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THE

NATURALIST:

A

MONTHLY JOURNAL OF

NATURAL HISTORY FOR THE NORTH OF ENGLAND

EDITED BY

THOMAS SHEPPARD, F.G.S.,

CURATOR OF THE MUNICIPAL MUSEUMS, HULL.

AUTHOR OF "GEOLOGICAL RAMBLES IN EAST YORKSHIRE"; "THE MAKING OF EAST YORKSHIRE";
EDITOR OF MORTIMER'S "FORTY YEARS' RESEARCHES."

HON. SECRETARY OF THE YORKSHIRE NATURALISTS' UNION; PRESIDENT OF THE HULL
SCIENTIFIC AND FIELD NATURALISTS' CLUB; MEMBER OF THE COUNCILS AND COMMITTEES
OF THE BRITISH ASSOCIATION, MUSEUMS' ASSOCIATION, YORKSHIRE ROMAN ANTI-
QUITIES COMMITTEE, THE EAST RIDING NATURE STUDY ASSOCIATION, THE
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PEARE SOCIETY; LIFE MEMBER OF THE YORKSHIRE
GEOLOGICAL SOCIETY; HON. LIFE MEMBER OF THE
SPALDING GENTLEMEN'S SOCIETY; ETC.

AND

THOMAS WILLIAM WOODHEAD, Ph.D., F.L.S.

LECTURER IN BIOLOGY, TECHNICAL COLLEGE, HUDDERSFIELD;

WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF

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

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

Prof. PERCY 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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PREFACE.

IN completing another Volume, an opportunity presents itself of congratulating the readers of the "Naturalist" upon the flourishing position now attained by the journal. It can be safely said that in no previous year has the "Naturalist" been so well illustrated, both by plates and figures in the text, as during 1906; and in no previous year have there been so many valuable papers by such well-known authorities as those who have favoured us with their contributions.

On account of the quantity of valuable matter available, the publishers have on four occasions increased the size of the journal. On one of these a special "British Association" number was issued, consisting of 64 pages, with photographs of some of the Presidents, etc. This (the October) number may be safely said to contain a reliable record of the natural history work accomplished at the York meeting, and includes summaries of the various papers read at the different sections, so far as they relate to the northern counties.

As in the past, prominence has been given to the work of the Yorkshire Naturalists' Union, and reports on the scientific results of its Excursions have appeared as promptly as was possible. Particular care has also been taken to keep readers acquainted with the current natural history literature, references to which have appeared monthly in the "Notes and Comments," "Northern News," or "Reviews" columns.

Dr. Woodhead's absence abroad for most of the year has again caused his colleague to be largely responsible for the volume.

Mr. W. E. L. Wattam has kindly prepared the Index

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Royal Herbarium, Kew; Chairman of the Yorkshire Mycological Committee; and

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Halifax, Hon. Sec. of the Yorkshire Mycological Committee.

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Please mention 'The Naturalist' in replying to Advertisements.

From "Methods of Microscopical Research." By A. FLATTERS.

PLATE XIV.

FIG. 51.



Longitudinal median section of a complete Branch of Sycamore, showing the position of the opposite petioles of the current year and the axillary buds for next year's vegetative period. 1, Central axis (pith). 2, Petiole of current year. 3, Central axis of next year's branch. 4, Separating layer. 5, Vascular bundle leading to leaf. 6, Xylem elements of branch. 7, Cambium. 8, Phloem. Sa, Cortical tissue. 9, Bud Scales. 10, Developing leaves. 11, Growing point of branch. The action of separation has taken place from the point marked X.

THE NATURALIST

FOR 1906.

NOTES AND COMMENTS.

OUR NEW VOLUME.

IT is very gratifying to the editors and proprietors to be able to report that their efforts, combined with the efforts of their contributors, have resulted in a very substantial increase in the circulation of the 'NATURALIST' during the past two or three years. This has enabled them to make the journal of greater value and interest by the use of numerous plates and illustrations in the text. A further result of this success is a satisfactory arrangement which has been made with the publishers, Messrs. A. Brown & Sons, Ltd., which permanently secures the standard which has been reached. In future the 'NATURALIST' will be printed at Browns' Savile Press, Hull, which already has a high reputation for excellent work, and this will enable the Editors to personally supervise the printing of the Journal. It will also save much clerical work, &c., which has naturally arisen in consequence of the printing being done over fifty miles away from the editorial office. Our only regret in connection with the change is that we sever our connection with Messrs. Chorley & Pickersgill of the Electric Press, Leeds, who have served us so well for some years.

METHODS IN MICROSCOPICAL RESEARCH.

Some little time ago we announced in our advertising columns the appearance of a work by Mr. Abraham Flatters, under the above title, provided sufficient subscribers could be found. The book is now issued,* and we have no hesitation in saying that every one who subscribed will be pleased with it. The name of the author is a sufficient guarantee of the excellence of the work, as few can claim the practical experience that

* Sherratt & Hughes, Manchester, x+116 pp. quarto, and 23 coloured plates, £1 1s.

Mr. Flatters can. The book is divided into 'General Remarks ;' 'Collection and Preservation of Specimens, &c. ;' 'Tools and Methods of Work ;' 'Stains, Reagents, Mounting Media, Cements, &c., their Formulæ and Manipulation ;' 'Mounting Media ;' 'Cements ;' and 'Instructions for the Preparation of Types.' Each of these contains the results of Mr. Flatters' extensive experience, the full benefit of which can be derived by all who use the book. As the author points out, 'had such a work been at his service twenty years ago, he would have been spared years of persistent hard work and many disappointments.' The first part of the book is illustrated by numerous diagrams and blocks from photographs, by the aid of which both beginner and expert will alike derive much benefit.

SECTION OF SYCAMORE.

But it is in the 85 coloured illustrations of botanical sections, enlarged by the microscope, that the charm of the book lies. These are arranged upon twenty-three large plates, and the manner in which they have been reproduced, showing the effects of various stains, reflects the greatest credit upon all concerned. By the kindness of the publishers, we are able to give our readers a specimen illustration (see Plate I.), but even this does not do justice to the work. In the first place the detail and effect of the plates in the book itself are not marred by the reference numbers, which are there printed in outlines on transparent paper, which covers each plate ; and, secondly, the descriptive letterpress appears on a separate page facing each plate. The appearance of the illustrations is thereby much improved. Not only do these show the proper method of cutting and staining sections, but they will be of the greatest service to all interested in vegetable histology.

THE DONCASTER EARTHQUAKE.

In a paper recently read to the Geological Society, of London, Dr. C. Davison described the Doncast Earthquake of April 25th 1905. He pointed out that the Doncaster earthquake of 1905 was a twin, with its principal epicentre half a mile north of Bawtry, and the other about 4 miles east of Crowle and close to the centre of the disturbed area of the Hessle earthquake of April 13th 1902.* The distance between the two epicentres is about 17 miles.

* See 'Naturalist, 1905, p. 35.

The disturbed area contains about 17,000 square miles, including the whole of the counties of Lincoln, Nottingham, Derby, Stafford, Leicester, and Rutland, the greater part of Yorkshire, and portions of Lancashire, Cheshire, Shropshire, Worcestershire, Warwickshire, Northamptonshire, Cambridgeshire, and Norfolk. The originating fault runs from about E. 38° N. to W. 38° S., and appears to be nearly vertical within the south-western focus, and inclined to the south-east in the north-eastern focus. The first and strongest movement took place within the south-western focus. A twin-earthquake is probably due to the differential growth of a crust-fold along a fault which intersects it transversely, the first movement as a rule being one of rotation of the middle limb, accompanied by the almost simultaneous slip of the two arches, and followed soon afterwards by a shift of the middle limb. The movements, in which the Doncaster earthquake originated, presented a slight variation in this order. They consisted of successive, but continuous, displacements, first of the south-western arch, then of the middle limb, and finally of the north-eastern arch.

PICTURES FROM NATURE.*

Under the above title Messrs. Cassell & Company have published fifteen large Rembrandt Photogravures of Birds and Beasts at home amidst their natural surroundings. Without hesitation we can say that these pictures are really the finest that we have seen for some time, and they are undoubtedly the 'pick' from the negatives of the Brothers Kearton. The subjects portrayed are Black-throated Diver, Kittiwakes at home, Leverets in their form, Kingfisher, Squirrel, Puffins at home, young Willow Wrens, Ring Dove, young Cuckoo and Sedge Warblers, Hedgehog, young Long-eared Owls, Gannet, Peewit, Sparrowhawk adding sticks to her nest, and the Great Tit, or Ox-eye. Each is a most suitable subject for framing and hanging in a naturalist's 'den,' and each is accompanied by a page of descriptive matter.

THE BLACK-THROATED DIVER.

Perhaps one of the most striking of the pictures is that of the Black-throated Diver on her nest, which the publishers kindly enable us to reproduce on a small scale, though even this

* In portfolio, 10s. 6d., 18½ in by 11.½ in.

looks poor compared with the original. 'Only two decades ago men were writing of the difficulties of approaching such shy, wary birds as the Black-throated Diver close enough for destruction with a shot gun, and here we have . . . a member of the species figured on her nest with the camera, and its operator not 16 feet away.' We have no reason to assume that there is any 'fake' in the photograph, and to obtain such a negative is truly a remarkable performance. In his



The Black-throated Diver on her Nest.

'Introduction' to the series Mr. Richard Kearton dwells once again upon the extraordinary difficulties experienced in securing the photographs, and of the 'danger to life and limb,' etc. If he will pardon our saying so, the prominence given to such details is rather irritating, especially when it is borne in mind that there exist several hundred very excellent 'bird' negatives taken by other qualified naturalists, without anything like the expenditure of money and time and labour that Mr. Kearton so frequently tells us is his lot.

THE TRENT AEGER.

In a recent issue of 'Nature'* Mr. W. H. Wheeler gives a detailed account of the Aeger in the Trent, which he had witnessed. The aeger or bore 'is caused by the check of the tidal flow through the shoal water of the sand banks and the contraction of the waterway, the tidal current over-running the transmission of the foot of the wave.' It first assumes a crest somewhere between Burton Stather and Amcotts, depending on the condition of the tide, the water rising almost simultaneously 3 feet. The bore was to be seen under exceptionally favourable conditions on September 30th and October 1st last. It could be heard approaching about half a mile from the place of observation, and passed with a crest in the middle of the river of from 4 feet to $4\frac{1}{2}$ feet, extending across the full width of the river, which is here about 200 feet at high water. At the sides the breaking waves rolled along the banks 6 feet or 7 feet high. The crest was followed by five or six other waves of less height, terminating in a mass of turbulent broken water for a distance of 100 yards. The velocity of the wave, as nearly as it could be measured, was about 15 miles an hour.

GEOLOGY.

Red Rock of Rotherham.—Whilst out with the Geological Students of the Sheffield University on October 7th, we were fortunate enough to discover a fossiliferous band of clay in this, otherwise barren, rock. The locality is a quarry, now disused, almost opposite to the Kiveton Park Colliery's Hospital, on the Kiveton Park to Harthill Road, about half a mile south of the former village. Leaving the road by the truck-way the quarry is soon reached, and the band is to be seen on the eastern face of the rock about four feet from the base of the exposure. It is about four or six inches in thickness, dipping in a northerly direction; about 12 feet of the band is to be seen, the northern end being obscured by the talus. Its further extension northwards is very probable, for a few yards further on a spring is seen, the presence of which could not well be accounted for in any other way. The fossils found in the clay are mostly fragmentary, but seem to be of the usual coal-measure type. Up to the present they have not been identified with certainty.—L. GLAUERT, Junr., F.G.S., Sheffield, Dec., 1905.

* Vol. 73, No. 1880.

NEW AND RARE BRITISH FUNGI.

GEO. MASSEE AND CHAS. CROSSLAND.

OF the following six species, the first five are new to the British Isles; the sixth has one previous record only, and does not appear to have been hitherto met with in any other country than Britain. As noted below, three of these were found on Union Excursions—Pocklington, Cudworth, and the Maltby foray; two are from Hebden Bridge, and one from Masham.

Advantage has been taken of the fresh specimens to make fuller descriptions. The description of the new British puffball is supplemented by the photograph on page 7.

During the recent fungus foray at Maltby, a very fine and representative series of specimens of a puffball, which appeared to differ in certain characters from hitherto known British species, was collected in Maltby and Stubbings Woods.

On further investigation the species proved to be *Lycoperdon cruciatum*, Rost., a fungus not previously recorded as having occurred in this country. Superficially this fungus somewhat resembles a small form of *L. gemmatum*, and has probably been passed over as such on previous occasions. Its most pronounced macroscopic, or field character, consists in the whitish outer wall of the peridium, peeling off in large flakes as in species of *Bovista*, and exposing the brown, minutely granulated inner peridium. The structure of the outer peridium in *L. cruciatum* somewhat resembles that of *L. velatum* (an exotic species), but in the latter the spines of the cortex are very persistent, and when they disappear, do so singly, as in most puffballs.

The following is a full diagnosis of *L. cruciatum*, which is well described and beautifully figured by Rostkovius in Sturm's Deutschlands Flora, vol. 5, p. 19, pl. 8 (1864).

Peridium subglobose to broadly piriform, narrowed below into a short, stout, sterile stem-like base, 3-4 cm. high by 2-3 cm. broad; cortex whitish, formed of groups of minute more or less pyramidal spines, breaking away in large flakes and exposing the inner yellowish-brown, minutely granulated peridium; dehiscence by a small, irregularly torn apical pore. Gleba umber, spores globose, smooth, almost hyaline, 5-6 μ diameter; threads of capillitium mostly unbranched, slender, 4-5 μ thick, ends tapering, very slightly coloured yellow-

brown. The lacunose sterile base not projecting into the gleba as a columella.

On the ground among hazel bushes.

Distribution.—Germany, France, United States.



Lycoperdon cruciatum, Rost.

The left-hand fig. shows the outer peridium intact. In the two remaining figs. only fragments of the outer peridium remain. Natural size.

Hebeloma subsaponaceum Karst.—On the ground in strip of mixed woodland, Allerthorpe Common, near Pocklington, Y.N.U. Excursion, Aug., 1905. First British record. Differs from allied species in the strong soapy smell, dry pileus, adnate gills, and smaller spores $6\text{-}9 \times 4\text{-}6 \mu$.

Cantharellus hypnorum Brond., Rev. Myc., 1892, p. 65 ; Sacc., Syll. 11, p. 32, 1895.—Pileus campanulato-convex then expanded and slightly depressed, margin incurved, minutely downy, the down sometimes collected into little fascicles, pale primrose yellow, sometimes verging on pale ochre, $1\text{-}1\frac{1}{2}$ in. diameter ; flesh thin, whitish ; gills thin, edge acute, somewhat crowded, branched, decurrent, yellow ; spores hyaline, smooth, oblong with a minute oblique apiculus, $7 \times 4 \mu$; stem about 1 in. long, slender, often slightly flexuous, almost glabrous, yellow, sometimes darker than the pileus towards the base.

Collected by E. Snelgrove, on Ferrymoor, near Cudworth, Y.N.U. Excursion, Sept. 9th, 1905. First British record. Previously recorded for France only.

A very distinct species, allied to *C. aurantiacus*, from which it differs in the less tomentose pileus, absence of orange colour, and smaller spores. *C. aurantiacus* is considered by some

authorities as belonging to the genus *Clitocybe*, and perhaps correctly so, the thin, acute-edged gills not agreeing with the one feature most characteristic of *Cantharellus*. *C. hypnorum* belongs to whatever genus *C. aurantiacus* does.

Lachnea cinnabarina (Schw.)—Ascophores gregarious or scattered, sessile, at first subglobose, then expanded, $1\frac{1}{2}$ -3 lines across, fleshy, $\frac{1}{2}$ -line thick, disc flat, scarlet, tending to vermilion, margin obtuse, bordered by rows of subclavate cells $40-50 \times 20-25 \mu$, exterior ochre, almost glabrous, only a few slightly thick walled hairs being present, the basal cells give rise to a few flexuous, hyaline, aseptate hyphæ 7μ thick, which penetrate the substratum; excipulum of irregularly inflated loosely interwoven, septate hyphæ, regular and parallel at the cortex which is 3-4 cells deep, cells $40-50 \times 25-30 \mu$, outermost layer globose $30-35 \mu$. Asci cylindrical, base gradually narrowed into a curved foot, $200-220 \times 12 \mu$, apex subtruncate; spores 8, obliquely 1-seriate, elliptical, ends obtuse, hyaline, continuous, eguttulate, minutely verrucose, $15-18 \times 18 \mu$; paraphyses abundant, septate, apex clavate, 8μ thick, filled with red granules $3.5-4 \mu$ thick below.

Peziza cinnabarina Schw. Syn. p. 173.

Lachnella cinnabarina Sacc. Syl., viii., n. 1643.

On dry, muddy settlings of old dye tanks, Hebden Bridge, September, 1905. Crossland and Needham. First British record. Previously recorded for America only. Closely allied to *L. umbrata*, but differs in the distinctly but minutely verrucose spores and almost glabrous exterior and margin.

Acetic iodine turns contents of paraphyses blue-black, no effect on asci.

Lachnea gilva (Boud.) Sacc. Syl., n. 747.—Ascophores scattered or gregarious, often contorted through mutual pressure, sessile, at first subglobose, finally expanded, fleshy, disc sometimes undulate and lobed, dingy pale reddish-ochre, 5-8 lines across, exterior brown, margin clothed with pale yellow-brown, 6-9 septate, gradually tapering, obtuse hairs, $250-300 \times 6-8 \mu$ (midway), mostly in tufts of 30-40, sparse below the margin; flexuous, almost colourless, septate hyphæ, $5-6 \mu$ thick spring from the basal cells; excipulum of stout, irregularly swollen hyphæ, cortical cells brown, subglobose, $15-20 \mu$ diam.; Asci cylindrical, 8 spored, $200-220 \times 12-14 \mu$, apex rounded; spores obliquely 1-seriate, hyaline, elliptical, smooth, continuous, eguttulate, $16-17 \times 9-10 \mu$; paraphyses hyaline, septate, 5μ , slightly thickened upward.

Peziza gilva Boud. Icon. 37.

Peziza (Sarcoscypha) gilva Mycogr., p. 240, fig. 406.

On sandy ground, among moss, river side, Hebden Bridge, September, 1905. Crossland and Needham. First British record. Previously recorded for France only. Closely allied to *L. fimbriata* Quel.

M. Boudier has established a genus *Tricharia* in which he includes this sp.

Humaria Phillipsii Cooke, Mycogr., p. 48, fig. 88; Massee's Brit. Fung. Flo., iv., p. 417; Sacc. Syll., viii., n. 553. Redescribed from freshly gathered specimens. Ascophores sessile, scattered, at first spheroidal, then expanded but deeply concave, fleshy, slightly gelatinous, 3-4 lines across, disc dark bluish purple, exterior dark purple, minutely rough with small tufts of cells $8-10 \times 6-8 \mu$, margin somewhat evenly crenulate-serrate with tufts of 3-4 septate hyphæ $80-90 \times 7-10 \mu$; cortex of circular cells $10-18 \mu$, two to three cells thick, hypothecium and inner portion of excipulum of densely interwoven hyphæ, which suddenly give place to the globose cells forming the cortex, the basal cells give rise to septate, hyaline hyphæ, $5-6 \mu$ thick, which penetrate the soil. Asci cylindrical, apex rounded, 8 spored, $270-290 \times 15 \mu$; Spores obliquely 1-seriate, continuous, hyaline, elliptical, ends rather acute, coarsely warted, warts hemispherical, in optical section 7-8 down each side, $22-23 \times 12 \mu$. Paraphyses septate, 4μ thick below, 5μ at the slightly swollen apex.

Ascobolus amethystinus Phil., Grev. iv., p. 84.

Peziza Phillipsii Cke., in Phillips' Brit. Disc, p. 90.

This most interesting peziza, apparently only once previously found, was met with by W. A. Thwaites in sawmill yard, on sandy soil by the river side, Swinton, near Masham, Sep., 1905. The first record (Grev. iv., p. 84), is by the late W. Phillips, on sandy ground on the margin of the river Severn, Shrewsbury, Oct., 1875.

It was named *Ascobolus amethystinus* on account of its colour, and the spores appearing to become purple. Later, however, it was found the spores are permanently hyaline, thus proving it not to be an *Ascobolus*, and Cooke re-named it *Peziza Phillipsii*.

The dark purple colour pervades the whole structure with the exception of the asci, spores, and the hyphæ given off by the basal cells. The following remark accompanies the original description: 'The cells composing the exterior are of a beautiful

amethyst purple under the microscope, and when pressed yield their colouring matter to surrounding objects.' The Masham specimens behaved in an exactly similar manner, and when fresh sections were cut the released colouring matter stained spores which came in contact with it and certainly gave such the appearance of being self-coloured. To settle this point finally spores were got without either cutting a section, or digging a pinch directly out of the disc. A couple of ascophores were placed side by side, on damp moss, in their natural position, in a shallow card-board box; a glass slip was placed over them, resting on the edges of the box so as to clear them by about a quarter of an inch. On the following day two small, cloudy, white, semifused circles were seen on the under side of the slip immediately over the ascophores. An examination proved the cloudy spots to consist of thousands of uniformly colourless spores which had been shot up direct from the asci beneath, and had adhered to the overlying glass. The colour leaves the paraphyses on their being placed in water.



BIRDS.

Rough-legged Buzzard near Grassington.—Mr. John Crowther of Grassington forwarded for my inspection a very fine specimen of an immature bird of this species which had been caught in a rabbit-trap on Grassington Moor, on December 8th. The bird measured 4 feet 9 inches from tip to tip of expanded wings, and weighed $2\frac{3}{4}$ lbs. From tip of beak to end of tail it measured (over all) about 25 inches, and covered exactly 23 inches from head to tail as it laid on its back on the table—which, in my opinion is the better way of obtaining the correct length in this class of birds. On dissection it proved to be a male.

This bird will be exhibited at the Annual Meeting of the Yorkshire Naturalists' Union, in the Cartwright Hall, at Bradford, on January 27, 1906, after which it will find a permanent home in the newly formed museum at Grassington.—HARRY B. BOOTH, Spring Royd, Shipley.

Fawn-coloured Siskin near Sedbergh.—I saw a light fawn-coloured Siskin near Sedbergh, feeding on alder seed, recently. I got close to it, but could not see any other markings upon it.—W. MORRIS, Sedbergh, 4th November, 1905.

THE LARGE FELSPARS OF SHAP GRANITE.

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

IN a recent discussion* of certain features in Shap granite allusion was made to the large pink crystals of orthoclase that characterise this beautiful rock. It is now proposed to endeavour to trace the life history of these crystals in some detail in the light of the theory of reciprocal solutions. From various observations on slags it is now known that feldspar forms very slowly, and that alumina exercises a retarding influence on the crystallization of such masses. Seeing that feldspar occurs in such abnormally large crystals in Shap granite, it becomes very evident that the conditions under which they formed were abnormal.

From the fact that the texture of the rock does not get finer towards the margin; that the porphyritic feldspars are well developed there too; that these feldspars are wanting in the small ramifying fissures while in the intrusive mass itself they are orientated as if to suggest a line of flow, it seems reasonable to conclude that they did not form in situ in contact with cold walls. They were probably ready formed when the mass was intruded, and thus date their formation back to the original magma. From the paper† quoted in the former article we learn that "these large feldspars enclose crystals of apatite and sphene, besides occasional flakes of mica and prisms of striated plagioclase. More rarely they contain little patches of quartz, or even a well-bounded crystal of this mineral."

With this data at our command, and treating the original magma as a reciprocal solution, several facts seem to stand out clearly. To begin with, the fused mass was once at a higher temperature; for the growth of the large feldspars only became possible when the temperature fell to the point where the orthoclase forming material would separate out. In the early stages of cooling, apatite, zircon, some magnetite, and possibly sphene, would separate out for the very good reason that the solubility of these minerals in fused silicates, such as the magma was composed of, is a function of temperature. In the

* Naturalist, December, 1905, p. 364.

† Q.J.G.S. 1898, p. 278.

case of magnetite it would appear from the writer's own experiments that its solubility also depends on the acidity of the magma, for he found magnetite to refuse to enter into solution with fused silica at a temperature exceeding 1800°c., though it seemed to combine with certain silicates. The presence of magnetite in the consolidated rock suggests that the original magma contained both ferric and ferrous oxides of iron, though only the former is mentioned in the analysis given in the paper quoted from. From experiments upon slags it has been concluded that magnetite never forms unless both oxides are present. If we consider that before it could form from ferric oxide alone, an atom of oxygen would have to be removed, the reasonableness of this conclusion becomes apparent.

When the temperature fell to the critical point corresponding to the separating out of orthoclase from the solution, there would only be in existence those minerals possessing low solubilities. Being a magma, we can also assume that the temperature gradient of the cooling mass was not a steep one. The skeleton frames of the felspars would begin to grow as the embryo crystals formed, and as the particles of orthoclase passed from the fluid into the solid condition heat would be liberated; from the size ultimately reached by the crystals it becomes evident that the evolution of heat during the solidification of the early orthoclase must have nearly, if not quite, balanced that lost by the magma through its containing walls. But felspar, we know, forms slowly, so our early assumption that the temperature gradient was not falling steeply receives confirmation.

There is, however, further proof of this from the evidence we have that connection currents were absent within the mass. Rapid cooling would have meant movement of the different particles in the direction in which heat transference was taking place. Now the large felspars could not have reached their abnormal size had the magma been in motion, for it is a common experience with solutions that the more rapid the cooling the smaller are the crystals, and also that motion tends to reduce the size. The reason for this is not far to seek; the skeleton crystals are very fragile, and if the surrounding mother liquor be in motion they break up and form separate units. Thus far it is very clear; but these conditions of stillness in the magma and the abnormal growth of the skeleton crystals would be the very ones to render it probable that a portion of the mother liquor would be enclosed in the meshes

of the forming crystal, and thus become land-locked as it were. Here, then, we have a hint that may serve to explain the occurrence of quartz, flakes of mica, and prisms of plagioclase as enclosures in the large crystals.

The meshes of the growing orthoclase crystals having entangled and cut off, from the surrounding mass, small portions of the magma, these would be robbed of their orthoclase material to complete the building of their prison. They could not recover equilibrium by diffusion, and we should have a case of a rock forming within a rock; for when the large feldspars were complete the little "land-locked" particles would, under certain conditions, perhaps not until after intrusion had taken place with the resulting further cooling, differentiate as quartz, mica, and plagioclase. The still fluid magma, however, would contain no free quartz or minerals other than those of low solubility. From the regular distribution of the porphyritic crystals in the consolidated rock it is rather suggested that the mass must have been in a viscid condition, and at no very high temperature, otherwise gravity would have acted and the large crystals segregated. But this would only land us in another difficulty, for if the mass was at a comparatively low temperature when intruded how comes it that the surrounding rocks bear such marked evidence, for a considerable distance, of metamorphism? As this problem does not directly concern the life history of the large feldspars it would perhaps be better to leave it alone for the present.



BIRDS.

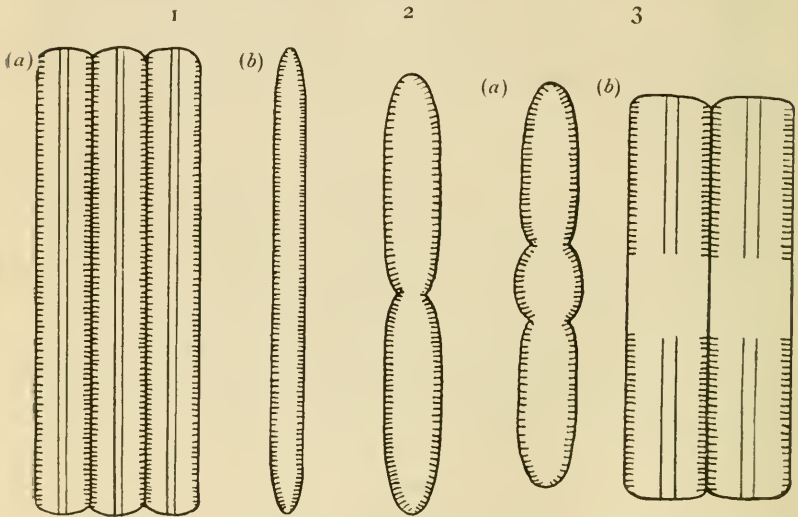
Easington Bird Notes.—A Hoopoe was seen here on Oct. 17th, and on the 21st of November a male Bittern killed itself by flying against the Lighthouse. In the last week in October a few Little Stints were noticed, and a Little Auk on November 24th.—P. W. LOTEN, Easington, Dec. 4th, 1905.

Ringed Plover, &c., at Sheffield.—Perhaps you may like to record that Ringed Plover (generally accompanied by Dunlin) visit the Redmires Reservoirs in this City every year on the autumn migration, and the Golden Plover, Curlew, and Common Sandpiper and Common Snipe breed close to the Reservoirs. Is there another City in England with such a record?—C. F. INNOCENT, Sheffield, Nov. 21st.

YORKSHIRE DIATOMS IN 1905.

