr. Buckman's monograph on Yorkshire ammonites.

The **Ninth Annual Report of the Horniman Museum and Library, Forest Hill, S.E.**, is very encouraging. The list of additions, as long one, and ethnology, as usual, takes a prominent place. Plates such as a Chinese Ivory Carving, a West African 'Nail-Fetish,' and the 'Introductory Case to the Swimming Series.' The classification of the List of Additions to the Library is peculiar. There is first a 'List of Additions (an asterisk following a title indicates that the publication was presented unbound)'; then follows 'Unbound Publications, Publications received by gift or exchange'; and 'Unbound Publications Purchased.' These three lists have to be perused before one can be certain as to any particular addition. Might we suggest that these additions be given in one list; those 'presented unbound' being marked with an asterisk, and those 'purchased unbound' being marked with a dagger, if such distinctions are really necessary.

THE NATURALIST

A MONTHLY ILLUSTRATED JOURNAL OF
NATURAL HISTORY FOR THE NORTH OF ENGLAND.

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WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF

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T. H. NELSON, M.B.O.U., WILLIAM WEST, F.L.S.,
RILEY FORTUNE, F.Z.S.

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YORKSHIRE NATURALISTS' UNION.

THE ANNUAL MEETING OF THE SECTION FOR VERTEBRATE ZOOLOGY

(President: -OXLEY GRABHAM, Esq., M.A., M.B.O.U.)

Two meetings will be held in Room C 8, at the Leeds Institute, Leeds, at 3-15 p.m. and 6-30 p.m. respectively, on Saturday, November 18th, 1911.

BUSINESS (at the Afternoon Meeting):—

To consider and pass the Sectional Reports for 1911, and to elect Officers for 1912.

To consider and pass the General and Financial Reports of the Yorkshire Wild Birds' and Eggs' Protection Acts Committee for 1911, and to elect the Officers and Committee for 1912.

To consider and pass the Report of the Yorkshire Mammals', Amphibians', Reptiles', and Fishes' Committee for 1911, and to elect this Committee for 1912.

Short papers (mostly illustrated by lantern-slides or specimens) will be read by the following gentlemen:—Mr. Riley Fortune, F.Z.S., "Notes on British Deer"; Mr. Thos. M. Fowler, "Glimpses into Bird-life"; Mr. Oxley Grabham, M.A., M.B.O.U., "Yorkshire Freshwater Fishes"; Mr. A. Haigh Lumby, "Distribution of Birds relative to Migration."

Any Member or Associate of the Y.N.U. is invited to attend, and to bring notes, specimens, lantern-slides, etc.; and is requested to bring forward matters of interest connected with the work of the Section, and to take part in any discussion.

Will Officials of Affiliated Societies kindly notify their Members.

Any further particulars from H. B. BOOTH, Ryhill, Ben Rhydding.

BOOKS FOR SALE.

From the Library of a Yorkshire Geologist, recently deceased.

- BEWICK. Geological Treatise in North Yorkshire (cloth). 7/6
PHILLIPS. Geology of Yorkshire. Mountain Limestone District (cloth). 12/6
PHILLIPS. Treatise on Geology. 2 vols. (half calf). 3/-
Journal Northants. Field Club. Vols. 3, 4, 5 (cloth). 2/6 each.
MILTHERS. Scandinavian Indicator Boulders. 3/-
ORR'S Circle of the Sciences. Organic Nature. 3 vols. (cloth). 2/- each.
Naturalist, 1907 (cloth). 5/-
Reports of the British Association. Bath (1864), Birmingham (1865), Nottingham (1866), Dundee (1867), Norwich (1868), Exeter (1869), Liverpool (1870), Edinburgh (1871), Bristol (1875), Glasgow (1876), Montreal (1884), Birmingham (1886). (Cloth). 2/- each.
The Geologist. Vols. 4 and 5 (half calf). 3/6 each.
Science Gossip, 1866, 1872, 1875. (Cloth). 2/- each.
The Antiquary. Vols. 1, 2, 3, 4, 5, 36, 37 (half calf). 2/- each.
BATEMAN. Ten Years' Diggings. (Cloth). 3/6.

Apply:—J. B. FAY, Royal Institution, Hull.

NOTES AND COMMENTS.

THE MIGRATION OF BIRDS.

Mr. W. R. Ogilvie-Grant and his colleagues on the Committee of the British Ornithologists' Club have just issued their Report on the Immigration of Summer Residents in the Spring of 1910, with notes on the migratory movements and records received from light-houses and light-vessels during the autumn of 1909. These latter have been condensed 'so as to shorten the Report which is becoming yearly more voluminous.' The present Report, which contains over three hundred pages, is published by Messrs. Witherby & Co., and unquestionably contains a mine of information relating to the movements of birds. Besides the weather reports, etc., the volume includes details of the immigrations of thirty-three species of birds, many being illustrated by maps, giving particulars of the records received. There is no doubt the British Ornithologists' Club is doing excellent work in classifying this mass of material, and placing it on record. The price is not stated, but presumably it is six shillings.

NEW BRITISH BIRDS?

In *British Birds* for October, Mr. M. J. Nicoll describes 'A New British Bird' (the Slender-billed Curlew), which was shewn to him 'in the flesh' on September 21st. It was, of course, shot in Kent. In the same journal Mr. E. Hartert discovers that "not less than five forms" of Green Woodpeckers 'must be distinguished within Europe alone.' . . . 'English Woodpeckers are . . . nearest to the Central European form, but the wings are still shorter . . . Moreover, the bill is shorter, but not slenderer, so that it appears to be rather stronger and more stumpy. *The English form requires therefore a new name,*' and it is proposed to call it *Picus viridis pluvius*, subsp. nov., because of the ancient superstition that its call is the sign of approaching rain. We then learn that Italian Woodpeckers have *the same measurements as the English ones*, but the beak is considerably slenderer. It is consequently named *Picus viridis pronus*, subsp. nov. The fifth European form is *Picus viridis sharpei* from Spain. If this sort of thing goes on, we shall soon have a separate name for every bird shot or 'seen in the flesh,' as no two birds are exactly alike. If, for the sake of argument, the birds in question should be described as new, there is certainly no excuse for describing new species without giving illustrations! Opinions may easily differ as to what 'slenderer' means.

PUZZLES IN NOMENCLATURE.

In the *Entomologist's Monthly Magazine* for October, the Hon. N. Charles Rothschild refers to a flea taken from a rat, which has been described as *Xenopsylla scopulifer* Rothschild; but, which turns out to be *Xenopsylla brasiliensis* Baker. In a

previous paper '*Xenopsylla brasiliensis* Baker was treated as a synonym of *cheopis* Rothschild, but, as we have already published, after critically examining Baker's types of this species, it is evident that it is a distinct species, and the name must be retained for the species we named *X. vigetus*.' We give the author's own words, but we confess we are not quite clear how the matter stands. Fleas usually are troublesome, we believe, but these rat fleas are causing much more worry than they should.

MORE REVISION.

Similarly, in *The Entomologist* for October, Mr. S. Webb has some notes on the varieties of *Peronea cristana* Fab. Here we learn that '*Lichenana* Curt., may perhaps be identical with *Subvittana* Steph.'—The ground colour of *Unicolorana* is mentioned as dark green . . . the unicolorous pale brown variety . . . was placed in all our older collections under this name, and it had better be retained for such forms. *Ruficristana* Johns., was very properly dropped. . . *rossiana* . . . may have been a stunted specimen of *cristana*, whilst the other *albicostana* Sand., is . . . unknown to us as British. These should be expunged from our catalogues.' On page 320 of the same journal a correspondednt records a black *Satyryus semele* and asks if it is a 'named variety.' What is the necessity for naming every variation of every insect, especially when they are subsequently 'dropped' or 'expunged'?

NEW (?) SHELLS.

In *The Journal of Conchology* for October, Mr. J. T. Marshall describes as a 'new variety' '*F. propinquus* Ald., var. *laevis* Marsh, n. var.' This corresponds with *F. gracilis* var. *glabra*, but is still smoother than that variety, and comes from the same British locality.' How a future worker is to know to what extent this variety is smoother than *glabra* we are not informed. No figure is given, although the same writer, speaking of another species with which there is apparently also some confusion, says 'unfortunately the author did not accompany his description with a figure'! Another 'new species,' *F. consimilis* is admittedly 'closely allied to *F. attenuatus*.' We learn that 'with two exceptions it agrees in every respect with Gwyn Jeffreys' description of *F. attenuatus*, so closely indeed as to suggest at first that these two exceptions may possibly be reconciled if more specimens come to hand.' Then why not have waited a bit? With regard to this alleged new species we can repeat the author's own words, and regret that unfortunately he does not accompany his description with a figure.

MORE MOLLUSCAN MIXES.

In the very next paper in the same journal Mr. L. E. Adams refers to a recent account by Mr. J. W. Taylor of an addition

to the Irish mollusca, viz., *Vitrina elongata* Drap (since altered to *V. hibernica* Taylor)! Mr; Adam adds 'It is just possible that conchologists will be interested in the confusion that there has been with regard to the British *Vitrina*, and its alleged varieties, one of which bears such a remarkable likeness to *V. hibernica* that one might almost imagine that Jeffreys had a specimen of the Irish form before him when he wrote the description of *V. elongata*. . . . When first I saw a shell of *hibernica* it immediately suggested the elusive form of *V. pellucida*, named by Jeffreys var. *depressiuscula*, a satisfactory example of which I have never seen'; and again, 'turning to Sowerby's Illustrated Index . . . we find in fig. 15, a rather exaggerated *V. pellucida*; but fig. 16 of *V. draperi* Jeffreys is an excellent representation of *V. hibernica*!' This may be 'interesting to conchologists' but it is very disheartening to those interested in the advancement of science.

THE CASE OF ADOXA.

In the Quarterly Journal of the Naturalist Society of Zurich (*Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich*), is a monograph on the Tuberous Moschatel, under the title 'Monographische Studien über *Adoxa Moschatellina* L.' by Karl Sturm. This is an excellent example of the careful and methodical work done by our naturalist friends in Switzerland. A full account is given of the seedling structure and general anatomy of the plant, the aberration (teratologie) to which it may be subject, its distribution, etc. One of the most important chapters is that dealing with the systematic position of *Adoxa* (*Die systematische Stellung von Adoxa*). In this respect the plant seems to have had a very varied career.

A BOTANICAL PUZZLE.

In 1561 it was named *Moschatellina* by Val. Cordus; in 1587, *Denticulata* by Dalechamp; in 1590 *Fumaria bulbosa s. tuberosa minima*; in 1623 *Ranunculus nemorosus*, *Moscatellina dictus*; and so on, until in 1735 Linné established the genus *Adoxa*. Even then no settled resting-place could be found for the plant. Chronologically from 1763 it has been placed between the Cactaceæ and Saxifragaceæ, in the Saxifragaceæ, Araliaceæ, Caprifoliaceæ, Ranunculaceæ, etc. Karl Sturm gives a carefully digested summary of the results of all previous researches on the position of *Adoxa*, and is of the opinion that it should be put in a separate family, Adoxaceæ; placed, if among the Sympetalous families, before the *Caprifoliaceæ*; if, however, among Choripetalous families, near the *Saxifragaceæ*. The state of the question may, perhaps, best be summed up in the last words of the monograph, 'Lieber zweifeln, als irren' (better doubt than err).

FIELD NOTES.

BIRDS.

Sanderling in Craven.—On August 14th, 1909, a female Sanderling was shot at Tosside-in-Craven, by C. P. Charlesworth, of Skipton. It is unusual for this species to be so far inland.—W. Wilson, Skipton-in-Craven.

Weights of Birds.—During the seasons of 1908 and 1909 I weighed a few birds which passed through my hands, and which may be interesting to record. The birds were all dead at the time of being weighed, with the exception of the Little Owl, which was placed on the scales alive:—Gold Crest, 74 grains; Blue Tit, 186 grains; Twite, 250 grains; Nuthatch, (in poor condition) 320 grains; Short-eared Owl, 1 lb.; Great Crested Grebe, 2½ lbs.; Peregrine Falcon, 2 lbs. 6 ozs.; Little Owl, 8 ozs.—W. WILSON, Skipton-in-Craven.

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FISHES.

Destruction of Fresh-water Fish in the Wharfe.—Evidently through some abominable carelessness at the gas works in allowing chemical refuse to escape into the river, enormous numbers of fish (over 3000 dead, have been taken out) have been destroyed below Ilkley. The majority of these were trout, though two barbel weighing each 8½ lbs., a large size for this portion of the Wharfe, were found. Practically all the trout were under a pound in weight.—R. FORTUNE, Harrogate.

—: o :—

ARACHNIDA.

British Velvet Mites.—The actual specimens of mites described by Dr. C. F. George, of Kirton Lindsey, in a series of articles to this journal, have been presented by him to the Hull Municipal Museum, where they will be available to students of this branch of Arachnology. The following is a list of the species represented, and of the respective numbers of 'The Naturalist,' in which they are described:—*Trombidium holosericeum*, Sept. 1908, pp. 333-6, Dec. 1908, p. 453; *T. fuliginosum*, Oct. 1908, p. 377, Dec. 1908, pp. 453-4, May 1911, p. 200; Type specimen of larvæ of *T. holosericeum*, Dec. 1908, pp. 452-4; and *T. autumnale*; *T. buccinator*, Nov. 1911, pp. 380-1; *Otonia bicolor*, Dec. 1908, p. 452-3, Feb. 1910, p. 90, May 1911, p. 201; *O. bullata*, March 1909, pp. 87-8, May 1911, p. 201; *O. clavata*, Dec. 1909, pp. 423-4; *O. conifera*, March 1910, p. 118, May 1909, pp. 194-5; *O. evansii*, May 1909, pp. 194-5; *O. ramosa*, March 1909, pp. 87-8; *O. valga*, Dec. 1909, p. 432, May 1911, p. 201; *Rhyncholophus communis*, Dec. 1910, pp. 427-8, May 1911, p. 201; *Ritteria hirsuta*, April 1910, pp. 182-3, May 1911, p. 201; *R. mantonensis*, Oct. 1907, pp. 357-9; *R. nemorum*; *Johnstonia errans*, Aug. 1909, pp. 281-2, May 1911, p. 201.—T.S.

THE RELATION OF THE PRESENT PLANT POPULATION OF THE BRITISH ISLES TO THE GLACIAL PERIOD.*

CLEMENT REID, F.R.S., F.L.S., F.G.S.

THE distribution of our British plants has long been a puzzle to the botanist, and no explanation was forthcoming till the cause was searched for in bygone changes of climate, and changes in the distribution of land and sea. A century ago it was generally supposed that species had originated mainly in the districts in which they were then found. But even under this hypothesis the anomalies of discontinuous areas seemed to require explanation, for the same species was not likely to originate at several different points.

With the growth of the idea of gradual evolution it was realised that faunas and floras had a past history, even if the included species had remained unchanged. Botanists recognised that there were many points that required explanation. For instance, it was noticed at an early date that each of our mountain-tops possessed a small outlying fragment of the arctic flora. How came it that the same species occupied so many different mountains? This seemed a perfectly fair subject of inquiry, even to naturalists who hated the very idea of evolution when applied to species and genera.

More than sixty years ago a great impetus was given to this study by the discovery that Europe had passed through a most remarkable series of climatic changes, and that, too, during the lifetime of the existing species of animals and plants. There had not been a mere cooling of the climate; the temperature in these latitudes had sunk far below its present level, and then had again risen.

Edward Forbes, in 1846, seized this clue, and explained through it, as relics of the Glacial Period, the arctic plants stranded on our mountain-tops; they were plants left behind when the climate became too warm for them any longer to survive on the plains. The subsequent discovery of fossil remains of these plants scattered over the plains, and often associated with relics of arctic animals now extinct in Britain, seemed a brilliant proof of Forbes' view, which has been generally adopted.

In some curious way, however, botanists and zoologists both seem to have overlooked the difficulty that, granting Forbes' hypothesis to be sufficient to account for our alpine flora, it rendered more difficult instead of easier the explanation

* Read to open the discussion at a joint meeting of the Geological and Botanical Sections at the Portsmouth meeting of the British Association.

of our southern flora, which occurs in a similar way stranded in some of the warmest low-lying parts of Britain.

The discussion is limited to the Relation of the Present Plant Population of the British Isles to the Glacial Period. Our problem is a special one ; it is not the same as that which confronts the botanist on the Continent of Europe or America ; and it is not the problem of the origin of the flora of an oceanic island. Also, the wider question of the origin of the species composing the British flora is outside the discussion, for it would lead us into too many untrodden bypaths, and could not satisfactorily be gone into in the present imperfect state of our knowledge.

Perhaps it will be well to explain at once why the inquiry is thus limited to comparatively recent periods, and how it is that we need not explore the unknown earlier periods and deal with larger questions.

Our first inquiry in this case must be : Has there been any continuous occupation of Britain by a temperate flora and fauna from pre-Glacial times to the present day ? Or, to put it in other words : Are any of our plants survivors that managed to live through the cold of the Glacial period in some warm nook in Britain ? They evidently found a refuge somewhere, for we know that the same temperate species that live in Britain now were here in pre-Glacial times. But was this refuge in Britain ?

Here geology comes to our aid, and I think that all geologists who have made a special study of the climatic conditions will agree with me. Any survival of our flowering plants, except in the case of a few arctic and alpine species, was quite impossible.

It may come as a shock to some of my colleagues when I say that for this particular discussion we have a perfectly definite starting-point. We have merely to account for the incoming of our existing flora, after an earlier assemblage had been swept away almost as completely and effectually as the celebrated volcanic eruption wiped out the plants of Krakatoa.

We know that during the greatest intensity of the cold all Scotland, Ireland, and the greater part of England were buried under ice and snow—except, possibly, for some high peaks on which a few arctic species survived. Ice filled the North Sea and covered the lowlands of England down to the mouth of the Thames. Without crossing the Thames it almost reached London. Its southern limit stretched to South Wales, where tongues of ice reached the Bristol Channel in big glaciers like those of the Antarctic Regions or Greenland. In South Wales a few hills may have escaped though surrounded by ice.

The glaciation in Ireland was even more extreme, for apparently no part of Ireland escaped. Even the warmest

parts of the south-west, are striated and covered by morainic material, the ice extending well out into the Atlantic. The icebergs were so big, or the ice-foot so thick, that, breaking away from the Irish coast, the masses were able to float across to the Scilly Isles before they melted; for they carried with them numerous striated stones of well-known rocks, now found stranded on the highest parts of the Isles of Scilly. Thus it is evident that in those days Scilly, our most southerly and warmest point, was surrounded by a bitterly cold ocean, and it was submerged to such an extent that it could be over-ridden by pack-ice. Could any temperate plant survive such treatment? I particularly want you to realise the climate that Scilly enjoyed in these days, for it is now one of the warmest spots in our islands, and its temperate flora has come back, though the islands are surrounded by fairly deep sea.

It seems evident, therefore, that a temperate flora could not have survived the cold in Ireland or in the Scilly Isles. But there is still the non-glaciated area south of the Severn and Thames to consider, and botanists may tell us that the temperate flora survived in some warm nooks in Devon or the Isle of Wight. Here, however, we can point to evidence that the botanist himself must accept as conclusive.

In the south of Devon one of the warmest of the sheltered valleys is that through which the Teign flows to Newton Abbot. But in the alluvial deposits of this valley, and only a few feet above the sea-level, Professor Oswald Heer and Professor Nathorst discovered leaves of the dwarf Arctic birch and some Arctic mosses.

Time will not allow us to go into all the evidence; so I will only point to one or two other areas which prove the extreme rigour of the climate in the south of England. Close to Salisbury are found in profusion remains of various Arctic mammals—reindeer, musk-ox, Arctic fox, lemming, and several others. Unfortunately plants do not seem to have been searched for, and the sections were obscured when I visited the pit; however, the flora associated with this assemblage of mammals can only have been the flora of the Arctic regions.

Around Portsmouth we have abundant evidence of this icy sea, for in the peninsula of Selsey especially we find numerous large erratic blocks floated by ice. Some of them have been identified as coming from the Isle of Wight, others from Bognor and Cornwall, and a number came from the Channel Islands. Thus even the north coast of France had its shores fringed with ice.

I have attempted to show on a map* what the Channel was like when Spithead was thus blocked with ice-floes. Is it

* Exhibited at the meeting.

possible to believe that the plants of the south of England, many of which can barely hold their own during a severe winter nowadays, could have survived these arctic conditions ?

If the southern plants were completely swept away by the cold, the question arises : How did they come back again, especially to islands like Ireland and the Isles of Scilly, and how did they obtain their very singular present geographical distribution ? We are told that the matter is simple enough, for Britain has often been connected with the Continent, and the plants spread slowly overland. However, before we adopt the view that for animals and plants to spread to islands it is needful to have land-connection, you should remember Krakatoa, and the rapidity with which the exterminated flora has come back. Also I must point out that there are peculiarities in the distribution of the different elements that go to make up the existing British flora that no land-connection will explain. Look at the recent distribution. One of the most striking peculiarities is the Pyrenean element in our flora. It is practically confined to two areas, the one in Cornwall and the other in the West of Ireland. Geologists nowadays will not agree to the reconstruction of a lost Atlantis to account for this peculiar distribution.