R. H. PHILIP.

AT two of the excursions of the Yorkshire Naturalists' Union last year (Pocklington and Maltby) gatherings of Diatoms were taken. The Givendale Springs, near Pocklington, yielded almost pure gatherings of *Diatoma hiemale*, the only other species present being that very fine form, *Melosira arenaria*—a truly lovely object under $\frac{1}{12}$ oil immersion objective, owing to



1. *Fragilaria capucina* Desm. Type form. (a) Three frustules conjoined. (b) Valve view. 2. *Fragilaria capucina*. Var. *mesolepta*. Valve. 3. *Fragilaria capucina*. New (?) variety from Roche Abbey Lake. (a) Valve. (b) Two frustules conjoined.

its iridescent colours and delicate cross striation. The Ouse-thorpe brook yielded a greater variety, of which the most interesting form was a diminutive *Diatoma elongatum* var. *tenuis* in abundance. The other species present were:—

<i>Achnanthes linearis</i> W. Sm.	<i>Navicula gracilis</i> Ehr.
<i>Diatoma hiemale</i> (Lyng.) Heb.	,, <i>radiosa</i> Kutz.
<i>Fragilaria virescens</i> Ralfs.	<i>Surirella ovalis</i> Breb.
<i>Gomphonema montanum</i> Schum.	<i>Synedra ulna</i> Ehr.
,, <i>olivaceum</i> Kutz.	,, <i>Vaucheriae</i> Kutz.
,, <i>parvulum</i> Kutz.	<i>Vauheurckia vulgaris</i> (Thw.) V. H.

The Maltby excursion was specially interesting from the opportunity afforded of comparison of the gatherings taken

Naturalist,

from Roche Abbey Lake with those of Mr. J. N. Coombe, recorded in the 'Naturalist' for November 1905 for the same water. Of the 58 species mentioned by Mr. Coombe, 36 were found again on this occasion, and in addition the following:—

<i>Achnanthes microcephala</i> Kutz.	<i>Nitzschia dissipata</i> (Kutz.) Grun.
„ <i>lanceolata</i> Breb.	vars. <i>media</i> and <i>acuta</i> .
<i>Cocconeis pediculus</i> Ehr.	„ <i>debilis</i> (Arnott) Grun.
<i>Cymbella amphicephala</i> Naeg.	„ <i>apiculata</i> (Greg.) Grun.
<i>Gomphonema acuminatum</i> Ehr.	„ <i>Palea</i> (Kutz.) Grun. and
„ <i>parvulum</i> Kutz.	var. <i>fonticola</i> .
<i>Navicula bacillum</i> Ehr.	„ <i>recta</i> Hantzsch.
„ <i>Gastrum</i> (Ehr.) Donk.	<i>Surirella ovalis</i> var. <i>Crumena</i>
„ <i>humilis</i> Donk.	Breb.
„ <i>Pupula</i> Kutz.	<i>Stauroneis Smithii</i> Grun.
<i>Nitzschia acicularis</i> W. Sm.	<i>Synedra radians</i> (Kutz.) Grun.

The most prominent form was still *Pleurosigma attenuatum* with unusually large frustules, as found by Mr. Coombe. *Fragilaria capucina* was present in three varieties, the type form (common in most fresh-water gatherings); the var. *mesolepta*, and a third variety which I have not previously seen described. Instead of the constriction in the median portion of valve, which is characteristic of the var. *mesolepta*, there was a distinct dilatation.

In Maltby village there is a spring to which local belief attributes mysterious virtue. When I went down to take a gathering from the brown fringe that festoons the water in its rocky basin, there was an ancient rustic engaged in filling a farm water-cart. 'Aye,' said he, 'tis real good watter, the best for many a mile round—and puts moor stuff in a man's boans.' To my ears this sounded as rather dubious praise, but to my doubtful query, the aged one staunchly responded, 'I doan't know nowt about that, but I've supped this watter for moor nor seventy year, and I've never had roomatiz in my life.' To this unsolicited testimonial no cavilling was possible, so I meekly filled my tubes, wondering whether this marvellous water would yield anything special in its algæ. The principal form proved to be *Meridion circulare*, whose graceful whorls are familiar to all diatom students. The most uncommon was *Synedra ulna* var. *vitrea*, which was also fairly abundant. About a dozen other species, all rather common, have been mentioned as occurring in other waters.

YORKSHIRE GEOLOGICAL PHOTOGRAPHS COMMITTEE'S REPORT FOR 1905.

A. J. STATHER.

THE Committee has succeeded in awakening the interest of a number of the Geological Photographers, who have come forward with a number of valuable photographs of various geological phenomena in the East Riding, which is ground which has been but sparsely touched upon previously.

Nearly all the photographs contributed this year have been obtained in duplicate, so the Committee will have a good number of prints to hand over to the British Association before the 1st of July 1906.

Altogether 78 additional photographs have been added during 1905. Some of these have already been reproduced in the 'Naturalist.'

The following is a list of Photographs received:—

From Mr. GODFREY BINGLEY, Leeds.

<i>No.</i>	<i>No.</i>
6845 & 6846. Hambleton Quarries, near Bolton Abbey.	6932, 6933, 6934. Osgodby Nab (Estuarine and Millepore series).
6889. High Force, Upper Teesdale.	6935. Osgodby Nab (Lower Oolites and Millepore series).
6890. High Force. Down stream from above Falls.	6937. Osgodby Nab from the North (Fault).
6891. Section of altered Limestone. Above High Force.	6940. Scalby Bay.
6892. Niddy Bank (Skiddaw Slates).	6941 & 6943. Sections in Scalby Bay.
6893. Niddy Bank (Mica Trap Dyke).	
6894. Cauldron Snout.	6944
6895. Falcon Clints.	6946
6896. Falcon Clints (Whinsill, on Basement Carboniferous limestone).	6948
6897 & 8. Thistle Green, Cronckley Fell.	6949 } Cliff sections in Scalby Bay.
6902. Dry glacial overflow valley in Teesdale.	6950 }
6926. Clayton Bay and Osgodby Nab.	6951 }
6928. Osgodby Nab, from sands.	6952 }
6929 & 6931. North side of Cayton Bay (Estuarine series capped with boulder clay).	6953 } Scalby Nab.
	6955. Cliffs South of Scarbro' (Upper Estuarine series).
	6957. Cliffs South of Scarbro' (Lower Oolites).
	6958. Castle Hill Scarbro', North Side (Middle Oolites).
	6960 & 6961. Red Cliff Cayton Bay.
	6963 & 6967.

From Mr. T. SHEPPARD, Hull.

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| 1. Cliff Section at Waxholme (see 'Naturalist' for October). | 2, 3, & 4. Sections in Railway Cutting at Hessle. |
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From Mr. J. T. DYSON, Hull.

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| 1. Humber Bank at Paull. | 2. Cliffe Section North of Scarborough'. |
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From Mr. W. S. PARRISH, Hull.

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| 1, 2, 3. Sections at Pocklington. | H1. Hornsea, The Mere. |
| 4. Filey Brigg (showing peculiar weathering). | H3. " " " |
| D152. Rudstone (showing Monolith). | H13. The Cliffe at Hornsea. |
| 2D. Hessle Waterside. | D135. Flambro', Robin Lythe's Cave |
| | D125a. Interior of above. |

From Mr. J. W. STATHER, Hull.

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| 1 & 2. Hessle, Cooke's Pit. | 12. Filey Brig (conglomerate). |
| 3. Hornsea. | 13 & 14. Scalby Island. |
| 5. Hornsea (bed of old Mere). | 15 & 16. Sections of Glacial Gravels and Boulder Clay north of Scarborough.' |
| 6 & 7. Bridlington (current bedded gravels). | 17. Current-bedded Shale and Sandstone north of Scarborough.' |
| 8. Sewerby (pre-glacial sea beach). | |
| 9. Weaverthorp (chalk on end). | |
| 10 & 11. Filey Bay (laminated Kimeridge clay.) | |

From Mr. SUDDABY, North Cave.

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| 1. Welton Dale. | 3. Woodale. |
| 2. Brantingham Dale. | 4. Drewton Dale. |

Eggs of the Native Birds of Britain. By W. J. Gordon. Simpkin, Marshall, Hamilton, Kent & Co. 3/6.

In the Introduction to this little work the author gives a useful account of the eggs of our British birds, and a serviceable comparison between the eggs of different species. There is also a list of British Birds towards the end of the book which, had it been printed on one side of the paper only, would have been admirable for cutting into labels. The author states that the eggs were arranged in trays, photographed, and *accurately coloured* from the eggs by Mr. T. J. Gordon, and the *lithographers have done the rest!* From this we assume that the lithographers are to blame for the poorness of the plates. We have recently seen many coloured plates of birds' eggs, of varying worth, but these are worse than any. The shape and relative sizes of the eggs are all right, but the colours are bad. From these one might assume that by far the greater proportion of our birds' eggs were of a slaty-blue colour, whilst red is almost entirely absent. Beyond the shapes there is nothing in the representation of the kestrel, buzzard, martin, etc., to enable one to recognise them. Quite half the eggs figured could not be identified by an expert oologist.

Notes on the Composition of Scientific Papers. By T. Clifford Allbutt, M.D., etc. MacMillan & Co. 2nd Edition. 164 pages. Price 3/6.

This is a book we can particularly recommend to our readers—to the Editors of the Proceedings of our local Field Clubs, etc., and especially to those who cannot understand why their notes when printed in this journal do not always correspond precisely with the wording of the manuscript. Not only does Dr. Allbutt present a most readable—not to say amusing—series of extracts from the examination papers which he has perused, but what is of more importance, he gives some sound advice to all those who write scientific articles.

THE WYCH ELM (*ULMUS MONTANA*).

P. Q. KEEGAN, LL.D.,
Patterdale, Westmorland.

AMONG the prehistoric trees specially characteristic of the Lake District is the Wych or Mountain Elm. It may be deemed and termed an opportunist sylvan item in that locality, i.e., the soil and situation thereof are admirably adapted to the secure ensconcement and vigorous development of the tree. Rich, deep, loose alluvial bottoms, lavishly paved with rock-débris, and therefore of infirm texture, and almost constantly dripping with percolating water, supply an excellent medium for the penetration of its long tough roots, capable of fully ministering to its inorganic needs. The fact that some such adaptive relations between soil and organism are indispensable in the case of this particular tree will be evinced in the course of the following exposition of its chief anatomical, chemical, and physiological characteristics.

STEM.—The wood is moderately hard and heavy (specific gravity 0.628), lightish-brown in colour, with a fairly clear distinction between alburnum and duramen. The medullary rays occur singly or are grouped in three or four layers, and in tangential section may be twelve times longer than broad; the vessels of the spring wood are very large, being over 160 μ wide, have areolated pores, and form a continuous belt of one or two rows, but in the autumn wood they are much narrower, have areolated pores and fine spiral bandlets, and are arranged in narrow, wavy, concentric bands; the very thick-walled fibres occupy most of the interspaces between the vessels, while the parenchyma is sparsely distributed among the smaller vessels. In the bark, the long, smooth, poorly-lignified fibres are arranged in bundles which form irregular concentric zones, separated laterally by the soft bast, which consists of cells enclosing either a single crystal or a red-brown pigment, and of sieve-tubes which are united end to end by transverse partitions nearly the whole surface of which is a simple sieve; isolated bast-fibre bundles occur in the pericycle, i.e., the latter is discontinuous; the phellogen is the sub-epidermal layer, and the superficial periderm formed thereby lasts three or four years, after which the secondary periderm and a persistent rhytidome commence to be produced in the form of flattish scales, the exterior parts of stem and branch ultimately becoming more or

less furrowed according to age. The wood contains traces of tannin and phloroglucin, no fat or resin, a moderate amount of lignin, some glucose, and an enormous production of starch in summer, which, however, disappears in October from the pith and becomes somewhat reduced in quantity in the rest of the wood till February, when it reappears till flowering time, then once more disappears during the bursting of the buds, and finally in July commences to be redeposited in full force; the wood of a branch of about one inch diameter, cut in May, had about 2 per cent. of ash in dry, which yielded 15 per cent. potash, 31 lime, 4.7 silica, 6.15 P_2O_5 , etc. (Of our trees in the division *Apetalæ* the Elm contains the most potash in its wood.) The bark retains its summer starch till towards the end of November; the bark of the branches contains about 2 per cent. wax and a little resin, about 1.8 tannin with traces of phloroglucin, about 20 mucilage (occurring as cellulose-encased projections from the walls of roundish, large, strongly-refracting cells or special sacs), and 10.8 ash, which in May has 12.4 soluble salts, 11.8 silica, 45.1 lime, 2.2 magnesia, 1.7 P_2O_5 , with traces of iron and manganese. The mucilage swells enormously in water, contains unchanged cellulose, has an acidic function, and arises apparently by the growing pressure provoking the decomposition of the pectates of the middle lamellæ of the thick cell-walls of the parenchyma.

LEAVES.—The mesophyll is composed of one or two layers of palisade cells occupying half its thickness and a regular lacunar tissue of single cells extended horizontally and separated from one another by wide intercellular gaps; the cuticle is normal; the upper epidermis is of straight, polygonal cells, the lower epidermis is of smaller and narrower cells with sinuous walls, have simple and peltate hairs; the stomata are small and surrounded by accessory cells; the petiole encloses three vascular bundles at the base, which nearer the blade are fixed into a closed ring which eventually opens in the form of the letter U. At the end of July the leaves contain about 63 per cent. of water, and the dried leaf yields about 2 per cent. wax, carotin, etc., 18 albumenoids, 2.9 tannin, and some free phloroglucin, much glucose, a large quantity of pectosic mucilage (enclosed in round, deep-reaching cells in the epidermises, petiole, and nerves), 9.5 cellulose, and 9.8 ash which yielded 18.4 per cent. soluble salts, 19.17 silica, 33.8 lime, 5.2 magnesia, 3.6 P_2O_5 , and 1.3 SO_3 . The finely-tinted withered leaves of the autumnal forest yield 16.8 per cent. of ash in dry, containing 28.8 per cent. silica and

40.8 lime. Silica-containing rosettes of cells surround the epidermal hairs whose walls are also impregnated with silica, as are also some of the walls of the epidermis; while crystals of oxalate of calcium occur in the nerves and druses of same in the mesophyll.

FLOWER AND FRUIT.—The flowers are disposed in loose clusters or in simple umbels, and most of them are male by abortion; they all open nearly simultaneously, and fertilisation is effected all at once in each umbel, soon after which they fall to earth. The dried flowers contain about 20 per cent. albumenoids and 8 ash, which has 29.2 per cent. potass, 14 lime, 11 P^2O^5 , and 16.3 SO^3 . The fruit is a samara with peripheral wings (= a winged achene), i. e., the external epidermis expands into flattened prolongations in the form of wings; the interior remains empty for some time, but is rapidly filled up by the developing embryo, which has tuberous cotyledons with cellulosic cell-walls, nerves in the procambial state, and aleurone and oil, but no starch; the radicle is superior, and there is no endosperm. The histological composition of the ripe fruit is obscure, the various original parts having become fused, or some of them altogether obliterated. The chemistry, however, is of great interest. The dried fruit and seed yield 8.3 per cent. of a fluid oil which is mostly of olein giving with mineral acids dark greenish-brown colours and a pale yellowish elaidin; also considerable resin, some sugar (glucose and levulose), traces of tannoid, a very large quantity of mucilage with much oxalate of calcium, but no phloroglucin, and no starch; the ash amounts to 9.9 per cent., and contains 30.9 per cent. soluble salts, 14.6 silica, 24.3 lime, 4.7 magnesia, 8.5 P^2O^5 , and 3.3 SO^4 . It will be observed that the amount of silica in this fruit is quite unique among our forest trees, and is probably connected with the great rapidity which marks the maturation of the organ. The thin extended surface of the winged epidermis offers facilities for rapid evaporation and the drainage of silica thereto from other parts.

SUMMARY.—An eminent peculiarity of this tree is the highly developed system for the conduction of water—the spacious vessels in the wood, the numerous lacunæ in the leaves, etc. The physiological processes are characterised as languishing, and so far imperfect; the increase of lignin, cellulose, and starch is slow, the albumenoids and the soluble carbohydrates show few symptoms of exhaustion, and the fixed insoluble matters tend to accumulate in a very marked degree. The young stems cease to grow at an early period, the vegetative development

terminates in June, and new buds are thereupon formed. The flowering, too, is very precocious, and the fruit rapidly matures and vegetates the same season. Hence from the latter weeks of June there is nothing to do, as it were, for the organic principles ready formed and apt for chemical transformations, and therefore their weights or percentages in the fresh leaf, etc., seem to undergo little change from the beginning of July till the autumnal fall in mid November. A somewhat similar physiological condition of things occurs in a few other of our indigenous forest trees, but as regards the increase in the percentage of ash and of silica as the life of the leaf progresses, the Wych Elm has no compeer. Thus, on 5th June, in the not-as-yet full-sized leaves I found 9 per cent. of ash in dry having 9.4 silica therein, and on 16th November the corresponding figures amounted to 16.8 and 28.8 respectively. The general explanation of this fact is, as expressed by Palladin, that 'it is on the quantity of water vapourised by plants that depends in a great measure the entrance and the distribution in the plant of silica, lime,' etc. The enormous accumulation of silica in the Elm leaf is the result of the action of the living tissues on the perishing or dying tissues with which they are connected. 'Between the time,' says M. Emile Mer, 'when a tissue in contact with living tissue commences to perish and that when it dies it dries a little, and in proportion as this water is evaporated it is replaced by a drainage of substances,' etc. The physiological condition of the leaf admits, so to speak, of a kind of demise almost from the first—a sort of drying, not perhaps of the entire organ, but especially of its external tissues; and the water thereby lost is replaced by silica which, copiously supplied by special soil, proceeds from the living parts towards the dermal appendages, especially of the upper surface.

MAMMALS.

White Mole in Lincolnshire.—'A White Mole, taken by a member (of the Spalding Society) at Cowbitt, in his garden in this parish. Present to the Museum. A spot of black hairs round each eye and a black tail.' 'Antiquities in Lincolnshire,' being the Third volume of the 'Bibliotheca Topographica Britannica' (Nichols), 1790.—E. ADRIAN WOODRUFFE-PEACOCK.

NEST-POKING.

S. L. MOSLEY.

I SHOULD like to enter a protest against what has become far too common a practice: I allude to the photographing of birds' nests. I am led to make these remarks from seeing the photograph of a nightingale's nest in your last issue, and the statement that it had been stolen. Is there any wonder when we know the number of visits made to it by the various "Naturalists?" The place must have been trampled down. Scores of birds have been driven away from their nests by such unwarrantable intrusion. For a man to wait five hours keeping a rare bird off its partly incubated eggs, in order to get a photograph of the bird going on, is worse than taking the eggs. And what good is the photograph when taken? In the print in your journal we cannot tell whether the eggs are round or square, the material of the nest might be anything, and not a single plant in the vicinity can be identified with certainty. The photograph is not needed. We know already far more about a nightingale's nest than any photograph can tell us, and for public instruction one of the South Kensington cases is, out of sight, superior to any photograph. If these men really wanted a photograph, why did they not go where nightingales are plentiful, and where the driving away of one pair would have done no great harm, instead of badgering away perhaps the only pair which favoured East Yorkshire with a visit? If we are naturalists let us try to protect Nature from ruthless ravages.

[Without suggesting for a moment that our Bradford friends were in any way guilty of the general charges made by Mr. Mosley, we certainly think that there is something to be said on this question from both sides].—ED.

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A **New Census Catalogue of British Hepatics** has been published by the Moss Exchange Club. The Catalogue is based on the system of classification adopted by Schifflner in Engler and Prantl's 'Die Natürlichen Pflanzenfamilien,' and was compiled by Mr. Symers M. Macvicar. The Rev. C. H. Waddell has done the distribution for Ireland and Mr. W. Ingham for Great Britain. This is the first time the distribution of Hepatics has been attempted according to the 112 Botanical Vice-Counties of Great Britain and the 40 of Ireland. Copies of this valuable Catalogue may be had from Mr. W. Ingham, B.A., York, at 9d. each, postage prepaid.

Naturalist,

CONFERENCE OF DELEGATES OF CORRESPONDING SOCIETIES OF THE BRITISH ASSOCIATION.

IN consequence of the Meeting of the British Association for 1905 being held in South Africa, it was arranged that the Annual Conference of the Corresponding Societies of the British Association should take place in London. A meeting was consequently held in the rooms of the Linnean Society, Burlington House, on October 30th and 31st, at which the Yorkshire Naturalists' Union was represented by its Secretary. Delegates from the following Northern Societies were also present:—Hull Geological Society, Hull Scientific and Field Naturalists' Club, Leeds Naturalists' Club and Scientific Association, Manchester Geographical Society, Manchester Geological etc., Society, Manchester Microscopical Society, North of England Institute of Mining etc., Engineers, Rochdale Literary etc., Society, Yorkshire Geological Society, and Yorkshire Philosophical Society.

The Conference was presided over by Dr. A. Smith Woodward, F.R.S., of the British Museum. After welcoming the delegates, he delivered an address, in the course of which he stated, in reference to

FIELD CLUB EXCURSIONS,

'I deem it a special honour to have been deputed by the Council to preside over this Conference of Delegates, because there is no nation in the world in which local Scientific Societies are so numerous or form so prominent a feature of intellectual life as in the kingdom of Great Britain and Ireland. I also undertake the duty with peculiar pleasure, because I began my scientific career as an active member of the small Society at one time flourishing in my native town, and it was then that I first learned how to observe and how to write down my observations in a logical form. None but those who have associated with the scientific men of other countries, and have seen the splendid isolation in which most of them are accustomed to work, can appreciate the service which our scattered small Societies render to the cause of natural science here. Through the influence of these bodies everyone who is able to devote his energies to original research is assured the sympathy, and frequently the help, of a multitude of cultured men who are too much occupied with other pursuits to give more than superficial attention to natural science. Through the same influence also a continual stream

of recruits is furnished to the great Societies in our three metropolitan centres whose activities and resources excite the admiration, even if not the envy, of our colleagues in scientific research abroad.

‘In the first place it seems to me that some of the Societies—especially the Field Clubs, which admit too many so-called ‘antiquarians’—continually reduce their efficiency, and even endanger their existence as scientific bodies, by the luxurious picnics which are misnamed ‘excursions.’ The excursion-circulars of one Society, which I often see, particularly amuse me. The hour of starting is made sufficiently late to avoid the discomforts of even moderately early rising; carriages are arranged for every possible part of the route; at least an hour is spent in an elaborate luncheon at some well-appointed hostelry; an hour and a half afterwards an amiable hostess invites the party to tea; and then, after inspecting some old building, the direct return journey is begun. Natural history forms an entirely subordinate part of the programme. I know three Societies which have lost the co-operation of some of the best naturalists in their district by frivolity of this kind: and, however tempting the prospect of multiplied subscriptions may be, I do not think it is to the advantage of science for any Society to increase its membership at the sacrifice of strict attention to its main objects. Excursions are a most admirable institution, but when intended for natural history should be as systematically scientific as the meetings.’

The address was followed by an animated discussion, in which it was shown that, at any rate, most of the Yorkshire Societies were not guilty of the drawback pointed out by Dr. Smith Woodward. Details of the discussion, as well as of Dr. W. Martin’s paper on ‘The Law of Treasure Trove’ which followed, will appear in the Report of the Corresponding Societies Committee in due course. Following these papers a visit was paid to the Museum of the Royal College of Surgeons, where the Conservator, Mr. C. Stewart, described the more interesting exhibits.

On the following day Prof. G. S. Boulger introduced the subject of

THE PRESERVATION OF OUR NATIVE PLANTS.

He pointed out that ‘Plants are in danger of extermination from inevitable natural causes, such as the encroachments of the sea and the increasing density of population, with its con-

comitant clearing, draining and building. Among avoidable causes of loss the more important are the thoughtless excesses of children, tourists, and botanists, and the work of trade collectors. The demands of artists have led to much local extermination of the sea-holly, and the fruitless endeavours of amateurs to cultivate our terrestrial orchids seriously endanger some species. Nurserymen, who certainly do not cultivate them, offer the latter for sale, just as clergymen and others in the Lake District, or other districts still rich in ferns, advertise collections of these plants. It is mainly plants such as primroses and ferns, which can be obtained in large quantities, that appeal to the trade collectors; but these men, who now range far afield from London or other large towns, are often merely the *employés* of large wholesale firms. Botanists, who ought to know better, are often recklessly wholesale in their collecting, rooting up numerous specimens of non-variable species partly for the purpose of exchange. Even the gathering of the blossom may endanger the continuance of species, such as *Blackstonia perfoliata*, which are annual, by preventing the formation of seed.

‘ Among protective measures are the concealment and enclosure of the localities of rarities, the cultivation of wild forms, transplanting them from places where they are in danger, educational or moral methods, and legislation. Enclosure, unless a keeper be employed, may only direct attention to the locality of some rarity: it must be costly, and can only be of very limited application. Much may be done by the cultivation of rarities in gardens near by, so as to supply tourists, as Mr. Correvoon grows edelweiss and other alpins at Geneva. Small gardens near Ben Lawes, in the Lake District and at the Lizard, would be very valuable. Ultimately we must depend mainly upon the development of a general sentiment in favour of the conservation of our natural beauties, and nothing will conduce to this end more than educational measures. We must educate our teachers. A leaflet might be distributed among them stating the case; and, perhaps, ‘ a reader ’ might be prepared intermingling pleas for plant protection with interesting accounts of plants and plant life. The clergy, or other managers of school treats, might well represent to the children beforehand such simple principles as that one cannot both eat one’s cake and have it; that some flowers should be left to form seed to grow into new plants; and that some should be left for others’ enjoyment.

'As the results of education must be tardy, and the existing law is inadequate, legislation appears necessary. It is at present necessary to prove damage; it is difficult to secure the co-operation of landowners and the police; and the powers of the Home Secretary and of the County Councils as to the making of by-laws are not sufficiently clear. It is proposed to introduce a Bill on the lines of the Wild Birds' Protection Acts, applying only to persons over fourteen years of age as principals, and exempting occupiers of land and those authorised by them, but authorising the scheduling of species, districts, or whole counties.'



BOTANY.

***Malaxis paludosa* in the North Riding of Yorkshire.** (See page 355 Dec. 'Naturalist,' 1905.)—Mr. Alexander will be interested to know that I found this plant on the Yorkshire side of the Tees, about 100 yards above the High Force, on 24th August, 1895, and recorded it in the 'Naturalist' soon after (Nov., 1895, p. 307.) In my case also, the few plants were growing on the top of Sphagnum close by the river, and kept wet by a slight trickle of water.—WM. INGHAM, York, 11th Dec. 1905.



ENTOMOLOGY.

***Aplecta nebulosa* var. *robsoni* at Wakefield.**—I took a specimen of *Aplecta nebulosa* var. *robsoni* at Haw Park, Wakefield, on 18th July last.—ARTHUR WHITAKER, Worsborough Bridge, Barnsley, 11th November, 1905.

This is the first definite record we have of the occurrence of *A. nebulosa* var. *robsoni* in Yorkshire, though very dark specimens are so numerous in the south-west, it was pretty certain that the extreme black form (*robsoni*) must occur.—G. T. P.

***Euchromia mygindana* near Sheffield; an addition to the Yorkshire list.**—Amongst some micro lepidoptera taken during the last few years, and identified for me by Mr. G. T. Porritt, are two specimens of *Euchromia mygindana*. This species, Mr. Porritt informs me, has not previously been recorded as occurring in Yorkshire. They were taken in a rough moorland wood in the Sheffield neighbourhood.—L. S. BRADY, Sheffield, 25th Nov., 1905.

NOTES ON A SOLITARY WASP (*Odynerus parietum* Linn.).

C. F. GEORGE, M.R.C.S.,
Kirton Lindsey.

THIS active little creature is, perhaps, our commonest species of this Genus of Solitary Wasps. It is not often observed, except by Naturalists, in consequence of its timid and suspicious nature. Occasionally it strays into houses by accident, and is then seen in the window, and promptly destroyed, as a nasty little black wasp. It ought really to be protected and set at liberty, for it is very useful in the garden, as it provisions its



Nest of Solitary Wasp.

nest with the green caterpillars, so destructive to the rose leaf. It is sometimes so intensely interested in its work that it may be closely approached. Many years ago I saw the little creature rush from one edge of a rose leaf to the other, backwards and forwards in quick succession, following the motion of something on the other side of the leaf, at last it caught hold of the caterpillar and dragged it forth; the weight was so great that both wasp and caterpillar fell to the ground; the wasp then stood

over the caterpillar to rest, and perhaps to sting it, as well as to perform its own toilet. After a little while it took up the caterpillar and flew away with it. On another occasion I saw an *Odynerus* either enter or come out of what appeared to be a nail-hole in the mortar between two bricks; after it had left I extracted several of these green caterpillars—it was evident that a hole, already formed, was to be used, instead of building an entire nest. In 1901 I went to examine a nest made by some insect near the front door of a neighbour; it had not been discovered until completed, and its entrance closed. It was situated in an angle of the brickwork, at the bottom of a column, as shewn in the photograph. In the spring of 1902 I was allowed to fix a small net of muslin over the cell, and fasten it in such a manner as to detain any insect that might emerge from the cell; in this way I was enabled to obtain more than one specimen of wasp, and to make out the species, which I decided to be *Odynerus parietum* Linn.* During the spring of 1902 another nest was built, two bricks above the first one, but possibly the insect builder came to grief from some accident, as the nest was never sealed up. It is very curious that, although people were very frequently passing in and out every day, the wasp whilst at work was not observed by anybody. On the 25th July 1902, I took the photograph which shows the two nests, the unsealed opening of the upper one is very plainly to be seen, and it will be observed the wasp made several attempts to make the upper nest, but was only satisfied of its security when it commenced on the mortar between the bricks. Panzer, in his 'Fauna Germanica' gives a good coloured figure of this Wasp. Donovan also in his 'British Insects,' Vol. xiv., p. 72, Plate 495, figures two other species. In 1868 Dr. Ormerod, the father of the well-known Entomologist, Miss Ormerod, published a popular History of British Social Wasps, beautifully illustrated. I have not however heard of any popular work on British Solitary Wasps. In the October 'Naturalist,' p. 292, appears a short notice of (American) 'Wasps Social and Solitary,' by G. W. and E. G. Peckham, which, thanks to Mr. Sheppard, I now possess, and which should be read by all interested in Wasps. In it are mentioned six or seven species of *Odynerus*, but *O. parietum*, which differ in its methods of nest building, is not described.

* We have several species of *Odynerus* in Great Britain: F. Smith, in his Catalogue of the British Museum, published in 1858, describes 12 species, and Saunders in his Synopsis of 1882 mentions 15, and possibly more have been recorded since that time.

EAST YORKSHIRE SPIDERS.

WM. FALCONER,
Slaitwaite.

AGAIN omitting the generally common species, the following spiders collected in the neighbourhood of Scarborough in August are additions to the brief list given in the 'Naturalist' for February 1905, p. 61:—

- Oonops pulcher* Templ. Three examples, Hayburn Wyke.
- Clubiona reclusa* Cb. Scalby, Scarborough, Cloughton.
- Clubiona holosericea* Degeer. An adult male and female, Scalby.
- Clubiona trivialis* C.L.K. Several examples of both sexes, Ringingkeld Bog, Cloughton. A rare spider.
- Chiracanthium carnifex* Fabr. Common, but all immature, both sexes, Ringingkeld Bog.
- Coelotes atropos* Walck. Raincliff Woods, a few females.
- Antistea elegans* C.L.K. Scalby, four males, two females. Ringingkeld Bog, one female. A scarce spider, frequenting bogs.
- Hahnina montana* Bl. Many adults, both sexes, Hayburn Wyke.
- Pholcomma gibbum* Westr. One male and six females, Hayburn Wyke.
- Drapetisca socialis* Sund. A few examples from tree trunks, Hayburn Wyke.
- Leptyphantus obscurus* Bl. Scarborough Mere. Raincliff Woods.
- Leptyphantus pallidus* Cb. Two adult males, Raincliff Woods. A rare spider.
- Bathyphantus variegatus* Bl. Many examples, Scarborough Mere.
- Porrhomma microphthalmum* Cb. One female, Ringingkeld Bog.
- Hilaira excisa* Cb. One female, Ringingkeld Bog; two females, Hayburn Wyke. A rare spider. One of the specimens was remarkable in having only half of its complement of eyes in a serviceable condition, two laterals on the same side being obsolete, and two centrals being imperfectly formed.
- Tmeticus rufus* Wid. One female, Raincliff Woods.
- Tmeticus luthwaitii* Cb. An adult male and female from beneath the stones on the foreshore, Hayburn Wyke. A rare spider.
- Microneta viaria* Bl. Raincliff Woods; Hayburn Wyke. Among dead leaves.
- Syedra pholcommoides* Cb. Just removed from the genus Sintula. One adult female, Cornelian Bay. A rare spider.
- Erigone promiscua* Cb. One male, Scalby.
- Lophomma punctatum* Bl. One female, Scalby; three females, Ringingkeld Bog. Another hygrophilous species and a scarce spider.
- Diplocephalus picinus* Bl. Many females, Raincliff Woods.
- Diplocephalus fuscipes* Bl. One female Raincliff Woods; one female, Hayburn Wyke.
- Peponocranium ludicrum* Cb. One female, Raincliff Woods.
- Tapinocyba pallens* Cb. Two females, Raincliff Woods. A rare spider.
- Cornicularia cuspidata* Bl. Two females, Raincliff Woods; one male, two females, Hayburn Wyke.

- Cornicularia unicornis* Cb. One female, Ringingkeld Bog.
Nesticus cellulanus Clk. Many examples, both sexes, adult and immature, Hayburn Wyke.
Ero thoracica Wid. Hayburn Wyke ; Ringingkeld Bog.
Meta merianae Scop. Hayburn Wyke.
Oxyptila trux Bl. A few adult and immature specimens, Scalby, Cornelian Bay, Ringingkeld Bog.
Lycosa nigriceps Thor. Adult and immature examples, Scalby and Ringingkeld Bog.
Neon reticulatus Bl. One female, Ringingkeld Bog ; one female, Hayburn Wyke.

REVIEWS AND BOOK NOTICES.

The Making of East Yorkshire. By **Thomas Sheppard, F.G.S.**
 A. Brown & Sons, Hull. 29 Pages and 4 Plates. 1906. Price 1s. od. net.

In this booklet Mr. Sheppard has done good service to two causes, to Geology and to Education. In the first aspect it is popular rather than scientific, in the sense that it is intended, not for the enlightenment of geologists but for the popularisation of geology. Viewed from this standpoint it has many merits. It is fortunate in its subject ; for though the East Riding is of recent origin, there are few districts where the elementary processes of earth-building and earth-carving can be studied to better advantage. We can see the river and estuary at work. In the long line of cliffs from Spurn to Whitby the sedimentary rocks are laid in successive sections mile after mile, there are witnesses of oceans and meres and shallow seas, while the stupendous forces of the ice world remind us of the time when Holderness was as Alaska is now. Those who read the record of the East Riding know no small portion of the secret of the earth's history. But the presentation of this record to the uninitiated requires knowledge. Just as the teacher knows his subject, has got beyond the perplexity of it, and sees it whole, can give it out in simplicity and with a sure hand. This Mr. Sheppard is able to do.

We said also that there was good service to education. This was prompted by the fact that the lecture was delivered to a Teachers' Association. For an appreciation of Geology has a double worth. It familiarises the mind with the action of the laws of nature. No one who has grasped the meaning of this record but can look out on the world with a larger view. Moreover, as our system of education learns to deal more with the realities of life, it is certain that the story of the earth will be taught to every educated child, and that it will be the better

for it. By his address to the Hull and District Teachers' Association Mr. Sheppard has helped to this end.

We may say that the Illustrations are excellent. There is one Greek word in the book and it is wrong, but this is a misprint.—J. MALET LAMBERT.

NORTHERN NEWS.

An earth tremor occurred in the Manchester and Salford district at 3.45 a.m. on November 25th last.

A memorial bust of the late Dr. Joule was recently unveiled at Sale, near Manchester.

The new Museum and Laboratories of Zoology of the University of Liverpool were opened by the Earl of Onslow in November.

In the Geological Magazine for December, Mr. G. W. Lamplugh, F.R.S., has some 'Notes on the Geological History of the Victoria Falls.'

Yorkshire Naturalists will be sorry to hear that Mr. W. Nelson, of Leeds, who has done so much for Yorkshire conchology, is suffering from a severe illness, from which he is not expected to recover for some time.

Mr. J. W. H. Harrison, B.Sc., writes on 'Social Hymenoptera in North Durham,' 'Note on *Volucella bombylans*,' and '*Megachile circumcincta*, Lep., in Durham,' to the December 'Entomologist's Record.'

Mr. W. West and Prof. G. S. West contribute a memoir on 'Fresh-water Algæ from the Orkneys and Shetlands' to the 'Transactions of the Botanical Society of Edinburgh,' vol. 23, part 1.

The Royal Society for the Prevention of Cruelty to Animals is issuing a new periodical, 'The Animal World,' part 1 of which has just reached us. The publication, which is well illustrated, will doubtless advance the cause of the Society.

It has been decided by the Council of the British Association that the meeting of the Association, to be held at York in 1906, shall commence on August 1st. This date is much earlier than usual, and we doubt the wisdom of such a change.

Sir John Burdon Sanderson, who was Professor of Physiology at Oxford for many years, has recently died at the age of 77 years. He was a native of Jesmond, Northumberland, and a familiar figure at the meetings of the British Association.

The death is announced of Capt. F. W. Hutton, of the Canterbury Museum, New Zealand, who was the second son of the Rev. H. F. Hutton, Rector of Spridlington, Lincolnshire; and of Dr. Ralph Copeland, Astronomer Royal for Scotland, who was born in Lancashire.

We regret to record the death, on November 18th, of a well-known Bradford worthy, James Monckman, D.Sc., at the age of 63. Dr. Monckman was one of the founders of the Bradford Scientific Association, and was three times the president. Though he was principally occupied with chemistry and allied sciences, he took a great interest in the natural sciences, and paid particular attention to the glacial features of the Bradford district. He was helpful in the formation of the Bradford Botanical Garden, and occasionally contributed to the Journals of the Yorkshire Scientific Societies.

From the 'Hull Daily Mail':—'Rara Insectus: A fly of the above genus was seen in the stackyard of a farmer in the neighbourhood of Drewton Dale. It is the first time that it has been known to visit this part. In appearance it is very much like the common or domestic house fly, only it has eyes very much larger and is continually humming. Several of the farm hands tried to effect a capture, as we are informed that a large price is offered for the rarity. It evaded its would-be captors, and was last seen making a bee line for Hull, humming the while. We suppose the extremely mild weather is accountable for its presence with us.' [The specimen has not arrived at the Hull Museum.—ED.]

At the annual meeting of the Lincolnshire Naturalists' Union, held at Lincoln on Nov. 23rd, the officials were re-elected. The President (the Rev. E. A. Woodruffe Peacock) read a paper on 'The Stoat and its ways.' In his opinion the 'record' was held by a stoat at Pennyhill, which 'killed during one night 11 turkeys, 30 ducks, and 20 chickens.' We cannot beat that record! The present membership of the Lincolnshire Union is 106. We are glad to notice that the Union has a 'balance in hand,' and trust it will now consider the advisability of printing annual transactions. We feel such a departure would result in an increased interest being taken in the natural history of the county.

We quote the following from the *Eastern Morning News*:—'At the Gainsborough Police Court, a baker was charged, under the Wild Birds' Protection Act, with having in his possession a horned owl. The fact was admitted, but defendant maintained that the bird was perfectly tame, and was allowed to fly about the house. He had had it between two and three months, and it was tame when he bought it. The Chairman pointed out, and quoted a case to show, that it was no offence in law to keep one of these birds in captivity, unless it could be shown that it had been recently taken. It was a bad state of the law perhaps, but they had to take the law as it stood, and the case must be dismissed.'

A meeting of the leading Yorkshire antiquaries and representatives of various Yorkshire Societies was held at the Leeds University on December 16th on the invitation of Principal Boddington. The object of the meeting was to consider the advisability of forming a Committee to advance the study of Roman antiquities in Yorkshire by the formation of a Bibliography and the production of a map, and by the investigation of Roman roads and of sites of buildings, and other remains within the county. It was unanimously decided that such a Committee be formed, and the following officers were elected and formed the Executive Committee:—President, Principal Boddington; Vice-Presidents, Rev. Julian (Sheffield) and Mr. Dickons; Prof. Foster (Sheffield), T. Sheppard (Hull), and T. Boynton (Bridlington), with Mr. Sidney Kitson as Hon. Secretary. The first meeting of the Society will be held at York in March.



We cannot resist reproducing the accompanying block from a recent issue of *Punch*, which the proprietors of that journal have kindly enabled us to do. The birds in the background are evidently not wasting their time in discussing 'protection':—

TOO MUCH OF A GOOD THING.

Mr. Bird. "I was with them when they started the Society for the Protection of Wild Birds, but now they're forming one for the protection of wild worms—it's a bit too sympathetic."

THE NATURALIST.

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

EDITED BY

T. SHEPPARD, F.G.S.,

THE MUSEUM, HULL;

AND

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

TECHNICAL COLLEGE, HUDDERSFIELD;

WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF

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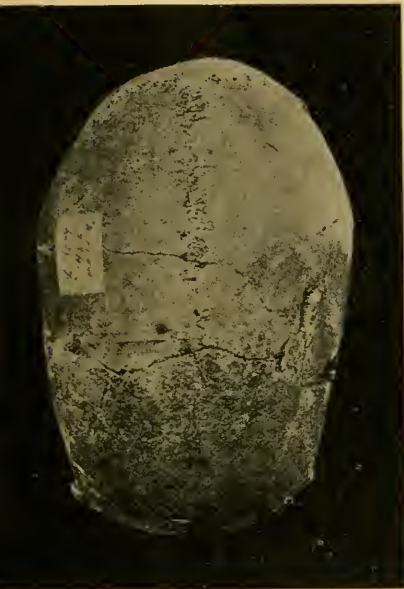
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Please mention 'The Naturalist' in replying to Advertisements.

NOTES AND COMMENTS.

SHAPES OF BRITISH SKULLS.

In the 'Journal of Anatomy and Physiology' Dr. Wm. Wright has recently given the results of his examination of the series of pre-historic skulls in the Mortimer Museum. It is illustrated by several photographs, two of which, shewing extreme types of skulls, we are kindly permitted to reproduce.



Skulls from Yorkshire Barrows.

The first is a good example of a long skull, or, as the author describes it, 'markedly dolichocephalic—an excellent example of the class called *Ellipsoides pelagicus longissimus*.' The other example is a brachycephalic, or round skull.

THE ORIGIN OF EARLY YORKSHIREMEN.

Dr. Wright's conclusions are interesting. He points out that it is usually stated that Europe in early Neolithic times was inhabited by a long-headed race; that in late Neolithic times—the so-called *Æneolithic Age*—a round-headed race

passed across from east to west. Representatives of these two races are frequently found buried together in the barrows of Continental Europe of the late Neolithic Age. He finds similar representatives of a mixed race in the round barrows of East Yorkshire. The conclusion to which one is therefore driven, is that at the dawn of the Bronze Age colonists from the mixed race passed over from the Continent to England, occupying, amongst other places, the East Riding of Yorkshire. This differs from the conclusions usually accepted, viz., that in the Bronze Age a pure brachycephalic race passed into England, and that the mixture of types found in the round barrows here is due to the peaceful intermixture of the new arrivals with those who were already in possession. To grant this conclusion, one must believe that a pure round-headed race could have made its tardy progress across Europe unmixed—an assumption which is unwarranted and incredible. Another fact which supports one in believing that the intermixture had taken place at an early epoch, is that the presence of bronze articles, and the practice of incineration, cannot be associated more with the round-headed individuals than with the long-headed. The round barrows of East Yorkshire must not be associated with a round-headed race.

STRANGE HABITATS FOR FUNGI.

In the 'Proceedings and Transactions of the Nova Scotian Institute of Science' (vol. ii., pt. 1) issued recently, Dr. A. H. MacKay gives a provisional list of the Fungi of Nova Scotia. In this is figured and described a specimen of *Pleurotus Coldwelli* n. sp., which was found growing on the bone of a whale in the Museum of Acadia College, Wolfville. The bone had been picked up on the beach two years previously. This somewhat unusual habitat is equalled by an entry in Masseur and Crossland's 'Fungus Flora of Yorkshire.' It is there recorded (p. 60) that about a dozen pilei of a minute agaric (*Pleurotus chioneus* Pers.) were found growing upon a human bone, which had been excavated from an Anglo-Saxon cemetery near South Cave, and had been placed in a hedge bottom for a few weeks.

POT-HOLING.

Judging from the excellent manner in which the 'Yorkshire Ramblers' Club Journal'* has been issued, the fine illustrations, and the variety of subjects discussed, the Yorkshire Ramblers'

* Vol. 2., Pt. 6. J. Fisher Unwin. 2/-.
 Naturalist,

Club is in a flourishing condition. The principal articles deal with 'A Fortnight in the Eastern Alps,' the 'Kleine Zinne from Cortina,' 'A Holiday among the Horungtinder,' etc., which, though possibly the work of Yorkshiremen, hardly come within the scope of this Magazine. It is on turning to the part of the Journal which more nearly refers to our own district, 'Jockey Hole and Rift Pot,' etc., that we are disappointed. One is christened 'Rift Pot' because it is a rift in the limestone. A hole through which the party wriggled is christened 'the Eye,' and lest the name should be forgotten, one meets with 'the Eye' again and again. Details are given of the rope ladders, life lines, ropes, flare lamps, etc., etc.; of the 'difficult climbing,' 'wriggling,' 'crawling,' 'negotiating'; the 'great deal of hard work,' 'much pulling and pushing,' 'struggling,' 'many contortions,' and 'tremendous efforts'; also of the accidents, additional bruises, etc. One 'explorer' had the misfortune to 'bump his knee'; another 'explorer' heard 'a stone of no great size falling,' which dislodged others in its descent, but he rushed to a place of comparative safety, and, notwithstanding the shock he experienced, he quickly regained the surface, and received the 'cordial congratulations of his comrades.' And so on. But when one comes to look for some scientific or other results of these dangerous and difficult explorations, the search is in vain, notwithstanding the fact that there are 'notes on the Geological Features' by another writer. We can only repeat the first sentence of the paper referred to:—'The fascinations of Pot-holing do not appeal to all.'

LANCASHIRE PALÆONTOLOGY.

In some 'Notes on the Palæontology of Sparth Bottoms, Rochdale,' in the Transactions of the Rochdale Literary and Scientific Society (Vol. 8), Mr. Baldwin gives particulars of the various interesting geological discoveries that have been made in the Coal Measures at Sparth Bottoms, Rochdale. Some of the more interesting have already been referred to in these columns. Nearly all of the specimens have been found by members of the Rochdale Society since 1900, when a specimen of *Prestwichia rotundata* was discovered and described. In his present communication Mr. Baldwin figures two examples of *Anthracomartus*, which we are kindly permitted to reproduce. With regard to Fig. 1, the author considers that this is probably

referable to *Anthracomartus trilobitus*, Scudder. The specimens figured represent the abdomens of arachnids. In the same volume, Mr. W. A. Parkin describes some Remains of Fossil

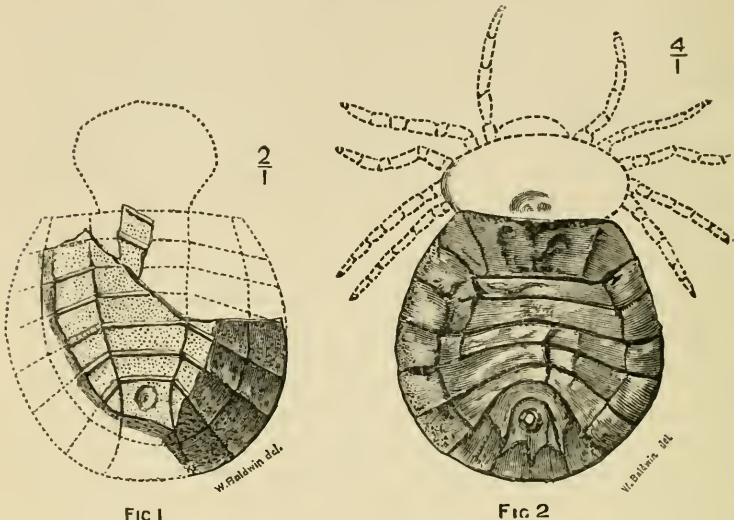


FIG 1

FIG 2

Anthracomartus, sp. from the Rochdale Coal Measures.

Fishes found near Rochdale; Mr. W. H. Sutcliffe describes 'The Bullion Mine of the Upper Carboniferous Rocks,' and there are other papers of particular local value, as well as some which do not appear to have any connection with the district.



GEOLOGY.

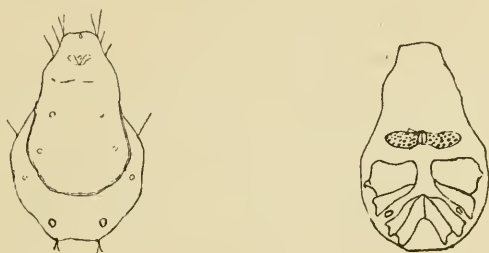
Mammalian Remains in East Yorkshire.—I have recently obtained two pieces of tusk, one measuring $13\frac{1}{2}$ inches in length by 4 inches in diameter, and the other 12 inches by $4\frac{1}{4}$ inches. One was found at Easington in November last, and the other in December, not far away from the first one. I have also obtained a fine antler of a Red Deer in excellent condition. Its total length is 36 inches, and the brow tine is 13 inches long. It was dragged up with a crab net, and is from the peat bed which occurs on the beach at Withernsea. —J. Wilkinson, Withernsea, January 13th 1906.

[I have seen these specimens, and from the appearance of the pieces of tusk they are evidently both from the same tusk of a mammoth (*Elephas primigenius*). —T.S.]

LINCOLNSHIRE FRESHWATER MITES.

G. F. GEORGE, M.R.C.S.

Arrhenurus curtus, n.sp. This mite is one of Thor's subgenus *Magalurus*, and when living is, in colour, similar to many individuals of *Arrhenurus caudatus* (the type of that subdivision), but is at once seen to differ in its general appearance, the tail part being comparatively short, giving the whole mite a stuggy appearance. The chitinous skin is well developed, and the end of the tail has no downward processes or projections, but the outer corners are slightly raised, forming small humps. When placed in preservative solution it soon alters in colour. Mr. Soar gives the length of the whole mite as 1.28 mm. The palpi and legs are of the usual type, having the spur on the fourth leg, the hairs on the end of which are wavy. The two



figures represent the upper and under surfaces of the mite, the legs and palpi being omitted. If these figures are compared with others which have appeared from time to time in the *Naturalist*, such as *A. membranator*, March 1903, p. 83; *A. pyriformis*, June 1903, p. 215; *A. mantonensis*, p. 216 of the same number; and *A. insperatus*, January 1905, p. 25, the great difference in general appearance will be very evident. I have only met with a single example of this mite.

Pionacercus. The species of *Pionacercus* appear to be rare in this district, I have only been able to identify one, whilst Mr. Soar in *Science Gossip* for March 1900, page 303, figures and describes the hind legs of the males of three species; the hind legs of the males are very peculiar, and vary so much anatomically from one another as to form very good marks of identity for each species. Mr. Soar however does not say a word about the females, whose legs are quite

unlike the males; it occurred to me that figures of the most likely parts for identification of this sex, of the one species I have found, might be useful should other species turn up; I have therefore figured the posterior part of a female, shewing the genital acetabula with their plates—these seem to be peculiar. The acetabula are very circular in figure, and equal in size, the plates in which they are embedded are



triangular, but are singular in that they almost embrace each acetabulum, and the edge of each plate is in consequence concave between each cup; on the plate also there are a few little hairs, which appear to differ in situation in different specimens. The palpi, fig. 2, resemble those of *Piona* (*Lamellipes* of Piersig), and the end part of the first leg is much enlarged, and furnished with a large retractile double claw, fig. 3.

With the December issue the *Journal of Malacology* closes its career, after having been in existence for twelve years. The number of natural history magazines that have ceased during the past few years is really appalling.

An application was recently made to the Halifax Corporation for a grant of £120 per annum towards the Bankfield Museum. The application has been declined, and the Committee naively decide 'seeing that Bankfield Museum has now attained to the excellence which your memorialists admit, the Committee think it should remain in that condition for some time until more attention has been devoted to the Libraries.'

Mr. H. V. Charlton reports that on December 20th last he shot a Chiffchaff, 'an unaccountably [!] scarce bird in Northumberland,' at at Cullercoates (January *Zoologist*). In the same journal Mr. W. Gyngell draws attention to the fact that he never sees the Twite in the moors near Scarborough, though they are apparently admirably suited to its habits. Mr. Rosse Butterfield also contributes some interesting notes on Cuckoo's eggs being deposited in nests of the Twite. He can quite confirm the veracity of (another writer's) statement. 'No man in the North of England has taken more eggs of the Twite in past years than he has!'

YORKSHIRE LEPIDOPTERA IN 1905.

THE following reports, contributed by various members of the Yorkshire Entomological Committee, were briefly referred to at the recent Annual Meeting of the Yorkshire Naturalists' Union, and are now printed in full:—

Mr. Whitaker, of Barnsley, writes that sugaring was particularly good. Five or six specimens of *Hadena suasa* which he took at Lunn Wood on June 28th were interesting 'finds,' as the species has not been taken in the district for very many years. *Xylophasia scolopacina* was abundant on sugar near Wakefield at the beginning of August. *Orthosia suspecta* plentiful at sugar. A fair sprinkling of *Euperia paleacea*, *Noctua triangulum*, *Xylophasia hepatica*, *Eupithecia fraxinata*, *Cymatophora fluctuosa* and *Notodonta dictæoides* are also interesting species which have occurred again during 1905 in the Barnsley district. Mr. Whitaker also took at Haw Park, near Wakefield, a specimen of variety *robsoni* of *Aplecta nebulosa*; and says that the afternoon of October 28th at Penistone, 'stone turning' for *Dasypolia templi*, produced eight specimens.

Mr. Morley, of Skelmanthorpe, reports the season a very good one. *Phigulia pilosaria* very common, and included one quite black, another in Deffer Wood the palest he has ever seen. *Larentia multistrigaria* abundant, and many of the melanic form variety *nubilata*. On the commons near Penistone *Saturnia carpini* and *Hadena glauca* were common. Whilst searching at night he came across larvæ of *Agrotis agathina*, which have produced a fine series of melanic imagines. This species is new to that district. On the same common early in July *Larentia cæsiata* swarmed, and many of those obtained were black. Odd specimens have turned up of the following species:—*Neuria saponariæ*, *Cucullia verbasci* (both new to the Skelmanthorpe district), *Acronycta leporina*, *Xylophasia scolopacina*, *Cymatophora duplaris* (black), *Notodonta dromedarius*, &c., *Eupithecia venosata* and *Eupithecia assimilata* were very common. *Eupithecia pulchellata*, *Cidaria siluceata*, *Melanthia albicillata*, *Eupithecia fraxinata*, *Cilix spinula*, and many others were more or less common. During June and July sugar was very good, and attracted countless swarms of common species, including many black *Xylophasia polyodon*, *Orthosia suspecta*, &c. On hedge wound-wort *Abrostola urticæ*, *A. triplasia*, and *Plusia gamma* were always about, and *Plusia chrysitis* only slightly less frequent, while *Plusia pulchrina* and *P. iota* were both abundant.

Other species were *Acidalia inornata* (a few), *Geometra papilionaria*, *Noctua dahlii*, and *Euperia paleacea* in Deffer Wood. Altogether during the season Mr. Morley records having taken or seen 201 species in the Skelmanthorpe district. Mr. Morley adds that of the *Larentia cæsiata* one-third were black, and that *Larentia multistrigaria* will soon be a black race about there. In all probability too, black *Xylophasia polyodon* are more frequent, and many other species seem to be becoming melanic.

Mr. J. W. Carter, Bradford, reports that *D. templi* has been rather common in the Bradford neighbourhood, and that *Erebia blaudina* was as abundant as ever at Grassington in August.

Mr. H. Johnson, Beverley, writes that *Hecatera serena* occurred in abundance near Beverley. Mr. Hewett took a specimen of this species at rest on a tree trunk, close to Flamborough Station on June 22nd.

Mr. Beck, Shipley, reports the capture of a fine female specimen of *Acherontia atropos* at Baildon Bridge on August 31st.

Mr. Corbett, Doncaster, says moths were very abundant at sugar during July, but chiefly common species, and that he never saw *Tryphaena pronuba* in such abundance. *Aplecta occulta* and *Xylophasia hepatica* and *Neuria saponariæ*, of the latter species he took a good pale variety.

Mr. L. S. Brady, of Sheffield, reports obtaining larvæ of *Boarmia repandata*, from which he bred some perfectly black forms and many intermediate varieties. He also captured melanic forms of *Venusia cambricaria*, which were fairly plentiful.

Messrs. Boulton, Chapman & Porter, of Hull, found common insects plentiful at sugar, and record the capture of 16 specimens of *Agrotis ravidata*, *Mamestra albicolon*, *Mamestra abjecta*, *Neuria saponariæ*, *Noctua brunnea* (two), all at sugar. This last species is scarce in the Hull district. *Acherontia atropos*, four or five larvæ, near Hull (Mr. Porter).

Mr. Lofthouse, Middlesbrough, reports the capture of a few *Teniocampa leucographa* at shallows, and at sugar single specimens of *Calocampa vetusta* and *Cloantha solidaginis* and one or two *Pyralis costalis* in an outbuilding at Linthorpe; for this last species only one or two localities are given in Mr. Porritt's list.

Mr. W. Brooks, Rotherham, says *Plusia iota* and *Abrostola triplasia* were very common at Grange Park, and that larvæ of *Cucullia verbasci* were common.

Mr. W. Hewett remarks on the scarcity, indeed almost total absence of *Abraxas ulmata* at Sledmere, where a few years ago it swarmed. *Asthena blomeraria*, *Venusia cambricaria* and

Melanthia albicillata, all of which used to occur at Sledmere in considerable numbers, are now scarce. Notwithstanding the large numbers of larvæ which are obtained by some of the York collectors and their friends, the very local *Epione vespertaria* was in abundance near York on the night of the 15th July, when also several *Geometra papilionaria* occurred.

Some beautiful varieties of *Abraxas grossulariata* have been reared by Mr. S. Walker, from larvæ obtained at York; and a number of specimens of the variety *varleyata* of the same species from larvæ obtained in the Huddersfield district, were bred by different collectors.

Mr. F. Emsley records the capture of two specimens of *Acidalia emutaria* at Kilnsea, near Spurn, on June 27, 1905; whilst Mr. L. S. Brady records *Euchromia mygindana* from near Sheffield, both of which species are new to the County List.

A specimen of *Otiorrhynchus rugifrons*, Gyll., is recorded in Miller's Dalé, Derbyshire (*Entomologist's Monthly Magazine*, January). This seems to be the most inland locality at which this usually maritime species has been found in Britain.

The President's address, entitled "What were the Carboniferous Ferns?" by Dukinfield H. Scott, F.R.S., is printed in the 'Journal of the Royal Microscopical Society' (1905, pp. 137-149). It contains some excellent illustrations of fossil plants from the Barnsley bed, etc.

Some thousands of tons of sand having been carted away from the shore between Tynemouth and St. Mary's Island during the past few months, the natural barrier to the encroachment of the sea has been removed, and the waves are undermining and removing the grassy slopes.

The following is a fair sample of newspaper natural history, taken from a recent issue of a leading halfpenny paper:—"Rare Moth Caught.—A convolvus or hawk moth just captured at Hartford (Cheshire) was presented to the Northwich Museum yesterday. It is a rare specimen, and the best informed naturalists declare they have never before seen one in this part of the country. The hawk moth is nocturnal, and lives upon smaller moths, being quite cannibalistic. The specimen measures four inches from tip to tip of the wings."