Undoubtedly since the Glacial period our islands have seen several oscillations of level. There has also been widening and narrowing of straits and channels. England has been connected with France near Dover, and also across the North Sea with Holland and Denmark. But 20 or 25 metres seems to have been the approximate extent of the rise in the south of England. I have searched in vain for evidence of a greater movement. A shallowing of the sea by 25 metres is not nearly sufficient to connect Ireland with England or Scotland, or the Isles of Scilly with England. Still less would it suffice to connect the West of Ireland or Cornwall with the Pyrenees, where the peculiar plants find their home. A rise of land to this amount would not even bring Scilly and the Land's End appreciably nearer together.

This limitation of the extent to which we can bridge over the gaps between our islands is, however, a point on which there is much difference of opinion, and I will not insist on the conclusiveness of the evidence as to the extent of the oscillations.

From the botanist's point of view there are, however, other archipelagos besides those surrounded by water. No doubt if we can postulate sufficient orographic changes plants would spread slowly from land to land during the few thousand years that have elapsed since the cold died away. But—and this 'but' is all-important—they would only do so if the soils were suitable. An isolated tract of limestone surrounded by

clay or by sand is as much an island, as far as many of our most peculiar plants are concerned, as if it were surrounded by water. We have many such islands—or oases is perhaps a more suitable term for them—and no possible ups and downs of the land will connect them. Many of them, like the central limestone district of Ireland, or the Peak District in Derbyshire, or the West Yorkshire Carboniferous limestone, must have been isolated from far-distant geological periods, from times before the present flora of Britain had any existence. We have a still more difficult problem than this. Britain is divided into numerous river-basins, for most of which any connection with other basins in post-Glacial times is unthinkable. Yet each basin yields numerous aquatic plants and animals of the same species as those found in other basins cut off by high hills. Isolated lakes have their aquatic flora; and even artificial ponds, such as the dew-ponds of our high chalk downs, have a fauna and flora closely proportionate in the number of species with the time that has elapsed since the pond was made, or since it last dried up. If no actual connection between river-basins or isolated ponds is needed for the spread of aquatic plants, why need we postulate a land-connection for the land-plants, or a bridge of limestone to aid the migration of the limestone plants from crag to distant crag? Aquatic plants and limestone plants must obviously in most cases have taken leaps of many miles to arrive at their present stations. Our plants have far greater power of crossing deserts and seas than most botanists are willing to allow.

Let us examine the present distribution of one of the most interesting groups of British plants. The Atlantic or Lusitanian plants form an assemblage belonging mainly to the Pyrenees, and found also in the S.W. of England, and again in S.W. Ireland. But they do not occur in the intermediate districts. If we look more closely into the composition of this Atlantic flora, as it is represented in Britain, we find that only plants with small seeds have been able to cross to Cornwall and Ireland, those with large seeds being left behind on the Continent. There is only one tree among them, and that is the *Arbutus*, one of the few trees with minute seeds now living in Europe. A further examination confronts us with the puzzle that, whilst various Pyrenean species are found also in Cornwall and Kerry, the species occurring in Cornwall and Ireland are not the same. The *Arbutus* is a case in point; it is wild in Ireland, but in no part of England. *Erica ciliaris* and *E. vagans* are English, and not Irish; *E. mediterranea* is Irish, and not English.

The local distribution of these plants is equally strange. A few, like *Pinguicula lusitanica*, have spread throughout the west country, wherever the conditions are suitable. Most

occur, however, in quite different fashion ; they are abundant over certain limited areas, to which they are strictly confined. but they are absent from other adjoining areas, though equally suited. I have mapped and examined a good many of these areas, and the plants seem in most places to be spreading vigorously from certain definite centres, to which chance has transported a seed. Thus, *Erica ciliaris* is confined to three areas, in Cornwall, Devon and Dorset. *E. vagans* occurs abundantly in the Lizard, and again on quite different soil in North Cornwall, so that the serpentine soil has nothing to do with its present distribution.

Chance introductions of seeds during thousands of years explain the existing peculiarities of geographical distribution in a way that no changes of sea or land or climate will do. Our alpine flora consists largely of survivors from a colder period ; the rest of our flora, on the other hand, is constantly being added to by chance introductions from the nearest continental shore. That is why the Atlantic element, and the eastern element, though not consisting to any great extent of maritime plants, are confined mainly in Britain to areas within a few miles of the coast. Seeds are evidently brought from the Continent and scattered broadcast over certain coastal districts, and they grow and spread where soil and climate are suitable. But the post-Glacial period has been so short that the process is still incomplete, and the slow spreading inland has only as yet extended a few miles. We can still fix the point or points of introduction.

The most striking elements in the British flora, except the arctic and alpine species, have a marked coastal distribution. The plants found correspond with those of the land opposite (in which they are often inland, as well as coastal). Thus the Cornish plants and those of S.W. Ireland contain a large Pyrenean element ; Norfolk plants correspond with those of the opposite shore of the North Sea ; even two or three American plants are found on the coasts facing America.

All the evidence seems, therefore, to point to a steady change and increase in our flora, due to occasional introductions. These introductions are, I think, now mainly due to birds driven by exceptional gales. But herds of migrating bison, deer, and horse have played their part, especially when the Straits of Dover were much narrower or non-existent. Packs of wolves which hunted the large game, foxes, cats, and especially raptorial birds which waited for and struck down the tired migrants, must also have assisted. Fences and the destruction of wild animals have probably rendered the process far slower than formerly ; but it still goes on, and anyone can see who notes the constant occurrence of seedling oaks miles from the nearest tree.

If I am right, therefore, there is no such thing as a native plant in Britain. Our flora has been swept away like that of Krakatoa; but we have arrived at a much later stage of the re-peopling in our islands. It seems to me far more interesting to watch this process of introduction, change, and spreading than to enter into speculations as to what species shall be listed as 'natives,' 'denizens,' or 'colonists.' No such differences exist; it is all a question of degree.

Britain, for several thousand years, has been receiving colonists from all sources, and the process still goes on. The oldest element in our flora, the alpine, occurs on nearly all our mountains; for it once occupied the intervening areas, and it does not greatly depend on conditions of soil. The limestone, aquatic, and Lusitanian flora, on the other hand, are more recent introductions; they can never have occupied continuous areas, and their present distribution is full of singular anomalies. These three elements of our flora are steadily growing in importance, whilst the alpine element is stationary, or tends to die out.

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MOLLUSCA.

Arion ater var. *albolateralis* (Roebuck) at Bridlington.—It is interesting to record as showing its eastern distribution of an almost full-grown specimen of this western form, at the northern end of the promenade, in the above place, on September 19th last. The two colours being sharply defined, make it a very conspicuous object.—JOHN F. MUSHAM, Selby.

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TRICHOPTERA.

Limnophilus politus at Tadcaster.—Among some Trichoptera recently sent to me by the Rev. C. D. Ash, and taken by himself at Saxton, near Tadcaster, I was pleased to find three specimens of *Limnophilus politus*, thus adding a second known locality for the species in Yorkshire, and another to the few records for it in Britain.—GEO. T. PORRITT, Huddersfield, October 13th, 1911.

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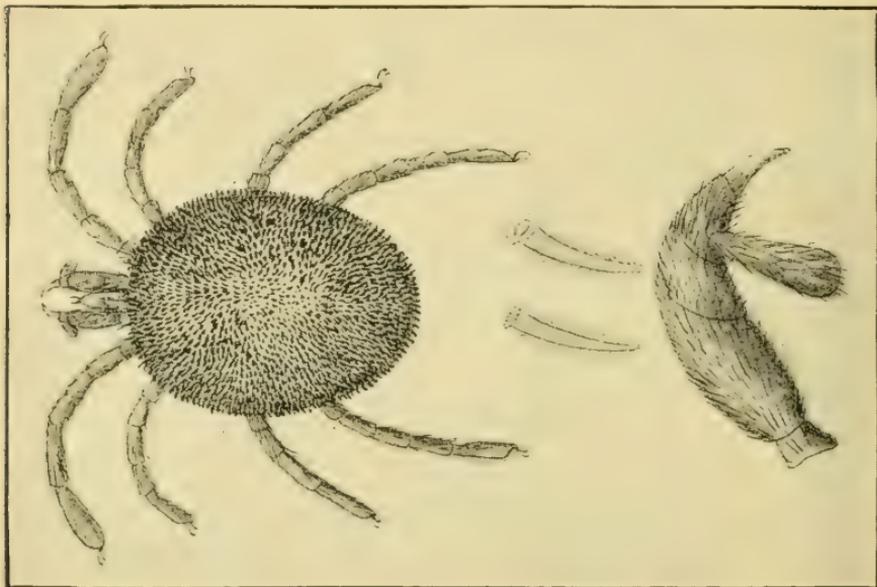
BIRDS.

Guillemot Nesting in Kittiwake's Nest.—When on the Bass Rock in August last, Mr. Campbell, the head lighthouse keeper, showed us where a Guillemot had deposited her egg in a Kittiwake's nest, and reared her young one safely. Mr. Campbell had obtained a good though very small photograph of the bird and her young one in this unusual situation. A bird or two usually nest in holes in the walls of the old fortifications, where a stone has been displaced; these are also rather unusual sites.—R. FORTUNE.

TROMBIDIUM BUCCINATOR.

C. F. GEORGE, M.R.C.S.,
Kirton-in-Lindsey.

MANY years ago I found this particular mite, and mounted it in balsam, so far as I can remember, without previous preparation; the mount was, of course, not over satisfactory, and is not now in a condition to be properly examined. I had hoped to have obtained another specimen for further examination and dissection, but having waited so long without that desired result, and not meeting with any figure or description which



- 1.—*Trombidium buccinator* (entire creature) \times 30, 1.60 mm.
 2.—Hairs, or papillæ, much enlarged, 0.04 mm.
 3.—Palpus 0.55 mm.

seemed to apply to it, I thought it ought to be recorded, especially as it may excite the interest of some other acarologist, who might find a specimen (which I should be pleased to examine), who may have met with it; or a figure and description, by some author whose work I am not acquainted with.

The mite is smaller than the usual specimens of *T. holosericeum*, and its hairs or papillæ are very handsome, their colour a deep crimson lake. Much of this colour still remains in this old mount; the eyes and crista cannot be made out satisfactorily, but the papillæ, which are its distinguishing character, can be fairly well seen. They are trumpet-shaped, but differ from any musical instrument in having the distal circular

edge notched or crenated, and the exterior surface, rather thinly beset with fine hairs. (See Mr. Soar's figure of two of these organs highly magnified).

Hermann, whose work was published after his death in 1804, paid much attention to, and figured the hairs or papillæ of many of the mites he described. His work is unfortunately scarce, but may be seen in the great libraries, such as that of the British Museum, Cambridge University, etc., and is still well worth consulting.

Of course, our knowledge of these creatures has increased amazingly since his time, and his classification is entirely superseded, and is yet far from complete. Moreover, he had not the advantage of high microscopic power, now so common. It is rather strange, that, so far as I know, no specialist has recently published an illustrated monograph on these very handsome creatures.

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GEOLGY.

Coast Erosion at Aldborough, East Yorkshire.—The following measurements show the loss of land at Aldborough, East Yorkshire, from August, 1893, to August, 1911. The distances of three fixed points from the edge of the cliff were measured in 1893, and a fourth was added in 1901. *A* is the south gate post in Old Dales, the lowest point on the cliff along the Aldborough frontage; the distances were measured nearly due east along the old road. *B* is the south gate post in the western hedge of the field immediately north of 'Old Dales'; the cliff rises sharply from *A* to *B*. *C* is the south-east corner of the permanent buildings of the public-house. *D* is the south-east corner of 'Red House.' The distances from *B*, *C*, *D* were measured due east :—

	August, 1893.	January, 1901.	August, 1911.
A.	63 yds.	50 yds. 1 ft.	34½ yds.
B.	48 yds. 2 ft.	39 yds. 1 ft.	37 yds. 1 ft.
C.	52 yds. 1 ft.	41 yds.	30 yds.
D.	—	90 yds.	70 yds.

The edge of the cliff at *D* is about the highest point on the coast at Aldborough. The distance from *A* to *D* is less than a mile.—T. PETCH.

THE UREDINEÆ.*

R. H. PHILIP,
Hull.

THE study of this branch of the Fungi is still in a stage of development, and a few words of introduction may not be out of place as tending to awaken a special interest and induce those of our members who have time and opportunity to do some work towards clearing up the puzzles that present themselves.

When the earliest observations were made, it was not unnaturally supposed that each leaf fungus had its own special host plant, to which it was confined, and from which it would therefore take its name, hence arose such names as *Uredo rosæ*, *Puccinia primulae*, and so on. Then it was found that certain leaf fungi were not confined to a single species or genus, but spread more or less through the same order, hence *Æcidium compositarum* for those occurring on the members of the order *Compositæ*, thus lumping what had at first been considered separate species. Next, it was observed that the same host plant in many cases had a second parasite which was supposed to be a distinct species; thus the yellow dusty spots, composed of masses of globular single-celled spores, on the leaf of the bramble, known as *Uredo rubi*, were found to be succeeded later by clusters of brown many-celled spores, to which the names *Aregma* or *Phragmidium* were given. In other cases then appeared to be three distinct parasites, of which those on mint are a type—*Æcidiospores*=*Æcidium menthæ*; *Uredo*, or single-celled brown spores=*Uredo menthæ*; *Teleuto*, or double-celled dark brown spores on the top of a pedicel=*Puccinia menthæ*. Careful investigation eventually proved all three, apparently distinct species, to be produced from the same mycelium, and were but three stages in the life history of one and the same fungus. These, and similar stages of other species had been going under the names *Uredo*, *Trichobasis*, *Lecythea*, etc., all of which had to be wiped out despite the demurs of a few able mycologists. To hark back many decades; the Uredines had in store a greater surprise for mycological students. For some considerable time it had been a belief among farmers that the presence of a Barberry bush on the margin of a wheat field had the power to induce an attack of mildew on the wheat, although there was no cause known for such an influence, in fact, the fungoid character of the mildew was then unknown. A writer of an agricultural work in 1733, ascribed the blight to the attack of small insects brought by the east wind, which fed upon the wheat leaving their excreta as black spots upon the straw.

* Read at the Yorkshire Naturalists' Union Fungus Foray at Sandsend.

Fontana, an Italian, appears to have been the first to discover the true nature of the mildew, and published an account of it, with figures of the Fungus, in 1767; but twelve years before that, an Act was passed by the Province of Massachusetts, for the complete extirpation of the Barberry plant in that district, so firm was the belief that it was an agent in causing the rust of the wheat plant. The same belief existed in this country. In 1804 there was a severe outbreak of wheat mildew, and Barberry bushes were destroyed in almost every quarter. The then Board of Agriculture asked for the opinions of farmers on the matter, and circumstantial evidence was furnished in abundance implicating the Barberry as an agent in the blight. The farmers stuck to their faith, though laughed at for their superstition. The progress of science, has, however, proved them in the right.

In 1805, Sir Joseph Banks wrote a paper on wheat mildew in which he made one of those remarkable guesses which seem more the result of intuition than of scientific observation, yet which have so often anticipated discoveries. Among other points, he mentioned the prevailing belief among farmers, and added, 'Is it not more than possible that the parasitic fungus on barberry and that of wheat are one and the same species, and that the seed is transferred from the barberry to the corn.' A few years later this remarkable guess was demonstrated to be true by Schoeler, a Danish schoolmaster, by a series of field observations and experiments. Strangely enough, considering the importance of the question to the agricultural interest, the matter was allowed to sleep for almost another fifty years. In 1864, De Bary, among other experiments with the different stages of the Uredines and their host plants he had for a few years been conducting, conclusively proved the connection of the *æcidium* spores on barberry and the puccinia spores on wheat, etc.

These facts, once established, research on similar lines was carried on with numerous plants, and their Uredine parasites. The cluster cup spores of the nettle were found to produce the puccinia on carex; those on coltsfoot to produce the puccinia on poa-grass; those on daisy to produce the puccinia on the field woodrush, and so on. The puccinia associations on the common reed were more complicated, yet were unravelled; these were found to comprise three distinct species, having their *æcidium* stage respectively on *Ranunculus bulbosus* and *repens*, on *Rumex acetosa*, and on various other docks but *not* on *R. acetosa*. These and other facts have only been acquired by very numerous and careful cultures by Dr. Plowright and others, including the late H. T. Soppitt, in this country; and by Klebahn, and numerous other botanists on the Continent, and in America.

Having thus far surveyed the history of the progress made in the study of Uredines, we may pause to consider what has been gained before proceeding to the investigation of problems for which answers are at present to seek. One of our greatest living authorities considers the Uredines as occupying a medium stage of development between the *ascomycetes* and the *basidiomycetes*. If this is so, then it seems probable that its parasitic habit has led to a degradation of type, as in many respects the Uredines approach the lower vegetable organisms, and certainly seem to have little in common with the more highly organised *basidiomycetes*. There has been a tendency among botanists to treat the fungi as the residual rubbish-heap of the vegetable kingdom, on to which everything may be thrown that does not find ready classification elsewhere. But, like the old order of infusoria, which, at one time, contained such diverse members as diatoms, oscillatoria, rotifers, and water bears, it will probably be split up; already the myxomycetes are semi-detached and the Uredines seem likely to follow. The Uredines consist primarily of a net-work of colourless threads whose office it is to permeate the internal vessels of the host plant and draw from them its nefarious parasitic means of existence. The dissemination of the spores follows the same lines as that of the pollen grains in the higher plants; the wind being the main agent, though insects, and even snails, which are very fond of the taste of the Uredines, have their share in the business.

We must note here that all spores that are carried to, or fall on, any other plant than their regular host, do not germinate, or, if they do, fail to survive. Why? This is one of the problems we have to solve. Mycologists have deliberately tried to produce such infection, but in vain.

Some species are only known to produce æcidiospores, others only uredospores, others again only teleutospores; while others have æcidiospores and teleutospores; or uredospores and teleutospores; in fact, there is every possible variation of the three forms. In many cases, however, this merely indicates the limits of our present knowledge, and it is quite possible that many of the missing links may yet be discovered upon other hosts, as in fact has been done in some species.

Again, it would appear that some Uredines are able to maintain continued existence without necessarily going through all the mutations which they might under more favourable circumstances undergo. Thus I have recently found considerable quantities of the *Puccinia* on *Polygonum amphibium*, which, according to Plowright, has only uredo and teleutospores. but Dr. Tranzschel has found in Germany that it is associated with an *Æcidium* on *Geranium pratense*. Now *Geranium pratense* is a common plant in the marshy country between the Wolds and the river Derwent, and on August Bank Holiday

I found in this district an abundance of infected *Polygonum amphibium*, but sought in vain for any cluster-cups on the Geranium. Mr. W. B. Grove of Birmingham informs me that this *Æcidium* has never been recorded anywhere in England. It would seem then that this particular species is able in this country to dispense with the æcidial portion of its life.

Among the puzzles which are requiring solution is the question Dr. Plowright asks: 'Why are some species heterœcious and others not?' and then proceeds to suggest one reason apparently without much consideration, that those which are heterœcious occur upon host plants, with cuticles hard and difficult to pierce, as Carices, etc. If this means anything at all, it means that the germ tube being unable to penetrate the hard cuticle is obliged to seek another plant whose epidermis does not present the same difficulties. There are two objections to this suggestion—(1) if the germ tube of the promycelial spore arising from the teleutospore cannot penetrate the hard cuticle, how did the previous germ tube of the æcidiospore find its way in? (2) it seems probable that no cuticle can be penetrated by the germ tubes of the fungus; since they really find their way in by way of the stomata, and if the burglar can get in at the window the comparative weakness or strength of the wall is immaterial. One apparently obvious cause of heterœcism is that a fungus growing on a deciduous plant, whose leaves die down in autumn must, if it is to survive the winter, find a fresh means of subsistence during that period. This explanation fits absolutely such a case as *Puccinia phragmitis*; the æcidium on the dock would if it continued as teleutospores on the same plant be liable to perish along with the spring leaves, but on the stems of the reed, even when they are dry, finds means of existence until the arrival of spring enables it to return to the dock; but to assert that this is a full and adequate explanation of heterœcism in the Uredineæ would be exceedingly rash. For instance, how does it help us in the double life history of *Puccinia poarum* which goes through the three series—æcidiospores on coltsfoot, and uredo- and teleutospores on poa grasses, twice in the year? Only one of these series of metamorphoses can be accounted for by tiding over the winter; and again, as regards the Uredine known to Plowright as *Puccinia rubigovera*. This is a yellow rust on the stems and leaves of wheat, rye, and some grasses. Plowright found that this rust produces an æcidium on *Lycopsis arvensis*, while Klebahn tells us that the yellow rust hitherto known as *P. rubigo vera* really consists of several distinct species on various graminaceous hosts. Of these he selects the one having its æcidium stage on *Lycopsis arvensis* and teleutospores on the rye, for the name of *Puccinia dispersa*. This species appears as an æcidium in September, the rye being then cut, and the rosettes of the *Lycopsis* appear-

ing among the stubble. Evidently the æcidium may be derived from the rust on the rye, but it is not easy to understand how the converse can occur, and the rust on rye be derived from an æcidium that appears only after the rye is cut, and that is dead long before the shoots of the next year appear.

The heterœcious fungus found on *Senecio* and known as *Colcosporium senecionis* has its æcidium stage as what was called *Peridermium pini* on the pine. Now in this case the uredo- and teleutospores are formed during summer and autumn on the deciduous leaves of *Senecio jacobææ*, and the annual leaves of *S. vulgaris*, *viscosus*, and *syvaticus*, on none of which can they be expected to survive the winter, while the æcidium which appears in May and June on the pine, would seem to have a much better chance of survival if it remained where it was, since the pine leaves are evergreen. Anyway, the purpose of tiding over the winter can scarcely be the explanation why it forsook the hardy pine for the more delicate *Senecios*.

Once again, if the necessity of tiding over the winter is the chief cause of heterœcism, how is it that certain species, such as *Melampsora helioscopiæ* on the spurge, and *Colcosporium cuprasiaæ* on the eyebright, and *Puccinia prenanthis* on wall-lettuce, fungi which exist on plants annual in duration, are not heterœcious? It is apparently the only chance they have of maintaining themselves. The annual plant perishes entirely and the fungus in its tissues must perish too unless it can find a place of safety with some other host. The probable explanation in this case is that very likely our knowledge is not perfect and that some portion of its existence is passed either on the ground, or on some other host plant. It is easy to believe that a fungus may be continued from year to year in a perennial plant and itself become perennial likewise, but the perpetuation of a parasite on an annual plant presents difficulties for solution.

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FLOWERING PLANTS, etc.

Cherry Galls at Ripon.—The willows bordering the right bank of the river Ure at Ripon, below the North Bridge, are presenting now a most remarkable appearance owing to the enormous quantity of cherry galls which crowd the smaller stems and twigs. These are so numerous, they attract the notice of even unobservant eyes, and give to the bushes the appearance of bearing a rich crop of ripe fruit. The galls are bright red in colour, fading into green, and are presumably those of a variety of Saw Fly. In numbers and size they rival the berries upon neighbouring hawthorn trees, but are scarcely so richly tinted.—A. LESLIE ARMSTRONG, Harrogate.

FUNGUS FORAY AT SANDSEND.

C. CROSSLAND,

Halifax.

THE Twenty-fourth Fungus Foray (the fourth fixed for this district) in connection with the Yorkshire Naturalists' Union was held at Sandsend, September 23rd-28th. Permission was again granted by Lord Normanby to freely explore the woods, parks, and pastures of the ancient Mulgrave domain. Fourteen members and four friends attended. The use of the schoolrooms at Sandsend for meeting and workrooms was granted by the Vicar of Lythe, as heretofore.

Collecting commenced on Saturday afternoon in the woods, but the pastures were reported to be almost free from fungi, probably owing to the fine, dry, sunny summer. However, the pronouncement so often made, that we should find more species than we had time to deal with, came out all right in the end, as usual. In the moist, shady places in the woods, material proved to be abundant, especially the smaller kinds, which are easily overlooked, and which require special search to bring them to light. Special efforts were put forth by all, in one direction or another. A very good variety of the larger species was met with, but sparing in quantity. Seven *Tricholomas* were added to the thirty-three already recorded for Mulgrave; five of the seven are additions to Yorkshire. Thirteen *Cortinarii* were added to a previous forty; five being new to Yorkshire. Three of the genus *Hygrophorus* were added to a previous twenty-seven. Only one *Collybia* was added, but, what is more remarkable, it is a new British species. Among other additions are five to the genus *Russula*; four to *Coprinus*; three to *Flammula*; three to *Inocybe*; four to *Polyporus*; and three to *Clavaria*; one of the latter being new to Science. *Armillaria mellea*, a timber-tree parasite, was at work. A colony of very fine *Lactarius vellereus* was noticed in a shorn bracken-bed on a bankside. One of the most interesting finds next to a new species, was *Polyporus albidus*, an all-white form, first found in this country at Grindleford, Derbyshire, by Mr. Thos. Hey and the writer, in 1909. *Choiromyces meandriiformis* was again met with. Not a single *Helvella* was seen, though five species are known to occur. *Stereum hirsutum*, a very common saprophyte on dead fallen branches, was noticed growing luxuriantly as a parasite on a living branch of the cherry-laurel. The teleutospore stage of *Phragmidium subcorticatum* was very prevalent on the leaves of cultivated rose-bushes at Sandsend. A potato-patch in one of the cottage-gardens presented a sad spectacle. The tubers had been 'got,' but the greater portion was rendered useless by parasitic fungi. The potato disease (*Phytophthora infestans*) was present, and also the 'soft-rot' (*Nectria solani*) which causes the tuber to decay in a soft rot having a very offensive smell. One

tuber was infected with 'black-scab' (*Synchytrium solani*). It was suggested to the owner that a dressing of lime would be beneficial to the plot, tending to sweeten the soil by destroying the disease-germs. *Cercospora apii*, an injurious parasite on celery, was also present in the same garden. In another garden everything looked at its best, fresh and bright; a little nettle-bed was confined to one corner, and it was on the ground among the nettles where the beautiful little *Collybia* mentioned above was found.

The venerable Mulgrave woodlands contain numerous remarkably fine healthy specimens of oak, beech, sycamore, ash, chestnut, wych-elm, etc., and are very extensive. It is a very great pleasure to be allowed to wander through them. The beeches are perfectly free from *Armillaria mucida*, a beech-tree parasite, as the larches are from *Dasyscypha calycina*.

On Saturday evening, Mr. R. H. Philip read a most interesting paper, entitled 'Notes on the Uredines.' (See pp. 382 *et seq.*).

Mr. J. W. H. Johnson dealt with fungi and bacteria found in polluted waters.

On the Monday evening, Mr. Masee delivered a public lecture in the large schoolroom at Mulgrave Castle, on Plant Diseases, illustrated by the lantern. This was arranged for the special benefit of local farmers, foresters, and cottage-gardeners. In the unavoidable absence of Lord Normanby, the Rev. W. G. Harland, Vicar of Lythe, presided.

The plant diseases dealt with were:—potato winter-rot and scab; smut on wheat, oats, etc.; wheat rust; 'finger and toe,' or 'club root,' (which attacks turnips, cabbages, and other crucifers); *Armillaria mellea*, and other tree-destroying toadstools; apple scab and apple-tree canker; and larch canker. The application of fungicides; dispersion of spores, etc., were described. The larch canker, the most serious disease among forest trees, is caused by an orange-coloured peziza, known as *Dasyscypha calycina*. It was pointed out that the introduction of the disease into the larch depended almost entirely on the presence of the larch aphid, and the preventive means to be used against the insect were given. All the larches seen here are in a very healthy state. Several diseases caused by insects were dealt with. The annual financial loss caused by the attacks on economic plants and trees by fungi and insects is almost incredible. It was admitted that 'the cultivator of plants cannot directly prevent the diffusion of spores by wind or other agents; but what he can do—and what it pays him to do—is, by systematic cleanliness and promptitude, to prevent, to a great extent, the germination of spores in the plants over which he exercises control.'

Amongst the recommendations and warnings, earnestly put forth by the lecturer, were the following:—Burn all diseased

plants, fruit and bulbs, and do not throw them on the manure-heap, a slovenly, thoughtless act which helps to disseminate the disease-germs. Neither cuttings from diseased plants, though themselves apparently healthy, nor the healthy looking portions of diseased potatoe, should be used for propagation. Bulbs or tubers produced by diseased plants perpetuate disease. Seeds produced by diseased parents should not, on any account, be sown. Fresh or green manure should not be used on land intended for cereals.

The attention of the audience was drawn to the valuable leaflets dealing with all kinds of field and garden pests, which contain numerous hints and advice in all directions, to farmers and fruit-growers, issued by the Board of Agriculture and Fisheries, 4 Whitehall Place, S.W. There are now about two hundred and fifty of these leaflets, any or all of which can be procured gratis (or bound up in volumes of one hundred for 6d.). There is no need even to stamp the letter applying for them. They have been of immense service to those who have made use of them. A vote of thanks to the lecturer was proposed by the Rev. J. W. Bowman, Whitby, and seconded by Mr. A. Clarke, Huddersfield.

On the Tuesday evening, Mr. Masee gave an interesting talk on a few 'Mycological Celebrities from early times onwards.' Photos taken from portraits or direct from the men themselves were thrown on the screen to illustrate the discourse. Among them were Sterbeek of Holland, J. G. Gleditsch, Desmazieres, Montague, Elias Fries, M. J. Berkeley, the brothers Tulasne, De Bary, M. C. Cooke, and Saccardo.

These several eminent mycologists each set up a new epoch in the constantly advancing study of mycology. The first mycologist of any note was Sterbeek, who published his 'Theatrum Fungorum' first printed at Antwerp in 1654, containing 32 plates with about 300 figures. Montague was the first French mycologist, and did the Flora of Algiers. Desmazieres initiated the study of the micro-characters of fungi and may be considered the Berkeley of France. Fries worked out a general systematic scheme of classification of European species, especially the Hymenomycetes, founded on the work of Persoon, and still in general use, and likely to be for some time to come.

Berkeley published his first work on mycology in 1836 ('Eng. Flor.', Vol. V., Pt. II.) which, so far as the larger fungi are concerned, is as yet unsurpassed for accuracy and originality. Although he continued to elucidate the systematic side, his name in the future will be more associated with the morphological and physiological side of the subject than as a systematist. He was the founder of what is known to-day as Vegetable Pathology, and one of the first to lay special stress upon the

necessity for studying the life-history of a fungus in order to understand it properly, the carrying out of which has upset many of the older ideas. He was, practically, the referee on fungi for the whole world a good number of years, and himself described between 5000 and 6000 species.

L. R. Tulasne was a mycologist of whom the French are justly proud. He and his brother worked out the morphology and life-history of various ascigerous fungi. They, with Berkeley, suspected that many forms of fungi then considered as entities, were not so in reality, but only phases in the life-cycle of a single species; their ideas in this direction have been proved to be correct in many cases. The great work of the brothers Tulasne was their 'Selecta Fungorum Carpologia' (1861-1865), in three folio volumes illustrated by 61 plates, which, for exquisite beauty, detail, and accuracy, have never been equalled.

De Bary introduced the pure culture method of tracing the development, step by step, of the life-history, in the laboratory, of numerous fungi amenable to that treatment. In 1864 he commenced a series of beautifully illustrated monographs, issued at intervals until 1882, in each of which new ground is broken. The discovery of Heterocism in the Uredines cleared the way for a better understanding of this group; numerous so-called species were wiped out, and the way indicated whereby those form-genera could be relegated to their true affinities.

Dr. M. C. Cooke has filled an unique role on the mycological stage. He has written many books on British and Exotic Fungi. The 'Handbook' published 40 years ago is still useful. The 'Illustrations of British Fungi' is a stupendous piece of work which men of less talent and determination could never have brought to a successful issue.

Cooke has also the credit of having rendered possible, the study of fungi in many remote parts of the world, by naming many thousands of specimens received from numerous correspondents. Such authentically named specimens served as a starting-point, and enabled his correspondents to continue the study of their respective fungus floras.

Prof. Saccardo worked on different lines from any of the others. He compiled a Universal Fungus Flora, with references to figures, descriptions, etc., taken from all obtainable sources. Additions are constantly being made to this enormous undertaking, of fungi of every description, occurring in every part of the world.

The summary of the work done in this district under the auspices of the Union, announced in the circular for Wednesday evening, is not given, as it was thought very desirable, by permission of Lord Normanby, to continue it through another season at least. We think this method will be more in accord-

ance with present-day ideas of investigation, to work one place fairly exhaustively, than to keep doing a bit here and a bit there, and finishing none approximately; the adverb is added because we know it would be impossible, even in a lifetime, to find all these venerable woods produce.

Along with Kew, the Mycological Committee of the Union has set the pace in this country for mycological investigation within a well defined area, and it would be a pity, now we have laid so good a foundation, not to press on with the work a little longer. 138 species have been added this year, making the total to date about 1100. Scarborough and the parish of Halifax are other instances of well-worked areas by members of the Union. Our object is to prove the great prevalence of these interesting organisms which play so important a part in the economy of nature. Their prevalence is not a question of this or that particular place; they occur universally where vegetation of any kind exists. Within the grounds at Kew 2200 have been discovered. The knowledge of our efforts may stimulate other societies, or individuals, to work out their own areas in a similar way. The desire to study the subject is rapidly developing, and helpful literature appearing. Mr. Masee's recently published volume on 'British Fungi and Lichens' (see 'Naturalist,' Oct., p. 397) meets a long-felt want, and will prove very useful.

On Wednesday afternoon Lord and Lady Normanby invited the Committee and friends to tea at the Castle, prior to which his Lordship personally conducted the party through the spacious greenhouses and around the gardens.

At the business meeting in the evening a vote of thanks was heartily passed to Lord Normanby for his permission to visit the woods; for the use of the large schoolroom at the Castle on Monday evening; and for kindly allowing the use of his lantern and services of operator for both evenings.

We are indebted to the Rev. J. W. Bowman, Whitby, a member of the Union, for assisting to make and carry out the arrangements.

It was decided to recommend two forays for 1911—May and Sept.—the spring meeting to be informal, the other to be as usual.

The number of species determined was 488, of these 138, including the 25 added in May (see below), are additions to Mulgrave, bringing the total to 1102.

In the following lists those marked † are new to the Yorkshire Flora; *† are new to the British Flora; and **† new to Science. Short descriptions of those new to Britain, and a full diagnosis of the two new to science will be published in this journal with the next batch of new Yorkshire species.

An informal foray was held at Sandsend in May, by Messrs. Clarke, Cheeseman, Gibbs, Peck, and myself, for the purpose of looking up spring species.

The additions made at the two meetings are as follow :—

MAY 1911.

- | | |
|--|--|
| <p><i>Collybia tenacella.</i>
<i>Omphalia muralis.</i>
<i>O. camptophylla.</i>
<i>O. gracillima.</i></p> <hr/> <p>† <i>Hydnum sepultum.</i></p> <hr/> <p>† <i>Corticium fætidum.</i></p> <hr/> <p><i>Puccinia festucæ.</i>
<i>Æcidium</i> on honeysuckle.
<i>P. smyrnii</i>, æcidio, and teleuto-
spores on <i>Smyrnum olusa-</i>
<i>trum.</i>
<i>Cæoma mercurialis.</i> On <i>Mer-</i>
<i>curialis perennis.</i></p> <hr/> <p><i>Nectria cucumis.</i></p> | <p><i>N. mammoidea.</i>
<i>Psilosphæria spermoides.</i>
<i>Rosellinia mammæformis.</i>
<i>Leptosphæria derasa.</i></p> <hr/> <p><i>Mitrophora semilibera.</i>
<i>Dasyscypha soppittii.</i>
<i>Mollisia melaleuca.</i>
<i>M. carduorum.</i></p> <hr/> <p>† <i>Rhinotrachium decolorans.</i>
† <i>R. ramosissimum.</i>
<i>Verticillium candelabrum.</i>
<i>Torula expansa.</i>
<i>Graphium flexuosam.</i></p> <hr/> <p><i>Lamproderma physarioides.</i>
<i>Arcyria rubiformis.</i></p> |
|--|--|

SEPTEMBER 1911.

- | | |
|---|---|
| <p><i>Bovista cæpeformis.</i>
<i>Scleroderma geaster.</i></p> <hr/> <p>† <i>Amanita puella.</i>
<i>Lepiota buchnali.</i>
<i>Tricholoma spermaticum.</i>
<i>T. immundum.</i>
† <i>T. hordum.</i>
† <i>T. patulum.</i>
† <i>T. civile.</i>
† <i>T. duracinum.</i>
† <i>T. lixivium.</i>
*† <i>Collybia phæopodia.</i>
<i>Myce a strobilinella.</i>
† var. <i>coccinea.</i>
<i>Mycena plicosa.</i>
† <i>M. paupercula.</i>
<i>Omphalia grisea.</i>
† <i>Pleurotus porrigens.</i>
<i>Pluteus nanus.</i>
*† <i>P. sororiata.</i>
<i>Entoloma lividum.</i>
<i>Clitopilus cancrinus.</i>
**† <i>Pluteolus Mulgravensis.</i>
† <i>P. aleuriatus.</i>
<i>Pholiota mustelina.</i>
† <i>Inocybe deglubens.</i>
<i>I. obscura.</i>
† <i>I. perlata.</i>
<i>Flammula inopoda.</i>
<i>F. hybrida.</i>
† <i>F. liquiritiæ.</i>
<i>Naucoria scolecina.</i>
<i>Galera mniophila.</i>
† <i>Cortinarius</i> (Phleg.) <i>emollitus.</i></p> | <p><i>C. (Phleg.) cyanopus.</i>
† <i>C. (Phleg.) turbinatus.</i>
† <i>C. (Phleg.) infractus.</i>
<i>C. (Myxa) mucifluus.</i>
† <i>C. (Inol.) turgidus.</i>
<i>C. (Derm.) decumbens.</i>
<i>C. (Derm.) diabolicus.</i>
<i>C. (Tela.) bivelus.</i>
<i>C. (Tela.) evernius.</i>
<i>C. (Tela.) gentilis.</i>
† <i>C. (Tela.) stemmatus.</i>
<i>C. (Hygr.) illuminus.</i>
<i>Agaricus angustus.</i>
<i>A. elvensis.</i>
<i>A. campestris</i> var. <i>silvicola.</i>
*† <i>Hypholoma ælopodium.</i>
<i>H. incomptum.</i>
<i>Panæolus leucophanes.</i>
<i>Coprinus sterquilinus.</i>
<i>C. fimetarius.</i>
<i>C. deliquescens.</i>
<i>C. domesticus.</i>
<i>Hygrophorus bicolor.</i>
† <i>H. nemoreus.</i>
† <i>H. fuscoalbus.</i>
<i>Lactarius subumbonatus.</i>
† <i>Russula virginea.</i>
† <i>R. pectinata.</i>
<i>R. vesca</i> var. <i>barlaea.</i>
<i>R. lactea.</i>
<i>R. integra.</i>
<i>Nyctalis asterophora.</i> Or <i>Rus-</i>
<i>sula nigricans.</i>
<i>Panus torulosus.</i></p> |
|---|---|

- Polyporus fuscidulus*.
P. rufescens.
 † *P. albidus*.
P. fragilis.
 † *Poria collebofacta*.
 † *P. vitrea*.
-
- Phlebia vaga*.
 † *Grandinia mucida*.
-
- Solenia fasciculata*.
Peniophora gigantea.
P. terrestris.
 † *Aldrigia cæsia*.
-
- Clavaria kunzei*.
 **† *C. crosslandii*.
 † *C. tenuispora*.
-
- Tremella viscosa*.
 † *Melampsora allii-salicis-albæ*.
 On *Salix alba*.
M. populina. On *Populus* sp.
Coleosporium campanulæ. On
Campanula turbinata in garden.
 † *Uromyces dactylidis*. On *Dactylis glomerata*.
U. rumicis. On *Rumex obtusifolia*.
Puccinia glumarum (= *P. rubigovera* D.C. in part; = *P. stricæformis* Westl.; = *P. straminis* Fekl.). On grass.
P. dispersa (= *P. rubigovera* in part). On stems and leaf sheaths of barley near Lythe.
P. sonchi. On *Souchus arvensis*.
P. annularis. On *Teucrium Scorodonia*.
-
- Nectria solani*. On rotting potatoes.
Podosphæria oxyacanthæ. On hawthorn leaves.
Microsphæria grossulariæ. On gooseberry leaves.
-
- Geoglossum hirsutum*.
Peziza pustulata.
P. badia.
Tapesia cæsia.
Cyathicula petiolorum.
Helotium venisporium.
Belonidium ventosum.
Propolis faginea.
-
- † *Synchytrium solani*.
-
- † *Ascochyta pisi*.
-
- † *Spicaria elegans*.
Cephalothecium candidum.
 † *Peviconia alternata*.
Polythrincium trifolii. On living leaves of white clover.
 † *Cercospora apii*. On living leaves of celery.
Dendryphium comosum. Also found in 1908, but record accidentally omitted.
Stilbum vulgare.
Epicocum micropus. On decaying laburnum leaves.
-
- Lamproderma violaceum*.
Cribraria aurantiaca.
 † *Arcyria pomiformis*.

We learn from a note signed 'C. M.,' on page 317 of *The Entomologist*, that the space reserved for the natural history extensions at South Kensington is not to be disturbed, but will be available for the extensions when the time arrives. Confirmation of this is given in a similar note signed 'H. R.-B.,' on page 318 of *The Entomologist*.