At the recent Annual Meeting of the Lancashire and Cheshire Entomological Society Mr. Horace St. J. K. Donisthorpe gave an address. He first dealt with the eighteen species of Beetles that had been added to the British list during 1905, and afterwards summarised the more noteworthy papers that had appeared in current Entomological literature during the year. Later, in discussing the Science of Entomology, he exhorted members to undertake original research, and to collect with some special object in view. There were the theories of mimicry and protective resemblance; the courtship of insects; the uses of the scents they bear, attractive and repellent; and other equally interesting problems for solution. In many cases he deprecated a protracted waiting for further evidence before venturing to theorise, and insisted on the faculty of imagination, rightly used, being as essential to a scientist as to a literary man, as instanced in Darwin, and referred to the mass of material already accumulated in the museums of the country.

THE BIRDS OF NORTH-WEST LINDSEY.*

MAX PEACOCK,
Cadney, Lincolnshire.

YELLOW-WAGTAIL. *Motacilla Raii* Bonaparte. Is fairly common, and breeds in meadows, corn fields, &c.

TREE-PIBIT. *Anthus trivialis* Linn. Visits us each season, but I have only found one nest, 16th July 1886. It is rare at S. Kelsey.

MEADOW-PIBIT. *Anthus pratensis* Linn. Comes to us every spring. It nests in pasture and meadow fields with us.

ROCK-PIBIT. *Anthus obscurus* Latham. Is a very rare bird so far inland. I have seen it on the beck at Yaddletorpe gravel pits after rough weather in winter.

GOLDEN-ORIOLE. *Oriolus galbula* Linn. I have never seen this species. The Eastern Woodlands have 'during the last thirty years undoubtedly had breeding pairs,' as Mr. R. N. Sutton-Nelthorpe has told us. Mrs. F. M. Burton saw one bird at Laughton in 1899, which was confirmed by her son's record the following season. (See 'Naturalist' 1900, p. 368.)

GREAT GREY-SHRIKE. *Lanius excubitor* Linn. Is very rare. I shot a pair on Butterwick Common 27th November 1886. One bird was feeding on a Jack-Snipe. Sir Charles J. A. Anderson records one for Lea shortly before 1847.

RED-BACKED SHRIKE. *Lanius collurio* Linn. I have never seen or heard of it. Mr. Cordeaux said he had proof of its nesting at Hibaldstow and Raventhorpe.

WAXWING. *Ampelis garrulus* Linn. Visits the woods occasionally. A pair was shot at Kirton-Lindsey in 1837, and seen in the flesh by the late Rev. W. T. Humphrey. I had a pair shot at Holme Hall, January 1889, by Mr. W. Mumby, bailiff to Mr. J. Cliff. They are in the Lincoln Museum now. 'Occurs occasionally in hard winters in fir woods near Claxby,' Mr. Young says.

SPOTTED FLYCATCHER. *Muscicapa grisola* Linn. Thinly distributed over the whole district annually. It was much commoner from 1873 to 1876 than in the years before or since.

PIED FLYCATCHER. *Muscicapa atricapilla* Linn. Is a rare visitor. It nested at Scawby in 1871, and at Normanby in 1896. In a *Pyraecanthus* on the front of West Rasen Rectory in 1891. Has nested near Gainsborough too, Mr. F. M. Burton says. Was observed at S. Kelsey in 1874.

* See 'Naturalist' 1902, pp. 197-204 for first instalment.

SWALLOW. *Hirundo rustica* Linn. Comes every year in great numbers. At Bottesford there were seven nests in one cow-house for years. From the 14th to the 23rd of April is their usual time of arrival; in 1890 it was as late as the 26th. Much depends on the prevailing wind and temperature. If it is genial weather with south-westerley breezes we may expect them early, but should it be 'a wild north-easter' and cold, they are very late. A white swallow was hatched, and flew from the Keeper's Lodge, Cadney, 1899. It never returned to the parish.

HOUSE-MARTIN. *Chelidon urbica* Linn. Was formerly very plentiful at Bottesford. It arrives, as a rule, about a fortnight after the Swallow. It was very late in 1900. Once a white specimen visited us three seasons running. On a barn at Mamby Hall, in the Eastern Woodlands, I counted 132 nests. No doubt some were old ones of former years, but the numbers of birds coming and going astonished a party of visitors to the Lily Woods. One season in the early seventies—I cannot now fix the date for certain—the weather was unusually cold when these birds arrived in their ordinary numbers. Probably they were weakened for want of sufficient insect food. However that may be, there came a heavy storm of wind and rain from the north-east. During this 'blast' we picked up great numbers drenched and dead, or nearly dead, in the hamlet of Bottesford. About a dozen were found in the Manor House garden. Not a single Swallow was discovered at the same time, though they were in their usual numbers. The House-Martin has never frequented the place to anything like the same extent since, and for some seasons we were almost without it.

SAND-MARTIN. *Cotile riparia* Linn. May be said to be plentiful in suitable localities. At Yaddlethorpe about 100 pairs breed in the gravel pits. During the dry season of 1887, when the Home Close at Bottesford was being mowed, hundreds of Sand-Martins visited the field to take the insects disturbed by the scythes. They breed in the sandy banks of the beck, but till I saw them over the grass I had no idea there were such large numbers about Bottesford. I once roughly measured the work a pair of birds could do on a fresh sand face in a day. The 'drift' was 2.75 inches across by 2.50 inches from the face to the back of the hole. It was shallow cup-shaped. The Vicar and I have often taken the female bird on the nest as lads from the beck bank. The tunnel was about 3 feet long.

GREENFINCH. *Ligurinus chloris* Linn. Is very common. There is a large immigration in October. In the winters from

1873 to 1876 hundreds collected at night in the evergreens of the two Halls and Vicarage gardens at Eastoft, in Lincolnshire, and Yorkshire.

HAWFINCH. *Coccothraustes vulgaris* Pallas. I never saw this species at Bottesford till the 27th July 1886. I shot one of two which were eating peas in the Manor gardens. On the 1st of April 1890 I saw a pair in the garden; on the 20th of April 1890 two pairs. They remained and nested in a holly bush and yew hedge. Others must have bred near at hand, for the young proved so destructive in the garden I had to shoot eleven before they were driven off. They have bred ever since. Has nested in the S. Kelsey Rectory gardens (Brewster). Fairly common at Gainsborough (Burton).

GOLDFINCH. *Carduelis elegans* Stephens. Is not so common in N.W. Lindsey as it was 25 years ago. In 1880 there were three nests in fruit trees in the Manor garden. We often caged up the young just before they could fly, and allowed the old birds to feed them through the wires. I have reared five birds from a nest in this manner. There is a local tradition that the old birds poison their young, if they are caged, when the proper time comes for them 'to find for their sens.' The young often die at this critical time from not having proper food and plenty of water provided. Rolled hempseed gets over the food difficulty. It must be slightly crushed, as the husk of the hemp is too hard for them to crack when young. The melanistic form often appears in caged birds which have been fed too long wholly on hemp seed. There are only two nests just round the Manor House this season, 1900. Mr. Young's notes are:—'A pair or two at Claseby, ditto Barnetby, every season. I saw a family party by the roadside between Gainsborough and Harpswell, September 1897.' I have often seen these family parties at Bottesford in the autumn feeding on thistle (*Cnicus lanceolatus*) seed. But very rarely the seed head of the common thistle (*C. arvensis*), but it cannot be seen frequently now. Mr. Hunsley writes to me, 22nd October 1900:—'One very seldom sees them at this work at Kirton-in-Lindsey. I have seen them in large flocks in my fields. They were most useful in destroying the thistle seed, but it is years ago now.'

SISKIN. *Carduelis spinus* Linn. Visits us rarely in September, October, and November. There are never more than two or three together. I believe it is this species which cracks the *Rubi* seeds and feeds on the kernels. I have never seen them

actually at work feeding on them. But in October, when I have disturbed a party on bramble bushes, the spiders' webs below the fruit heads have usually been loaded with the broken husks. I should much like this observation confirmed by other workers. (See under 'Lesser Redpole.')

HOUSE-SPARROW. *Passer domesticus* Linn. Is everywhere, driving out and taking the place of much more valuable species. It is a curse wherever found. Its eggs vary very greatly in colour, more so than our other common birds.

TREE-SPARROW. *Passer montanus* Linn. Is widely but thinly distributed, but is not as common with us as about York.

CHAFFINCH. *Fringilla caelebs* Linn. Is still plentiful, and grows remarkably bold where it is protected. It makes a beautiful nest, and follows its environment wonderfully closely. First nests 29th March 1884 and 16th April 1900.

BRAMBLING. *Fringilla montifringilla* Linn. Rarely visits us in late October. A good beech-nut year, like the present, 1904, seems to attract it to certain localities, like the Eastern Woods before the beech trees were cut down.

LINNET. *Linota cannabina* Linn. Is generally but thinly distributed in suitable places. It nests in whin bushes and rough places, but is hardly common where most plentiful. 'At Kirton this species grows rarer and rarer,' Mr. Hunsley says.

MEALY REDPOLL. *Linota linaria* Linn. I have never seen this species. On the 19th to the 20th of April 1899 three birds were in the Rectory garden at South Kelsey. They were never seen again after the latter date.

LESSER REDPOLE. *Linota rufescens* Vieillot. Is not by any means rare, but at no time plentiful. I found a nest with four eggs at Bottesford in June 1896. We have small flights in winter in the woods. They may nearly always be found picking and feeding on birch-tree buds. In December 1879, while watching the taking of ducks in Ashby Decoy, I and the Vicar observed Redpoles and Siskins in company fairly gorging on the birch trees. This was the largest flock of both species I ever saw.

TWITE. *Linota flavirostris* Linn. Is a rare bird. I have only seen one specimen, shot by Mr. Platt at Yaddlethorpe during the October migration. A few pass down the Trent valley from Yorkshire nearly every year, the Vicar says, but are more rarely seen on their northern passage.

BULLFINCH. *Pyrrhula europæa* Vieillot. Nests with us, but not in great numbers. The orchards in winter have a great

attraction for them. For years they ruined two large cherry trees below the Manor garden. It is said their visits are prompted by a grub in the buds; but when shot in the act of ruining the flowering buds, the Vicar could discover nothing like a grub in their crops—only the future flowers and leaves.

CROSSBILL. *Loxia curvirostra* Linn. Is not as uncommon in our fir plantations as is generally thought. But, personally, I have only seen them once. They were on the edge of Mr. J. Cliff's plantation N.W. of Holme Hall, December 1888.

CORN-BUNTING. *Emberiza miliaria* Linn. Is found most years at Bottesford. It cannot be called common anywhere in the district. Found nest June 1888. (See 'Naturalist' 1903, p. 262).

YELLOW BUNTING. *Emberiza citrinella* Linn. Is very common. No two nests of eggs are marked alike. I had one clutch quite white. At Howsham the Vicar found three nests within 50 feet on a ditch side.

CIRL BUNTING. *Emberiza cirrus* Linn. Very rarely seen on our commons and sandy warrens. I have never heard of a nest. 'I identified one some years ago' (Burton).

REED-BUNTING. *Emberiza schœniclus* Linn. Is frequently seen by our becks and drains, especially in the lowlands. It decreases steadily as we improve away its nesting places. I saw a partially white one, 4th August 1892.

SNOW BUNTING. *Plectrophenax nivalis* Linn. May be called very rare inland. I, however, shot seven in the winter 1894.

STARLING. *Sturnus vulgaris* Linn. Is very common. Large flights pass over Bottesford in the winter evenings on their way to roost in the reed beds on the warpings or woods. The noise of their many wings can be heard before they come into view and after they have passed out of sight. These 'flocks' or 'warblings' are a perfect nuisance when they select a game cover for their winter or spring concert roosting-place. Their droppings make the place foetid and uninhabitable for other birds. The way to be rid of them is to light smoky fires to the windward of the covers or woods for a few evenings. The drifting smoke soon makes them shift their quarters. Mr. Young says:—'Very common in the Market Rasen district. It interferes very seriously with both the Green and Great Spotted Woodpecker, neither of which seems able to retain a hole for their own use till the season is well advanced and the wants of the Starling are provided for.' The same is just as true of the Cadney-cum-Howsham fox covers, where both these species of Woodpeckers breed.

NUTCRACKER. *Nucifraga caryocatactes* Linn. Is a very rare species indeed. Mr. F. M. Burton saw one or more at Laughton, 14th August 1900. (See 'Naturalist' 1900, pp. 319, 320).

JAY. *Garrulus glandarius* Linn. Has never been common in Bottesford parish, but at the present is perhaps commoner than ever before, 1895. This year, 1900, they have increased greatly. Mr. Young says:—'Fairly common, few being killed by keepers about Claxby.'



The Rational Almanac: Tracing the evolution of Modern Almanacs from Ancient Ideas of Time and suggesting Improvements. By **Moses B. Cotsworth.** 474 pages. 5/- net. To be obtained from the author at Acomb, York.

In this work Mr. Cotsworth, who is already well known through his wonderful series of Calculators, etc., has brought together a mass of information relative to the methods of measuring and recording Time, from the earliest periods. His travels in various parts of the world have enabled him to observe for himself the numerous monuments which have been erected—such as the Pyramids—having a bearing on the subject. Several of these have been photographed, and appear amongst the 180 illustrations. Our author has sought the aid of astronomy, geology, and archæology, and undoubtedly some of the conclusions arrived at are well worthy of the consideration of scientific men. To geologists Mr. Cotsworth's observations on the shadows cast by the Great Pyramid are of especial interest, and from a series of elaborate calculations Mr. Cotsworth concludes that when the Pyramid was built the pole was evidently in a different position from what it is in to-day (as indicated on the map on page 214). The position of the pole at that time has a bearing upon the position of the great terminal moraines across Europe and America, and in this way our author gives some evidence of the date of the Glacial period. The well known Devil's Arrows near Borobridge are amongst other items dealt with. These Mr. Cotsworth considers to have been erected for astronomical purposes. It is mainly, however, with the Almanac of the future that Mr. Cotsworth is concerned, and, briefly, his views are as under:—

'Without disturbing the accepted Gregorian length of years now used, the advantages of the Proposed Permanent Almanac could be easily realised by three simple steps. (1.) From Christmas Day, 1916, cease naming Christmas Day by any week-day name, and merely call it "Christmas Day," which could thus be set apart as the extra yearly day, fitted into the last week of the year as a duplicate Sunday to permanently combine the week-end holiday with Christmas, and get rid of the troublesome and unbusiness-like changing of week-day names for dates throughout future years. By naming "Leap Day" as a public holiday without any week-day name, justice would be done to salaried servants, whilst maintaining fixed day names for each date. (2.) Let Easter, Whitsuntide, and the other movable Festivals be FIXED (as Christmas is) to always fall on the fixed dates to be arranged for 1916, or such other permanent dates as will suit the convenience, welfare, and pleasure of the people. Easter, our longest "open-air" public holiday, would be better for the Church and people if celebrated in more ideal weather towards May. (3.) Divide the 52 weeks of the year into thirteen months of 4 weeks each for greater utility and business facility by inserting a Mid-Summer month (Sol), between June and July.'

There are doubtless many advantages in the Rational Almanac, but whether Mr. Cotsworth will succeed in getting it adopted is another matter.

NOTES ON LEPIDOPTEROUS VARIATION IN THE SKELMANTHORPE DISTRICT.

B. MORLEY,
Skelmanthorpe.

After some years of careful observation upon the variations so strikingly developed in many of our local species of lepidoptera, perhaps the following brief account of a few instances noticed may be of interest to others. It is not my intention to try to explain any of the various causes that may have more or less influence on the coloration of the species. My leisure being limited, it is impossible for me to carry out a large number of experiments by breeding and crossing forms of extreme variety, and recording the results thus obtained. Perhaps by such means a few of the puzzling phases of the variation might be solved. At present it almost seems impossible to arrive at any satisfactory conclusion as to what agent is, or agencies are, in force causing the variations. The results, however, are such that one need scarcely be surprised at any strange variation that may develop. Not only is the melanic tendency remarkably well developed in many species locally, but of recent years other species not affected by melanism are actually showing a strong tendency to vary in the opposite direction, and frequently examples are obtained, the bright colours of which are quite surprising. It is not merely an instance of occasional bright specimens, but a few species in particular seem to be gradually leaving their darker hues, consequently the predominating forms are much lighter than formerly.

Cidaria suffumata is a good example. Last spring I netted a few, using no discrimination whatever, only for those in the best condition. In due time, when pinned into the cabinet, the difference in comparison with others taken on the same hedge-row seven years ago was very striking indeed. The lighter parts of the wings were more clear and the central band darker. In the same locality a brighter form than this is frequently taken, and very rarely the extreme form var. *Porrittii* (Robson) is obtained also. It seems probable that the extreme forms now so rare are in reality the forerunners of what the species may ultimately become locally. The colour of this beautiful variety is very striking, the central band and the blotch at the base of the wings are quite black, as though all the colour in the remaining parts of the wings has been assimilated into

them, leaving the other parts a very pale straw colour. All the stages linking this fine form with the ordinary type have been taken during recent years, and now apparently the species generally is leaving the mingled brown-coloured form that obtained a few years ago, and taking on this well-defined type of marking and coloration. It may be of interest to note that the dark variety *piceata*, which occurs in some parts in the north of the county, has never been recorded here. One would almost expect to find that the dark form would be the natural variation of the species in this district, where melanism predominates in comparison with any other variation, especially when it is remembered that the dark *piceata* type is by far the commonest form of extreme variation in these islands. How are we to account then for the neighbourhood of Skelmanthorpe producing specimens of perhaps the very brightest type to be found in Britain!

Another very singular instance of extreme and widely differing variation came under my notice during the season of 1903. Having previously noticed the frequency of *Xanthia cerago* ab. *flavescens* at heather bloom, &c., I determined to breed the species. Accordingly, while collecting for *Tenio-campæ* at sallow during the spring, I carefully picked up all the catkins that fell down upon the sheet, hoping that some might possibly contain the young larvæ of the species desired. When the bloom had passed away, and the catkins had become withered, I went for more. From the number of small larvæ they were infested with, it was evident that *cerago* would be present among them. When they grew larger it proved to be that *cerago* and *X. silago* had been obtained plentifully by this simple method of collecting. Later, when the same sallows came into leaf, the larvæ of *Epunda viminalis* were found plentifully, and a good supply was taken, which during July gave good reward for the little work and care spent on their behalf by coming out into the perfect state, invariably almost black. The result, however, was expected, for this species seems to be a perfect example of melanism locally. During August the *Xanthias* began to make their appearance also. *X. silago* gave thirty-three moths, all more or less of one type, and so far as I know quite ordinary. *X. cerago*, on the other hand, came out very variable; of the nineteen moths bred, twelve gave a good range of variation from the type to almost ab. *flavescens*, and the remaining seven were of that very pale form. I have no idea what percentage may be expected of this

distinct variety from larvæ obtained from other parts of the county. Perhaps the above were high in comparison, but it seems very extraordinary that the same sallow bushes should be supporting at one and the same time, exactly under the same conditions, three species, one ordinary in colour, and practically showing no variation; another invariably almost black, an absolute departure from the type; and another, of which above one-third were of the bright form mentioned, with the remainder showing a nice gradation between it and the ordinary type.

Another case of local variation came under my notice last season, 1905, and one worthy of mention both from its local significance, and the striking varial position in which the species stands, when compared with its kind in other parts of the county. In June last, on a heath about three miles from here, and detached from the moors, it was my good fortune to accidentally come across larvæ of *Agrotis agathina*. This in itself was regarded as a stroke of good luck, for I had not previously found the species in this district, nor had I a specimen in my collection. From the larvæ found fifteen moths were bred. I suspected from the first that the specimens were of a darker form than usual, but had no idea of the great difference that really existed between them and those from other parts of the country, until Mr. G. T. Porritt pointed it out to me when he saw them. It occurred to me that it would be interesting to compare them with others taken in the county. The Rev. C. D. Ash, of Skipworth, very kindly sent for my inspection a few of his forms taken near Selby. Of the five specimens sent the following brief descriptions will perhaps be sufficient for the purpose intended.

No. 1. Ground colour, lightish brown, with pinkish and black dashes. Common.

No. 2. Ground colour, darker brown than No. 1, pinkish and black not so prominent. Common.

Nos. 3 and 4. Very worn, seemed to be rather sooty, and marking not distinct. Very rare.

No. 5. Ground colour a very pale pink, black marks not conspicuous, except the black dash on which the discoidal spots are placed. Rare.

When compared with Mr. Ash's specimens mine were almost black. With the exception of one they are all of one type, with a very short dirty pinkish streak at the base of the costa, the discoidal spots small but distinct, the centre of the wings a deep

shining black, and the area beyond the reniform suffused black and dark brown, very slightly dashed with dirty pink. The exception has the pinkish colour rather more prominent than the rest, and probably a near form to Mr. Ash's 3 and 4. It is worthy of note that we have this very distinct variation in *A. agathina*, but perhaps the strangest feature is the respective variation of this species and *Acronycta menyanthidis* in the two districts. In the Selby district *A. menyanthidis* is taken commonly of a black form, and *A. agathina* of the forms mentioned above, while on the West Riding moors exactly the opposite seems to be the case in both species. Such instances rather upset one's calculations as to the why and wherefore of local variations. It is evident, much that is now only slightly understood, will have to be grasped more fully, and perhaps causes that are really very effective in their influence on the colours of many species are not understood, or even suspected. Much remains to be demonstrated therefore before a plausible solution is arrived at.

Another species has afforded much interest in this district of recent years, namely, *Xylophasia polyodon*. Always an abundant species, and forcing itself upon one's notice so much by coming to 'sugar' so freely. It is six or seven years since I noticed the first black one, but since then every year the black ones have been more in evidence. During last season it may be said to have been quite common. Sixteen were brought home considered fit for cabinet specimens, including a very inky black one, and as many were left on account of their shabby condition. Intermediate forms are common, in fact the species here is a very variable one. But melanism is no doubt developing very rapidly, in this immediate locality, at any rate in this species. *Smeriuthus populi* is also worthy of note, a few bred last season from larvæ, found close to my home, were a very variable and fine series. All are of types lighter than the ordinary dull slaty form. Two in particular are very beautiful, with a ground colour of a light slaty hue, and striped by marks almost white. A few have the stripes and shaded portions of the wings distinctly purple, others olive green, while others are the pale and faded form. The whole series is a demonstration of striking variation, and give one the feeling that even our most common species are well worth care and attention, for it does afford much pleasure when one sees the beautiful variable ranges which so many of them give, standing out in such fine contrast to each other.

BIRDS, ETC., USED FOR FOOD IN THE SIXTEENTH CENTURY.

The 'Northumberland Household Book' (the Regulations and Establishment of the Household of Henry Algernon Percy, the fifth Earl of Northumberland, at his Castles of Wressle and Leconfield in Yorkshire, begun Anno Domini 1512) has just been issued by Messrs. A. Brown & Sons.* It is full of quaint and interesting entries relating to that period. Under "Direccions taken by my Lorde and his Conseill at Wresill upon Sunday the xxvijth day of Septembre . . . in the ijth yere of the reigne of our Sovereigne Lorde Kynge Henry the vijth concerynge the Provision of the Cator Parcells as well as of Flesch as of Fysch which shall be provyded througheout the Yere," &c., we find several items, with prices to be paid, &c. Generally "yt is thought goode that [Pygges, Geysse, Chekyns, Capons, † Hennys, Pegions etc.] be bought for my Lordes Mees [Mess]. Other delicacies purchased were Cunys [rabbits], Swannys, Pluvers [*jd.* a pece = one penny each!] Cranys (= cranes,) xv^{jd.} a pece; Hearonsewys (Hérons) xij^{jd.} (one shilling) a pece; Mallardes ij^{jd.} (2d.) a pece. Evidently Teal was not thought much of, as we find that "Item it is thought good that no Teylles be bought bot if so be that other Wyldefowl cannot be gottyn and to be at *jd.* a pece." Also we find that "Item it is thought good that Woodcokes [woodcocks] be hade for my Lordes owne Mees and non other and to be at *jd.* a pece or *jd.* ob. [three half-pence] at the moste. The same applies to "Wypes" [Peewits], and "Seegulles" "so they be good and in season." These were to be bought at the same rate. Styntes (stints) "so they be after vj a *jd.*" = six a penny. "Quaylles [Quails] "at Pryncipall Feestes and at ij^{jd.} [2d.] a pece at moste." "Snypes . . . iij a *jd.*" [Snipe at 3 a penny] "Pertryges [Partridges] at ij^{jd.} a pece yff they be goode." Redeshankes [Redshanks], three half-pence each. Bytters [Bitterns] xij^{jd.} [one shilling] a pece so they be good. Fesauntes [Pheasants] were also to be a shilling each. "Reys" [Ruffs and Reeves]—2d. each; "Sholardes" [Shovellers] 6d. each; "Kyrlews" [Curlews] a shilling each. From the following entry it seems that peacocks could be obtained at a shilling each, but no pea-hens were to be bought:—"Item Pacokes to be hadde for my Lordes owne

* 452 pages, 1905, 8/6 net.

† A variety of the far-nyard fowl.

Mees at Pryncipall Feestes and at xjd. a pece and noo Payhennys [pea-hens] to be bought."

Immediately following the above is an entry in more general terms: "Item it is thought good that all manar of Wyldfewyll [wildfowl] be bought at the fyrst hand where they be gottyn and a Cator [Caterer] to be appoynted for the same For it is thought that the Pulters [Poulterers] of Hemmyngburghe and Clyf [Hemingborough and Cliff] hath great advauntage of my Lorde Yerely of Sellynge [selling] of Cunys [rabbits] and Wyldefewyll."

"Wegions" were to be "jd. ob." [three half-pence] "the pece except my Lordes comaundment be otherwyze." "Knottes" a penny each; "Dottrells" were the same; "Bustardes," unfortunately, are not priced; "Ternes" were four a penny, and "Great Byrdes" [Fieldfares, Thrushes, &c.] four a penny and "Small Byrdes" [Sparrows, Larks, &c.] 12 a penny; Larkys [Larks] were also a penny a dozen. Seapyes [Oyster catchers] were "for my Lorde at Princypall Feestes and none other time."

Following the above are some general entries:—

Mounthly.—Item BACON FLYKES for my Lordes owne Mees Mr. Chambrelayn and the Stewardes Mees bitwixt Candlemas and Shroftyde ells none except my Lordes comaundment be to the contrary.

Yerely.—Item that a direccion be taken at Lekyngfeld [Leckonfield] with the Cator of the See what he shall have for every SEAM of FYSCH thorowt the Yere to serve my Lordes hous.

Quarterly. Item that a Direccion be taken with my Lordes Tenauntes of Hergham and to be at a serteyn with theme that they shall serve my Lordes hous thrugheowt the Yere of all manar of FRESH WAYTER FYSCH.

Yerelye.—Item it is thought good that there be a counnt made with the Cator by great for EGGES and MYLK for the hoole Yere if it can be so doyn what for a Gallon of Mylke and how many Egges for jd.

Yerely.—Item that from hensforth that there be no HERBYS bought seinge that the Cookes may have herbes anewe in my Lordys Gardyns.

Yerelye. Item a Warraunt to be sewed oute Yerely at Michaelmas for xx SWANNYS for th'expencez of my Lordes hous as too say for Cristynmas Day v — Saynt Stephyns Day ij — Childremass Day ij — Saynt Thomas Day ij — New Yere Day iij — ande for the xijth Day of Cristynmas iij Swannys.

Yerely.—THE COPIES of the WARRUNTS to be sewed oute Yerely for SWANNYS for th'expencez of my Loordes hous after this forme followynge.

WELBILOVED I greete you well ande woll ande charge you That ye delyver or cause to be deliverd unto my welbiloved Servautes Richard Gowge Countroller of my hous ande Gilbert Wedall Clarke of my Kitchinge for the use and expencez of my saide hous nowe against the Feest of Christynmas next comynge Twenty SIGNETTS to be taken of the breed of my Swannys within my Carre of Arrom [Arram Carr] within my Loordeship of Lekingfeld within the Countie of Yorke whereof ye have the kepinge Ande that ye cause the same to be delivered unto theme or too oone to theme furthwith upon the sight hereof Ande this my writinge for the delyverey of the same shal be unto you agenst me and toffore myne Auditours at youre next accompte in this bihalf sufficient Warrunt ande Discharge Geven under my Signet and Signe Manuell at my Manoure of Lekingfeld the xxij^d daye of Novembre in the vth Yere of the reign of our Sovereign Lorde Kyng Henry the viijth.

To my welbiloved Servaunt the Bailiff of my Lordeship of Lekingfeld afforesaide and Kepar of my seid Carre at Arrom ande to the Undre Kepar of the same for the tyme beinge.

In the list of birds enumerated* it will be noticed that the turkey is not mentioned. On p. 398 is a note bearing on the matter. "About the 15th [year] of Henry VIII. it happened that diverse things were newly brought into England, whereupon this Rhyme was made :

"Turkies, Carps, Hoppes, Piccarell and Beere,
Came into England all in one yere."

Amongst the fish required for food we find Stokfish, Salt fishe, Whyt Hering, Rede Herynge [red herring], Sproutis, or Sproytts [sprats], Salmon, Saltt Sturgion, and Saltt elis (or Elys) [eels].

There are also some interesting facts in reference to the number of deer in the parks at that period. "For th' expensez

* Several of the birds in this list are also enumerated in 'The Birds of the Lincolnshire Fens and Wolds in 1612,' in a series of stanzas from the *Poly-olbion*, with notes, printed in the 'Naturalist' for December 1886.

of my Lordes hous bitwixt Alhollowdey and Shraftide ” twenty-nine does were required, as under:—

Spofford	...	...	...	...	v
Great Parc of Topclyff	...	...	...	...	vj
Litle Parc of Topclyff	...	...	...	...	v
Helagh	...	...	...	...	vj
Lekingfeeld	...	...	...	...	ij
Catton	...	...	...	...	ij
Newseham	...	...	...	...	ij

The Nombre of Does is—xxix.