Mr. Heatherley, describing (in *The Zoologist*, for September) a nest of the raven, states:—"I should very much like to mention the locality of this nest, as the alcove site could not be beaten as regards opportunities for watching, and the young could, by means of a ladder, be easily placed there. But so long as ornithology is infested by a number of born stamp-collectors who have missed their vocation, and who do ornithology more harm than any other of the bird's enemies, it is not wise to do so. I may say for the benefit of those who wish to help in preventing the extinction of our rarer birds, that by scribbling all over an egg with a blue marking-ink pencil marks are made which cannot be washed off without obliterating the natural blotches of the egg. I recommend this as a slight measure of protection against those who have not outgrown the childish state in which the desired object to give any pleasure must be grasped, even if the grasping entails destruction."

ANNELID BIONOMICS.

Rev. HILDERIC FRIEND, F.L.S., F.R.M.S.,
Swadlincote.

IN spite of the interest aroused by Darwin's book on Vegetable Mould, and all that has been done to increase our knowledge of earthworms, little is at present known on the subject which I have named as my theme. Some observations which have been made are of little value because too little attention was given to the species. Notes have been made about the common earthworm, as if we had only one, and not forty British species. What is true of *Lumbricus* may be inapplicable to *Allolobophora*, and observations anent the Brandling may be placed to the credit of a totally different worm.

I spent my brief holiday this year in visiting different localities, with a view to careful observations on annelids, and although the intense heat and drought made records respecting the *Lumbricidæ* to a great extent impossible, I was able to do a large amount of work upon the *Oligochaets* in general. My notes cover a wide field, and will follow in the form of separate memoranda.

OCTOLASIUM GRACILE Oerley.

This interesting worm, first described by Oerley, a most careful Hungarian authority, has been the subject of much unhappy handling on the part of the Continental writers. Michaelsen does not allow it separate existence, but gives the name as a synonym of *O. lacteum* Oerley. This is a mistake, for in England the two species are quite distinct. The British records are being tabulated by me in a series of articles on the Distribution of Annelids, which is appearing in the *Zoologist*. Hitherto I have always found it very sparingly as at Bridlington, Easter 1910; Carlisle, February, 1911; and elsewhere. This year, however, I had a curious experience. Arriving on August 14th at Sutton Broad Laboratory, kindly placed at my disposal by Sir Eustace and Mr. Robert Gurney, I went down to the landing stage, where the soil was moist, to try and obtain some earthworms for some experimental work in which my son, Dr. Newton Friend, F.C.S., is engaged. I soon found a dozen specimens of *Lumbricus rubellus* Hoffm. and a dozen of another species which I sent off without examination as *Allolobophora caliginosa* Sav. Next day when I began my studies, what was my surprise to find that I had been utterly mistaken, and that the dominant worm of the locality was *O. gracile*. Although I found a few other species of earthworm during my stay at Sutton, no other was so abundant as this; and the fact is so striking that it merits special record for the guidance of future observers.

HELODRILUS OCULATUS Hoffm.

The story of this curious worm is full of romance. Found more than half-a-century ago, it was named *oculatus* because it frequently shows two eye-spots on the head. It is the only 'earthworm' known in this zoological region possessed of that peculiarity. For many years it was lost to sight, and entered in all the records of the latter part of the nineteenth century as doubtful. Michaelsen in 1860 found a new *Allolobophora* which he named *A. hermanni*. This he states in 'Das Tierreich,' x., 497 (1900) to be the lost *H. oculatus* Hoffm. Some years ago I found *A. hermanni* Mich. at Cambridge, and in 1908 it was my good fortune to discover *H. oculatus* Hoffm. at Malvern. The problem has been to prove or disprove the truth of Michaelsen's contention. This year a Dutch correspondent sent me a specimen of *Helodrilus* from the Hague, which seemed to go to Michaelsen's favour. At Easter I paid a special visit to Malvern to collect living specimens of *Helodrilus*. I obtained it also at Eastnor, but though cocoons were fairly plentiful, not a single specimen of the worms possessed a girdle. In the Broads and at Yarmouth search was made for the worm in vain, but when I made an express visit to Cambridge, and went to the spot in the Gardens where *A. hermanni* Mich. had formerly been obtained adult, now only immature *H. oculatus* Hoffm. was to be found! Next a visit was paid to Kew, but the lakes, pools, and tanks were searched in vain for any trace of either *Helodrilus* or *Allolobophora*. Yet I no sooner passed out of the gates on to the Thames, than the oozy mud on its banks yielded me numberless specimens of *Helodrilus*, with cocoons. There seems little doubt about the identity of the species. Michaelsen appears to tread on safe ground when he gives *H. oculatus* Hoffm. as a synonym of *A. hermanni* Mich., but can *Helodrilus* produce cocoons without a girdle, or does the girdle appear for a brief period and then pass away? There is a marked difference in the size of the worms and also in that of the cocoons from Malvern and the Thames. Are the small cocoons those of worms without a girdle, and the large ones those of worms which have developed a clitellum, or what is the explanation of the phenomenon?

ENCHYTRÆIDS.

In February last a visit was paid to Newton Moss, near Penrith, in order to decide the question whether or not annelids lived in peaty soil. It is not necessary here to enter into that question as a whole, but my discoveries, confirmed by observations under similar conditions at Sutton Broad, are of interest. It will be found that wherever willows grow in bogs and mosses various *Enchytræids* abound in the soil beneath, and among the decaying leaves. Allusion has already been made in this

Journal to some of my results from Newton Moss. At Sutton I endeavoured to ascertain (1) the species found, (2) the extent of their correspondence with and differences from those in the North, and (3) the relative number of individuals of each species. The following table is given as an illustration of the result; and the point will be of greater interest still when I am able to work out the comparisons between Newton in Cumberland and Sutton in Norfolk in detail.

At the Eel hut on the Ant where the stream from Wayford embouches into the Barton Broad a lump of earth was taken from under the willow bushes, and the *Enchytræids* examined one by one. The results were as follows:—

<i>Fridericia bisetosa</i> Lev.	1
<i>Fridericia</i> , species new to Britain	1
<i>Fridericia</i> , species new to Britain	1
<i>Buchholzia fallax</i> Mich.	2
<i>Fridericia michaelsoni</i> Bret.	8
<i>Fridericia bulbosa</i> Rosa	11
<hr/>	
<i>Fridericias</i> , 22 out of Total	24

This does not exhaust the number of species found, but supplies a clue to the forms which are most prevalent and their relative numbers. Does each species do the same work as all the rest, or does one prepay the way for the other?

APORRECTODEA SIMILIS Friend.

On August 28th a visit was paid to Kew Gardens, with a view to deciding a number of bionomic questions, and the first worm which came to hand was a species which has not, so far as I am aware, been found elsewhere. As it was fairly numerous and is evidently a regular denizen of the Gardens, a detailed account of the animal is here supplied.

On May 3rd, 1910, I received a number of *Lumbricidi* collected in the Royal Gardens, Kew, by Mr. Free. These consisted of specimens of the brandling, red worm, green worm, submontane, and turgid worms, together with a specimen of a worm which is new to science. As it is in some respects very similar to the green worm (*Aporrectodea chlorotica*) I have little doubt but that it is more common than might be supposed, but has hitherto been passed by as belonging to the more familiar species. The name which I have adopted for the new species is intended to draw special attention to the similarity with the green worm, and so lead to its more careful discrimination in the future.

I may first give the main external characters, and then shew in parallel columns wherein the species differ. As I had, when writing this, only a solitary example I have not dissected

the new worm. The internal characters, therefore, remain for the present unknown.

A. similis Friend is 7 cm. in length when well preserved in alcohol. The first ten or dozen segments are without annuli, and the segments 5 to 8 are the widest and largest. The total number of segments is 180. The body is cylindrical, but the tail is somewhat flattened. When alive the animal resembles *caliginosa* in colour and shape, and in alcohol it is practically colourless. It is much more active than the green worm, and does not emit the yellow fluid for which the well-known ally

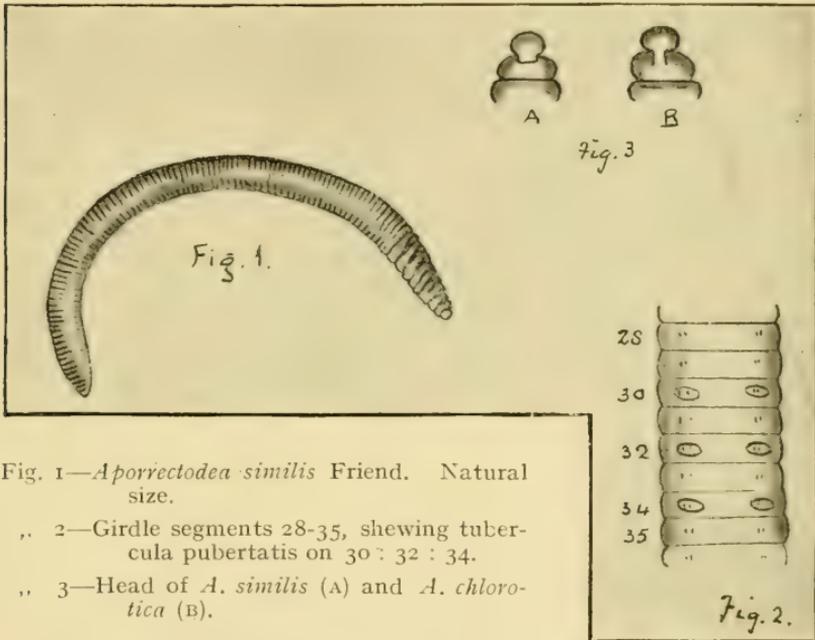


Fig. 1—*Aporrectodea similis* Friend. Natural size.
 „ 2—Girdle segments 28-35, shewing tubercula pubertatis on 30 : 32 : 34.
 „ 3—Head of *A. similis* (A) and *A. chlorotica* (B).

is famous. The male pores cannot be seen, nor have I yet been able to decide where the first dorsal pore is situated. The setae are paired as in the green worm. The girdle extends from the 28th to the 35th segment, and the tubercula pubertatis are situated on 30, 32, 34, *i.e.*, on alternate segments. There are no papillae on the more forward segments such as occur in the green worm and the mucous worm. The head barely cuts into the first segment (peristomium), but has a well marked groove running transversely. The diagram shews the difference between the two species in this respect.

But when we come to a side-by-side comparison we soon see how great the difference between the two species is.

A. similis Fr.

Length in alcohol about 7 cm.
 Number of segments, 180.
 Segments 5 to 8 largest and widest.
 Colour yellow-grey. Worm active.
 Very little, if any, mucus exuded.
 Crawls like *A. caliginosa*.
 Head with transverse furrow.
 Male pores invisible.
 Girdle covers 28 to 35.
 Tubercula pubertatis 30 : 32 : 34.

A. chlorotica Sav.

Length in alcohol $3\frac{1}{2}$ to 5 cm.
 Number of segments 80 to 130.
 Segments much more uniform.
 Usually green, and very sluggish.
 Very turbid, dirty green exudation.
 Usually coiled and difficult to move.
 Head with two parallel grooves.
 Male pores on very large papillæ.
 Girdle covers 29 to 37.
 Tubercula pubertatis 31 : 33 : 35.

Mons. de Ribaucourt points out that the male pores in *A. chlorotica* are already well developed when the tubercula pubertatis make their appearance. This is a point of great interest, because in the specimen of *A. similis* from which this description is drawn the male pores cannot be detected though the tubercula are well developed. In *chlorotica* the 14th to the 16th segments are greatly swollen, and there are papillæ on other segments in front of the girdle and male pores which are wanting in *similis*. Mature specimens of *A. chlorotica* were in the box containing the new species, and the differences in colour, size, and appearance were so marked that I could not confuse them in a living condition, though the similarity in the girdle and tubercula might easily lead one to confuse them if seen only in alcohol.

This interesting discovery serves to shew that our earth-worm fauna well repays the attention which is being bestowed upon it. The numbers of new species which have recently come under my notice reveal the fact that up till the present our knowledge of the subject has been exceedingly imperfect.

Readers would be rendering great service to science by sending specimens of Annelids from unexplored localities to the writer. It is also particularly desirable that the ooze of our estuaries and rivers be examined. Four ounces of mud from the banks of a river might contain a dozen different species of rare or little known worms, which would throw a flood of light on Annelid bionomics.

We regret to record the death of Mr. G. H. Verrall, the well-known authority on Diptera; also of Mr. Albert Harrison, entomologist.

The Marsden Hall Estate has been purchased by the Nelson (Lancs.) Town Council, and the Hall is to be converted into a public museum and art gallery.

What a wonderful place Filey must be; hardly a week passes but some extraordinary occurrence is recorded. The latest, which we take from the daily press, is 'a live eel, four inches long, which *can only have been dropped there by a whirlwind*, as there is no connection with the water supply, has been found on the roof of a house at Filey.'

REVIEWS AND BOOK NOTICES.

NEW NATURE STUDY BOOKS.

The production of popular natural History books still proceeds apace, and happily the rule is that they are well written, well printed, well illustrated, and cheap. In this way the study of natural history is becoming more and more general.

Messrs. Gowans & Gray, of Glasgow, have issued No. 29 of their well-known nature-books (76 pp., 6d.), being the fifth series of their **Wild Birds at Home**. There are 60 reproductions of charming photographs of bird-life, by **Mr. A. Brook**. The photographs are principally those of the jay, jackdaw, nightjar, buzzard, sparrow-hawk, and kestrel.

Messrs. Macmillan & Co. have issued a third edition, revised and enlarged, of **Mr. R. C. Punnett's** excellent little handbook on **Mendelism**, which we have already noticed in these columns. The fact that this work has been several times reprinted, and that American, German, and Swedish editions have been prepared, speaks for its popularity. The present edition (176 pp.), contains many illustrations, including some very fine coloured plates.

Messrs. Cassell & Co. have published **The Nature Lover's Handbook** (265 pp., 2/6). It is on light paper, of small size, and with rounded corners, evidently for use in the pocket. The book has been compiled by **Messrs. R. Kearton, J. J. Ward, H. P. Fitzgerald, H. Irving, and S. L. Bensusan**. There is a chapter of ten pages or so for each month, and elaborate tables of birds' nests and eggs, butterflies and moths, wild flowers and trees. These contain particulars of scientific and popular names, dates of appearance, where found, etc. It is just the thing for a teacher.

From the same publishing house have been issued **Wild Flowers as They Grow**, by **H. E. Corke** and **G. C. Nuttall** (2 vols., 5/- net each, 197 pp. each). They are printed in large type on stout paper, and would make admirable presentation volumes. These books claim to be the first to be illustrated from photographs of plants in situ, prepared by the Lumiere process. These are reproduced by the four-colour process, and certainly the actual plants are represented as well as in any illustrations we have seen. There are dozens of these beautiful plates, which include such subjects as dog-rose, scarlet pimpernel, wild strawberry, foxglove, bee-orchis, poppy, etc., etc.

Messrs. Methuen & Co. have published two interesting nature-books, both of which will certainly become popular.

The first is **Our Insect Friends and Foes**, (296 pp., 6/-), by **F. Martin Duncan**, and contains over fifty illustrations from photographs by the author. Some of these depict the insects in their various stages and in their natural surroundings; others shew enlargements of parts of insects. The chapters deal with insect communities, aquatic insects, insect actors, insects in commerce, poison fangs, plant fertilization, beetles, insect foes, etc. They are written in popular and readable English, and interest in the volume is maintained by many romantic narratives.

The same firm have published **The Life of Crustacea**, by **Dr. W. T. Calman** (289 pp., 6/-).

This, perhaps more than any book yet noticed, supplies a want. The Crustacea have been sadly neglected, and rarely do we see a 'nature-study' book refer to them in any way. This is largely due to the fact that few are qualified to write on the subject in an accurate and popular manner. Dr. Calman has succeeded in doing this, and his book should certainly give an impetus to the study of these interesting and neglected organisms. The volume is also made much more valuable by the wealth of excellent illustrations, there being 32 full-page plates and 85 illustrations in the text. The author not only describes all the numerous important forms of crabs, lobsters, shrimps, etc., etc., but has chapters on their distribution, both in time and space; fossil crustaceans, and methods of preserving the modern forms. We welcome the book; we have wanted it a long time.

Of a more serious kind, though none the less charming in point of style and also as regards illustrations, is **Prof. J. A. Thomson's** work on **The Biology of the Seasons** (Andrew Melrose, 384 pp., 10/6 net).

Perhaps the following extract from the author's preface will best explain the purport of the volume. 'From Gilbert White's evergreen "Natural History of Selborne" to Prof. L. C. Miall's "Round the Year" there has been a succession of Naturalist Year-Books. But the aim of this volume is at once more general and more intimate. It is an attempt to get at the underlying principles.' To shew the remarkable versatility of the author, we quote the following chapter headings from Part I., the 'Biology of Spring'; 'Impressionist Sketch,'; 'Young Things'; 'Tadpoles'; 'The Eel-Fare'; 'Caterpillars'; 'Rhythms in Plant-Life'; 'The Return of the Birds'; 'Migration,'; 'Re-awakenings' 'Spring Flowers.' Each of the essays is a gem. The plates are from clever paintings by W. Smith, and are mounted on tinted paper.

From Messrs. G. Routledge & Sons we have received a good volume, produced on similar lines to Masee's 'British Fungi and Lichens,' referred to in our October issue. The book is entitled **British Trees**, including the finer shrubs for garden and woodland, by the late **Rev. C. A. Johns**, and **E. T. Cook** (285 pp., 7/6 net). It is practically a new edition of the Rev. Johns' 'Forest Trees of Britain,' brought up-to-date, and with chapters on the shrubs added. Every British tree and shrub of importance is illustrated and described, and there are 56 plates (24 being coloured), as well as illustrations in the text. The book is all that it professes to be.

Wild Flowers of the British Isles, by **H. Isabel Adams** (W. Heinemann, 197 pp., 4to., 62 coloured plates, 30/- net).

This magnificent volume is a companion to that referred to in this Journal for December, 1907, pp. 434-5, and has all the charms and advantages of its predecessor. The 62 coloured plates are obviously the work of an accomplished artist as well as a botanist, and we should like to congratulate authoress and publisher alike on the appearance of the second volume. The present work includes the orders from the Campanulaceæ to the Araceæ, thus, with the previous volume, completing the whole of the British wild flowers, with the exception of water plants and trees. Should any of our readers wish to make a useful Xmas present that would certainly be appreciated by any educated person, we should recommend these two volumes by the talented authoress, Isabel Adams.

British Birds' Eggs, with twenty coloured plates, by **A. F. Lydon**, is evidently intended for the young collector of eggs; a subject we should hardly have expected the publishers, The Society for Promoting Christian Knowledge, to have encouraged. On these twenty quarto plates, there are 'eggs [drawings of!] representing all the indigenous birds of our islands, all the regular summer visitors that nest here, besides 140 out of the miscellaneous, chance, rare, and irregular spring and winter migrants. There are also four or five lines of descriptive letterpress to each egg, giving particulars of the bird's nest, position, date; and number of eggs. The author hopes 'that by having a faithful representation of one normal specimen of each species a key is furnished by which identification may be made comparatively easy.' But they are not 'faithful representations,' or else the eggs in the British Museum, which were selected, must be very unusual in colour, and occasionally so in shape. As a matter of fact the plates are useless for the purpose of identification of any but the most obvious species, and the way in which the eggs are represented, overlapping each other, only adds to the confusion. For example, plate 8, which is supposed to shew representative eggs of ten different species of duck, might almost be a drawing of a clutch of hen's eggs. We defy anybody, ornithologist or egg collector, to guess what even half the eggs are on any one of the plates. In fact, they cannot be 're-Lydon'!

THE NATURALIST.

A MONTHLY ILLUSTRATED JOURNAL OF
NATURAL HISTORY FOR THE NORTH OF ENGLAND.

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RILEY FORTUNE, F.Z.S.

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NOTES AND COMMENTS.

MUSEUMS CONFERENCE AT LIVERPOOL.

A conference of curators and members of museums committees was held at the Public Museum, Liverpool, on the 18th of October. Its chief value was the opportunity it afforded of enabling the visitors to see the elaborate way in which the specimens of birds are there exhibited. Each case is devoted to one species, with its nest, eggs, etc., in its natural surroundings, and it is astonishing to what an extent these are used by Art Students and others. There are scores upon scores of costly cases arranged in the extension of the museum. Mr. J. W. Cutmore, the taxidermist, described the methods of preparing these exhibits. Of particular value was the paper read by Mr. E. Rimbault Dibdin, of the Liverpool Art Gallery, in reference to the Copyright Bill which had already passed the House of Commons, the effect of which would be to take away the copyright of any work of art exhibited in any public Museum or Art Gallery. The authorities present were appealed to to agitate for the rejection of the Bill. The Director of the Liverpool Museum, Dr. Clubb, read a paper on 'The Educational Value of Museums for Schools.' Mr. W. S. Laverock gave some useful hints on 'The Exhibition of Botanical Specimens in Museums,' and Mr. P. Entwistle read a paper on 'The Method of Exhibiting an Introductory Series of Pottery and Porcelain.' The Museum's Committee entertained the visitors to tea at the museum, and also conducted them round the various and numerous galleries.

THE HOMING HABITS OF CRABS.