From the same parks were also obtained 19 bucks, and also one from “Wressill”—the total “Nombre of Bukks” being “xxii.”

Bearing on the above is added a valuable “Account of all the Deer in the Parks and Forests in the North belonging to the Earl of Northumberland taken in this 4th year of Henry VIII. Anno 1512.

“ IN NORTHUMBERLAND.

“ Huhn Park,	Fallow-Deer	...	879
“ Cawledge Park,	ditto	...	586
“ Warkworth Park,	ditto	...	150
“ Acklington Park,	ditto	...	144
“ Rothbury Forest,	Red Deer	...	153

“ IN YORKSHIRE.

“ Topcliffe Great Park,	Fallow-Deer	...	558
“ Topcliffe Little Park,	ditto	...	291
“ Spofforth Park,	ditto	...	180
“ Spofforth Wood,	ditto	...	43
“ Wressel Wood,	{ Red Deer, 42 } { Fallow, 92 }	...	135
“ Wressel Little Park,	Fallow	...	37
“ Newsham Park,	ditto	...	324
“ Leckinfield Park,	ditto	...	249
“ Catton Park,	ditto	...	79

“ IN CUMBERLAND.

“ Langstrothdale Park,	Red and Fallow	...	456
“ Adylthorp Park,	ditto	...	307
“ Ditto Old Park,	ditto	...	205
“ Helagh Park,	ditto	...	319
“ Wasdale,	Red Deer	...	230
“ Ditto	Fallow	...	21
“ West-Ward,	Fallow-Deer	...	225
	Total of Deer	...	557 ¹

Exclusive of those is Sussex and other counties in the South.

Though perhaps not strictly of natural history interest, I can hardly resist giving the following extracts relating to breakfast "for my Lorde and my Lady." "Braikfastis of Flesh days dayly thorowte the Yere":—"FURST a Loof of Brede in Trenchors ij Manchetts j Quart of Bere a Quart of Wyne Half a Chyne of Mutton or ells a Cheyne of Beif boilid."

During Lent "my Lorde and my lady" partook of "FURST a Loif of Brede in Trenchors ij Manchetts a quart of Bere a Quart of Wyne ij Pecys of Saltfysch vj Baconn'd Herryng iiij Whyte Herryng or a Dysche of Sproits."

T. S.



YEAR BOOKS, ETC.

The Naturalist's Directory, 1906-7. L. Upcott Gill, London. 1/6, cloth, 2/-.

This useful annual improves each year, but is yet not perfect. The directory of naturalists is very handy for reference, particularly to the amateur. As is quite possible, unless very much up-to-date, the 'list of natural history publications' contain the names of many now defunct. And under Yorkshire (Museums) on page 176, we fail to find that there is a Museum at either York or Hull. Ye gods!

Who's Who, 1906; 7/6. Who's Who Year Book, 1906; 1/-. The Writers' and Artists' Year Book, 1906; 1/-. A. & C. Black.

These three indispensable annuals appear promptly. The first is made more useful than ever by the addition of much new matter, and the volume now contains nearly 2000 pages, and is yet a convenient size. Telephone numbers, telegraphic addresses, &c., have been added. We notice several interesting new entries in this edition. The 'Year Book' contains statistics of societies, government officials, &c., &c. The third volume referred to is most useful to authors and artists wishful to find a suitable paper for their work. The 'List of papers and magazines with details' is most complete, and enables one to see at a glance the nature of any publication.

The Science Year Book, 1906. King, Sell & Olding. 5s. net.

The additions and improvements made in the current issue of this well-known scientific diary make it, if possible, even more indispensable than ever to naturalists and scientific men. A useful feature is the series of articles on the Progress of Science in 1905—those of particular interest to our readers being 'Anthropology,' by Professor A. C. Haddon; 'Botany,' by Mr. G. Massee; 'Geology,' by Mr. H. J. Seymour; 'Meteorology,' by Mr. W. Marriott; 'Microscopy,' by Mr. F. S. Seales; and 'Natural History,' by Mr. W. P. Pycraft. Amongst the new features is a list of the Universities with Professors of Science, a list of Colonial Scientific Societies, and a list of the more important scientific books published during the year. One or two of the articles bear little evidence of the proofs having been read. A paper in the Transactions of the 'Norf. Now. Nat. Soc.' by Mr. 'R. Garney' will hardly be recognised by our Norwich friends, whilst on the next page a reference to a 'Decoction of bouillion' would seem to indicate that the compositor had fairly let 's run riot. The year book contain about 600 pages in all, and is well bound.

YORKSHIRE NATURALISTS AT BRADFORD.

BRADFORD has certainly kept up its reputation. At the annual gathering of the Yorkshire Naturalists' Union, held on Saturday last, January 27th, the citizens of Bradford had obviously done everything in their power to ensure the meeting being a thorough success.

Two excursions were arranged for the morning, and notwithstanding the inclement weather, these were well attended by naturalists from all parts of the county, and afforded an opportunity of seeing the various glacial features of the district as described by Messrs. Jowett and Muff. By the aid of an excellent contoured map in the current issue of the *Bradford Scientific Journal*, the principal items of interest were pointed out by Mr. J. E. Wilson. Mr. W. H. Parkin and Mr. H. B. Booth were also responsible for carrying out the morning's programme, and in addition the members were able to visit the botanical gardens in Lister Park, where Mr. E. Naylor is doing such excellent work.

The members dined together at the Royal Hotel, and then proceeded to the Cartwright Memorial Hall, where the meetings for the remainder of the day were held, by the permission of the Bradford Corporation.

The report presented at the General Committee was of a very satisfactory character. It was shown that the various excursions held during the summer of 1905 had been well attended, and had been productive of good result from a scientific point of view. Four new societies had become affiliated with the Union since the last annual meeting, and over thirty new members were on the Union's list, making the number of members and associates over 3300.

In the matter of publications it was reported that during the year Mr. Roebuck's Presidential Address on 'The Salient Features connected with the History of the Yorkshire Naturalists' Union,' and the final part of the 'Fungus Flora of Yorkshire' (350 pages), had been issued. It was also stated that the final part of Baker's 'North Yorkshire' was in type and about to be issued, and that the 'Birds of Yorkshire' was in the printer's hands.

The reports of the various committees and sections were received, and on the recommendation of the Geological Section, the scope of the Fossil Flora Committee was enlarged so

as to include the investigation of the Mollusca of the Coal Measures, &c.

Messrs. S. Margerison (Calverley), E. Naylor (Bradford), and H. B. Booth (Bradford), were added to the permanent General Committee.

After much discussion the excursions for 1906 were arranged as under :—

Ingleton, week-end, second week in May.

Flamborough, Whit-week-end, June 3rd-5th.

Fewston for Washburn Valley, end of June.

Askern, Thursday, middle of July.

Guisborough, August 18th-20th.

Farnley Tyas, near Huddersfield (Fungus Foray), Sept. 22nd-26th.

It was also decided that an excursion be arranged on August Bank Holiday in connection with the meeting of the British Association at York.

By the invitation of the York Society the next annual meeting of the Union will be held in the capital of the county, probably in December, when Mr. W. Eagle Clarke will deliver an address.

At the conclusion of the meeting of the General Committee tea was provided in the Restaurant in the Cartwright Hall, after which the members had an opportunity of seeing the various archæological, botanical, and natural history exhibits which had been brought together for the benefit of the Union. Several of these were of altogether exceptional interest, and it was arranged that the exhibition should be continued during the following week for the benefit of the public. Dare we go so far as to hope that the exhibits arranged on Saturday last may be looked upon as a commencement of a public Natural History Museum for Bradford? The Cartwright Hall—which has so recently been opened as an Art Gallery and Museum—is a building of which any city might be justly proud. The structure is grand—the rooms within it are fairly numerous, spacious, and well lighted—the exhibits already on view—pictures, statuary, &c., are beautiful. So far Bradfordians may congratulate themselves. But, is there any city in Yorkshire of anything like the size of Bradford that cannot boast of its museum of *local* geology, antiquities, and natural history? Is there any town of any importance whatever but has its local history represented in some way or another? Can there be any

question of the importance—educational or otherwise—of a local natural history collection? Is there any sane being in Bradford who will say that a local natural history collection is not worth the trouble and expense of getting it together and maintaining it? The Corporation is already in possession of some valuable specimens which are suitable for such a purpose. Why not go on, therefore, and arrange and exhibit them in a part of the Cartwright Hall? Why should Bradford, so go-ahead in many ways, be behindhand in this respect? Why?

But the first step to such a desirable end must be the appointment of a qualified curator, who shall devote all his time to the work. Until this is done all the efforts and all the enthusiasm of the local naturalists—amongst whom are many of our foremost men—will be without avail, and future generations of Bradford's citizens will doubtless have cause for regretting the apathy of their predecessors.

Many points in favour of a local museum were brought forward by various prominent scientific men in the discussion following the President's address, and from the excellent way in which the reports of the Union's proceedings were published in the press, the members and friends of the Bradford Corporation will at any rate have an opportunity of carefully considering the question on its merits. The same subject was also the main topic of conversation at the subsequent *Conversazione*, which was kindly given in the Cartwright Hall by the Mayor and Mayoress of Bradford, Mr. W. A. Whitehead, J.P., and Mrs. Whitehead.

The address of the President, Mr. G. W. Lamplugh, F.R.S., was delivered during the evening, and dealt with the 'Responsibilities of the Amateurs in Science.' We hope to print this in our next issue. Afterwards the meeting was addressed by Messrs. H. Wager, F.R.S., P. F. Kendall, F.G.S., and others. In replying to the vote of thanks passed to the Bradford Corporation, the genial Chairman of the Art Gallery and Museum Committee, Alderman Toothill, vastly entertained those present by detailing the products of his extraordinarily imaginative brain!

The Bradford meeting was a great success, and the Union is much indebted to the Scientific Association and the Natural History and Microscopical Society for their efforts, and particularly to Messrs. S. Margerison and H. E. Wroot, upon whose shoulders fell the principal burden of the arrangements and work in connection therewith.—T. S.

FIELD NOTES.

GEOLOGY.

Cornbrash Fossils from North East Yorkshire.—Visiting one day last year the quarry on Seamer Road, Scarborough, I found a small tooth in the Cornbrash shales. On submitting it to Dr. A. S. Woodward, he kindly informed me he thought it belonged to the Pycnodont *Mesturus*. This is a new record for the Cornbrash of Yorkshire. Also in the Cornbrash of Cayton Bay I found a tooth of *Lepidotus*. In the buff shales on the top of the Cornbrash rock I found a Belemnite in matrix of Cornbrash shale. It measures 50 millimetres from the tip to the alveolus and 7 millimetres in diameter. The Rev. J. F. Blake, M.A., F.G.S., in the 1905 "Palæontographical Society's Monograph," mentions only one species of Belemnite, viz., *B. redivivus* of which there are only four specimens, two in the Sedgwick Museum, and two in York Museum, all from the Cornbrash shales of Cayton Bay. The Belemnite I found there is indeed like those figured in the above, but only about half the diameter. —H. C. DRAKE, Hull, 13th January 1906.

—:o:—

ARTHROPODS.

***Trichoniscus roseus* near Liverpool.**—While on a visit to The Priory, Grassendale, near Liverpool, I was fortunate enough to turn up a large colony of the little Rosy Woodlouse in the old garden of The Priory. My host's boys, Masters Jim and Eric Pinion, had gone with me to assist in a snail hunt, and on turning over a large flat stone the latter disturbed several species of Woodlice, including numbers of the above, the species having only in recent years been found in Ireland, very local in all stations, excessively rare in some, though very abundant at others. I started a thorough search in likely places all round The Priory to see how it might occur in England. We did not find it outside the garden, but there it was most abundant, especially about cinders in one heating pit, very bright in colour, and as large almost as the best Bushy Park, Dublin, specimens.* We have about nine Irish records now, from Dublin, Kerry, Limerick, Down, and Antrim. I was fortunate enough to find it in the very centre of the latter County last summer. —R. WELCH, Belfast.

Irish Naturalist, Nov. 1904, p. 260.

BIRDS.

Late Swallows near Middlesbrough in November.—On the morning of 9th November I noticed two Swallows hawking about for insects at Linthorpe, Middlesbrough.—T. ASHTON LOFTHOUSE, Linthorpe, Middlesbrough.

[Mr. W. H. St. Quintin, also informs us that he saw a Swallow flying very feebly in Lowthorpe on the 4th November.

—Eds.]

REVIEWS AND BOOK NOTICES.

Beasties Courageous. By Douglas English. S. H. Bousfield & Co. 121 pages. 5/-

Under this somewhat odd title Mr. English gathers together a number of interesting stories relating to rats, mice, voles, weasels, toads, etc. They are told in a somewhat peculiar style, presumably for the benefit of younger



The Weasel.

naturalists, to whom the book will undoubtedly be of value. But the numerous beautiful photographs reproduced in the book undoubtedly are of great value. Of their kind they would be exceedingly difficult to beat. The frontispiece, 'The Woodmouse, he who is of all mice the handsomest,' is perfect. The publishers have kindly enabled us to reproduce herewith one of the illustrations.

The Age of the Earth and other Geological Studies. By W. J. Sollas, F.R.S., etc. T. Fisher Unwin. 328 pages. 10/6 net.

In this volume Prof. Sollas has brought together various essays, which every geologist will be glad to have in this form. The first, and that which gives the book its title, is Prof. Sollas' address to the British Association

at its Bradford meeting. We also welcome the story of 'Funafuti,' which appeared in 'Natural Science.' Whilst the present generation is not likely to forget that excellent journal, its premature decease may result in future students not having this narrative of the effort to bore a coral island so easy for reference. It therefore finds a suitable place in the present volume, as also do the addresses on the 'Influence of Oxford on Geology' ('Science Progress'), 'Origin of Freshwater Animals,' (Royal Dublin Society), 'Geology and Deluges' ('Nature,') etc. Some of these, however, are largely re-written, and contain much new matter. One chapter on 'The Formation of Flint,' is new, and 'gives a connected account of the results of observations and discoveries extending over a long series of years, and is perhaps the first attempt yet made to trace in detail the origin, growth, and final decay of that puzzling object, the common flint.' To Yorkshire and Lincolnshire geologists this chapter is particularly interesting. One of the essays, on 'A visit to the Lipari Isles,' is written in a lighter vein, and though it may contain a few references not geological, it is not the less welcome. It at any rate bears evidence that even the professor of Geology at Oxford is human. Though the essays are upon such a variety of subjects, they appear to follow each other quite naturally, and we agree with the author that the volume 'appears to have come together through a natural process of evolution.'

Nebula to Man. By **Henry R. Knipe.** J. M. Dent & Co. 251 pages. 21/- net.

This large volume is undoubtedly one of the most extraordinary that we have seen for some time. It contains a sketch of the history of the evolution of the Earth on the Nebular Hypothesis—from that far-off time when

"A glowing mist, through realms of space unbounded
Whirls on its way, by starry hosts surrounded."

to the present day, the whole being written in rhyme!

In his preface the author states, 'To attempt a work of this kind in rhyme is, I know, a bold experiment. But, however severely scientific in some of its aspects, the Story of Geology is truly the most enchanting story in the world; and rhyme may well be regarded as an appropriate form in which to present it. Indeed it is a fit theme for presentation in a much higher form than this; and we may well hope that some day it will be taken in hand by some great poetic genius.' Let us hope so. In the present work, however, wonderful as it is, the desire to rhyme has resulted in the frequent use of words which would not otherwise have appeared—words which have obviously been used because they rhymed, and not because they best expressed the author's thoughts. In the chapter devoted to the Epoch of Great Glaciation, we find:—

"Weird is the scene. Ice shattered great and small
Of various shapes lies off the littoral.
And throng it is that well may call to mind
A roadstead filled with craft of every kind."

And later,

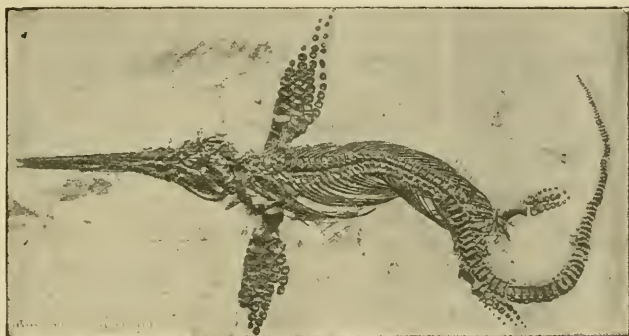
"Meanwhile are other glaciers wandering far
On divers routes from Scandinavia.
Some far to north their glassy cargoes bear
Down sloping vales, coal carrying as it were
To Newcastle. Others south-eastwards stretched
With facile steps have distant regions reached."

and so on. The book is, however, most beautifully illustrated—Messrs. J. Smit, L. Speed, J. Charlton, E. Bucknall, C. Whympers, E. A. Wilson, and Miss Alice Woodward having contributed over 70 excellent plates, fourteen of which are coloured. These for the most part represent restorations of the various beasts which come under Mr. Knipe's review, and are very clever. They certainly add much to the value of the book.

Extinct Animals. By **E. Ray Lankester, F.R.S.** Archibald Constable & Co. 331 pages. 7/6 net.

In this attractive and well-illustrated volume is reproduced a report of the series of lectures delivered at the Royal Institution during the Christmas Holidays of 1903-04, by Dr. Lankester. The lectures were prepared for a

juvenile audience, and the book is therefore in such a form as to be most suitable for young readers. On the other hand, those of more mature years will find it a most fascinating narrative of the strange animals once inhabiting the globe. Not only does Dr. Lankester refer to those strange beasts which were 'dead and turned to clay' countless ages ago, but he also



Skeleton of large-paddled Ichthyosaurus preserved in Liassic rock.



Drawing to shew the probable appearance of an Ichthyosaurus swimming beneath the surface of the sea.

describes those which have become extinct within historic times, some of which owe their extinction entirely to the efforts of civilised human beings! The Author's position as director of the Natural History Museum has enabled him to illustrate his remarks by a number of photographs and sketches taken from the magnificent series of specimens in the national collection. Of these there are over 200, two of which we are kindly permitted to reproduce. They may be taken as fair samples of the other illustrations in the book—some are better, others are not so good. The book is printed with large type, and in other ways bears evidence of its suitability as a present for a young naturalist.

NORTHERN NEWS.

We much regret to hear, on going to press, of the death of Mr. W. Nelson, of Crossgates, Leeds, which took place on Sunday, midnight.

In the January *Annals of Scottish Natural History* Mr. Robert Service records the occurrence of the Red Mullet and the Maigre in the Solway.

Referring to the note in this journal for February last (p. 35), we understand the £12,000 necessary to purchase the Gowbarrow estate by the National Trust has been secured.

At a recent meeting of the Entomological Society, Mr. G. T. Porritt exhibited specimens of *Odontoptera bidentata* ab. *nigra*, the melanic form of which is rapidly increasing in the Wakefield district.

In the 'Eminent Living Geologists' series, the January *Geological Magazine* contains an article on 'Thomas McKenny Hughes, M.A., F.R.S.,' &c., with portrait.

At a recent meeting of the Lancashire and Cheshire Entomological Society, three specimens of *Limnophilus elegans*, one of the rarest of European Caddis-flies, were exhibited. They were captured at Ballaugh, Isle of Man.

At a recent meeting of the Conchological Society Mr. J. D. Dean exhibited a specimen of *Vertigo alpestris* from Devil's Bridge, Kirby Lonsdale—the first record of this species for Westmorland. Mr. B. R. Lucas exhibited sinistral living *Valvata piscinalis* and var. *antiqua* of same, from Budwith Mere, Cheshire.

In the January issue of the *Entomologist's Monthly Magazine*, Mr. Percy H. Grimshaw (formerly of Leeds) continues his notes 'On the British species of *Hydrotea*, Dsv.' The present instalment includes a description of *H. Albipuncta* Ztt (*fasciculata*, Meade), a specimen of which is recorded at Burley-in-Wharfedale.

The Chief Constable of Scarborough has been instructed to take steps to prevent the shooting of sea birds on the sands. The Corporation have been advised that apart from the Wild Birds' Protection Act persons discharging firearms on the sands can be prosecuted, and the Committee of the Town Council have unanimously resolved to stop the wanton slaughter of birds.

Referring to Mr. Mosley's note on 'Nest-poking' in the January 'NATURALIST,' which was written as a result of a photograph of a nightingale's nest reproduced in our December issue from the Bradford Scientific Journal, Mr. Rosse Butterfield informs us that the nightingale's eggs were not stolen, but were destroyed by mice. Neither did any one from Bradford pay a second visit to the nest, not to mention 'various visits.'

In the January *Geological Magazine* Mr. C. Davies Sherborn gives 'Some Remarks on the Irregular Echinoids of the White Chalk of England, as exhibited in the British Museum.' In the same journal Dr. H. Woodward figures and describes 'a very well preserved impression in clay-ironstone, of the wing of a neuropterous insect, from the rich plant-bed at Foley, near Longton, North Staffordshire.' Dr. Woodward refers it to *Lithomantis carbonarius* (?)

The following is taken from the December 'Nature Notes':—'This spring a pair of house martins built their nest under the eaves of Kimberley House, Barnby Moor, Yorkshire. A few days ago the old nest was removed, when it was noticed that the opening was closed, and inside was found a dead sparrow. One of the workmen informs us that he noticed with interest (in the nesting season) great excitement amongst the martins, and wondered why a number of them combined to seal up the door of the nest. The dead body of the poor usurper explains their combined action to punish with death the foe who refused to be ejected.'

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

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T. SHEPPARD, F.G.S.,

THE MUSEUM, HULL;

AND

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

TECHNICAL COLLEGE, HUDDERSFIELD;

WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF

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

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

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

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

JOHN W. TAYLOR,

WILLIAM WEST, F.L.S.

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NOTES AND COMMENTS.

NATURAL HISTORY MAGAZINES.

Since the first number of the 'Naturalist' was issued, over three quarters of a century ago, it has seen the birth and death of some scores of natural history magazines. Some of these were of a most useful character, and their death is a loss indeed. Others are as well dead, and their loss would only be felt by those who were financially responsible for their production. During the past few months we have chronicled the decease of several publications; some really well produced, edited by most competent naturalists, and supported by a number of influential men. Still they were not successful. We have reason to believe that other magazines will shortly be sharing the same fate. In view of this, how can it be expected that a new magazine, covering the same ground, can flourish, without it has some exceptionally good features.

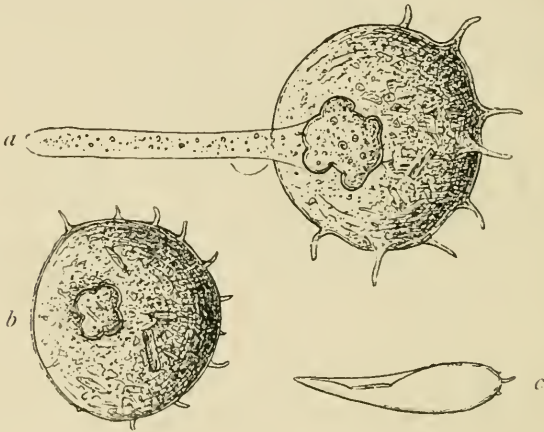
STILL ANOTHER NEW MAGAZINE.

Yet we have before us the first part of 'The Naturalist's Quarterly Review,' printed by Mr. Davis, published by Mr. Davis, and edited by Mr. Davis. From the number of Davis' advertisements in the magazine we should assume, and probably correctly, that the new magazine is a publisher's venture—a cheap way of advertising one's natural history requisites and books, and is not intended to be a serious scientific contribution. By far the longest article is by Mr. W. P. Westell, who refers to the enormous number of books that have recently 'passed through' his hands, and proposes each quarter to give 'notes upon those volumes *which reach him*,' presumably for the benefit of the reader of the magazine, though from the ridiculously indiscriminate praise which he showers upon the thirty odd volumes he 'reviews' (many of which are certainly not worth it) there is just a suspicion that Mr. Westell may have some other motive than benefitting his readers. Certainly the notices cannot be looked upon as a guide to the naturalist requiring books. Then follows some more book notices, presumably by the editor, Mr. Davis, with a very favourable notice of one of Mr. Westell's books—a work which has not had the unanimous approval of the ornithological press. A note informs us that any of the books reviewed 'can be supplied by the publishers of the magazine at the published

price.' Not the review copies, we hope! Then there are advertisements of Mr. Westell's books, and of Mr. Westell's lectures, and advertisements of Mr. Davis' publications, Mr. Davis' entomological apparatus &c. And Mr. Davis writes some articles for the magazine, and so does Mr. Westell. And you pay your eightpence for the 32 page quarterly, and must be satisfied. In case the work reaches a second number, we would suggest as a far more appropriate title 'The Westell-Davis Advertiser.'

BRITISH RHIZOPODA AND HELIOZOA.

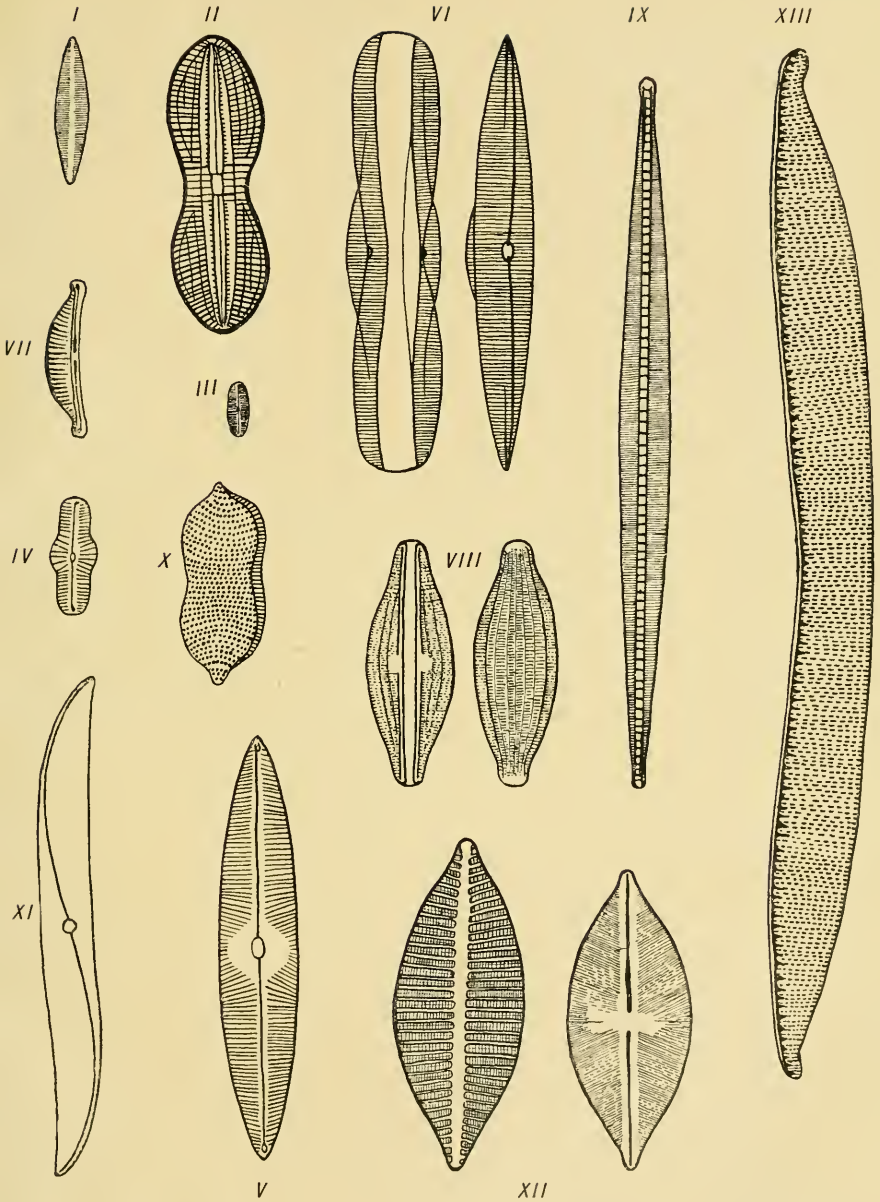
The Ray Society continues to publish its valuable monographs. The latest issued is under the above title, and has been prepared by Mr. James Cash, of Manchester, with the assistance of the energetic Secretary of the Ray Society,



Centropyxis aculeata var. *splnosa*.

(a) A well developed form. (b) An example showing variation. (c) Lateral view of this form, in outline. From Dunham Marsh, Cheshire, x 250.

Mr. John Hopkinson, who is a native of Leeds. In the new volume is a classified description of these microscopic animals, which it is hoped will result in other workers entering upon a field of research, which is fascinating in a high degree even to the general microscopist. The field is a wide one, and besides the structural beauty of the Rhizopoda and the interesting phases of their life histories, the possibilities open to anyone of discovering new and previously unsuspected forms in our ponds and marshes, are practically unlimited. The volume is profusely illustrated by a number of beautiful



Diatoms.

plates and illustrations in the text, which are of particular interest to readers of the 'Naturalist' from the fact that most of the specimens figured have been taken in Cheshire. We are kindly permitted to reproduce one of the illustrations herewith, representing a new variety, better representations of which occur on one of the plates.

RARE DIATOMS.