We learn from the *Yorkshire Post* that some remarkable results of experiments with crabs were reported recently at the half-yearly meeting of the Eastern Sea Fisheries Board, held at King's Lynn. Large numbers of Yorkshire, Lincolnshire, and Norfolk crabs had been captured, labelled, and released in the sea at various places, and since then 408 of the labelled crabs have been recaptured, and the experiment showed that the crabs, particularly those from Yorkshire, had wonderful homing instincts. The Board's Inspector (Mr. H. Donnison) gave a detailed report on the experiments. The investigations show that crabs keep to their own locality and that if taken a distance away their instinct is to return. Numbered crabs which were set free on the spot where obtained did not travel far, frequently only one or two miles. Crabs taken off Cromer and Overstrand and set free towards Suffolk, when recaptured were, with one exception, on or in the direction of their old feeding ground. In like manner, crabs taken from between

Sheringham and Runton, and brought towards the Wash, without exception, turned back. From Kelling the recaptured crabs travelled along the coast from 1 to 11 miles, from Salthouse 2 to 8½ miles, from Cley 3½ to 15½ miles, and from Brancaster 21 to 25 miles. Tidal currents, etc., did not prevent the homeward movements of the crabs, as it was done from opposite directions—from the south-east and north-west, according to the run of the coast.

PRODIGAL CRABS.

One Norfolk crab migrated to another county. This went the long distance from Sheringham to Flamborough, on the Yorkshire coast. One Lincolnshire crab also left its own waters. This travelled from Mablethorpe to the clayholes on the shore at Brancaster, Norfolk. One hundred marked Mablethorpe crabs were set free on the ground they came from, and with the exception of the one which crossed over to Brancaster, no crab was recaptured at a greater distance than four miles from the place of its liberation. With regard to the 364 crabs which were brought from the Yorkshire coast, labelled, and set free along the Lincolnshire coast, as far south as Skegness, only 27 as yet have been sent in for rewards. Twenty of these returned to their own coast, crossing the Humber in so doing. All would have to walk a long distance, even if they went direct. The distance between some of the places is as follows:—

From	To	Miles
Sutton-on-Sea	Hornsea	46
Ingoldmells	Hornsea	57
Huttoft	Flamborough	69
Skegness	Flamborough	76
Winthorpe	Filey	85

Five of the other recaptured Yorkshire crabs went a considerable distance north towards home, and two remained where set free. Not a single Yorkshire crab was recaptured south of the place of liberation.

YORKSHIRE CRABS.

Of the 20 Yorkshire crabs which returned from Lincolnshire to their own coast, two, a male and a female, were taken from the same trap and at the same time, although there were over a thousand traps set in the locality. Both crabs were originally caught on the 19th September, 1910, near Easington, Yorkshire, and after being labelled, the female was set free off Saltfleet, Lincolnshire, and the male off Huttoft, some distance further along the same coast. They were recaptured on 13th June of this year, and in addition to the catching of them when

together in the same trap, which was set in the neighbourhood of many similar pots, there is also the curious fact that the recapture was on their old ground at Easington, where they had been brought from nine months previously.

NOMENCLATURE AGAIN.

In *The Entomologist's Record* for November, Mr. L. J. Lambillion points out that there are now no fewer than three names for the dwarf aberration of *Pieris napi*. viz., *nappella*, given by himself; *minor*, given by Crombrugghe, and *minima*, named by Muschamp. Here is another instance of the unnecessary labelling of varieties. The first name was apparently given in 1902, the second, by another worker in the same year, and the third, this year.

THE MONEY COWRY.

In the *Irish Naturalist* for October Mr. R. Welch draws attention to the fact that in the first half of the nineteenth century, Belfast naturalists frequently had specimens of the Money Cowry (*Cypraea moneta*) sent to them from Bangor, County Down, which were supposed to have been from an old slave ship wrecked in the vicinity. Some years ago this shell was abundant on the Cumberland coast near the mouth of the Calder. These came from the 'Glendowre,' wrecked near Seacale in 1873, which had sixty tons of cowries on board; 'which would amount to seventy million shells in all, so that even now, and for many years to come, there is a chance of this shell being found almost anywhere on the north-west coast of England.' It would be interesting to know where the shell really does turn up.



Vol. XXIII., No. 5, of *The Entomologist's Record* is a special 'James William Tutt Memorial number, and is entirely devoted to notices of the journal's late editor, by many of his friends. The price of this special issue is half-a-crown.

The *Bradford Scientific Journal* still appears, if a little late. The last number we received (for July) has a paper on 'The Pre-historic Remains in the Shipley Glen,' by Mr. Butler Wood; 'A World Below Stones,' by Mr. W. P. Winter; 'Memories of the Month,' by Mr. A. Badland; 'The Common Lizard,' by Mr. J. A. Butterfield; and 'The late John Beddoe,' by Dr. J. H. Rowe.

Since the preceding was in type we have received the October number of this journal. In it Mr. F. Booth describes the molluscan fauna of Shipley Glen; Mr. H. B. Booth has some interesting notes on the nesting of three common birds, (and corrects some misprints); Mr. A. E. Benney writes on 'The Yellow Clay'; and Mr. E. P. Butterfield gives a list of the 'Micros' of the district.

FUNGI FOUND IN POLLUTED WEST RIDING STREAMS AND OTHER PLACES.*

J. W. H. JOHNSON, B.Sc.
Thornhill.

THE flora of polluted waters is characterised by an abundance of the lowest forms of vegetation, namely, Schizomycetes and Schizophyceæ, the blue-green algæ; as the pollution decreases there is an increase both in the number and variety of the higher forms.

The Schizomycetes or fission fungi is the lowest group of fungi, and may be conveniently arranged as follows:—

- | | | |
|-----------------------------------|----|-----------------------------------|
| Bacteria proper. | { | 1. Coccaceæ—rounded forms. |
| | | 2. Bacteriaceæ—rod forms. |
| | | 3. Spirillaceæ—twisted rod forms. |
| Sheathed bacteria. | 4. | Chlamydobacteriaceæ. |
| White sulphur bacteria. | 5. | Beggiatoaceæ. |
| Coloured—nonfilamentous—bacteria. | 6. | Rhodobacteriaceæ. |

The bacteria present in polluted waters are very numerous, amounting to as many as one million per cc. (twenty drops). They multiply by means of fission which is characteristic of the whole group, that is, the individual cells increase in length until a transverse wall is formed. The original cell is thus divided into two cells, and each of these functions like the original, by this means rapid multiplication is brought about.

The group of sheathed bacteria or Chlamydobacteriaceæ is distinguished from the bacteria proper by having the cell elements (bacteria) protected by a gelatinous sheath. This group contains most of the interesting lower forms of which the chief genera are *Chlamydothrix*, *Crenothrix*, *Sphærotilus*, *Cladothrix*, and *Zooglæa*.

Species of *Chlamydothrix* and *Crenothrix* occur as ochrey deposits in water and have therefore been called 'iron bacteria' or 'iron algæ.' Such growths have frequently been the cause of serious trouble in water supplies, by choking up the service pipes, and imparting an unpleasant taste to the water.

Sphærotilus, *Cladothrix*, and *Zooglæa* are most probably distinct forms of the same organism, and are all indicative of pollution. *Sphærotilus* is the common fungus met with in polluted streams, and its development is not restricted to any particular kind of pollution; it often occurs in the warm waste waters from manufacturing premises.

The next group Beggiatoaceæ contains the white sulphur bacteria, the chief species are *B. alba* and *B. leptomitiformis*;

* Abstract of paper read at the Sandsend Fungus Foray (Y.N.U.).

these occur in waters containing some form of sulphur. The filaments are regularly septate, but the sulphur deposit obscures the division walls giving the appearance of a nonseptate organism. *B. alba* occasions the white deposit seen in sulphur springs, and *B. leptomitiformis* forms the delicate white film sometimes found on decomposing mud.

The members of the group Rhodobacteriaceæ often contain sulphur, but are distinguished from the Beggiatoaceæ by possessing a red colouring matter (*bacteriopurpurin*), and by not being filamentous. *Chromatium Okenii* is the best known member, which in appearance greatly resembles a red flagellate, and may occur in such quantity as to give a distinct red colour to the liquid.

The fungi of the higher groups usually occur in less polluted waters, and are more frequent in running streams; but, as found, they are generally indeterminable. Subculture on suitable media is therefore necessary to reveal their identity. The subcultures are usually made in glass (Petri) dishes on solid media, and by this means the following species have been isolated:—*Mucor tenuis*? *Thamnidium elegans*, *Saprolegnia* sp.? *Leptomitius lacteus*, *Oospora lactis*, *Oospora* (*Monilia*) *variabilis*, †*Aspergillus griseus*, **Acremonium spicatum*, **Sporotrichum lanatum*, *Botrytis vulgaris*, *B. fascicularis*, *Fusarium solani*.

Round the Year with Nature, by **W. J. Claxton** (London: G. Routledge and Sons. 302 pp., 7/6 net), deals fully with the various aspects of animal and plant life month by month; and is evidently intended for younger readers. It begins in September, and there are chapters on 'Seed Formation and Dispersal,' 'The Woodlands,' 'Fruits,' 'The Partridge and Grouse.' Under October we find 'The Rose Family,' 'Fruits of the Hedgerow,' 'Nuts, Pheasant, Hare, and others, and a 'Ramble on the Moor,' and so on. Most of the information is gathered from rambles in the south of England. The book is unusually well illustrated, there being over 200 blocks from photographs in the text, and 24 coloured plates from paintings by Maude U. Clarke, which are really admirable; the view of the Fungi on the Moor (facing p. 48), being perfect.

Mr. Claxton has also issued another volume, **Methodical Nature Study** (Blackie & Sons, Ltd 195 pp.).

This work also deals with the various aspects of Nature, month by month, and the fact that part of the volume is reprinted from *The Teachers' Aid* shews that the writer had the teachers' needs in his mind when preparing his notes. The fact is further shewn as the author has endeavoured to correlate the Nature Study with drawing. Here, again, the author begins with September, in which month he deals with the woods, seed formation and dispersal, hips and haws; in October we have 'Fruits' the Partridge and Pheasant, Nut-bearing trees, leaf coloration,' in fact, throughout there is a similarity in this and the volume already referred to. *Methodical Nature Study*, however, is more for the teacher, whereas *Round the Year with Nature* is more for the scholars.

* New to Britain.

† Probably all such records are synonymous with *A. fumigatus*.

THE SPALDING GENTLEMEN'S SOCIETY.

THE history of the Spalding Gentlemen's Society is probably unique. Founded over two centuries ago by Maurice Johnson, and a few of his friends, with the object of studying literature, the arts, and antiquities, it still exists, on practically the same lines as those upon which it was originally founded. With the exception of a few slight breaks, the society has a



Photo by]

[S. Jebson.

New Home of the Spalding Gentlemen's Society.

continuous history, and even so long ago as 1784, a large quarto history of the society was published.

To-day, after all these years, the society has as devoted, enthusiastic and hardworking members as ever it had. These members still regularly meet, and discuss the local antiquities, make records of disappearing buildings, carefully collect the local tokens, medals, 'bygones,' as well as documents and books, and other objects illustrating the history, geology, etc., of their district,

For some years past the President, Dr. Marten Perry; the

Naturalist,

Secretary, Mr. Ashley K. Maples, and a few other of its members, have been very desirous of having a permanent home for the society's collections, and on the occasion of its two hundredth anniversary, made a strong effort to attain this end. An appeal was made for funds, and an amount considerably exceeding a thousand pounds was forthcoming. To those who live in larger and more flourishing towns, this success seems nothing short of miraculous, but there are not many societies in which the members work so whole-heartedly as they do at Spalding.

Anyway, an excellent site in a central part of the town was purchased, and upon it has been built a magnificent suite of rooms, including a library, museum, lecture-room, committee-room, etc., and a house for the caretaker.

These were formally opened on October 25th, by Sir Henry H. Howorth, K.C.I.E., M.P., F.R.S., etc., than whom it would have been difficult to have found a more suitable gentleman. Sir Henry put his whole heart and soul into the matter, and from opening the building at one o'clock, to a late hour at night, vastly entertained, in various ways, those who had the pleasure and privilege of being in his company.

Immediately after the opening ceremony, the members dined in their new lecture-room; a real substantial old-fashioned Lincolnshire meal, which laid a good 'foundation' for the subsequent proceedings. Afterwards several toasts were honoured, during which Dr. Perry and Sir Henry Howorth gave many interesting facts relating to the early years of the society, in the reign of Queen Anne. In this connection, Sir Henry commented upon the fact that England had reached the highest points of its political, its literary, and its scientific reputation in the reign of its three queens.

Later the members and visitors had an opportunity of examining the rare books, charters, documents, maps, engravings, tokens, 'bygones' (of which there is an excellent series), geological specimens, etc., in the society's possession. Mr. T. Sheppard then gave an address on 'The Value of Local Museums,' in which he congratulated the society upon the way in which it endeavoured to represent the archæology, geology and natural history of its own district, and did not attempt to make a miniature British Museum of its collection, with odds and ends from any and every corner of the earth. This is a danger which the society will have to fight against if it is to be successful in its work. It is pleasing to find that the Honorary Curator, Mr. E. M. M. Smith, has the right idea as to the nature of a local museum, and doubtless he will be well supported by his colleagues. Subsequently Mr. Sheppard gave a public lantern lecture on 'The Romans in Lincolnshire,' in which he described several thousand antiquities of Roman date, principally from North Lincolnshire, which are now in the

museum at Hull. Sir Henry Howorth, who presided, stated that he knew the lecturer very well, and was bound to say that if ever any valuable antiquities or other objects were missing from any of the museums or private collections in the county, the first place they looked to in the hope of finding them was the museum at Hull!

FOSSILS.

Fossil Fish Remains, etc. from Chesterfield.—During the past summer I examined the shale thrown out by a small colliery on the western boundary of Chesterfield, called the 'Ashgate Colliery.' *Carbonicola robusta* was found in the black shale; but where this occurs I did not find any vertebrate remains. *Anthracomya* sp. occurs in a black shale, and I noticed that *Megalichthys* teeth were often in the shale in association.

The following fish remains which I collected have been kindly named by Dr. A. Smith Woodward:—*Rhadinichthys monensis*; *Acanthodes* sp. (spines); *Coelacanthas elegans* (scales); *Pleuroplax rankinei* (teeth); *Helodus* sp. (teeth); *Diplodus* sp. (teeth); *Rhizodopsis sauroides* (teeth and jaw); *Megalichthys hibberti* (teeth and scales); *Platysomus* sp. (clavicle); and *Stemmatodus* sp. (teeth, etc.).—H. C. DRAKE, Scarborough.

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LEPIDOPTERA.

Entomological Notes.—This fine summer must have done something to repair the havoc amongst European lepidoptera caused by the wet and cold of recent seasons. Here, as generally, the 'Whites' have been only too abundant. I saw a newly-hatched male *P. rapæ* on October 20th, which date was unusually mild.

During the later half of September, *P. phlæas* was extremely plentiful on Lavender; and *V. urticæ* very abundant on the herbaceous borders. *Atalanta* seemed scarce, and *cardui* altogether absent, so far as my observation went.

What appeared to be a solitary specimen of *V. io*, was seen two days in succession, on the second day being partly disabled with a damaged wing, probably due to some bird's attack.

The Butterflies, no doubt, have hard work to escape from our numerous birds. Two springs ago (March), I heard of a Tortoise Shell Butterfly which was disturbed as it sat sunning itself on a garden path. As it flew, a sparrow came over my informant's head, and dashed the insect to the ground. It rose half crippled, and a starling swept down and carried it off.

A battered male, *S. convolvuli*, was taken from the back of a wooden shed in September, and released—W. H. ST. QUINTIN, Scampston, Yorks

RECENT RESEARCHES ON THE JURASSIC PLANTS OF YORKSHIRE.*

H. HAMSHAW THOMAS, M.A.

SINCE the formation of the large collections of fossils from the Yorkshire coast by Williamson, Bean, Leckenby, and other enthusiastic collectors, few plant remains of importance have been obtained from this famous locality. In 1879 Professor Nathorst, of Stockholm, had obtained a number of new and interesting forms, and during a visit in 1909 he made further important discoveries, on which the first of his recent papers on *Williamsonia* was based. It became clear that much further information about the flora of Jurassic times might be obtained by renewed researches in Yorkshire, and the present paper is a brief summary of some of the results obtained by Professor Nathorst, Dr. T. G. Halle, and myself.

Important additions to our knowledge of the Bennettiales have been made by Professor Nathorst. He distinguished, for the first time, the male sporophylls of *Williamsonia*, which are united together into a cup-like structure somewhat comparable to a flower. The sporophylls are more or less covered with large sessile synangia from which the remains of the microspores can be extracted in great numbers by treatment with acid in the usual way. *Williamsonia* appears to have been unlike most of the *Bennettites* (or *Cycadoidea*) in having unisexual 'flowers.' Several species of male 'flowers' have been distinguished, which differ in the number and the arrangement of the synangia. In some forms a considerable reduction in the number of synangia seems to have taken place. The female strobilus of *Williamsonia* bears a close resemblance to the corresponding structure in *Bennettites*.

I have recently discovered near Gristhorpe a new Bennettalian 'flower' which appears to be bisexual. The central axis bore the usual ovules and interseminal scales, and below this there was a whorl of five or six large free sporophylls, arranged in a similar way to the petals of a hypogynous flower. On these sporophylls five or six large reniform sporangia were borne.

Some facts in the history of seed-bearing plants will probably be furnished by the study of some small fruit-like bodies which I have recently found and have named *Caytonia*. They appear to contain the remains of eight to ten seeds, each 1 to 2 mm. long, and similar isolated seeds have been obtained. A certain amount of their structure has been preserved, and parts of the integuments, nucells, and micropylar tubes can be made out. These fruits appear to be undoubtedly angio-

* Read at the Portsmouth Meeting of the British Association.

spermous in nature, while at the same time these seeds may be comparable with the Palæozoic *Gnetopsis* and *Conostoma*.

Some additional information has been obtained about the mesozoic ferns. Dr. Halle has found that the sporangia of some specimens of *Cladophlebis denticulata* were pear-shaped and had an apical cap of thickened cells. He suggests the affinity of these with *Seftenbergia*. I believe that the sporangia of *Todites*, which are arranged much as in the modern *Todea*, possessed a similar apical cap of cells, and were in this respect different from the recent forms.

The sporangia and spores of *Coniopteris hymenophylloides* have been discovered and show resemblances to those of some of the modern *Cyathaceæ*. Fertile specimens of *Cladophlebis lobifolia* have been obtained which are somewhat similar to recent *Dicksonias* in the form of the sori and spores. The sporangia have not yet been clearly seen. We are now able to go a short distance towards splitting up the old artificial genus *Cladophlebis*.

Several plant remains new to Yorkshire have been found, such as *Stachypteris* and *Neocalamites* at Whitby, *Marattiopsis* at Marske. It seems probable that future work will yield many further interesting results.

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In *The Entomologist's Monthly Magazine* for November Mr. D. Sharpe points out that in his monograph on *Homalota*, he introduced *H. autumnalis*, but he now finds that the name should be *H. basicornis*.

Between 9 a.m. and 1 p.m. on September 30th, about two hundred Pomatorhine and Arctic Skuas, in parties of from five to twelve, were observed at Teesmouth, flying north-westward. (*British Birds*, November 1911).

Amongst the papers in the *Geological Magazine* (No. 567) is one by Mr. E. L. Gill on 'A Carboniferous Arachnid from Lancashire,' and one by Mr. J. W. Jackson on 'Two Arthropods from the Lancashire Coal Measures.'

In the *Journal of Conchology* (Vol. XIII., No. 7) there is an interesting paper on 'Additions to British Conchology,' a note on protective resemblance of marine mollusca near Scarborough, and a record of *Helix aspersa* var. *glabra* in Mid-Lincolnshire.

Dr. L. Moysey has an interesting paper 'On *Palæoxyris* and other allied fossils from the Derbyshire and Nottinghamshire Coalfield' in the *Quarterly Journal of the Geological Society*, No. 263. These curious objects were first described in *The Naturalist* by Mr. A. C. Seward many years ago; and it does not yet seem certain whether they are plant remains or the egg capsules of fishes.

The *Entomologist's Monthly Magazine* (No. 568) contains a beautifully coloured plate of 'Some Interesting British Insects.' Upon this are represented *Zygæna trifolii* ab. *obscura*, *Nonagria neurica*, *Nylophasia zollikoferi* (a specimen taken at Methley, near Leeds), *Luperina gueneei*, *Xanthia ocellaris*, *Ophiusa stolidia*, *Gelechia (Lita)*, *salicorne*, *Argyresthia(?) decimella*, and *Aristotelia tetragonella*. The descriptions are by Messrs. G. T. Porritt and E. R. Banks.

NEW RECORDS FOR BRITISH ANNELIDS.

Rev. HILDERIC FRIEND, F.L.S., F.R.M.S.,
Swadlincote.