It is pleasing to find that the Hull Microscopists are not resting on their oars, since the appearance of Mills' and Philip's excellent illustrated monograph on 'The Diatomaceæ of the Hull District' was issued in 1901. Notwithstanding the fact that the work contained particulars and illustrations of no fewer than 600 species and varieties, the list is added to annually. In the transactions of the Hull Scientific and Field Naturalists' Club for 1905, Mr. R. H. Philip gives particulars of the additional forms recently found. These are figured on a plate, which we are permitted to reproduce (plate III.). The specimens figured are from Spurn, Cleethorpes, &c. In the order on the plate, they are I. *Synedra barbatula*, II. *Navicula apis*, III. *N. exilissima*, IV. *N. seminulum*, V. *N. vulpina*, VI. *Plagiotropis gibberula*, VII. *Amphora turgida*, VIII. *A. acutiuscula*, IX. *Nitzschia socialis*, X. *N. punctata* var. *coarctata*, XI. *Pleurosigma obscurum*, XII. *Achnanthes Danica*, XIII. *Hantzschia amphioxys* var. *vivax*.

PERMIAN FOOTPRINTS IN NOTTINGHAMSHIRE.

At a recent meeting of the London Geological Society, Prof. W. Boyd Dawkins communicated a paper by Mr George Hickling, which was of particular interest from the fact that 'No footprints had previously been found in the undoubted Permian of this country.' The fossils were discovered in the Rock Valley Quarry, Mansfield, in a local lenticular mass of sandstone intercalated in the Magnesian Limestone. The impressions formed two double rows, approximately parallel, and seven and two feet long respectively. Nearly the whole of the longer series is in the Nottingham Museum, and part of the shorter series is in the Manchester Museum. Both sets were made by the same species of animal, the stride in one case being eight, and in the other case eight and three quarter inches. The prints show a well marked heel and comparatively slender

digits, and there is evidence of a membrane between the toes. There is a wide separation between the right and left sides, the separation being more marked in the fore than in the hinder footprints. The prints present some resemblance to those named *Ichnium acroductylum*, from the upper Permian of Thuringia. The footprints are evidently of an Amphibian allied to those recorded from the Permian on the continent.

A YORKSHIRE CAVE RELIC.

In part 3 of the 'Bradford Scientific Journal,' which we have only just seen, is a note by Mr. W. Cudworth on a Unique Yorkshire Cave Implement. This was found by the Rev. E. Jones in Calf Hole Cave, in Upper Wharfedale, and was associated with bones of bison and reindeer. The haft of the implement is made from the antler of a reindeer, in which is



Implement from Calf Hole Cave.

inserted (according to Prof. Dawkins) a very large boar's incisor. The total length of this, the 'very oldest British Tool known,' is a little over seven inches. As will be seen from the block, which has been kindly loaned by the Bradford Society, the haft of the implement is perforated, the orifice being about an inch in diameter. Whilst the object was at the Manchester Museum a plaster cast was made, which is fortunate, as on its way home the tool was 'lost'—stolen, we believe. Though this is some years ago, it is hoped that the object may yet exist. Should any of our readers see it at any time, we trust they will advise us. A plaster cast has been placed in the archæological section of the Hull Museum.

BRADFORD AND NATURAL HISTORY.

It is most gratifying to learn from the *Yorkshire Observer* that the exhibition of natural history specimens, which was arranged in connection with the annual meeting of the Yorkshire Naturalists' Union at Bradford, and was subsequently left open for the public, has been an unqualified success. 'Though comparatively little has been done to make the exhibition known, it is admitted by the attendants at the hall that equal numbers have been attracted by no art exhibition held in Bradford during recent years—last year's exhibit, of course, excepted. Every afternoon, and on both evenings when the building was specially kept open till nine o'clock, the room has been crowded, something like a hundred persons being frequently to be seen there at one time. Representatives of the two societies concerned in its organisation—The Bradford Scientific Society and the Bradford Naturalists—have attended, and have done not a little, by explanations, to interest the visitors. The exhibition has 'caught on' so effectively that it was kept open for another week, and will doubtless do not a little to stir up the Museum Committee to make the natural history museum a permanent and an effective educational institution of the city.'

**British Butterflies.** By **J. W. Tutt, F.E.S.** Elliot Stock.

The full title to this work, viz. : 'A Natural History of the British Butterflies, their world-wide variation and geographical distribution. A text book for Students and Collectors,' fully describes its scope. The work is being issued in shilling parts, two of which are before us. The first contains pages 1-48 (General Observations on Butterflies), and pages 81-104 (in which details of Egg-laying, Ovum, Habits of Larvæ, &c., are given). Part II. contains pages 5-8 (Eggs of Butterflies, &c.), and pages 105-124. Mr. Tutt's reputation is such that remarks on the value of this work are unnecessary. There is nothing to indicate how many parts will be issued, but we understand from the author that there will be two volumes, and that the first will contain twenty parts.

Hugh Miller: A Critical Study. By **W. M. Mackenzie.** London, Hodder & Stoughton. 246 pp., 5/- net.

In this interesting little book Mr. Mackenzie very carefully reviews Hugh Miller and his work under the heads of early life and training, literary style, history and folklore, religion and philosophy, geology-researches, geology-reconciliations, geology—the development hypothesis, politics, and ecclesiasticism and editorship. It is not necessary to inform readers of the 'Naturalist' further of the nature of this work, which has been written by one who has become thoroughly familiar with Miller's many-sided interests. Our marvel is, that in a certain 'literary' review recently, this book was referred to as "An account of the life of an extinct and worthy Scotchman. . . . Mr. Miller *appears to have been something of a scientist* as well!"

THE LESSER GREY SHRIKE NEAR WHITBY: AN ADDITION TO YORKSHIRE AVI-FAUNA

THOS. STEPHENSON,
Whitby.

On the 20th September last a Grey Shrike was shot at Sleights, about three miles from Whitby. I sent the specimen to Mr. W. Eagle Clarke for identification, and he reports that it is an addition to the Yorkshire list, namely, the Lesser Grey Shrike (*Lanius minor*). This South and Central European species has only on eight previous occasions been detected in England, and this is the first occasion on which it has been known to occur in the North of England. It is a young bird in first plumage. The specimen has been placed in the Whitby Museum.

AN ADDITION TO THE YORKSHIRE LIST OF LEPIDOPTERA.

T. ASHTON LOFTHOUSE, F.E.S.,
Middlesbrough.

Orthotaenia antiquana.—I took a good specimen of this Tortrix at Redcar on July 3rd 1905. The only Yorkshire record for this species was struck out of Mr. Porritt's list when it was revised; thus this re-establishes the record, and adds another species to the present Yorkshire list.

We should advise all readers of the 'Naturalist' who are interested in the photography of birds' nests, plants, or other objects which are not easily accessible to the ordinary camera, to write to Mr. W. Butler, of 20, Crosby Road, Birkdale, Southport. Mr. Butler will gladly forward to such persons an illustrated prospectus of a camera stand which he has invented and patented under the name of 'Swincam.' We have carefully examined the details of the new stand, and have seen some of the results achieved by its use, and can thoroughly recommend it. For the purpose of taking photographs of objects in awkward positions or at unusual angles it is indispensable.

Naturalist,

ON THE NECESSITY FOR THE AMATEUR SPIRIT IN SCIENTIFIC WORK.

*Being the Presidential Address delivered at Bradford on
January 27th, 1906.*

G. W. LAMPLUGH, F.R.S., F.G.S.

IT is with a somewhat uneasy conscience that at this, the close of my Presidency, I undertake for the first time the duties proper to the Chair. In proffering my apology to the members of the Union for such apparent neglect, I shall venture to plead that the contingent circumstances which, in the event, have barred my presence from any of the meetings of the Union during the past year were made known beforehand to your Executive, and were met by a gentle hint that if I could manage, in case of absence, to secure a continuance of the active services of your last President, the interests of the Union would suffer no detriment whatever. This, through the kindly acquiescence of Mr. Pawson, I was fortunately able to do, and feel that in this matter I have acquired merit.

Nevertheless, I was uncomfortably reminded of the state of the Union during the homeward voyage from South Africa, when our Amateur Dramatic Company produced a new and original play entitled 'The Lost President,' the plot of which turned upon the mysterious disappearance of the President of an Association, who, before he was discovered, had unexpectedly reverted to the parent stock! It is with an echo of this whimsical little plot in mind that, being now here to address you, I shall claim the privilege of reverting to the parent stock of my own work, and shall take the standpoint of the amateur rather than of one to whom scientific investigation has become a matter of daily duty. From this standpoint I shall seek to direct your attention to some of the general responsibilities that rest upon us in taking part in the advancement of knowledge.

When the necessity for preparing this address was brought forcibly home to me by the whip of our genial Hon. Secretary I hesitated between two courses. One, the easier and pleasanter, was to face inward over the excellent results that have already been achieved in almost every branch of science by amateur workers in our county, a course which could not fail to put us on good terms with ourselves as Yorkshiremen. But, being

myself a Yorkshireman, I know that our complacency on this, as on most matters, needs no stimulus. Therefore I have chosen the other course, and shall face outward over the wider field, in whose cultivation we amid a multitude of earnest workers have taken our little share, and have still a vast undeveloped country ahead of us.

But in suggesting this familiar old simile of the labourer and the field, it is well to consider what in this particular case is its meaning—we become so accustomed to the use of time-worn symbolism that we are apt to forget that a concise meaning may attach to it. What then are we doing, and why should we busy ourselves so greatly with matters that lie outside the routine of our daily life? Even it may be asked, is what we are so busy with really worth doing? To the professional man in a professional atmosphere, such a question would seem trivial and unworthy of notice; but I know by experience that to the amateur, working amid more or less unsympathetic surroundings, it is a question with which, tacitly or outspokenly, he is so persistently challenged that he cannot entirely ignore it. To that question we can give a clear and sufficient answer, for the justification is complete.

In increasing the sum of human knowledge—be it by ever so little—we are increasing the range of human consciousness and pushing forward the development of those faculties which have raised mankind to his present state, and have given him great promise of further attainment. We are the makers of the new material of thought—the humble silkworms drawing the threads from which the philosophers and poets of the future will weave their most radiant and enlightening perceptions. This, as it seems to me, rises above all the utilitarian—all the educational—all the personal considerations which obscure our forward path. Each in his own sphere—the astronomer in studying the heavens, the physicist and chemist in studying the properties of matter, the geologist in studying the past of the earth, the zoologist and botanist in studying the life upon its surface—is trying to bring into his own consciousness, and through his own, into the general consciousness, a more faithful representation of the universe in which we find ourselves. The investigator may so lose himself in the fascinating detail of his work that for a time this wider purpose may not be perceived; but, knowingly or unknowingly, it is toward this end that he is striving. Carefully he corrects the slightest inaccuracy in the received idea; carefully he seeks to add his mite to the general

fund of accurate ideas that represents the mental wealth—the only safe and enduring wealth—of mankind.

And in his intellectual as in his physical career, the progress of each worker is an epitome of the progress of the race. From the simple elements of a few impressions that have chanced to strike deeper into his consciousness than the habitual sensations of his daily life, his observant faculties are aroused, and are directed with a slowly growing sense of purport toward a definite end. If we turn from the particular to the general—from the individual to the race—how slow were the first stages in this progress let the archæologist declare!

I have sometimes half-seriously pondered over the generations of early research-work that led up to the discovery of the pocket or its predecessor, the wallet, with its later development, the collecting bag. Judging from the relative distribution of flint implements, it is clear that for a long time after the discovery by primitive man that certain kinds of stone could be made useful for cutting, it was his habit when there was cutting to be done to resort to the places where cutting tools were readily obtainable, and there do the work. Like the lowest savages of the present day—practically unclad: with no means of conveyance for small objects except hands and mouth, and these available only when not otherwise occupied: imbued also, no doubt, with the usual savage disregard for contingencies—our early ancestors seem to have struggled along for ages without so much as the germ of the idea which underlies the evolution of the pocket-knife; and their upward progress must have been terribly hampered in consequence. To become even a geologist under such conditions was of course impossible, and it is no wonder that the only Ancient Briton we know to have made a feeble attempt in this direction was found by the archæologists dead in his barrow with his burdensome specimens around him.*

Is it not clear that the invention of the wallet marked a very decided step towards an accurate knowledge of things, by rendering possible the collection of material that served to fix and correct the hazy remembrance of common objects? How distorted such memories tend to become, even at a much more advanced stage of human progress, we may know from the grotesque caricatures of natural objects that were based on the recollection of travellers to strange lands in mediæval times.

But with the wallet once in common use, the habit of

* See illustration in 'Naturalist,' Nov. 1904, p. 321.

collecting grew apace; thus the establishment of that larger permanent wallet, the museum, became inevitable; and then followed, as a matter of course, the perception of the relation of things to each other, and their classification into like and unlike, whereby a vastly increased number of facts were brought easily within the range of the mind.

It is indeed essential that we should make constant reference to the things themselves in order to maintain the truth and vigour of our impressions unimpaired; for it is not in small matters only that the mirage of memory and imagination tends continually to lead our faculties astray. The note-book, with its outcome—the technical memoir, and its latest development—the scientific text-book, in which we strive, according to our ability, to image the facts in words, are at the best but imperfect pictures that show on a plane surface what must necessarily be a superficial rendering of the object.

Again and again has it happened to the wayfarer along the path of knowledge that, through too much dependence upon written directions, the wrong fork has been taken, and a by-way entered that has led only into a maze of abstractions from which there has been no escape save by harking back to the slower path of laborious personal observation. And herein, again, lies the virtue of the humble collecting-wallet, at which impatient minds in all ages have been prone to scoff. How often has the plausible and apparently brilliant generalization been proved unsound and misleading when applied to the touchstone of a sufficient collection either of data or specimens, such as any intelligent worker finds it well within his power to make. In this way the veriest mouse in science may, and sometimes has, set free the lion himself from a network of error; though I am afraid that such service has not always been received with the gratitude that, under the circumstances, would have been becoming in the lion.

And this brings me to the matter that I had especially in mind in claiming the privilege of addressing you as a fellow-amateur. It is that, with the rapid advance in every branch of science and the heaping up of its subject-matter into highly technical schemes of much complexity, there has arisen a very serious danger that the duty of further advance will be left too much to the professional worker, and will be regarded as beyond the scope of the amateur. Without implying any disparagement of the professional scientific spirit as it exists at present I cannot help feeling that the fulfilment of the magnifi-

cent prospect which science has opened before us is not likely to be thus attained. It has happened many times in the history of our race that the Learning of the community has been left entirely to the Wise Men employed for its service, and always the results have sooner or later been disastrous not only to the community and to the Wise Men themselves, but especially to Learning. For a time, perhaps, all has gone well—the first Wise Men have been devoted to their work and have worthily fulfilled the measure of their great responsibility. But after a time, these worthy men have been succeeded by others with scarcely any sense of responsibility beyond the duty of maintaining and enlarging the caste-privileges that were obtained by the virtues of their predecessors; until by and by the position has become intolerable, and the community has been compelled to resume, in amateur fashion, its relegated task of enquiring into the nature of things.

It is easy enough for the community by payment to secure the services of the professional Teacher who will impart what he has himself been taught; but not by any system of tithe can we evade our collective responsibility to investigate the things that have not yet become teachable. And it is only in the spirit of the amateur that such investigation can be carried out; though the spirit may—and fortunately very often does—animate the professional worker also.

Of course it is necessary that there should be men to whom can be allotted the duty of gathering together all that is already known in some particular branch of learning, so that such knowledge may be the more readily communicable at need; and this duty can rarely be undertaken except as a profession. But the amateur is not disqualified from doing serviceable work because he may lack this comprehensive knowledge. It is still such a short distance to the limits of the surveyed ground, that he who will but choose a definite path and follow it steadily and unswervingly for a while, will soon find himself in new or imperfectly known country whatever may be the direction in which he choose to travel. It is when the amateur seeks to follow the professional method in ranging over what is already known that he becomes discouraged by the complexities and difficulties of the trodden ground.

In dwelling on the importance of the amateur in science, we of course refer only to those who have an earnest purport in the pursuit—the trifler does not count whether he call himself amateur or professional. But with this proviso, I think we may

confidently expect to find that the advancement of science will depend as largely upon the efforts of its voluntary workers in the future as in the past. It is true that the number of those employed professionally in the work has been largely increased of late, but it does not by any means follow that the rate of advance will be proportionately increased—indeed, to judge from analogy, there is much probability that such will not be the case. The advance in Medicine has never been proportionate to the number of its professional followers, of whom the majority are content even to stop short of what is already known. Nor can it be said that in Law or in Theology the endowment of the professions has brought about the results that might reasonably have been anticipated. So also in Education, I think it must be acknowledged that the vested interests of the schoolmasters have been a hindrance rather than a help to advance in the methods of their profession.

Indeed, as in all other spheres of human activity, where there is a livelihood to be gained the livelihood and not the work most frequently becomes the paramount motive; and when this happens, it is only to be expected that the worker will view with some disfavour the movements that tend constantly to increase the amount of labour required of him. It is not every medical student who hails with delight the wider range of knowledge that modern advances in science have made necessary to him!

Moreover, the very fact that the range of knowledge required of the professional man has so greatly increased and is still increasing, whereby his mental energies are taxed to the utmost, and under the spur of necessity, at the beginning of his career, must have a tendency to check the ardour of his later work. It is only in exceptional cases that we can expect the keen amateur pleasure in the work itself to be maintained unabated after the hard pressure of the professional training is withdrawn.

Then, too, the multitude of new facts and their subtending problems with which the professional worker has perforce to deal, tend to distract his attention and to blunt his sense of appreciation for new discovery. Yet it is only when such discovery is welcomed with delight, and is lovingly cultivated to mature growth, that it attains its full productiveness. To change the metaphor, we may say that new ideas thrive best that are treated, not as patients, but as offspring.

Hence, I repeat, it appears to me that instead of there being less necessity for the amateur worker owing to the increasing

number of professional men of science, there is the greater necessity for such workers. And under the new conditions their responsibilities are also greater, for it is in their hands not only to advance knowledge by individual effort, but also to guard against the crystallizing out from the body of the community of a special privileged class that might eventually claim to be alone capable of the duty and to be above external criticism. Already one sometimes hears that ominous word, 'layman' applied in contradistinction to the professional investigator; and the implication is obvious.

But since it is above all things essential that by one method or another the splendid work that has been begun shall go forward vigorously, we must see to it that there shall be an ever-widening intelligent sympathy in our progress, even among those who do not feel called upon to take up an active share in the movement. To arouse this intelligent sympathy, as well as to furnish the friendly appreciation which helps to maintain the zest of the serious worker, is pre-eminently the function of such a body as this Union of ours—a function that it has fulfilled in the past and may be expected to fulfil with increasing sense of responsibility in the future. With the spread of this sympathy there will assuredly follow an increase in the number of those who find delight in the pursuit of scientific investigation for its own sake, and are best qualified to criticize and check any undue presumption that may arise from the growth of professional interests. It will also rest with them to maintain unimpaired the spirit of high ideals in the effort toward further advance.

In respect to the actual work of investigation, I know from personal experience that the amateur is apt to overestimate his disabilities. It is true that the time he can devote to his chosen subject is usually very limited—though, after all, these limits are more narrowly determined by the measure of his enthusiasm and energy than by any other factor. Yet his control over such time as he can give is unrestricted. Therefore he can freely select the line of research most to his liking, and can concentrate upon it with unblunted faculties, finding positive recreation in what might prove a wearisome task if done of necessity and not from choice. Moreover, in doing this, he can afford to neglect all considerations that do not bear directly upon his self-appointed objective, in a manner that is not often possible to the professional worker.

To take a concrete example, let us compare the methods of

the amateur geologist with those of the official surveyor. The amateur can go straight to the open sections or to the most favourable localities where the materials for the special purpose that he may have in view are most accessible—to the sea-cliffs, quarries, or craggy mountain-sides that are best likely to repay every moment spent upon them—and there he is free to concentrate his whole attention upon his pre-determined object. The geological surveyor, from whom a wider range of general information is rightly demanded, has no such free hand, but must go laboriously over the whole country-side alike—over the soil-covered cultivated lands, the grassy slopes, and the artificially obscured town-sites—with all kinds of objects in mind that have an equal claim upon his attention; and consequently the greater part of his time is spent, not on the favourable exposures, where usually for the very reason that the information is adequate his duty is quickly done, but in searching the obscurer ground for scraps of evidence that the amateur would scarcely deign to consider. The comparison comes forcefully to mind whenever I re-visit Speeton and recall the methods of my earlier work there. I am compelled to recognize that any such method of prolonged concentration upon a single section could never be possible to the geological surveyor. I refer to this work merely as a ready example of the kind of research in geology that can only be carried out either by the amateur, or by the professional man who is ready to adopt the amateur spirit and method, for he who goes beyond the bounds of allotted duty in pursuing with his whole energies a congenial task thereby proves himself to be essentially and truly an amateur.

Of course, in considering this aspect of the matter, we must not lose sight of the fact that there is a vast amount of irksome toil necessary to the further advance of science, which, like most of the field-work of the geological surveyor, would never be undertaken by the voluntary worker, and will require the employment of labourers of all grades. Also in the future even to a greater degree than in the past, the high task of co-ordinating and interweaving the freshly-gathered materials into a serviceable fabric will be rarely possible except to the man who can devote himself entirely to the duty. And just as the geological surveyors' map supplies the basis from which the amateur geologist usually starts his advance, so in other branches of science the amateur makes the best progress on his chosen ground when he finds the route thereto already cleared for him.

This is the first use of new roads—to aid the road-makers themselves, whether amateur or professional. But the amateur must see to it that he take his full share in the work, lest the professional road-maker come to regard him as an idle path-stroller on pleasure bent, who can be ordered to 'keep off the grass.' There is always a danger that the free waste lands of to-day may become the preserved park lands of to-morrow!

It is not, however, to be implied that we expect everyone who finds interest in science to undertake forthwith the work of investigation—indeed, this is not even desirable unless the same hands that gather the raw material are capable also of weaving it into the fabric. The active amateur workers will always be few compared with the number of those who are sufficiently interested to watch with appreciation what is being done, though, as I have previously suggested, with an increase in the number of the sympathetic watchers there will assuredly be a proportionate increase of serious workers. It is upon these workers, backed as they should be by the intelligent support of the community, that the great responsibilities of the future to which I have alluded will mainly rest.

It may seem perhaps that for me to dwell thus upon the value of the amateur worker in science is superfluous—the mere labouring of an argument that is already granted. But it is useful sometimes to review matters of this kind under the light of changing circumstances, and I must let this be my excuse.

There is another aspect of scientific research, independent altogether of the matters we have been discussing, with which I should have liked to deal, but can only just touch upon now. It is with regard to the reaction of this kind of work upon the worker.

There is one thing sure, that whoever enters seriously upon the study of any subject in the scientific spirit, and pursues it far enough to grasp the essence of the scientific method, whether he succeed in adding to the sum of knowledge or not, will be intellectually the better for the discipline. The illusions and shadowy uncertainties that perplex the mind in our daily life are generally based on defective observation, or lack of observation; and any training of the mental faculties that helps to bring the idea into closer accord with its object—that, in common phrase, aids us 'to look facts square in the face'—is indeed valuable for this reason alone. The man of business unconsciously acquires this faculty by contact with affairs, and his

training is to this extent a scientific training; but it is remarkable how readily a habit of thought that has been acquired for some definite purpose is dropped except when employed for that particular purpose. In the scientific training proper, however, the faculty is persistently and consciously exercised, and if really gained, it cannot fail to permeate the whole mind. The conscious striving after accuracy in all things, small and great, is the essence of the method and the proof that it has been acquired.

But at the beginning of the address I sheared off from one tack lest it should lead us to excessive self-complacency, and I now find myself drifting along another that is certainly not tending towards humility of spirit; so it is evidently time that we dropped anchor. I am fully aware that I have asked you to accompany me over a trite course—a mere Dover-to-Calais sort of voyage—that has offered no new incident or outlook. But it is useful sometimes on occasions like this to follow the old route with a fresh pilot, if for no other reason than to see whether his soundings agree with those of his predecessors.

If, with a purport which is serious enough, I have taken unwarranted advantage of the opportunity that my office affords, in bringing forward matters of personal opinion rather than of fact, it must be my plea that there is a standpoint from which opinion itself is a fact that deserves consideration. Nor have I forgotten in addressing you that while the statement of scientific fact may justly demand acquiescence, the statement of scientific opinion can, at the most, ask only for consideration.



The Clyde Mystery: A Study in Forgeries and Folklore. By **Andrew Lang.** Glasgow: James MacLehose & Sons. 141 p.p., 4/6.

In this little book an effort is made to prove that the various extraordinary objects found in the Clyde area, and pronounced as forgeries by Dr. Munro, may be really genuine—though unique—or, at any rate, the author would like to show, after carefully considering all the evidence, that the matter is 'not proven.' The book is cleverly written, and no effort has been spared to bring in every possible argument in favour of the relics being genuine. But we do not think the author has advanced the matter much. Amongst the objects found were some carvings on 'American Blue-Points!' the antiquity of which even Mr. Lang cannot substantiate. As to the genuineness of the Clyde relics, the author's own words on p. 125 perhaps best define his position:—'Whether they were done by early wags, or by a modern and rather erudite forger, I know not of course; I only think that the question is open; is not settled by Dr. Munro!' There are no fewer than 34 'chapters' in the book, which is explained by the fact that a page or a page and a half is sufficient for a chapter.

BIRDS REQUIRING PROTECTION IN YORKSHIRE.

RILEY FORTUNE, F.Z.S.,
Harrogate.

Hon. Sec. Wild Birds' and Eggs' Protection Committee, Y.N.U.
Hon. Sec. Vertebrate Section, Y.N.U.

MEMBERS of the Yorkshire Naturalists' Union, and naturalists generally, will be greatly disappointed with the conduct of the County Council of the West Riding in shelving the proposed new Bird Protection Order, which has been drawn up with the utmost care by the Wild Birds and Eggs Protection Committee of the Union.

When, in conjunction with Mr. Nelson, I called a meeting of gentlemen interested in this subject, I felt that it was quite time something was done if the extermination of several most interesting species as residents in the county was to be prevented.

One of the principal points in view was to have a uniform order for the whole of the county, and when a meeting had been arranged of representatives from each of the County Councils to consider the proposal from the Y.N.U., all were very hopeful that the results of their deliberation would be satisfactory.

This Committee agreed practically to the whole of our proposals, and, from what we understood, the matter was settled, and we congratulated ourselves upon the good work done.

Just when we were expecting the new order to be issued, we learn with consternation that the County Council of the West Riding has shelved the whole matter, and without giving any reason.

Their action is extremely disappointing; a body of men, perfectly competent in every way to deal with the subject, drew up the proposed schedule with the utmost care, and it is inconceivable why the County Council have not followed out their suggestion.

The worst enemies to our rare birds are collectors. Personally I have no objection to anyone making a collection of eggs in a modest way, but I think the wholesale taking of the eggs of rare birds in clutches is deplorable, and especially when the collector is not satisfied with taking what he requires for his own cabinet, but continues to harry the nests for the purpose of selling the eggs outright, or, what is quite as bad, using them for the purpose of exchange. There are "naturalists" in our own

county who persist in this course, even going to the extent of obtaining access to protected grounds, on the pretence of being anxious to see the birds, being wishful to obtain photographs, or some similar excuse, and when the secrets have been revealed, afterwards sneaking back and clearing the ground of eggs. I have even heard of them paying lads so much each for curlew's eggs, and coming away from certain districts with a basketful.

Conduct like this is reprehensible and abominable; if persisted in it will result in these people having their names pilloried (they are well known) and held up to the scorn of all true naturalists.

It is, therefore, necessary for some stringent order to be passed and effective means adopted so that its provisions may be enforced to protect our birds against these wholesale destroyers.

I think if all naturalists' societies in the county were to pass resolutions asking the County Council to go forward with this matter, it would strengthen the hands of the Union considerably, and in the meantime local efforts to protect any special or rare bird might be effective.

Spurn Point, the only breeding place of the Lesser Tern in the county, has been declared a sanctuary by the County Council of the East Riding, but unfortunately there is no one to see that these orders are carried out, and to my knowledge the eggs of this bird and those of the Ring Plover are regularly taken. Some years ago subscriptions were obtained, and a watcher employed during the breeding season to look after these birds, but for some reason this system was abandoned; it would be a good thing if it could be resuscitated. I am sure the editor would be glad to receive subscriptions for the purpose, and the Wild Birds' Protection Committee would see they were employed with good effect.

The following is a list of birds which are in urgent need of protection.

Peregrine Falcon.—There are now only two, or at the most three, pairs endeavouring to nest in the county, but they fail absolutely in their attempts to bring off their young. For years I have had their nests under observation, being particularly anxious to secure a photograph of young birds, but the eggs have invariably been taken, on several occasions when on the point of hatching. One cliff has to my knowledge been inhabited by a pair of falcons for a quarter of a century, and during that time they have not reared half a dozen broods. Unless we can give these few adequate protection, they will soon be extinct as Yorkshire nesting species.

Raven.—This species is reduced to an odd pair endeavouring to nest, unfortunately without success, the eggs being invariably taken, like those of the Peregrine, even when on the point of hatching.

Buzzard.—These birds have not nested in the county for several years; all their old haunts are deserted. An absolutely harmless species, it is a great pity that continual persecution has driven it from the county. If only from a matter of sentiment, it is a cause of deepest regret that we should have to contemplate the disappearance of these three fine birds from our area. I strongly appeal to collectors in Yorkshire and elsewhere to stay their hands, and give them a chance to again establish themselves.

Merlin.—The numbers of this beautiful little hawk have been sadly thinned of late years, both by collectors and game preservers. As the food of these birds consists almost entirely of Meadow Pippits and other small birds, there is no excuse for their destruction by gamekeepers.

Goldfinch.—This bird is practically exterminated as a Yorkshire nesting species. The depredations of bird-catchers in the first place, and egg-collectors to a smaller extent, have combined to bring this about. A beautiful and absolutely harmless bird, every protection should be given it for some years.

Linnet.—The actions of the bird-catchers threaten this species, which happily is yet not uncommon; still there are many old haunts which are now deserted, the birds having been swept away entirely.