DURING no previous year has so much been done as in the present to advance our knowledge of the Oligochaets of this country. This is due to the fact that the Royal Society has awarded me a grant from Government for the purpose of such investigations. The endowment of research is said by some to be very dangerous, and it is therefore a pleasure to be able to shew what may be achieved when a voluntary worker is aided in his heavy expenses. The present contribution is not intended to be exhaustive but suggestive; the aim being threefold. In the first place some recent records for rare and little known species will be given. We shall then take some of the species which are new to Britain, and close with a description of some annelids which are new to science. The lists will only include those names or species about which no doubt can any longer exist. There are a number of species in the writer's possession which can only be satisfactorily determined after a further investigation into their character on the one hand, and the recent Continental literature on the other; and it is felt that one had better make only such records as are entirely beyond dispute.

I. SOME NEW COUNTY RECORDS.

Nais heterochata Benham occurs at Woodville, Derbyshire. *Chætogaster diaphanus* Gruith, found in the same county, in a pond at Hartshorne between Burton-on-Trent and Ashby, September 28th, 1911. *Nais obtusa* Gerv., same time and place. Also *Stylaria lacustris* L., which was likewise the dominant water worm at Sutton Broads in August. The same species received from Crowborough in Sussex. *Nais clinguis* O.F.M., taken at Kirkbride, near Carlisle, February 4th.

Among the Tubificids we find *Clitellio arenarius* Müller at Lytham, *Limnodrilus hoffmeisteri* Clap. and *L. udekemianus* Clap. at Malvern, Kew, and elsewhere. *L. parvus* Southern at Repton, May 12th, adult, and near Malvern Wells; *Heterochæta costata* Clap. at Lytham, as well as in the mud of the river Thames, along with various other species of Tubificids which are still under examination. My thanks are due to Mr. Charles Todd of Tottenham, for samples of ooze from the Thames, the Roding, and the Lea, which are rich in worms of this description. Other species will be named later. *Tubifex templetoni* Southern occurs in Sutton Park near Birmingham, and at Welland, near Malvern.

Lumbriculus variegatus Müller is very widely distributed, though, strange to say, I sought it in vain in and around the Sutton Broads in August. These phenomena, as Mr. R. Gurney

remarked to me at the time, have their value, and ought to be recorded. I found one adult at Welland, 1909. *Stylodrilus vejdotskyi* Benham has also been frequently taken. *Psammoryctes barbatus* Grube has been found by me at Stratford-on-Avon, in the Thames and elsewhere.

Among the Enchytræids much valuable work has been done. *Henlea nasuta* Eisen occurs at Sutton, Norfolk, with *Buchholzia fallax* Mich. *B. appendiculata* Buch. is common around Swadlincote. *Pachydriulus subterraneus* Vej. was received recently from Worcester, where it was found in the drip from a tap. *Henlea puteana* Vej. abounds at Ledbury in Herefordshire.

Enchytræus albidus Henle, *E. pellucidus* Friend, and *E. argenteus* Mich. (= *E. parvulus* Friend) have received much attention. One or other of the forms, or each and all have been taken at Birmingham, Carlisle, Sutton Broads, Kew, Cambridge, Malvern, and elsewhere, and the question of their possible identity, with that of *E. hyalinus* Eisen, is being carefully studied. *E. turicensis* Bret. has this year been added to the English lists, as has also *E. minimus* Bret. *Fridericia bulbosa* Rosa is one of the most widely distributed species in this group, and has been found at Malvern, Hurstmonceux, Rugby, Newton near Penrith, Newark, and elsewhere, usually in the company of *F. michaelseni* Bret., while *F. striata* Lev., *F. ratzeli* Eisen, *F. leydigi* Vej., and *F. perrieri* Vej. have a similar distribution. Up till this year the various species of Achæta have evaded the English collectors, though three species have come into the hands of Mr. Southern in Ireland. We are, however, not without representatives of the genus. Our first record is *A. bohémica* Vej., Kew Gardens, August 28th, 1911. Another species has to be noted later.

I need say little about the earthworms as their distribution is being carefully worked out in my contributions to the *Zoologist*. An interesting form of *Eisenia rosea* Sav. was found in the Botanic Garden, Cambridge, on August 26th. One specimen of the rare *Bimastus eiseni* Lev. was taken on Mr. R. Gurney's estate near North Walsham; *Eophila icterica* Sav., *Aporrectodea similis* Friend, and *D. submontana* Vej., with other interesting species at Kew on August 28th. Special note may be made, in conclusion, of *Helodrilus oculatus* Hoffm. and *Octolasion gracile* Oerley. The former is now known to occur near Edinburgh, in various localities on the eastern side of the Malverns, at Eastnor, in the Botanic Garden, Cambridge, abundantly in the Thames at Kew, with other rare worms new to Britain, and in the dykes of the Sussex marshes, as at Boreham and Hurstmonceux. The other worm (*O. gracile*) was the subject of a note in the last issue (see page 394). It has been found abundantly at Sutton Broads, where it was the most

prevalent form of *Allolobophora*, and sparingly at Bridlington, Carlisle, in Scotland, Derbyshire, and elsewhere.

These notes, which do not by any means exhaust the year's records, will suffice to suggest the direction in which our subject is advancing.

II. ANNELIDS NEW TO BRITAIN.

The year has been fruitful in this direction also. A few worms which were known to occur in Ireland or Scotland have now been found in England too, while others are at present known only in England so far as these islands are concerned. It is pleasing to be able to record the occurrence in England of *Monopylephorus trichochæta* Dit., and *M. parvus* Dit. They were both found in the mud on the banks of the Thames off Kew Gardens, along with *Paranais naidina* Bret., *Helodrilus*, an Enchytræus new to science, and other novel oligochæts. A new *Trichodrilus* and a new *Stylodrilus* are under examination. The Enchytræids have been the chief subject of investigation, and mention may be made of *Buchholzia appendiculata* Buch., found at Smisby near Ashby, and elsewhere; *Enchytræus minimus* Bret. and *E. turicensis* Bret., found in Derbyshire; *Fridericia paroniana* Bret., a beautiful pigmy form discovered at Acresford near Ashby-de-la-Zouch with the last named, and another rare Enchytræid named *Achæta cameranoi* Cognetti. This is a most interesting addition to our worm fauna, since the creature not only has no setæ, but is even destitute of the sacs which are usually found in other species of *Achæta*.

Fridericia bisetosa Lev. as well as *F. bulbosa* Rosa may now be definitely added to the English list. During my stay at Sutton Broads Laboratory in August two or three new species of *Fridericia* were discovered; but these, together with some other Enchytræids from Newton Moss in Cumberland, and Newark, have yet to be determined. *Henlea rosai* Bret. was found by me at Buxton on May 27th, 1911. *Lumbricillus (Pachydrius) verrucosus* Clap. occurs near Ashby-de-la-Zouch.

I find on reference to my notes that there are several other species which have long been known to me which do not occur in the lists published by Southern and others. These will be enumerated in due course when the whole subject will come up for careful revision.

No new species of Lumbricid has been added to our lists since *Dendrobæna mercienensis* Friend was discovered. We pass, therefore, to our final subject, viz. :—

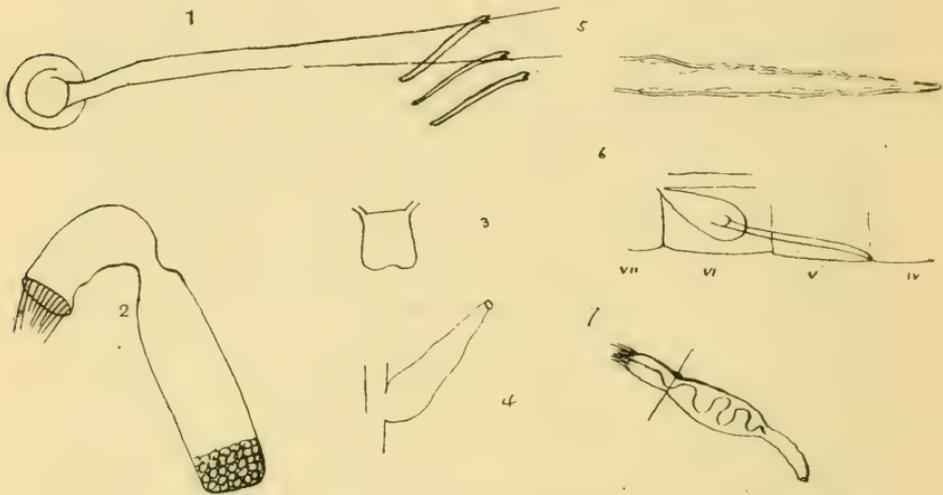
III. SPECIES NEW TO SCIENCE.

In a letter to *Nature*, September 21st, 1911, I stated that a new *Monopylephorus* had been found in the Thames ooze. Further examination shewed that the worm had already been

described, and two species of this genus have now been added to the one (*M. rubroniveus* Lev. = *Vermiculus pilosus* Goodrich), already known. I found, however, a new Enchytraeus and a new Limnodrilus in the mud, the latter occurring in the Lily Ponds in Kew Gardens as well. The diagnoses are as follows:—

1. *Limnodrilus aurantiacus*, n. sp.

Length 6-8 mm. or more, with about 60 segments. Brilliant orange coloured cells in segments 8 to 20 or thereabouts—hence the name. Setæ usually 5 in segments 2 to 8, and three behind the 8th segment, varying somewhat in size in two ways. The setæ in front (anterior) are to those of the posterior segments as 3 : 2 in length, while the individuals of the anterior



1. — Penis sheath of *Limnodrilus aurantiacus* Friend, with setæ of same relative size.
 2.—Spermatheca of " "
 3.—Brain of *F. exigua* Friend. "
 4.—Spermatheca of *F. exigua* joining intestine.
 Salivary gland (5), spermatheca (6) joined to intestine in 6/7, Nephridium (7) of *Fredericia pulchra* Friend.

segments are of unequal lengths. A large heart occurs in segment 8 with a less prominent one in the 9th. The penis sheath is slightly bent, and its length is to its greatest breadth as 13 : 1. It is of value also to observe that the penis sheath is five times as long as the hinder setæ, and nearly four times the length of those in the anterior bundles. The brain is roundish, with strong processes in front and a slight concavity behind. The shape of the spermatheca can only be rightly understood by means of a drawing. The pharynx reaches to the posterior end of the 4th segment, and the septa 4/5 to 7/8 are thickened. The nephridia of the tail possess a very tiny ante-septal,

2. *Enchytræus exiguus*, n. sp.

A very tiny creature measuring 2-3 mm. and containing about 28 segments. Blood yellow; heart-like bodies in segments 7 and 8. The setæ are large for the size of the worm, are 2 or 3 in number in each bundle, while the front individuals are to the hinder ones as 3 : 4 in length. The girdle extends over segment 12 to the setæ of 13. The spermathecæ do not possess glands, diverticula, or a separate duct, but gradually widen towards the intestine. The salivary glands are of a very rudimentary character and look like the two ends of an old-fashioned clerical cravat. There are strong single commissures in $3/4$ and $4/5$, and the post-septal of the nephridia is about five times the length of the anteseptal. The dorsal vessel originates in $11/12$ at the beginning of the girdle.

3. *Fridericia peruviana* Friend.

This species was received in earth from Kew Gardens. The mould had come with plants from Peru, and the description is in the hands of the Sec. Roy. Micro. Society.

4. *Fridericia pulchra*, n. sp.

When I was at Kew on August 28th, a careful inspection was made of the loam heap. Here, along with *Eophila icterica* Sav., *Aporrectodea similis* Friend, *Achaeta bohémica* Vej., and other rare annelids, I found a species which is not known to me as having been previously described. It belongs to the bisetose group but differs in various ways from *paroniana*, *maculata*, and *bisetosa*. The setæ, of which there are two in front, and one in each set behind, are bent internally. The worm is quite transparent, is 12-15 mm. in length, and has from 55 to 60 segments. It is a yellowish green to the naked eye, the colour being due to the coelomic corpuscles, which are individually large and of a yellow hue, but tend to shew a green tint when crowded. A striking characteristic is the long salivaries which extend back to the septum $7/8$. The chloragogen cells on the intestine are large, brownish, and somewhat wide apart. The spermathecæ have long ducts which open normally in $4/5$, but the ampulla joins the intestine further back than usual, near the septum $6/7$. The ante-septal is nearly as large as the post-septal, but this latter gives off about its middle a large duct which increases its apparent size. The duct is as long as the other parts of the nephridium combined. The dorsal vessel originates about $21/22$ or even further back, the girdle covers segment 12 and $\frac{2}{3}$ of 13, there are two pairs of septals in $4/5$, $5/6$, and the septa behind these as far as $8/9$ are thickened and forced back. The ampulla in segment 12 is about 2-3 times as long as broad, straight at the mouth, without neck or collar, grey and glandular. The duct is slender, coiled and long. It is the prettiest species I have seen, hence the name.

5. *Henlea perpussilla* Friend, was described in this journal in September (see page 320).

6. *Trigaster minima* Friend.

Some earth received by me from Kew, in May, which had come from Peru, contained two immature Perichaetidae, and a new Enchytraeid. When I had kept the earth several weeks I found another annelid which seems to represent a species new to science. Beddard's *Monograph* contains the following account of Benham's genus *Trigaster*:—'*Definition*: Setae strictly paired, Clitellum extensive, XIII.-XL. Three gizzards in VII.-IX.; calciferous glands absent; Nephridia diffuse; a mucous gland present; penial setae absent. This genus only contains one species.' The type came from the West Indies, and was fully described by Benham, who notes that the prostomium is not imbedded in the buccal segment or peristomium, that the intestine begins in the thirteenth segment, and that the spermathecae are without any apparent diverticula. In *Das Tierreich* Michaelsen gives five species, but the remaining four have only 2 gizzards, and *Trigaster lankesteri* Ben. remains alone with three. This species is, however, subdivided into three subspecies, on account of the differences in the setae and other details. In the type the gizzards are in segments 7, 8, 9; in *intermedia* and *calwoodi* they occupy segments 5, 6, 7.

The position of the gizzards is a point of great importance, as is also that of the hearts and the commencement of the intestine. In these particulars the species now under consideration varies widely from Benham's type, as will be seen from the following details.

Trigaster sp. nov. Immature. Number of segments, 50; length, 15 mm.; breadth, 1 mm.; prostomium very delicate, and capable of being drawn into the buccal cavity and everted. The movements of the worm remind one of a planarian rather than of an oligochaet. The setae are paired, and differ somewhat in length and size in the ventral and dorsal bundles. The dorsal vessel is attended by dark chloragogen cells, and there are four or more pulsating hearts between the gizzards and the intestine, the strongest being in segments 12-15. The intestine begins in 19, and the gizzards lie in 9, 10, 11. The segments in front of the gizzards are richly supplied with blood vessels, which ramify in all directions. A commissure is found in each segment behind the 19th. There is a striking difference between the fore and hinder parts of the intestine. From its commencement backwards to the 30th segment it is of large size; it then contracts, and from about the 33rd to the end, it is only one half the size.

Unfortunately the immature condition of the specimen renders it impossible for me to give any information respecting the disposition and structure of the sexual organs. But the

details I am able to supply are abundant to show how widely the new species differs from Benham's type. It may be well to place the essential points side by side.

Organs.	<i>T. lankesteri.</i>	<i>T. l.</i> vars.	Sp. nov.
Gizzards	7, 8, 9	5, 6, 7	9, 10, 11
Segments	Ca 500	550-580	50
Length	?	240-280 mm.	15 mm.
Last Heart	? 12	13	Ca 16
Intestine begins ..	13	? 13	19

In the related genus *Benhamia*, we find species differing in length from 16 mm. (in *B. curta*) to 540 mm. (in *B. rosca*), and we may therefore expect *Trigaster* to have a similar range. On account of the small size of the species here described, I propose to name it *Trigaster minima*. Other species new to science will be described in a later contribution. Meanwhile I earnestly solicit the co-operation of collectors.

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In the November *Geological Magazine*, Dr. Lewis Moysey describes and figures some arthropods from the Derbyshire and Nottinghamshire coalfield, including *Leaia trigonioides* sp. nov.

In *The Mineralogical Magazine*, No. 74, Mr. F. H. Butler has a paper on 'The Brecciation of Mineral-veins,' in which he figures and describes examples from the Isle of Man, Grassington in Yorkshire, and Allenheads in Northumberland. In the same journal the Rev. Mark Fletcher figures and describes some artificially produced crystals of Gypsum, from Burton-on-Trent.

With the new volume the *Annals of Scottish Natural History* will appear monthly, instead of quarterly, and will be devoted exclusively to zoology. The last part of the old series (No. 80) contains a report on Scottish ornithology for 1910, the Hydroid Fauna of the West of Scotland, the Freshwater Rhizopoda and Heliozoa of Scotland, and the distribution of *Goodyera repens*.

In the *Journal of Botany*, Major Wolley-Dod describes a rose to which he gives the name *Rosa Margerisoni*. He writes: 'Reluctant though I have been to name any new form, especially one of which the parentage is doubtful, I think this form is sufficiently distinct to deserve a name, and its finder tells me there are several bushes.' The finder was Mr. Samuel Margerison of Calverley, who obtained the plant in Upper Wharfedale.

In *The Zoologist* (No. 844), Mr. F. J. Stubbs has some interesting observations on the Nocturnal Habits of the Redwing; Mr. J. M. Charlton describes the birds of the Northumberland coast; Mr. R. Fortune gives a spirited reply to the criticisms upon his observations of a variety of the Gannet, and adds 'it seems nowadays to be perfectly useless recording any occurrence rare, or differing from the normal, unless one is prepared to exhibit the specimen "in the flesh" and, although this course may be considered correct by "scientific" naturalists, to me, as a "field" observer pure and simple, it does not appeal. Otherwise it would have been an easy matter to have secured the bird.' With these remarks we heartily agree, though we do not remember to have previously met with a 'pure' and 'simple' ornithologist! Mr. R. Warren refers to his transactions with a Leeds dealer in birds' eggs.

THE CHEMISTRY OF SOME COMMON PLANTS.

P. Q. KEEGAN LL.D.,
Patterdale, Westmorland.

WOUNDWORT (*Stachys sylvatica*). This vigorous perennial flourishes in spring and summer in thickets and wood-edges, and occasionally sprouts forth in great force from cinder heaps and refuse gatherings. The rhizome puts forth subterranean creeping branches, forming aerial stems provided with adventive roots at their base after the flowering period. On July 8th the entire leaves dried yielded 2.3 per cent. benzene extract, consisting of considerable carotin with some fat-oil, wax, and resin. The alcoholic extract contains a tannoid with a quinol nucleus, its ammoniacal solution turns deep brown in air; there was no glucose, and only a little cane-sugar. Much mucilage was extracted by hot water and dilute alkali, but no proteid; there was some glucoside, acid-soluble proteid, and much oxalate of calcium, but no reserve starch. There was 11 per cent. of ash in dry, which contained 34.2 per cent. soluble salts, 7.9 silica, 25.2 lime, 7 magnesia, 6.6 P^2O^5 , 7.4 Cl., and 2.7 SO^3 ; there was only a little manganese, and a moderate amount of soluble carbonate. The leaf mesophyll has only three layers of cells, but they all contain chlorophyll, which is crystalline according to Willstätter. These conditions seem to be favourable to the development both of fat-oil and volatile oil, but induce apparently a shortage of tannin. When Labiates grow vigorously, and have sufficient moisture and sunlight, they produce large quantities of volatile oil, but plants in a poor condition and of stunted growth contain only oleo-resin. The volatile oil of the Woundwort seems to consist mostly of derivatives of cymene.

BOGBEAN (*Menyanthes trifoliata*). This inhabitant of peat bogs is found most frequently in pools where the surrounding soil is wanting in lime, *i.e.*, in acid humus. The rhizome is of very singular structure, it is formed of rings close together, from which the leaf buds spring forth incessantly, its central portion is absolutely similar to that of aquatic Monocotyledons, its cortex and pith have air spaces, and their cells contain reserves (inulin mostly and no starch); the roots are provided with hairs (often wanting in bog plants), and have no mycorrhiza. The leaves have an extremely lacunar mesophyll, and a considerable power of transpiration. On 14th June the dried leaves yielded 1.5 per cent. wax, with much carotin; they contain also a considerable quantity of caffeetannin (a very interesting fact) and a resin dissolving in sulphuric acid deep brown passing to a splendid red, also a bitter principle named menyanthin; there was no sugar, but some inulin, reserve starch, and soluble proteid, no ordinary mucilage or pararabin,

and only traces of oxalate of calcium. The ash of the leaves amounted to 8.6 per cent. in dry, and contained 38.9 per cent. soluble salts, 4.1 silica, 20.2 lime, 7.1 P_2O_5 , 6.8 SO_3 , some iron and manganese, very much soluble carbonate, and traces of chlorine. The chemistry of this plant corresponds to some extent with that of its co-habitant the Marsh Cinquefoil, but, although the nitrogenous matter which supplies both is of the same nature, there is less starch in the former, and the various tannins and organic acids produced are essentially different.

ST. JOHN'S WORT (*Hypericum perforatum*). This plant belongs to a section of plants that in our clime are evidently not quite to the manner born, although some are regarded as true natives. Their peculiarity seems to be that a great deal of their vitality seems to be thrown into the stem, the leaves and other organs being neglected. Moreover, there is a distinct development of secretory canals and sacs, such as is more characteristic of sub-tropical organisms. On 5th August, the overground parts yielded a good deal of wax with a little carotin and fat oil; there was a considerable quantity of a tannin which precipitated gelatine, bromine water and tartar emetic, and yields a voluminous fine red phlobaphene by dilute acids—altogether it was similar to the tannin of ordinary tea; there was also a resin with no aldehydic groups, some cane-sugar, free phloroglucin, and phlobaphene, much mucilage, but no starch, oxalate of calcium, or soluble proteid. The ash contained 38.1 soluble salts, 7.9 silica and sand, 15.2 lime, 12.1 P_2O_5 , 6.5 SO_3 , 5.5 chlorine, with a good deal of iron and manganese; there was only a little carbonate. The plant is a very poor producer of starch and organic acid. There is, however, powerful evidence of a great production of nitrogenous matter which undergoes deassimilation chiefly in the direction of aromatic derivatives, viz., tannins, resins, and some volatile oil. Perhaps the most remarkable feature is the great facility with which the soluble carbohydrates are converted to the elements which help to build up fibrous tissue, thuswise indicating a regular development, a profound differentiation, and a slowness of growth.

An obituary notice of the late John Beddoe, M.D., F.R.S., the well-known anthropologist, with portrait, appears in *Man*, for October.

The *Journal of Conchology* for October contains an interesting paper on the colour and band variations and distribution of *Helix nemoralis* and *H. hortensis*, based largely on Yorkshire specimens.

Mr. A. E. Lechmere has an elaborately illustrated paper on 'Investigations of Methods of Reproduction in the *Saprolegniaceæ*,' in '*The New Phytologist*, Vol. X., Double Number, Nos. 5 and 6. May and June, 1911. Published September 30th.' (Why not say 'Vol. X., No. 5, September, 1911'?)

MARINE BIOLOGICAL MEETING AT SCARBOROUGH.

By REV. F. H. WOODS,
Bainton.

THE meeting of the Marine Biological Committee at Scarborough proved highly successful in every way. The weather was fine, the tides very low, and large numbers of finds were made. Those new to the Scarborough Society are marked (rec.), though not necessarily 'records' in the strict sense of the term, in all except the shell molluscs. The only shell mollusc not previously recorded for Scarborough is *Lepeta fulva*. The specimen is very minute, but has the ribs radiating from the beak, which define this species, distinctly marked, though very fine, and it is quite different in shape from specimens of *Acmæa virginea* of the same size. *Lamellaria perspicua*, of which I found a large number of living specimens in seaweed washed up at Bridlington after a storm some years ago, I have not otherwise met before on the Yorkshire coast. *Brachystomia albella*, the identification of which requires confirmation, was found by Jeffreys at Filey. *Modiolaria marmorata* does not appear to have been found in a living state on the coast itself before, though occurring not unfrequently in shell sand. *Nuculana minuta* occurs occasionally in shell sand at Scarborough. I found three specimens on my previous visit to Scarborough, two on the last occasion. The specimen of *Montacuta substriata* was very much worn, and must have come from the deep sea. Other more or less rarities were *Mangilia costata*, and *Eulimella commutata*, which I have not come across before. On a previous visit to Scarborough, I found a specimen of *Setia obtusa* (*Rissoa soluta*) which does not appear to be definitely mentioned as found in Scarborough before, but Jeffreys does not give any special localities either for this or *Lepeta fulva*, so that he may have found both on the Yorkshire coast.

The afternoons were devoted to exhibits, which were placed temporarily in the museum. The evenings were occupied by lectures. Mr. Watson's lantern lecture on "Sedentary Sea-worms" was remarkably interesting. The success of the meeting was largely due to the untiring energies of the Scarborough Field Naturalists' Society. It was decided by the Committee to hold the next annual meeting at Robin Hood's Bay, if possible, at the spring tide, immediately following the autumnal equinox.

A full list of the different species is given below:—*

PORIFERA (Sponges).	
<i>Ascetta primordialis.</i>	<i>Leuconia nivea.</i>
<i>Sycandra ciliata.</i>	<i>Leucosolenia botryoides.</i>
<i>Grantia compressa.</i>	<i>Halisarca</i>
	<i>Halichondria panicea.</i>
	<i>Chalina oculata.</i>

* These are compiled from lists supplied to me by Dr. Irving, Messrs. Watson, Thompson and Burnley. I am responsible myself for that of the Shell-Molluscs only.

HYDROZOA.

- Tubularia indivisa*.
 " sp. compound.
Obelia geniculata.
Clytia johnstoni.
Plumularia se'acca.
Sertularia pumila.
 " *abiet'na*.
 " *falcata* (rec.)
 " *filicula* (rec.)
Thuiaria thuja.

ACTINOZOA.

- Actinia mesembryanthemum*.
Tealia crassicornis.
Dianthus plumosa.
Sagartia miniata.
 " *parasitica* (trawl).
 " *pwa*.
 " *trogloodytes*.
Acyonidium digitatum.

POLYZOA.

- Flustra securifrons* (rec.)
Membranipora membranacea.
 " *pilosa*.
Bugula turbinata (rec.)
Acyonidium gelatinosum (rec.)
 " *hirsutum* (rec.)
Pedicellina cernua.
Scrupocellaria reptans (rec.)
Crisia eburnea (rec.)

VERMES (Worms).

- Leptoplana tremellaris*.
Carinella annulata Montagu (rec.)
Harmothoë (Polynoë) imbricata.
Syllis armillaris Müller (rec.)
Lepidonotus squamatus Linn (rec.)
Nereis diversicolor.
 " *cultrifera* Grube (rec.)
Polydora ciliata Johnston (rec.)
Cirratulus (Andoninia) tentaculus
 Montagu (rec.)
Cirratulus cirratus.
Amphitrite johnstoni Malmgr.
Terebella (Lanice) conchilega Pallas.
Nicomache lumbricalis Fabr. (rec.)
Arenicola marina Linn.
Siphonostoma (Flabelligera) affinis
 M. Sars (rec.)
Serpula vermicularis.
Pomatoceras triquetrum Linn.
Spirorbis borealis.
Sabellaria spinulosa Leuckart (rec.)

MOLLUSCA (Shelled).

- * *Tonicella rubra*.
 * *Craspedochilus cinereus*.
 * *Acanthochites fascicularis*.
Nucula nitida.
 † *Nuculana minuta*.
 † * *Anomia ephippium*.
 " *patelliformis*.
 * *Mytilus edulis*.
 † * *Modiolaria marmorata*.
 † " *discors*.
 † " *discrepans*.
Ostrea edulis.
 † *Chlamys varius*.
Æquipecten opercularis.
Turtonia minuta.
 † *Astarte compressa* ?
Cyprina islandica.
Montacuta substriata ?
 " *bidentata*.
Tellinomya ferruginosa.
 * *Kellia suborbicularis*.
Lasea rubra.
Syndosmya alba.
 * *Tellina tenuis*.
 " *fabula*.
Macoma baltica.
Donax vittatus.
 † *Maetra stult-rum*.
 † *Spisula solida*.
 † *Venus gallina*.
 * *Tapes pullastra*.
 " v. *perforans*.
Cardium echinatum.
 " *fasciatum*.
 " *nodosum* ?
 † " *edule*.
 † *Psammobia ferroensis*.
Ensis siliqua.
 * *Saxicava rugosa*.
 * *Barnea candida*.
 * *Zirphæa crispata*.
 * *Patella vulgata*.
 * *Helcion pelluc da*.
 * *Acmæa virginea*.
 † *Lepeta fulva* ?
Eumargarita helicina.
 * *Gibbula cineraria*.
 * *Calliostoma zizyphinus*.
 * *Lacuna divaricata*.
 * " *pallidula*.
 * *Littorina obtusata*.
 * " *rudis*.
 * " *littorea*.
Rissoa parva.
 * " v. *interrupta*.

NOTE.—An asterisk * prefixed to a name signifies that the animal was found in a living state; a dagger † that it was only found in a very young state.

- Alvania punctura.*
Manzonina costata.
 **Onoba striata.*
 **Cingula semistriata.*
 †*Paludestrina stagnalis.*
Skenea planorbis.
Homalogyra atomus.
 **Trivia europæa.*
 †*Natica alderi.*
 †*Lamellaria perspicua.*
 †*Velutina lævigata.*
Odostomia unidentata.
 " *turrita.*
Brachystomia rissoides.
 " *albella?*
Pyrgulina interstincta.
Spiralinella spiralis.
 †*Turbonilla lactea?*
Eulinella commutata.
 **Buccinum undatum.*
 **Neptunea antiqua* (trawler).
 **Tritonofusus gracilis* (trawler).
 **Purpura lapillus.*
 **Nassa incrassata.*
 †*Bela turricula.*
 †*Mangilia costata.*
 †*Clathurella linearis.*
 †*Actæon tornatilis.*
 **Tornatina truncatula.*
Diaphana hyalina.
Philine catena.
 " *punctata.*
 **Pleurobranchus pumilus.*
- MOLLUSCA (nudibranchs).
- Archidoris tuberculata.*
Jorunna johnstoni.
Lamellidoris aspera.
 " *repanda.*
Aeolidia papillosa.
Facelina coronata.
Coryphella rufibranchialis.
Polycera quadrilineata.
Ancula cristata.
- ECHINODERMATA.
- Cucumaria pentactes* (rec.)
- Asterias rubens.*
Cribella oculata.
Astropecten (trawl) (rec.)
Solaster papposa.
Ophicoma rosula.
Ophiura texturata.
 " *ciliaris.*
Echinus sphaera.
 " *miliaris.*
- CRUSTACEA.
- Cyclops marina.*
Balanus balanoides.
Carcinus mænas.
Cancer pagurus.
Lithodes maia (trawl).
Hyas araneus.
Stenorynchus tenuirostris.
Porcellana longicornis.
Inachus dorynchus.
Eupagurus bernhardus.
Galathea squamifera.
Gammarus marinus.
Mysis chamæleon.
Talitrus locusta.
Orchestia littoralis.
Idotea tricuspidata.
Caprella tuberculata.
 " *acantifera.*
Amphithoë littorina.
Hippolyte (*Virbius*) *varians* (rec.)
- PYCNOGONIDA.
- Pycnogonum littorale.*
Phoxichilus spinosus.
Phoxichilidium coccineum.
Nymphon gracile.
- TUNICATA.
- Ascidia mentula.*
Cione intestinalis (trawl).
Cynthia aggregata.
Fragarium elegans.
Botryllus smaragdus.
 " *schlosseri.*
 " *rubrus.*
Botrylloides.

In addition to the worms here specified, Mr. Watson found a minute Gephyrean, *Phascolosoma minutum*, which was sent for identification to Professor Spengel. It has not been recorded, hitherto, for the Yorkshire coast.

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In a 'natural history' monthly we are sorry to find that some bats have been 'found impaled upon barbed wire by a policeman.' In the same journal is a record of some 'ofahlzned' snails. We guess its 'orphaned,' but even that doesn't seem quite right.

THE BORING HABITS, ETC., OF THE PHOLAS.

W. HARRISON HUTTON,
Leeds

ON July 18th, 1907, assisted by Mr. Talbot Thompson of Scarbro', I collected a number of *Pholas dactylus* and *P. candida* on the rocks in the North Bay, Scarbro'. These I brought home and placed in my marine aquarium on the 19th.

Most of them were in their bores in the pieces of rock we had broken from the scars, but a few were loose. As all the Pholas were found in a very soft blue rock (Oxford Clay), I placed some fairly soft pieces of the rock on the bottom of my aquarium; upon these I placed the Pholas that were loose, or had no bores, and although they were upon and amongst the pieces of soft rock six days, they made no attempt to bore into them, that I could detect, though I examined the pieces very carefully. I then removed two, and placed them in small holes that I had made in a piece of the rock; these holes accommodated about three parts of the shells. Four days later I found these were slightly enlarged, and, in a further four days, the shells were completely embedded in the rock. Another specimen that had bored through the piece of rock, and had fallen out of the other side, I replaced, and each time it worked its way out of the other end. Then I placed it upon a piece of soft rough rock; but for three days it made no attempt to bore amongst the inequalities of the rock.

From the preceding it seemed clear that the Pholas do not 'bore' into the rocks, but the young fry are deposited or find their way into the very small holes and inequalities of the clays and rocks, and, lodging in them, gradually enlarge the holes, as they grow, by a slow continual rotatory movement. As they grow larger the aperture grows with them, and if they are at any time removed after they have acquired some growth, they cannot make themselves a new habitation.

I repeated the experiments the year following with the same results.

I was surprised at the length to which the Pholas was able to extend its syphon; one specimen (and in proportion all the specimens were similar), measured just over $1\frac{1}{2}$ inches, when within its shell; but when it extended its syphon it measured $3\frac{1}{8}$ inches.

This year I had an interesting experience when collecting Pholas in the North Bay, Scarbro'. I broke away the rock so that the mollusca would fall out. I then waited until the water in the pool, into which they had fallen, cleared, so that I could pick them out. To my surprise, however, I could not find a single specimen. This occurred two or three times in

succession. On examining the pool more carefully I noticed a moderate-sized crab busy with something under a ledge of rock. To confirm my suspicions, I broke out a Pholas away from the pool, so as not to stir up the mud, and dropped it into the water, when out rushed three or four crabs, and the one there first seized the Pholas and scurried away, holding the shell up in its fore-claws.

Having often heard wonder expressed that the Pholas could excavate holes into rocks of varying hardness with so fragile a shell, I tested the cutting hardness of the shell. I found that with the rasplike sides of a valve I could scratch and wear into marble and calcite, and also scratch fluor-spar. Evidently, therefore, the shell is sufficiently hard to wear into wet rocks.

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The 'Journal of Agriculture' for November contains illustrated notes on the Wart Disease of Potatoes, and a Cucumber and Melon disease new to Britain.

The latest from Filey is that a bullock has been removed from the golf links on account of the fact that it runs after golf balls and chews them, much to the annoyance of the golfers!

'Petrology in Yorkshire' will be the subject of Mr. A. Harker's Presidential Address to the Yorkshire Naturalists' Union, at the Annual Meeting to be held at Heckmondwike, December 16th.

Volume XLV. of the North Staffordshire Field Club's Annual Report and Proceedings for 1910-11 contains valuable reports on the club's year's work, in the various branches. There are also a number of archaeological papers bearing upon the club's sphere of investigation.

'Shipley Glen: An explanatory Outline of its Physical Features for the interested lover of our country', is reprinted from 'The Bradford Scientific Journal,' by Mr. W. P. Winter, B.Sc. The pamphlet is well illustrated by a map and views. It should have been dated.

Part VIII. of Major Barrett Hamilton's 'History of British Mammals' deals with the hedgehog, the common shrew, and the lesser shrew. These are referred to in the same thorough way as those in previous parts. There are several illustrations, including an admirable coloured plate of house mice.

Part LXXXIII. of the Yorkshire Archaeological Journal contains an illustrated list of the Anglian and Anglo-Danish Sculpture in the East Riding; from which, however, the record of the part of the pre-Norman cross found at Patrington two or three years ago, is omitted. Messrs. W. H. St. John Hope and H. Brakspear give an excellent plan and description of Jervaulx Abbey, in the same publication.

We are not aware that nightingales have been recorded singing so far north as Aberdeenshire, but in case our Scottish friends care to have such a record, we give the following extracts from Miss Florence L. Barclay's book, 'The Rosary,' the locality referred to being Deeside, Aberdeenshire:—'The nightingales filling the woods and hills with soft-throated music,' and later on in the same chapter, 'Sweet, sweet, sweet thrill, sang a nightingale in the wood'; and again, 'Two nightingales, in distant trees, sang alternately, answering one another in liquid streams of melody.'

Naturalist,

FIELD NOTES.

LEPIDOPTERA.

Polia chi near Huddersfield.—On August 7th, during a walk in the neighbourhood of Fixby, Huddersfield, I found seven specimens of *Polia chi* in the characteristic position of this moth, viz., perched on walls. This is a common species hereabouts, but it seemed peculiar that all the seven moths should have been found within a very short distance—say a couple of hundred yards—of each other, and not another was seen during the afternoon. They were all quite fresh out of

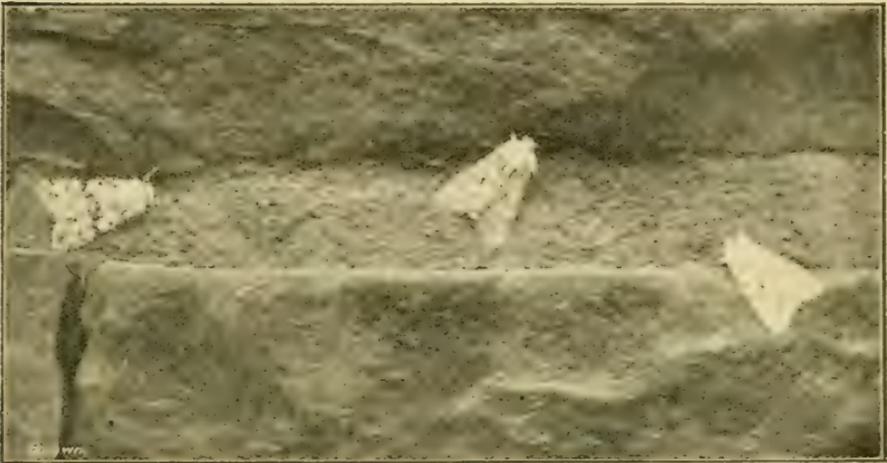


Photo by]

[Charles Mosley.

Polia chi and var. *olivacea*.

the pupæ; in fact two of them were only just drying their wings. Of the seven, three were beautiful types of the variety *olivacea*. The centre one in the accompanying photograph is of this variety.—CHARLES MOSLEY, Lockwood.

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BIRDS.

Ruff at Harrogate.—I have recently seen a stuffed specimen of a Ruff in winter plumage, which was shot on the Irrigation Farm, by Mr. J. E. Titley, on August 28th, 1905. It was at the time mistaken for a big snipe.—R. FORTUNE, Harrogate.

Night-Heron shot near Whitby.—An immature female Night-heron was shot on Ruswarp Carrs, near Whitby, on October 26th. So far as the local records show, the Night-heron has not occurred in this district since the year 1861, when an adult bird was shot in autumn about a mile higher up the River Esk.—T. STEPHENSON, Whitby, November 7th, 1911.

REVIEWS AND BOOK NOTICES.

PRE-HISTORIC AND ROMAN BRITAIN.

That there is an increased interest being taken in the earlier history of this country is evidenced by the fact that new societies are constantly being formed, the special object of which is the study of the beginnings of our history; as well as by the publication of books and monographs.

From Messrs. Simpkin, Marshall, Hamilton, Kent & Co. we have received **Pre-Historic Man in Cheshire**, by the late **W. Shone, F.G.S.** 110 pp., 3/-. This booklet contains the first chapters of a projected History of Cheshire, which never saw the light; consequently the author, having prepared the work, arranged for its publication. It is an admirable compilation, and has well illustrated chapters on the Palæolithic, Neolithic, and Bronze Ages; 'Late Celtic Times,' an admirable bibliography, and appendices. The work seems to have been carefully and conscientiously compiled, and typical implements, etc., found in Cheshire, are illustrated. In addition the booklet gives a good account of the early inhabitants of the district. The axe-head from Hargrave (on Fig. 8), is remarkably like the well-known conical celts which are found at Bridlington.

Saddleworth: Its Pre-Historic Remains, by **Ammon Wrigley**. Oldham: W. E. Clegg. 77 pp., 1/6 net.

This is on similar lines to 'Pre-Historic Cheshire' already referred to, and deals with the district around Saddleworth. The evidences relating to the various periods are given, and there are many illustrations of implements, urns, sites, etc. Some of these are from the author's drawings, and some from photographs; we like the latter best.

The Stone Age and Lake Lothing, by **J. Chambers**. O'Driscoll, Lowestoft, 1911. 28 pp., 4½d.

In this pamphlet the author sets out with the laudable object of describing the flint implements found in the bed of Lake Lothing, at Lowestoft, and begins well; but, as he quotes, 'I saw a vision in my sleep,' and he gets on to the question of place-names and their origin, and ends up by opining that in Lothingland lingered the last of the Icenii. Still, the pamphlet's cheap enough.

Proceedings of the Pre-Historic Society of East Anglia for 1908-10. Vol. I., pt. 1. Edited by **W. G. Clarke**, 12 St. Philips' Road, Norwich. 121 pp., 3/6 net.

Judging by the part before us this Society has more funds than it knows what to do with; otherwise it would not be able to publish such extraordinary papers at such extraordinary length; though we are glad to learn that the authors have helped with the expense, possibly otherwise the papers might not have appeared. It is something to learn that some of the best papers read to the Society have been published elsewhere! Mr. J. Reid Moir describes implements from deposits where no respectable implements should occur; and whilst he quotes authorities to say that (a) his specimens are evidence of human handiwork, and (b) the deposits in which they occur are undisturbed: other equal authorities opine that (a) the 'implements' are quite naturally broken stones, and (b) the deposits in which they occur have been disturbed. His illustrations certainly do not seem to help his case; and the Special Committee in their report on the matter certainly do not assist matters by dragging in the 'Suffolk Coprolite Jaw' and the 'human face' on the *Pectunculus glysemeris* [sic] from the Crag; both specimens being generally accepted as workmen's 'jokes.'