Bullfinch.—This species has had its numbers sadly thinned by the bird-catchers. A year or two ago I knew one small plantation that held nine nests full of young birds, all of which fledged safely. Yet, in spite of this, there has not been a nest in this place since; every bird was captured. There are many who say the Bullfinch should not be tolerated on account of the harm they do to the gardens, &c. I grant that they cause a certain amount of destruction, yet I am confident that if their habits and movements are studied, and not from one point of view only, it will be found that the good they do at least balances the harm; in any case, it would be a disgrace to exterminate such a beautiful bird.

Redpole, Chaffinch, Twite, Siskin.—These species all suffer from the depredations of the bird-catchers. I am not altogether against anyone possessing cage-birds, but I am strongly opposed to the reckless destruction caused by this nefarious

trade. I think that I am well within the mark if I say that not one bird in a dozen captured lives more than a day or two; the rest, crowded together in a vitiated atmosphere, with unsuitable food, perish miserably, while the amount of cruelty practised is appalling. Bird-catchers are a curse to the country.

Kingfisher.—This, our handsomest bird, should have absolute protection, both against the egg-collector and the man who fancies having them in a glass case, or the lady who would like one in her hat. They are harmless to anyone's interests, as their food consists chiefly of minnows and other small fry. Of course, if they gain access to trout-rearing ponds they play havoc, but it should be comparatively easy to keep them out.

Lapwing.—I am astonished that farmers ever allow the eggs of this bird to be gathered. They are the best friends the agriculturists have. Many districts I know, where they used to be common, but continual persecution has driven them to seek fresh pastures until there is hardly one pair where formerly were twenty.

Stone Curlew.—One or two pairs still endeavour to nest with us, but the efforts of the collector effectually prevent them adding to their numbers. A most interesting bird, it would be a thousand pities if they were turned out of the county by ceaseless persecution. Only absolute protection, both for themselves and their eggs, can save them.

Dotterel and Dunlin.—There is probably only one pair of the first mentioned in the county and not many of the second. Their eggs should be protected for some years.

Ring Plover, Oystercatcher, Lesser Tern.—There are only two places in the county where the first-named species nests, and only one where the other two are found. In these cases their eggs should be strictly protected, and also those of the odd pair of *Shelducks*, which nest in the same locality.

Ducks.—Some of the rarer species of ducks are extending their range, and if they were allowed to nest in security would no doubt become much more common; for this reason the eggs of the following should have the utmost protection afforded:—Shoveler, Wigeon, Teal, Pochard, and Tufted Duck.

Great Crested Grebe.—This fine species, like some of the ducks, is extending its range in the county, and would become more plentiful if it were not so persecuted by egg-collectors. Both birds and their eggs require absolute protection for some

years. Of course, I do not advocate the protection of the birds so far as the Ducks, Plovers, &c., are concerned, as the county is visited by such enormous numbers of migrants in the autumn and winter months.

Kittiwake.—I am inclined to think the numbers of this bird are slightly increasing. Nevertheless, as we have only one breeding-place in the county, protection afforded to both birds and eggs for a number of years could only do good by increasing the numbers of the most beautiful of the gull tribe.

Black-headed Gull.—These birds are endeavouring to found colonies in several places in the county, and would do so were their eggs not so persistently taken. The eggs should be protected, as the birds are harmless to both agriculturists and game preservers—indeed, to the former they are good friends.

These are a few species requiring, in my opinion, special protection. Of course, there are many more needing it, but not to such a great extent as these. Owls, Woodpeckers, Kestrels, &c., might be mentioned, but, as a rule, these nest on large and well-preserved estates; and thus, more or less, effective protection is afforded them, and more especially so, as the owners are beginning to recognise the good qualities of the Kestrel and the Owls.

Other birds should receive protection from the gunner. I will only refer to some. The Golden and White-tailed Eagles, the Osprey, Harriers, Bitterns, &c. Of course, some will say, Why protect these; they are not likely to nest in our county? I admit this, but in the case of the Eagles they are chiefly young birds, and would, if not molested, probably find their way back to their old haunts to occupy some of the ancient deserted eyries, and thus help to keep these noble and interesting birds as inhabitants in our islands.

The same of course applies to the Osprey. I think I am right in saying that Ospreys have practically ceased to nest in Scotland, which is a great pity. They ought to receive protection throughout the whole of Britain. Parliament should pass a law scheduling certain species for absolute protection in the kingdom.

To Harriers and Bitterns the same remarks will not hold good, as there are many suitable places in the county for both species to nest, and from the number reported every year as shot, it is pretty certain that were this persecution withdrawn we should soon be able to number them among our breeding species. Many others could be mentioned, if space permitted.

In contrast to the action of the County Councils of the West Riding, it is pleasing to note that the Councils of the North and East Ridings have adopted the proposals of the Union.

The actions also of the Town Councils of Scarborough and Bridlington, in prohibiting the shooting of Gulls, &c., on the sands, is greatly appreciated by the Union.

Nature in Eastern Norfolk. By **Arthur H. Patterson.** Methuen & Co. 352 pp., with twelve illustrations by F. Southgate. Price 6/-.

Not long ago we noticed in these columns an interesting work by Mr. Patterson entitled 'Notes of an East Coast Naturalist.' In 'Nature in Eastern Norfolk' our author gives a more substantial volume, which is exceedingly readable, and contains most reliable information on the fauna of the district in which he resides. The volume is in two parts, the first section being autobiographical, and also containing some general observations on the fauna; the second being a catalogue of the various birds, fishes, mammals, reptilia and amphibia, stalk-eyed crustacea, and mollusca. Needless to say the first part of the work is that which will be at once read by every purchaser of the book, and the remainder is also full of facts and records of the most useful character. It can be safely said that Mr. Patterson has monographed the fauna of his district in a very creditable manner.

As an example of the information in the second part of the work, we quote the following from the author's remarks in reference to the Bearded Titmouse;—This exquisite little bird has for years past been most mercilessly slain and its eggs stolen by the mercenary part of the shooting fraternity in the Broadlands. On November 19th, 1890, eight slaughtered birds were exposed for sale in the market place, seven of which were so badly mauled by duck-shot as to be useless for the stuffer's art. Four were brought up from Filby Broad on February 1st, 1895. For years a premium placed upon nests and eggs, to supply a rapacious skin dealer in the Midlands, was the means of sadly decimating this native species, of which Norfolk naturalists are so justly proud. 'After the mild winters of 1862-63,' writes Stevenson, 'these birds were more than usually plentiful at Hickling in the following spring, and from this locality alone about five dozen eggs were procured by one individual, nominally a collector, but in reality a dealer, who thus for the sake of a few shillings would go far towards extirminating this beautiful species.' Old birds in some numbers were also killed at the time. It will be a sad pity if eventually this beautiful creature should be lost to us. It is a positive delight to watch a flock of these elegant birds flying in company from one reed-clump to another, or creeping mouse-like up and down the reeds, their bright rufous plumage contrasting sharply with the green lanceolate leaves, meantime uttering their clear metallic *ping! ping!* a call note which, once heard, can never be confounded with any other.' The following figures relating to the estimated number of nests in different years tell their own story.—In 1848, 170; 1858, 140; 1868, 125; 1878, 90; 1888, 45; 1898, 33. And yet there are some who speak of the uselessness of the Wild Birds' Protection Act! The notes on the Bearded Tit are illustrated by a charming coloured plate, which the publishers have kindly enabled us to reproduce (plate II.). We have particular pleasure in doing so, partly because it gives our readers an idea of the nature of the twelve illustrations, which are from drawings by Mr. F. Southgate, and partly because the Bearded Tit was recorded in these columns some little time ago as occurring at Hornsea Mere—a record we should very much like repeating.



Bearded Tits.

SHEFFIELD'S TROUGH FAULT.

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

SHEFFIELD is remarkable for the many striking geological features which occur in its vicinity. Reference has been made in the pages of this journal* to the small patch of boulder clay found at Crosspool, at an elevation which places it in a position of splendid isolation so far as current theories of the glaciation of Yorkshire are concerned. The famous Wharnccliffe Gorge has supplied the key † to one of the interesting examples of river diversion in this island, while the Red Rock of Rotherham has puzzled a couple of generations of geologists, and, despite several praiseworthy attempts, ‡ still remains with its exact stratigraphical position undefined.

It only requires a striking example of the effect of complicated earth-movements to complete the series, and this is supplied by the narrow strip of faulted ground that forms the northern side of the Don Valley between Sheffield and Rotherham. A reference to the sketch map (Plate IV) will help to make clear the structure of the rocks intersected by the Sheffield, Northerly Don, and Southerly Don Faults. East of the last mentioned fault the coal measures dip gently to the N.E., while the various coal seams crop out with a strike ranging N.W. and S.E., this being the normal dip and strike for this portion of the coal-field. North of the Northerly Don Fault, and west of the Sheffield Fault, the measures have again the normal dip and strike, but are lower in the series. In the country between the two main faults we find the so-called middle coal measures, from the Silkstone up to the Barnsley seams, exposed, dipping steeply in places up to 50°, and with a strike at right angles to the rest of the country. The late Prof. Green, when making his survey of the district, drew attention to this striking feature, and, after describing the present lie of the rocks, remarked as follows :— §

“ The way in which this block of strata has been torn from the beds to which it was once united, and twisted round through an angle of nearly 90° is very striking, but we know so little

* Johns, 'Naturalist,' Aug. 1905, p. 243.

† Lower Carter, 'Rep. Brit. Assoc.,' 1904, p. 558.

‡ Green, 'Yorkshire Coal-field,' p. 482. Kendall, 'Rep. Royal Com. on Coal Supplies,' 'Geological Report,' p. 22.

§ Green, 'Yorkshire Coal-field,' p. 498.

of the machinery by which faulting and disturbance were produced, that we can offer no explanation of the way the wrench was caused."

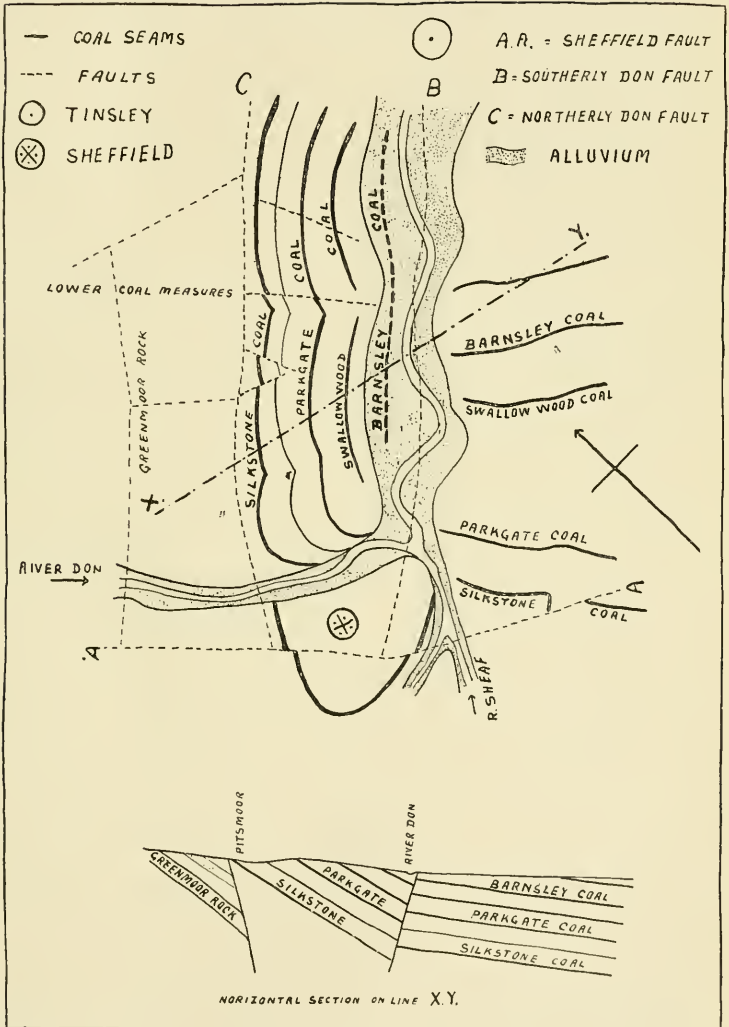
It should not be forgotten that when the survey was made, Structural Geology had not received the attention that has been devoted to it during recent years.

To begin with, it might be mentioned that there has been no wrenching away and twisting round through an angle of 90° in the area we are discussing, so we are spared the trouble of investigating the mechanism necessary to produce such movements. The Yorkshire coal-field is singularly free from evidences of tangential stresses and reversed faults, and overthrusts are almost absent; such trifling examples as may be pointed out are local in character, and only due to the efforts of wedge-shaped rock masses to accommodate themselves to new positions while undergoing subsidence. The disturbances that have determined the tectonic features of the basin, are to be included in the group of Gravity Faults. Gravitational stresses are the only ones that need consideration, and Normal Faulting is the rule.

Normal faults, as is well known, hade to the downthrow side, and from their very nature involve extension of the strata affected. It is, however, in the sequence, rather than in the character, of the faulting that we must seek for an explanation of the movements that brought about the present structure of the part of the Don Valley now under investigation. The Southerly Don Fault ends abruptly against the Sheffield one, so the last mentioned is evidently the older. The Southerly Don Fault is perhaps the most interesting in the coal-field, and there is a strong suspicion * that it was progressive in its character, and moved more than once between the deposition of the Barnsley coal and the laying down of the Permian rocks. That is, however, a question that does not concern us here. The important point is that its extension into the area under discussion was posterior to the Sheffield Fault and anterior to the Northerly Don Fault.

When the fracture was extended, after the close of the middle coal measure period, to use the conventional term, up to the Sheffield Fault, it did not establish complete equilibrium in the stressed rocks, for afterwards the strip, that now lies with a strike at right angles to the rest of the district, broke away.

* Kendall, 'Q.J.G.S.' No. 242, May 1905, p. 344.



Map and Section of Country around Sheffield.

The cross section of this mass must have been of a wedge-shaped form with the small end down, for, as a result of the two successive fractures, the space between had been increased, and the dislocated strip sank into the trough. But the strip did not sink evenly, for owing to the Southerly Fault being the older, the rocks on that side of the trough would be lower, and the edge of the displaced strip nearest the depressed side would sink deeper. The opposite edge would be reared up, and a portion of its fractured surface, with the coal seams, would be exposed with a strike that would now be at right angles to that of the rocks bordering the trough. The transverse faults probably developed as the displaced mass adjusted itself in its new position. The movements just described were in all probability gradual in their character. Denudation would afterwards do its work, and one result that seems clearly indicated is that the Don, or, as it would then be, the Sheaf, for the Don diversion above Wharnccliffe Gorge had possibly not occurred then, followed the line of fault. The probable outcrop of the Barnsley seam is marked beneath the alluvium of the Don Valley on the sketch map. Recent excavations in the neighbourhood of Brightside, disclosed the seam at a depth and with a dip that would carry it to the position indicated.

We have here, therefore, an example of a trough fault distinguished by the fact that the faulted strip has subsided unequally, and has one long edge reared up above the opposite one. It is also distinguished by the fact that, owing to the differential rate at which the areas to the east and west of the strip have subsided, one margin is much higher than the other. There is evidence too that the rocks had undergone considerable flexure before the second fracture occurred. The various movements are therefore more complex in their character than would be the case with a simple trough fault. Though this explanation might seem more prosaic than the one it is offered as a substitute for, it does not necessarily detract from the interest of what must be considered to be the most instructive faulted area in the whole of the coal-field.



The report of the Corresponding Societies' Committee of the British Association, and of the conference held in London on October 30th and 31st, has been issued. It contains the papers, &c., referred to in our January issue, as well as the discussions thereon. A valuable addition to the report is the classified summary of the papers printed in the various proceedings and transactions of the corresponding societies.

NEOLITHIC REMAINS ON THE NORTHUMBERLAND COAST.

C. T. TRECHMANN, B.Sc.

CHIPPED flints appear to be absent from that part of the Northumberland coast extending from the mouth of the Tyne northwards to Monkseaton. At the latter place where the coast line is cleaner a few chippings were found. Further to the North on the coast opposite to St. Mary's Island, more distinct traces were noticed; a few flakes occurring on a patch of bare ground together with a gun flint and several fragments of glazed pottery and broken bones.*

The coast extending from the Island to Seaton Sluice is more interesting from a purely geological point of view, and has not afforded any flint flakes; while from this point to Blyth is a long stretch of blown sand which would conceal any neolithic site which might exist. On approaching Newbiggin flints begin to be more plentiful, and between Camboise and Newbiggin they may be picked out of the soil capping the edges of the cliffs.†

The most prolific site however is situated about 1 mile North of Newbiggin, and nearly opposite the village of Woodhorn. As in other localities the site is immediately above the sea coast. The part where most of the flints have been found is an old sandstone quarry near the promontory. In order to reach the stone it has been necessary to strip off about 3 feet of clay and rubble which covers the rock. This rubble, plentifully mixed with pieces of sandstone, has been shot over the cliff on the edge of the quarry nearest the sea coast, where every specially high tide washes a portion away, exposing the flint flakes and other stones. The chipped flints are also found completely washed out of the soil and lying amongst the shingle accumulated at high water mark.

The series includes most of the usual objects found on such sites, with the peculiarity that flint seems to have been an

* This site is a curious one, a similar one occurs at Newbiggin quite near the church, where a distinct stratum of a light colour may be noticed beneath the brown sand. Such sites are quite different from the true Neolithic sites which are rarely found amongst the brown sands.

† Pieces of flint are found in the so-called pre-glacial beach at this spot but they are very different from the fragments and nodules used by Neolithic man.

even scarcer commodity here than on the Durham coast and many of the flakes show traces of having been used as cutting and sawing tools.

About four hundred implements, flakes, and chippings, were obtained from this spot. The largest flake is no more than $1\frac{1}{2}$ inches in length, while most are much smaller; some of the scrapers are absurdly small, resembling in this respect some of the minute thumb flints from the Scotch sands. One pigmy or midget implement was obtained.

A curious implement in the form of a small "sling stone" was found; it shows the crust of the pebble on one side, and was probably used as a scraping tool as the use of a lens reveals numerous fine fractures on one edge only. The flints are all fresh and show no iron stains or other marks, and the surfaces of the flakes are highly bleached and mottled from exposure.

About 10 distinct scrapers were picked up, all abnormally small and none of them fitted for use in handles.

In addition to these a quartzite core with a few quartzite flakes occurred, and three or four much battered quartzite striking stones.

No arrowheads have occurred up to the present on the site, and neither greenstone nor any polished implements were found.

The rest of the Northumberland coast seems to be very unprolific in prehistoric remains. A fine arrowhead of opaque flint is in the possession of the Rev. M. Fletcher of Seahouses; it was found near Bamborough, but appears to have been an isolated example. Although many barrows have been opened up on the Whin sill escarpment in the parish of Bamborough, I failed to find any definite flint sites along this part of the coast. A seemingly good locality on the coast between Dunstanborough and Bamborough yielded only a single flake.

One and All Gardening, 1906, London, the Agricultural and Horticultural Association, Ltd., 2d.

The eleventh issue of this popular gardening annual, edited by E. Owen Greening, contains about 30 original articles by well-known writers. There are 200 pages and 170 illustrations. Anyone with a garden will do well to spend twopence on this 'hardy annual.'

The Fifteenth Quarterly Record of the Hull Museum (Publication No. 28) has been issued. (A. Brown & Sons, Ltd., Hull, One Penny). It contains illustrated articles on Inscribed Roman Fibulæ, Rural Relics, and on a large Mammoth Tooth recently found at Withernsea. There are also notes on Medals; Saurian, &c., remains; Cremation, &c.

ERYTHRÆA PULCHELLA Fr.

An Addition to the Flora of the N. Riding of Yorkshire, and Other Records.

P. FOX LEE,
Dewsbury.

DURING the two weeks, 26th July to 9th August 1905, I had a glorious time amongst the coast-line flora at Whitby, Saltburn, Marske, and Redcar, and inland at Middleton-in-Teesdale and High Foss. Besides enjoying the pleasure of seeing many species of plants not previously observed growing anywhere (all recorded, however, in Mr. J. G. Baker's classic 'North Yorkshire,') I was fortunate in discovering an addition to the flora of the Riding, namely, *Erythræa pulchella*, or Slender Centaury.

Mr. Baker, the veteran author of 'North Yorkshire,' has verified my record, saying in a letter, 'The *Erythræa* is certainly dwarf *pulchella*, which is new for the North Riding.' Passing through Middlesbrough by train, a naturalist might easily think he had come to some active volcanic region, the grimy smoke-laden atmosphere of the district is fairly alarming, but after all, it is comforting to reflect that the ballast-hills have not yet invaded all the ground. Although they do spread out in huge, unsightly tongues of slag, they are gradually being disintegrated and covered with plant life. At the present time, some of the slag is being utilised in various ways commercially. There is much marsh-land still free and open for the seaside-loving plants.

The tiny specimens of *Erythræa pulchella*—pretty as the name denotes, and but one to two inches in height—with rose-pink, star-shaped flowers, were growing freely on several of the drier sandy hillocks in one of the salt-marshes near the East Coatham sand-hills.

The following coast plants were associated with the *Erythræa*, namely:—*Buda media*, *Trifolium fragiferum*, *Glaux maritima*, *Juncus maritimus*, *Triglochin maritimum*, *Lepturus filiformis*, and many commoner species. Unfortunately the abnormally dry season had both hastened the maturing and stunted the growth of many of the plants observed on the sand-hills and boulder-clay cliffs between Redcar, Marske, and Saltburn, such as *Thalictrum dunense*, *Carlina vulgaris*, *Orchis latifolia*, *Scirpus Carices*, and *Equisetum maximum*.

The only other records of *Erythræa pulchella* for Yorkshire hitherto made are near Scarcroft, Finningley, and Bawtry, in Mr. F. Arnold Lees' 'West Riding Flora,' p. 324, and at Bridlington Quay (a very old record) in J. Fraser Robinson's 'East Riding Flora,' p. 144.

LINCOLNSHIRE FRESHWATER MITES.

G. F. GEORGE, M.R.C.S.

THE following are some notes on observations of the growth and changes of the appendage of a species of *Megalurus* extending over a period of about six weeks.

On Tuesday, August 29th last, I found in water taken from one of my usual collecting ponds the day before, a male *Arrhenurus* unlike any I had before noticed. Its general colour was pale reddish with a yellow Y-shaped malpighian centre, the legs a pale transparent blue colour, the fourth segment of the hind leg spurred, the hair on the end of the spur curly, eyes a bright vermillion, the chain-like chitin coat very distinct, and the lined condition of the epidermis which covered it was easy to make out; the striated epidermis I have before observed to be most frequently and best seen in young mites which have recently changed their skin. The most remarkable thing about



FIG. 1.



FIG. 2.



FIG. 3.



FIG. 4.

the mite was the tail, which was short and globular. At the extreme end, in the centre, a small papilla, and another on each side near the outer edge (see fig. 1). On the 7th of September following the tail had slightly elongated and become conical (fig. 2), reminding one of Piersig's figure of *Arrhenurus conicus*, the central malpighian body extended almost to the end of the tail, the side cœca were a semi-transparent warm brown colour, and the end of the tail a rather transparent delicate pale pink. On the 11th this had become more elongated, and continued semi-transparent, the end nearly square across, with the little papilla in the centre, and above this some slightly blue chitin plates. The mite now appeared to be very like the mite described by me as *Arrhenurus mantonensis* (see figure in 'The Naturalist' for June 1903, p. 216). As development was perhaps not yet finished, I still kept the mite alive for observation; a week afterwards great changes had taken place in the tail, two side projections had formed at the end, the chitin

plates had fully developed, and a sort of papule had formed above them, and the mite had taken upon it the appearance of *Arrhenurus caudatus*, fig. 4; the general colour of the mite however continued to be pale, and rather transparent, the side cœca brown. After this I sent the living mite to Mr. Soar for his examination. He wrote to me October 14th. He thinks it is *Arrhenurus caudatus*, and the absence of the usual colouring of that mite is perhaps due to its being developed in confinement. On October 16th I found it dead, and so mounted it. It certainly was very differently coloured to any *A. caudatus* I have before seen, and I still think it a variety of that mite, and suggest it being called '*Arrhenurus caudatus mantonensis*,' until further investigation shows that the ordinary *A. caudatus* goes through all these different changes during its final growth.

LEPIDOPTERA.

Interesting Tortrices, &c., taken in Cleveland in 1905.—

Pyralis costalis [= *fimbrialis*]. Specimens taken in out buildings, Linthorpe, Middlesbrough, previously recorded for two localities in the Yorkshire list.

Peronea sponsana.—Middlesbrough.

Peronea comariana.—Kildale in September. Only one previous Yorks. record.

Peronea maccana.—Four or five specimens, including both sexes, taken at sugar, Linthorpe, Middlesbrough. This confirms my previous record (the only Yorks. one), which was made from a single specimen taken some years ago.

Peronea ferrugana.—Kildale.

Mixodia schulziana.—Kildale.

Padisca ophthalmicana.—Kildale.

Ephippiphora turbidana.—Kildale in July.

Olindia ulmana.—Kilton Woods, Loftus, July.

Catoptria fulvana.—Swaintsy in Cleveland, June 17th. Only one previous record in Yorks. list.

Œcophora stipella.—Kildale.

T. ASTON LOTHOUSE, Linthorpe, Middlesbrough,
27th Jan. 1906.

OLD ENGLISH FORESTS.*

IN our February number (page 52) we drew attention to a recently issued publication which was of particular interest to northern naturalists from the information contained therein relating to the birds &c., used for food in times gone by. Of a similarly informing character is the work just issued on the Royal Forests of England, one of 'The Antiquary's Books' written by the Editor of that series, Dr. Cox. In this work Dr. Cox has gathered together for the first time many valuable facts relating to the old forests, the forest officers, beasts of the forest, trees of the forest, &c., and describes in detail the various forests once existing in different parts of the country. The work is also illustrated by numerous quaint drawings, &c., mostly from contemporary sources.

In the first place Dr. Cox defines a forest, as it was understood in the Norman, Plantagenet, and early Tudor days. It was 'a portion of territory consisting of waste lands, and including a certain amount of both woodland and pasture, circumscribed by defined metes and bounds, within which the right of hunting was reserved exclusively to the king, and which was subject to a special code of laws administered by local as well as central ministers.' Had the true meaning of the old word 'forest' been grasped, much waste of learning and of vain strivings to prove that certain barren tracts were wood-covered in historic times might have been spared. A 'chase' was, like a forest, unenclosed, but could be held by a subject.

The foresters and other officials appointed in connection with these vast tracts of country are described, and particulars given of their duties, wages &c. We learn that twopence a day was the usual wages of the Pickering foresters.

Under 'The Beasts of the Forest' are many particulars of animals formerly existing, which should be studied by all interested in the former fauna of Britain. Particularly interesting are the records relating to the wolf. 'The abundance of wolves throughout England in the pre-Norman days is borne witness to by the Saxon name for January, namely, the wolf-month. There was probably no part of England where the wolves had surer or more prolonged retreats than amid the wilds of

* 'The Royal Forests of England,' By Charles Cox, LL.D., F.S.A. Methuen & Co., 372 pp, 7/6.

the Peak Forest and its borders. The last places in this country where they tarried were the Peak, the Lancashire forests of Blackburnshire and Bowland, and the Wolds of Yorkshire. It has been confidently asserted that entries of payment for the destruction of wolves appear in the account books of certain parishes of the East Riding, presumably of sixteenth or seventeenth century date; but this on examination proves to be an error.' The last wolf was killed in Scotland in 1743.

There are extremely full and interesting accounts of the forest of Galtres, and the forest of Pickering, and it is disappointing to read at the end of the chapter dealing with the former that 'lack of space prohibits any reference to the Yorkshire Forests of Hatfield Chase, Knaresborough, and Wensleydale.' It is to be hoped that the information Dr. Cox has gathered together relating to these will be published elsewhere. To Yorkshire Naturalists, particularly, is the account of the Forest of Galtres of value. This forest naturally suffered severely during the Civil War, which raged so fiercely round York. It was deforested in the time of Charles II.

Relating to the forest of Pickering there are many curious entries, but we can only refer to one or two. At 'the eyre for Pickering Forest in 1338, the question as to whether the roe was a true beast of the forest arose' and it was decided (contrary to previous decisions) that it was a beast of the warren, for the curious reason that it put to flight other deer. In 1322, Edward II. paid the large sum (in those days) of £5 for cord to make nets to catch roebuck. Henry, Lord Percy, claimed in 1338 to hunt and take fox, roe deer, cat and badger, on his manor of Seamer, although within the forest.

Sir John de Meaux paid to the Earl of Lancaster for his woods of Levisham, in Pickering Forest, 2s. annual rent, and eyries of falcons, merlins, and sparrow hawks. Thomas Wake, in his barony of Middleton, in the same forest, claimed to have eyries of sparrow hawks and merlins in his woods.