In Dr. Sturge's elaborate paper on 'The Chronology of the Stone Ages,' he states that 'Since Neolithic man came to Britain there has been an Ice Age'; this extraordinary theory to account for minute scratches on some flint implements! We do not suppose the theory will appeal to anyone who has had a geological training; nor are we satisfied that Dr. Sturge has proved the existence of the various and numerous separate Ice Ages which he advocates, merely on the strength of his flint imple-

ments. We once knew a man who professed to tell the incomes of the former owners of any stray brace buttons he picked up. He was an enthusiast, and had a big collection of buttons; but he never convinced us.

Then Lieut.-Col. Underwood follows with an account of his 'Animistic Forms in certain Flints, shewing Human Work.' In our opinion the 'shewing human work' is exceedingly doubtful, and we have seen the specimens. There are animals and other figures represented which no self-respecting pre-historic man ought to have seen; 'Mr. Gladstone' for instance! The 'Proceedings' certainly contain one good plate of unquestionable 'chipped neolithic axes,' a very interesting hoard; but this is dismissed in half a dozen lines!

Romano-British Buildings and Earthworks, 310 pp.; **The Roman Era in Britain**, 289 pp.; by **John Ward, F.S.A.**, 7/6 net each; Methuen & Co.

In these two excellent volumes issued in 'The Antiquary's Books' series, the Curator of the Cardiff Museum has brought together an admirable summary of what has been left by the Romans. In the first place he deals with the camps, forts, walls, houses, baths, forums, temples, construction details, and mosaic pavements. On no previous occasion has such a wealth of detail relating to the work of these early invaders been brought together. The various chapters are well illustrated by plans and drawings, and there is evidence throughout the work of the fact that the author has carefully examined the various and numerous accounts of the discovery of Roman remains which are scattered in a bewildering number of provincial societies' publications. The book also includes particulars of all the important recent finds. The numerous references in the footnotes will enable the student to obtain further information upon any particular point. It is also interesting to find that Mr. Ward has paid particular attention to the evolution and development of the various Roman structures he describes. His description of the Roman wall is well worthy of perusal, even by an advanced student in these matters. There is but little in the book that requires correction; the Horkstow pavement referred to on page 311 is the same as that described on page 306, not a different one; neither are referred to in the index, which is not adequate—6½ pages being not nearly sufficient for so full a volume.

In the second volume Mr. Ward takes a more general view of Roman antiquities; but to some extent unnecessarily overlaps the details in the first book. There are, for example, chapters on camps, forts, houses, forums, baths, etc., on very similar lines to those in the other volume, and with the same plans, sketches, maps, etc. The rest of the book, however, is good, and deals with graves, pottery, glass, metal and stone utensils, tools and domestic appliances, lamps, locks, footgear, pins, needles, mirrors, rings, coins, etc. His description of the pottery is particularly well done and well illustrated, and in the other numerous chapters on different aspects of Roman Art the illustrations are fine. Whilst most of the important Roman sites are described, there are others which are not referred to, though in a book of the size a complete enumeration may be impossible.

These two books together will prove of great value to the increasing number of students taking an interest in this important period in our history. They are well worthy of a place in Messrs. Methuen's excellent series of 'The Antiquary's Books.'

An Elementary Manual of Roman Antiquities, by **William Ramsay**. London: C. Griffin & Co., 10th edition. 277 pp., 4/.

This is an Abridgment of Ramsay's well-known 'Manual' which we have already referred to in these pages; the smaller volume being suitable for boys in the second or third year of their Latin studies; but it will also prove a most useful guide to older students interested in Roman remains. The volume is excellently arranged, adequately illustrated, and the fact that it has reached a tenth edition speaks for its popularity.

PROCEEDINGS OF PROVINCIAL SCIENTIFIC SOCIETIES.

The Annual Report of the **Huddersfield Naturalist and Photographic Society** for 1910-11, besides containing Mr. C. Mosley's and Mr. A. C. Ellis's general report, includes Mr. E. Fisher's report on the library, and on ornithology, Mr. Mosley's on lepidoptera, Mr. W. E. L. Wattam's on Botany, and Mr. H. G. Brierley's on Microscopy.

A lengthy obituary notice of the late Dr. C. B. Plowright, from the pen of Mr. T. Petch, appears in the **Transactions of the Norfolk and Norwich Naturalists' Society**, Vol. IX., pt. 2. Messrs. Robert Gurney and A. G. Innes have valuable papers on The Tides of the River Bure and its Tributaries. Mr. J. H. Gurney figures and describes the Norwich Great Auk and egg, and Mr. A. Bennett refers to *Gnanthe pimpinelloides* and *Epipactis atrorubens*. There are also other papers of interest.

The **Leeds Astronomical Society** has issued its **Journal and Transactions** for 1910 (No. 18). They are edited by Mr. E. Hawks, and are sold by Messrs. R. Jackson & Son, Commercial Street, Leeds, at 2/-. The contents shew that the society has an excellent nucleus of enthusiastic workers, and in view of the special nature of the subject, the record is an admirable one. We are glad to notice that Mr. Whitmell, in referring to the cause of the Glacial Period, states that, so far as he knows, 'no geologists, and no astronomers acquainted with geology, accept Ball's conclusion that the Glacial Period was due to changes in the eccentricity of the earth's orbit.'

The Memoirs and Proceedings of the **Manchester Literary and Philosophical Society** (Vol. LV., pt. 2) include many papers of interest to naturalists. Amongst them we notice Miss Margaret C. Marsh's and on 'Variation in *Unto pictorum*, *U. tumidis* and *Anodonta cygnea*,' and on 'The Ancestry of *Trigonia gibbosa*, and the ornament of *T. clavellata*.' Mr. D. M. S. Watson writes on a Plesiosaurian Pectoral Girdle from the Lower Lias, Upper Lias Reptilia, and some British Mesozoic Crocodiles. It is pleasing to find that attention is being given to this class of fossil-remains, but we wish Mr. Watson would give us a little more information with regard to the localities from which the specimens were obtained. Mr. Holden describes an abnormal spike of *Ophioglossum vulgatum*.

The Fortieth Annual Report and Proceedings of the **Chester Society of Natural Science**, etc., contains an interesting contribution to the ornithology of the district, entitled 'Bird-life in a Suburban Garden.' The paper is by the late Charles Kingsley Siddall, who died last November, in his thirty-third year. The report also contains the usual list of additions to the museum, etc. We think there is just a little too much matter on what would be pages 16-17, if there were room for the page numbers. The Society has also issued, separately, a very useful account of 'The Formation of the Chester Society of Natural Science, etc.', and an epitome of its subsequent history, by J. D. Siddall. This well illustrated pamphlet (64 pp.) is issued 'by the desire and at the expense of' ten of its members.

The **Transactions of the Natural History Society of Northumberland, Durham and Newcastle-upon-Tyne**, New Series, Vol. III., Pt. 3, for 1911, has been issued, and contains many valuable papers and notes, as well as a report on the progress being made at the Society's museum. The Rev. J. E. Hull has a paper on the genus *Tmeticus* and some allied genera, and also on some Northern Spider Records in 1909. Mr. R. S. Bagnall is responsible for three contributions, viz., 'The British Species of the Order Symphyla'; 'a Synopsis of the British Pauropoda,' and 'Two New Species of Trichothrips from the Derwent Valley.' Mr. Stanley Smith has a detailed paper dealing with the Faunal Succession of the Upper Bernician. There are some shorter notes, amongst which we note that the fossil arachnid from Crawcrook, named *Anthracosiro latipes* by Mr. E. L. Gill, turns out to be identical with that previously described as *A. woodwardi*.

MUSEUM NEWS, ETC.

The Twenty-fifth Annual Report of the Free Libraries and Museum Committee of **Great Yarmouth** includes several illustrations of stuffed birds in the museum, including a group of Pallas' Sand Grouse.

The Report of the Librarian and of the Museums Sub-Committee of **Beverley** for the year ending March 31st, 1911, has been received, and contains particulars of the additions during the year. The Beverley Museum was opened to the public during the year.

The **Warrington Museum** continues to issue its useful leaflets containing particulars of its recent additions, which vary from Frogbits and Sheep-ticks, Bramblings and Beavers, to Netsuke and paintings. The report for the year ending June 30th, 1911, also is a record of a good year's work.

The Sixth Annual Report of the **Manx Museum** shows an excellent year's work at that institution, and also has a satisfactory account of the steps that have been taken to protect the island's ancient monuments. The Report is illustrated, and can be obtained for sixpence from Messrs. G. & L. Johnson, Douglas.

From **Stockport** we have received the combined Reports of the Librarian, Parks Superintendent and Museum Curator. There have been fourteen visits to the museum paid by schools during the year. Several additions have been made to the various departments, a list of which is given. We wonder how many museums dare put a column for 'how acquired' as is done in honest Stockport?

The Annual Report for 1910 of the **Scarborough Philosophical Society**, which includes the records of the **Scarborough Field Naturalists' Society**, is to hand. Both societies seem to be working ahead. The year's reports on the club's work include reports by W. J. Clarke on Vertebrate Zoology; H. Witty on Lepidoptera; J. A. Hargreaves on Conchology; E. A. Wallis on Terrestrial Isopoda; J. Irving on Marine Zoology; E. R. Cross on Botany; A. E. Peck on Fungi; W. Pearson on Coleoptera; A. Hibbert-Ware on Mycetozoa and on Geology (Microscopical); and H. C. Drake on Geology. The reports appear in the 'order' given. There is no recorder for misprints, or he would have had a busy time! The balance sheet is a great improvement upon that of previous years.

From the **Viking Club** we have received their **Saga Book**, Vol. VII. Part I, which contains a number of valuable papers, including 'Norse Elements in English Dialects,' by an American professor; 'Finds and Excavations of Heathen Temples in Iceland,' translated into English from the Norwegian; 'The Scandinavian Kingdom of Northumbria'; 'King Fialar'; 'Odal Orkney'; 'Notes on the Battle of Largs'; and 'Miniatures from Icelandic Manuscripts.' Some of the papers are well illustrated.

The same club's **Year Book** (Vol. II.) contains the official reports on the year's work in the various sections and branches of the Club, and a lengthy list of queries, reviews, etc. The 'reviews' represent a valuable summary of the literature relating to northern lore, which has been published during the year. The society also publishes a valuable **Old Lore Series**, a miscellany of Orkney, Shetland, Caithness, and Sutherland Records. No fewer than seven of these were published during 1911. We cannot give too much praise to this excellent series, which contains a field of information relating to the districts mentioned. The parts include notes on the folk-lore, old families, place-names, bibliography, Pictish towers, stone circles, sagas, sheep-marks, rhymes, authors, monuments, early visits, etc. It is astonishing what a large amount of useful material is published by the Viking Club in view of its comparatively small subscription. Mrs. A. W. Johnston is the energetic Honorary Secretary and Editor; whilst the Editors of the 'Old Lore Series' are Mr. A. W. Johnston and Amy Johnston.

THE YORKSHIRE NATURALISTS' UNION AND ITS WORK.*

THE Yorkshire Naturalists' Union can be safely said to occupy the foremost position amongst the provincial scientific societies in the country. At the present time it has over four thousand members and associates, and has the co-operation of nearly fifty affiliated societies. By the aid of its various committees and sections, it secures the assistance of the leading naturalists in almost every branch of science, quite a large proportion of whom are resident in the county. By the aid of field excursions and indoor meetings, the natural history and physical features of every part to the broad-acred shire are thoroughly investigated. For these meetings elaborate programmes are drawn up, and circulated amongst the members. Not only is a careful census made of the fauna and flora, their changes, and the causes thereof, but the Union takes active steps towards the protection of animal and plant life. Other committees keep a careful record of the coast changes, the discoveries made in coal mines or in railway cuttings, or other geological exposures. There is also a committee of suggestions for research, which gives advice as to the many directions in which useful work may be accomplished. These committees meet periodically, and draw up their reports on the year's work, which are printed in the Union's annual report. This report itself is a very substantial contribution to Yorkshire natural science. In addition, the Union publishes natural history memoirs from time to time; an annual volume of transactions, and its Monthly Illustrated Magazine, 'The Naturalist,' which now occupies a foremost place in the scientific literature of Great Britain. The management of the whole of this vast organisation, and the editing of its various reports and publications, and the compiling of its excursion programmes, is in the hands of Mr. Thomas Sheppard, F.G.S., F.R.G.S., of the Municipal Museums at Hull. Mr. Sheppard was elected the Hon. Secretary and Editor about ten years ago, since which date the Union, in addition to its reports, programmes, transactions, and volumes of 'The Naturalist,' has published 'The Birds of Yorkshire,' by T. H. Nelson, R. Fortune, and F. Boyes (2 vols.); 'Yorkshire Lepidoptera' (second edition), by G. T. Porritt; 'The Fungus Flora of Yorkshire' by C. Crossland and G. Masee; 'North Yorkshire,' by J. G. Baker; and there is other work in hand. This is a record of which any society might be justly proud. Certainly no society outside London has accomplished a quarter of this amount in the same time, and in view of the absurdly small subscription to the Yorkshire Naturalists' Union (half-a-guinea per annum), the result is all the more astounding. From the annual report for 1910, recently issued, it is found that notwithstanding its great numerical strength, further new members are urgently required in order that its work may not be impaired. We trust the society will be successful in its efforts.

A former secretary of the Union, Mr. W. Denison Roebuck, F.L.S., in 1903, took as his presidential address the 'Salient Features in the History of the Yorkshire Naturalists' Union,' which, unfortunately, was issued separately, and not in either of the Union's publications. In this Mr. Roebuck points out that there were local naturalist societies in Yorkshire in the first half of the nineteenth century, though the records of some are meagre.

The principle of federation was not long in following the establishment of local societies, and it was in the year 1861 that the Association of Societies, which is now known as the Yorkshire Naturalists' Union, had its birth. Heckmondwike was the place, and William Talbot, of Wakefield, was the founder. Mr. William Talbot, with whom the idea of a confederation of societies originated, was one of the ablest and soundest field naturalists of the district, and one whose kindly and genial disposition

* Reprinted from the 'Yorkshire Weekly Post.'

endears his memory to all who knew him. His admirable list of the birds of Wakefield is almost the only published record of his work, but he was an excellent lepidopterist, and a warm-hearted and enthusiastic observer of Nature in all her aspects. He died in 1882.

In September 1861, a meeting was held at Heckmondwike for the purpose of founding a Naturalists' Society for that town, when the Heckmondwike naturalists were supported by about sixty others from the Huddersfield, Halifax, and Wakefield Societies. At this meeting Mr. Talbot introduced the question of the advisability of more combined and organised intercourse, and pointed out the mutual benefits which would accrue. He was warmly supported by others, and then on his motion it was unanimously resolved to form a Union of Societies for the purpose of holding joint meetings periodically at the various places where societies had already been established.

Thus the Heckmondwike Naturalists' Society and the Yorkshire Naturalists' Union were founded on the same day, and at the same meeting, and it is to the credit of the Heckmondwike Naturalists' Society that it is the only one which has uninterruptedly kept up its connection with the Union from that day to this, a period of half a century. Moreover, the headquarters of the Union were at Heckmondwike during the years 1861 and 1862, and from 1870 to 1877. It furnished during these periods the Secretary to the Union, and in 1870 a Heckmondwike member became its first President. A further meeting was held on the 18th January, 1862, at which the objects were defined, rules drawn up, and arrangements made for the holding of meetings. The name was also decided upon, and the new-born federation was called the 'West Riding Consolidated Naturalists' Society,' a title which it retained until changed to that which it now bears.

A constitution was printed a year or two later in which its object was stated to be 'the effectual advancement of local natural science,' for, by the various societies meeting together, having a kindly interchange of thought, and becoming acquainted with the natural history of the districts of each other, a more rapid dissemination of knowledge is attained, and facilities afforded for the better acquisition, exhibition, and exchange of specimens.

As to the organisation of the Union of this time, it was extremely simple. There was only one office-bearer, the secretary. No president was found necessary, as the president of the society in the place of meeting was appointed to preside. During the first year, and again in a succeeding year, the meetings were held on Sundays, but this was found to be highly detrimental to the society's success, and the practice was discontinued. During the first four years the meetings were indoor meetings, but with the year 1866 and afterwards outdoor field excursions were substituted. This was found to revive the old enthusiasm of the early years, and henceforward the meetings were well attended and exceedingly useful in bringing naturalists together to their mutual benefit.

The meeting having been fixed for a convenient place, usually on a Saturday, the members walked from their respective homes to the place appointed, collecting and observing as they went. On arriving, the whole of the plants and other objects collected were turned out on to the tables. The chairman then called on some good botanist to play the part of Adam, and 'name the plants.' The 'namer' then picked up the various species, and gave their names more or less rapidly for the benefit of the others, and in the case of plants of special interest he gave such information as he thought advisable. Other members were in like manner asked to name the insects, the shells, the fossils, etc., and the ornithologists to report in what they had observed.

The disadvantages of these methods were various. The waste of time involved in going through the specimens collected, whether common or not, and the want of scientific accuracy inherent in the system of mixing

specimens collected on several distinct lines of route converging on one common centre, were obvious. These considerations, and the accession to the Union of Societies so far away from the old centre, as Bradford, York and Selby, as well as the rise of a new and more scientific race of naturalists, brought about a reconsideration of the whole position of affairs. The more active thinkers of the society formulated a scheme of reform, which was carried into effect at the end of 1876.

This re-organisation of 1876 took cognisance of several important points. The area of the operation of the federation was to be extended to take the whole county, and the name was accordingly changed and shortened to the 'Yorkshire Naturalists' Union,' at Pontefract, on the 2nd of April, 1877. The sectional system was introduced with the view of ensuring a more complete and scientific examination of the material collected, and the saving of time at the general meeting by the sections reporting only on the broad results and the more important discoveries of the day. The excursions were to be made more definite and precise in their scope, the area investigated being restricted and properly defined, and a programme or circular printed for each. At the beginning there was the danger of the pic-nic and sight-seeing element being introduced, but the members at the opening excursion of 1877 proved themselves wiser than their leaders, and promptly and emphatically laid it down that there were to be no sight-seeing arrangements made, no field lecturing, and, in short, nothing to interfere with the active personal investigation.

On these lines the excursions have ever since been conducted, and have, on the whole, been remarkably successful. The Union has been able to show that it is perfectly practicable for real scientific investigation to be carried out on field excursions. The failures in this direction complained of by societies in other parts of England are the usual result of the neglect of these precautions. The establishment of sections and sectional meetings to precede the general one has resulted in the saving of time at the latter, and of greater scientific accuracy in recording. The character of the annual meeting also received special attention. It was felt that it should include more than mere business, and should be, as far as possible, an occasion for a social gathering of the members. For this reason a different town is selected each year, always by invitation, the inviting society organising a reception and conversazione.

The status of the Presidency of the Union arose in this connection, and it was from the outset deemed desirable that a combination of scientific eminence with Yorkshire connection should be aimed at, that the President should be an acknowledged leader in his subject, capable of delivering an address to the members at the annual meeting, and it also is a point that the President should be a Yorkshireman by birth, residence, association, or some connection. Thus the Union has had a series of Presidents who have rendered service to Yorkshire science in various ways.

Among the past Presidents are the names of the late Dr. Clifton Sorby, Professor Williamson, Dr. W. H. Dallinger, W. H. Huddleston, Dr. Walsham Howe (the Bishop of Wakefield), Professor A. H. Green, C. P. Hobkirk, J. Cordeaux, and Sir Michael Foster; whilst among the living scientists who have occupied the chair are:—Professor A. C. Seward, M.A., F.R.S., Rev. William Fowler, M.A., Mr. J. Gilbert Baker, F.R.S., F.L.S., Right Hon. Lord Walsingham, M.A., F.R.S., Sir Ralph Payne-Gallwey, Bart., M.B.O.U., Mr. H. Eeles Dresser, F.L.S., F.Z.S., Mr. R. H. Tideman, M.A., F.G.S., Mr. Robert Braithwaite, M.D., F.L.S., Professor W. Boyd Dawkins, M.A., F.R.S., Mr. William West, F.L.S., Mr. G. T. Porritt, F.L.S., F.E.S., Professor P. F. Kendall, M.Sc., F.G.S., Mr. W. Denison Roebuck, F.L.S., Mr. A. H. Pawson, J.P., F.L.S., F.G.S., Mr. G. W. Lamplugh, F.R.S., F.G.S., Mr. W. Eagle Clarke, F.R.S.E., Mr. C. Crossland, F.L.S., Dr. Wheelton Hind, B.Sc., F.G.S., and Mr. W. H. St. Quintin, F.Z.S.

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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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CORRIGENDA.

Page 233, line, 26 for "*Andrena cineraria* Linn." read "*Andrena albicans* Kirby. ♂ and ♀."

Plate 252, in "Greatest Fall, Angst 1," line 30, for "4.42," read "1.42."

Page 363, line 19, for "W. Whitaker," read "A. Whitaker."

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