In Pickering Forest, also, as elsewhere, poaching and game trespassing was carried on, frequently by men of good family, such as the Acclams and Boyntons. A number of secular clergy were also found to be culprits. Walter Wirksall, chaplain of Westerdale, was convicted of twice joining a poaching party in 1328, and was fined £1 6s. 8d. Robert Hampton, rector of Middleton, kept four greyhounds, and often hunted hares; as he did not put in an appearance and could not be found,

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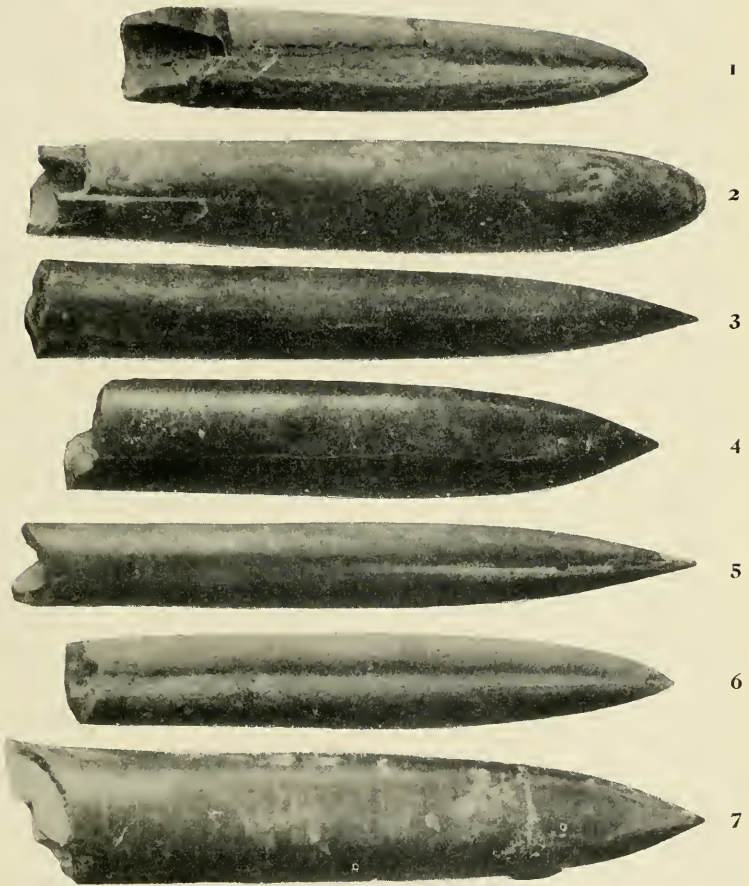
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Deformed Specton Belemnites.



Speeton Belemnites.

the rector was outlawed. John, the chaplain of Hackness, in 1312, knowingly received unlawfully hunted venison and was fined £1 6s. 8d. And so on. Right through the volume are interesting details, valuable alike to the naturalist and antiquary. 'The Royal Forests of England' should be on every naturalist's shelves.

NOTES ON SOME SPEETON-CLAY BELEMNITES.

T. SHEPPARD, F.G.S.
Hull.

PERHAPS one of the best arguments in favour of the necessity of the amateur spirit in scientific work, referred to by Mr. G. W. Lamplugh on another page, is a piece of work now before us, which will particularly appeal to Mr. Lamplugh on account of his former researches on the same ground. I refer to an admirable paper by Mr. C. G. Danford, entitled 'Notes on the Belemnites of the Speeton Clays.'*

The Speeton Clay were first referred to by Young and Bird, in 1822, as the 'Upper Shale,' and from it they figured a few specimens. Phillips, in his well known work on the Yorkshire Coast, a few years later, gave a much more complete account of the beds, with figures of fossils therefrom. In 1868-70, Prof. Judd published some papers in the *Quarterly Journal of the Geological Society*, in which he sub-divided the beds by the aid of the Ammonites. But all these works were eclipsed by a paper by Mr. G. W. Lamplugh, then an amateur, with a little leisure time. Mr. Lamplugh carefully collected from, and measured the different beds, and by the aid of the belemnites they were sub-divided into more or less definite divisions. Mr. Lamplugh's ability, and the exceptional opportunities he had for studying the clays, left us almost without hope of adding much to our knowledge of the fauna of the Speeton Series. A few years later however Mr. J. W. Stather, in the 'Transactions of the Hull Geological Society,' described a section south of the ravine from which he had obtained some specimens which were

* In the 'Trans., Hull Geol. Soc.' vol. III. part I., 1906, with 4 plates. This paper may also be had separately from Messrs. A. Brown & Sons, Ltd., Hull, price 1/6.

new to Mr. Lamplugh's lists. A circumstance certainly well worthy of record. After that, the Speeton Clay did not appear to have the attraction for geologists that its reputation merited. Rain and frost and sea played havoc with the section—large landslips occurred, and when, three or four years ago, a few of us visited the section, we found a huge mess resembling an enormous cauldron of sooty, sappy pudding, such as could not be adequately described without some association with his satanic majesty! It was certainly then thought that not in our time would the section be 'presentable' again, and nothing short of a miracle would enable anyone to add anything new relating to the zones and their fossils.

Soon after this, Mr. C. G. Danford took up his residence



Slipped Mass of Speeton Clay.
(From 'Geological Rambles in East Yorkshire.')

at Reighton Hall, close by—with most beneficial results to geological science—and to the Hull Museum! As a result of almost daily visits to the section, combined with a perseverance and patience and enthusiasm which did one good to witness, Mr. Danford has not only been able to make order out of muddle and puddle, but he has been able to demonstrate that the zones are by no means so sharply defined, and the range of certain belemnites is by no means so restricted as was previously supposed. He has also added considerably to what was known of the palæontology of the beds. Some of the belemnites he has found were little suspected—though they are now known to occur in some numbers, and several are of by no means small size. It is quite probable that four or five are new to science. Mr. Danford's acquaintance with foreign literature on

the subject has enabled him to compare his specimens with those found in the Neocomian strata on the continent—the result being, that with regard to the Speeton belemnites and their nomenclature local geologists will have to begin *de novo*.

In order however, to put the Speeton belemnites on a proper footing, Mr. Danford's paper is accompanied by four beautiful collotype plates, upon which twenty-six of the typical belemnites—common and rare alike—are figured. Previously some of the belemnites had not been figured at all. Others were in different out-of-the-way publications which were difficult of access. The Hull Society is certainly to be congratulated on enabling geologists for the first time to see the illustrations of the Speeton belemnites together, and the plates are so well executed that identification is quite an easy matter.

The two plates accompanying these notes are from photographs of the specimens which Mr. Danford has placed in the Hull Museum. The number of specimens figured in the memoir under notice is much greater. The first plate (No. V.) shows a number of deformed belemnites. Such examples are by no means common. A deformed specimen from the chalk of Flamborough was figured in this magazine for May, 1904. In one particular bed of the Speeton Clay, however (the *ewaldi* zone) such abnormal specimens are not uncommon, that is to say, to collectors of Mr. Danford's kind. As will be seen from the photograph, some of the guards of these old time cuttlefishes have evidently been damaged at an early stage in the life of the animal. One or two look suspiciously as though some denizen of the Neocomian Sea had taken a bite at these cuttlefishes, and thus abnormally 'shaped their ends.' Others have similarly suffered, either from damage or disease. The specimens figured are:—1. *B. puzosi*. 2. *B. ewaldi*. 3. From the *B. lateralis* beds. 4. From the *B. brunsvicensis* beds, probably *B. speetonensis*. 5. *B. jaculum*. 6. *B. ?* 7. *B. minimus*. 8. *B. ewaldi?* Nos. 2, 3, 7, and 8 are probably post-mortem deformities; the remainder are obviously guards which have been damaged and healed during the life of the animal.

The other plate (No. VI.) illustrates some of the specimens of more particular interest, described by Mr. Danford. The species represented are, in order, 1. (? New). 2. *B. obtusirostris*. 3. *B. brunsvicensis*. 4. *B. jasikowi*. 5. *B. speetonensis*. 6. *B. absolutiformis*. 7. *B. subquadratus*.

FIELD NOTES.

BIRDS.

The Bramble as food for Birds; &c.—I was much interested to read Mr. Peacock's record of the Siskin. I have never seen this species feed upon the blackberry fruit, but in heavy snow-times I have watched the Bullfinch, perched in the hedge, slowly crackling in its thick beak the hard, dry seeds that had never developed a succulent exterior. Here the Siskin is the great devourer of the naked red seed that lies ensconced in the woody cone of the alder-tree. It comes in great flocks, which are extremely shy and wary; but if food is abundant, the flock will break up, and linger in small parties. Possibly it passes through the district every winter, though not noticed unless it stays to feed, which is generally from mid-November to mid-January, the time when the alder fruit is ripe. On December 9th last, I was close to five birds which were feeding eagerly on the trees by Grasmere Lake. They descended to the ground, apparently to pick the fallen seeds; for the seeds were then loose in the cones, which had probably been already well shaken by a large flock of birds, of which these were the left-behinds.

A notice of the Siskin was unfortunately omitted in my list of the Birds of Rydal, July and August, 1902.—MARY L. ARMITT, Rydal, Westmorland.

Siskins in Airedale.—Scarcely a winter passes without a small flock of these birds being noted in this district. For some unaccountable reason, during the present rather mild winter we have had a greater number, and extending over a longer period, than I have ever known before. I have seen them several times during December, January, and in early February, but the greatest flocks occurred on December 22nd and 23rd, when there would be quite sixty to seventy birds. They were always seen near the river (between Shipley and Bingley), generally in company with a few other finches; and usually investigating the seed cones of the Alder. But on February 4th, with a strong and cold northerly wind blowing, they were away from the trees altogether, and evidently feeding on something quite close to the edge of the water along with Meadow Pipits. I afterwards learned that five had been shot out of the large flock in December. On examination I found they consisted of two adult males, two adult females, and an immature bird.—HARRY B. BOOTH, Spring Royd, Shipley, February 20th, 1906.



Nests of Herring Gulls on the Cliff.



Nesting Place and Eggs of Arctic Tern.
(Amid drift of highest tides.)



Nesting Place and Eggs of Lesser Tern.

REVIEWS AND BOOK NOTICES.

MANX BIRDS.*

Mr. Ralfe's monograph on the avi-fauna of the Isle of Man, which has been anxiously awaited by British ornithologists, has made its appearance, and is in every way a credit to the author, publisher, and the little island with which the work deals. We have had many new books on birds through our hands recently, a good proportion of which were worthless, or nearly so, whilst others were of some value from the beauty of the illustrations, or some similar feature. The present work, however, may unhesitatingly be placed upon the shelves of all bird lovers and naturalists as a sound, reliable, and interesting work of considerable scientific value. For years the author has been carefully collecting information relative to the birds of the island. He has the advantage of the help of Mr. P. M. C. Kermode, whilst the boundaries of the island, and its position in the middle of the Irish Sea, almost equi-distant from England, Scotland, Ireland, and Wales, give the author an exceptional opportunity of describing the birds of his particular area, an opportunity of which he has taken full advantage. The wonder is that such a work on this subject was not issued long ago.

Mr. Ralfe, who is a contributor to this journal, describes in his work a total of 183 species. Of these, 75 are resident (breeding); 18 regular summer migrants (breeding), 45 regular autumn, winter, or spring migrants (not breeding), and 45 occasional. An interesting comparison is made between these birds and the birds of the mainland of the adjacent countries. A lucid description is also given of the physical features of the island, and this section of the work is illustrated by a charming series of plates. There are also a number of plates (from photographs) of favourite nesting places. We observe with pleasure that the nesting places of some of the rarer birds are described as 'At ——.' Manx names, folk-lore, &c., are not neglected. In fact, we fail to see how Mr. Ralfe could have advantageously added anything to his volume. By the courtesy of the publishers, we are able to give our readers an idea of the illustrations in this work. Plate VII. shows nests of Herring Gulls on the Calf, and Plate VIII. gives views of nesting place

* The Birds of the Isle of Man, by P. G. Ralfe. Edinburgh, David Douglas, pp. lv.-321., maps and plates x, 18/- net.

and eggs of the Arctic Tern and Lesser Tern respectively, — photographs forcibly calling to mind the conditions at Spurn Point. By a coincidence, the 'Birds of Yorkshire,' now being printed off, is being issued in similar style to the 'Birds of the Isle of Man.'

—: 0 :—

An Introduction to Practical Geography. By A. T. Simmons and Hugh Richardson. Macmillan & Co. 386 pages. 3/6.

The exceedingly practical nature of the book at once commends it to the notice of all teachers of geography, and its use will unquestionably materially add to the interest taken in geography by the scholars. To many of our readers also who have recently taken up the question of mapping, the book will be found to contain most useful hints. Having been prepared for the use of scholars it is by no means too technical, and that it

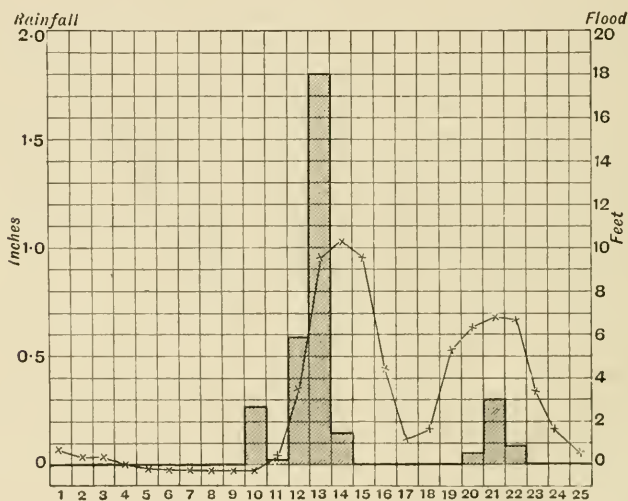


Diagram to illustrate the connection between the amount of rainfall at York and the height of the river Ouse.

is thoroughly up to date is proved from the carefully prepared chapters dealing with plant geography and botanical mapping. The book is suggestive in its method, and points out useful problems to be worked in whatever district the reader may be situated. One such problem is given in reference to the connection between the rainfall and the height of the water of a river. This is illustrated by statistics furnished at York, and a diagram, which we are able to reproduce. This 'Introduction' is well illustrated.

The January *Bradford Scientific Journal* is a valuable number, and contains an Obituary Notice (with photo) of the late Dr. J. Monckman; Fungi, by C. Crossland; Vanishing Local Plants and Animals, by R. Butterfield; Botany at the Bradford Sewage Works, by J. W. Carter and

J. Beanland; Winter-time in the Bradford Botanical Gardens, by W. P. Winter; and another section of Jowett and Muff's paper on the Glacial Geology of the District. There is a useful contoured map of the Bradford area, which can also be had separately for 3d. and is well worth it. There are a number of queries at the end of the Journal, presumably in the hope of being answered in a subsequent issue. From their nature we shall expect at least a double number to be devoted to them alone.* We hope, however, the editor will consider the replies unsuitable for the Journal—as are the questions. The first 'query' occupies twelve lines—and contains as many questions. It begins, 'As regards the exhibition of life, what are the degrees of environmental influences which limit its manifestation?' 'G.A.B.' wants to know 'What are the chief theories as to the origin of speech in mankind?' &c.; and 'A.B.' asks 'What is the difference between Instinct and Intelligence?' Another " would be pleased if someone would explain the phenomenon of sleep,' &c., &c.

NORTHERN NEWS.

Lord Masham died at Swinton Park, Masham, on the 2nd February.

In the January 'Journal of Conchology' Mr. M. V. Lebour writes 'On Variation in the Radulæ of certain Buccinidæ.'

Mr. G. W. Lamplugh, F.R.S., will preside over the geological section at the British Association Meeting at York in August.

Mr. Walker's 'Quarries Inspection Report' for 1904 on the Yorkshire and Lincolnshire district appears in the January 'Quarry.'

Mr. Arthur Smith, the Hon. secretary of the Lincolnshire Naturalists' Union, has been appointed Curator of the Lincoln Museum.

Mr. W. Ingham contributes notes on 'Some new and rare Hepatics and Mosses from Yorkshire and Durham' to the January 'Revue Bryologique.'

The Annual Report of the Bolton Museum and Meteorological Observatory for 1905 contains a lengthy list of the various objects begged, bought, or—borrowed during the year.

Prof. W. W. Watts, F.R.S., of the Birmingham University, has been appointed to the professorship of geology at the Royal College of Science, vacant by the retirement of Professor Judd.

Referring to the notes on late Swallows in our February issue (p. 61), Mr. J. Wilkinson, of Withernsea, informs us that he saw a swallow flying near the Cliff top at Waxholme on November 12th last.

A female otter and two cubs were shot in the Louth Canal, near Grainthorpe, in January. The female weighed 12½ lbs., and was 3 feet 7 inches in length. A reward was offered for their capture, on account of their being so destructive to fish.

In a note on the type specimen of *Pleuromutilus pulcher*, in the Proceedings of the Malacological Society (vol. 6, pt. 5), Mr. G. C. Crick definitely proves that the type-specimen of this interesting cephalopod was obtained from the 'Pendleside Series' of Hebden Bridge, Yorkshire. (See also 'Naturalist' 1904, p. 256).

* We might suggest, as an alternative, that the latest edition of the Encyclopædia Britannica be presented to each subscriber.

It is reported that three salmon poachers were recently before a North Yorkshire police court. The constable, in giving evidence, swore that on the day he arrested the prisoners he searched the house where one of them lived, and discovered three salmon hidden away. Two were dead, but the other was alive and *quite warm!*

At the Annual Meeting of the Scarborough Philosophical and Archaeological Society recently held, Dr. J. Irving was elected president. Complaint arose of the apparent carelessness in dealing with the egg of the Great Auk which the Society possesses. It was decided to 'keep the specimen under lock and key in future.'

A Dusky Thrush (*Turdus dubius*) is recorded at Gunthorpe, Nottinghamshire—a new record for the county (December 'Zoologist.') 'There is no doubt that it is a Dusky Thrush, and is in very perfect plumage, and not only the first Notts. specimen, but a new one to the British list. The bird was shot on October 13th last, and was a male.'

Amongst the recent awards of the Geological Society of London, we notice the Wollaston medal has been granted to Dr. Henry Woodward, F.R.S., the Murchison medal to Mr. T. C. Clough, the Prestwich medal to Mr. W. Whitaker, F.R.S., part of the Lyell Fund to Mr. W. G. Fearnside, and the Barlow-Jameson fund to Mr. H. G. Beasley.

The Rev. H. P. Slade, Hull, writes that a brilliant meteor suddenly startled wrapt lovers and lonely pedestrians about 8.35 p.m. on January 27th. So intense was the light that all objects rising above the earth's surface cast strong shadows. The path pursued was from east to west, parallel to the horizon and situate in a slightly curved line between the star 'U' in the constellation Leo and Procyon in Canis Minor.

We give below another choice bit of newspaper natural history:—Another mummied mammoth, or saurian, known as the Tyrannosaurus—the most formidable fighting animal of which there is any record whatever—has been resurrected in the 'Bad Lands' of Montana, and is now being restored in skeleton outline. Not since the great Brontosaurus skeleton have archaeologists and savants been so interested in a prehistoric discovery as in this new Tyrant Saurian, which is declared to be the king of all kings in the domain of animal life.

In consequence of enquiries which are constantly being made, we should like to state that the Geological Bibliographies dealing with the papers, &c., published relating to the Northern Counties, which formerly appeared in this Journal, are still being kept up, and the lists for 1902-1905, necessary to bring them up to date, are practically ready for the printer. On account of pressure of space in this Journal, however, they have been held over, and they will probably shortly appear in the Transactions of the Yorkshire Naturalists' Union, or in a special supplement to the 'Naturalist.' If the former, readers of the 'Naturalist' will be duly advised.

A meeting called by the Lord Mayor of York (Alderman R. H. Vernon Wragge) was held at the Mansion House, York, on Friday, the 9th February. At this meeting £2500 was asked for to meet the local expenses in connection with the forthcoming visit of the British Association to York on August 1st to 8th. It was announced that over £2000 had already been received. The Yorkshire Naturalists' Union was represented by its secretary, by invitation; and on the strong Local Reception Committee which was formed the following twelve officials of the Union were elected:—Messrs. W. Eagle Clarke, G. W. Lamplugh, J. H. Howarth, H. H. Corbett, R. Fortune, W. Robinson, J. J. Burton, J. W. Stather, P. F. Kendall, W. G. Smith, G. T. Porritt, and T. Sheppard. The forthcoming meeting of the British Association, which will be held on the seventy-fifth anniversary of the formation of the Association at York, promises to be an exceptionally successful gathering. [At a further meeting held on February 23rd, it was announced that over £2640 had been subscribed.]

THE NATURALIST.

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

EDITED BY

T. SHEPPARD, F.G.S.,

THE MUSEUM, 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.

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NOTES AND COMMENTS.

YORKSHIRE ROMAN REMAINS.

The first annual meeting of the Roman Antiquities Committee for Yorkshire was held in the Museum at York on Saturday, March 3rd, under the presidency of Dr. N. Bodington, of the Leeds University. A tour was made around the principal objects of interest in this city, under the guidance of Mr. F. Haverfield, F.S.A., of Oxford. Mr. Haverfield also delivered an address to about forty antiquaries from all parts of the county, in which he congratulated the new society upon the fact that in it the Yorkshire Universities and the local societies were working together—a rare occurrence in this country, curiously enough; and he also suggested lines upon which the society should carry out its work. Mr. Haverfield was rather severe with the nature of the work of the average amateur, and urged that research should be largely left to the specialists. To some extent, perhaps, he was right, but it must not be forgotten that, in Yorkshire particularly, most of our present knowledge of the relics of Roman occupation is the result of the efforts of the amateur. And so long as the amateur is content to carefully record facts, and place the results of his excavations, localised and described, in some permanent public institution, no one, not even Mr. Haverfield, would have anything to say against him. It is doubtless due to the fact that Mr. Haverfield has had occasion to examine 'tons' of local publications for papers, most of which were of a speculative or theoretical character, that caused him to speak so strongly. And we can sympathise with him.

WORK FOR 1906.

In the new society, however, with the experienced men on its list of officers, there is every hope that good will result from its work. During the coming year the researches named below will be carried on, under the supervision of the persons referred to: (1) Investigation of the Roman Road from Ilkley to Adel and Tadcaster, by Sir John Barran, Bart.; (2) Excavation of the Roman Villa at Harpham, by Mr. T. Sheppard; (3) Investigation of the Roman Road across East Yorkshire from Stamford Bridge, by Mr. W. Stevenson; (4) Excavation of Roman Foundations at Middleham, by Dr. Bodington; and (5) Roman Remains near Tanfield, by Mr. J. N. Dickons. It was also decided to form a Bibliography of Literature on York-

shire Roman Remains, and to prepare a map. An excursion will be arranged to Blackstone Edge during the summer. The Yorkshire Naturalists' Union, being affiliated with the new society, its members may join at the modest fee of half-a-crown per annum. Mr. S. D. Kitson, of Greek Street Chambers, Leeds, is the hon. secretary. The other officers elected for the coming year were as shewn on page 32 of our January issue.

THE YORK MUSEUM.

At the meeting referred to above, the members had the rare privilege of being conducted around the collection of Roman antiquities by Mr. Haverfield. York undoubtedly contains "the finest and most complete series of Roman remains in the provinces," notwithstanding the fact that scores of valuable specimens from this ancient city are to be found in other museums in the country. But on examining the collection it was deplorable to notice the limited space allotted to the specimens—probably no more than was available when the York Society first opened its Museum about a century ago. Objects which in other museums would have special cases set apart for their reception are literally piled one upon another, or are placed in rows on shelves not protected by glass at all. Is not this a crying disgrace to the wealthy citizens of York? Without exaggeration it can be safely said that a building quite three times the size of the present one is required for the proper display of the treasures it contains. Is it too much to hope that one result of the forthcoming meeting of the British Association at York will be that a keener interest is taken in York antiquities, and that better premises are provided for their reception? At a recent meeting held at the Guildhall, York, the Right Honourable the Lord Mayor of York stated that any surplus funds raised in connection with the British Association meeting would be devoted to some scientific purpose. What better purpose than an extension of the Museum? We can only hope that the surplus will be a large one, and that it will, at any rate, form a nucleus for a fund for the work suggested.

Dr. H. C. SORBY, F.R.S.

In the presence of a large number of specially-invited supporters of higher education, the Lady Mayoress of Sheffield recently unveiled at the Sheffield University a portrait of

Naturalist,



Trichoniscus pusillus. Brandt.
Length, four millimetres.

Charles Sillem, del. ad nat.

F. W. Reader, sculpt.

Dr. Henry Clifton Sorby, F.R.S. It had been subscribed for by friends in recognition of Dr. Sorby's long-life devotion to science and his services in the spread of it. Dr. Sorby is in his eightieth year, and owing to bad accidents it was not thought advisable that he should be present. The subjects that have chiefly absorbed Dr. Sorby's attention, and about which he has written more than one hundred memoirs, are the applications of the microscope to the study of the structure of rocks—a new optical method, by which a 'flood of light' has been thrown on the science of geology. Not less important was his application of the spectrum microscope to the examination of animal and vegetable colouring matter, and to the detection of blood stains found in criminal investigations, and the origination of the modern method to the study of the structure of iron and steel. His valuable geological, biological, and archæological researches are familiar to our readers. On several occasions Dr. Sorby has been engaged by the Metropolitan Board of Works to conduct scientific investigations in the Thames, which led to the study of marine plankton. There has been no more ardent and generous worker in securing the establishment of the Sheffield University, and it was thought fitting that his portrait should adorn its walls.

BRITISH WOODLICE.*

Messrs. W. Mark Webb and C. Sillem have for some time been publishing in the *Essex Naturalist* detailed accounts of various species of British Woodlice. These have now been reprinted in the form of a monograph, which is well produced, and illustrated by no fewer than twenty-five charming plates. Being printed on extra thick paper, the plates give the volume a much more substantial appearance than it would otherwise have. With their aid, however, it should be a very easy matter to identify any species. In looking through the various 'British localities' we are astonished to find an almost entire absence of any Yorkshire or Northern Country records! This should be remedied. The plate we are permitted to reproduce (No. IX.) represents a species which happens to be recorded for Northumberland and Durham. We trust our readers will be able to add to the meagre northern records in 'British Woodlice.'

* 'The British Woodlice.' Duckworth & Co. 1906. 54 pages and 25 plates. 6/- net.

EAST COAST EROSION.

The high tides of the 12th March and subsequent dates, have certainly done much to bring the question of the erosion of the Yorkshire coast prominently before the public. A recent visit to the principal places on the Holderness coast, showed to what a serious extent the sea had wrought havoc, not only on the coast, but inland. At Hornsea, a skeleton-like line of piles shows where the sea-wall was. At Withernsea also the cliffs are cut into considerably, and at Kilnsea the sea has overridden the embankments, cut across the cliffs, and has flooded several hundred acres of land. The aspect of south east Holderness a fortnight after the tide, was desolate in the extreme. Here and there remains of entire wooden buildings were scattered over the fields and roads.

GROYNES AND SEA DEFENCES.

Watching the waves at high-water time at Hornsea was most instructive. The groynes which had been thrown out, roughly at right angles to the cliff, were obviously not of the most suitable character. They were far too high above the beach, and simply guided the rush of waters to definite points on the cliffs. The fact that they were also at some little distance from the cliff foot, enabled the water to get behind the complementary line of piles, and in this way the material for protecting the cliffs was washed away.

WATER SUPPLIES OF YORKSHIRE.

The Geological Survey is about to issue a memoir which should be of very great service to all interested in the provision of water from underground sources. It will deal with all water supplies, public and private, in the county east of the Magnesian Limestone of which any information can be obtained. The task of preparing the memoir has been entrusted, as was inevitable, to the competent hands of Mr. C. Fox Strangways, and he has had the assistance of other geologists, official and unofficial, in the collection of his data. The memoir is one of a series, of which that of Lincolnshire has already appeared.

BIRDS AS HEAD-GEAR.

It is pleasing to find that in response to a memorial from the Society for the Protection of Birds, the Queen has caused the following letter to be forwarded to the president of the society, which was read at its annual meeting on the 20th March:— ‘The Queen desires me to say, in answer to your letter, that she gives you as president full permission to use her name in any way you think best to conduce to the protection of birds. You know well how kind and humane the Queen is to all living creatures, and I am desired to add that her Majesty never wears osprey feathers herself, and will certainly do all in her power to discourage the cruelty practiced on those beautiful birds.’ As the ‘fashionable’ people, likely to meet her Majesty, will probably now take care that they have no dead birds strung about their person, and as all ‘fashionable’ people are presumably likely to meet her Majesty at some time or other, it will probably now become fashionable *not* to wear such ornaments, and undoubtedly in this way more has just been done to protect the birds than is even at present dreamt of.



MAMMALS.

Pleistocene Mammalian Remains near Doncaster.—In excavating for a deep cutting on the Dearn Valley Railway near Conisboro’ some fragments of bone were thrown out by the steam navvy. These were taken to the office of the resident engineer, Mr. Gibbs, and were kindly given by him to me. They consisted of part of an antler, probably *Cervus elaphus*, and two bones of *Rhinoceros*.* These latter have been submitted for identification to Mr. T. Sheppard, and by him to the British Museum Authorities. Close to the place where the bones were found is a cave in the Magnesian Limestone, and it is hoped that when this is further opened up, more bones, &c. may be found. Mr. Gibbs has given orders that anything of interest discovered is to be handed over to me for our local museum.—H. H. CORBETT, M.R.C.S., Doncaster.

* These are the ulna and tibia, and one of them is distinctly gnawed, apparently by hyænas. It is to be hoped that further researches will result in as interesting a set of specimens being found as occurred in the Creswell Caves, which were also in the Magnesian Limestone.—T.S.

THE WEATHER AND THE MARCH HIGH TIDES.

W. H. WHEELER, C.E.,
Boston.

THE weather during March has been true to the old saying 'March many weathers.' There were in the early part of the month bright sunny days and mild temperature. These days of glorious spring weather made it appear as if 'a week of May had lost its way.' The bright sunshine had a magical effect upon the garden, and the beds began to look very gay with yellow, mauve, and white crocusses, all opening wide to the sun; the white snowdrops which had peeped out of the snow, were still lingering, and contrasted with the bright blue and red of the hepaticæ, and here and there, the bright blue scillas and the chinodoxias were peeping out of the earth, the first bunches of the megasea were very pronounced, although the great leaves from under which they had pushed their way, showed the effect of a recent frost by their brown colour and withered appearance. But as it has been said English weather 'is always normal when it is most abnormal,' and March, which had come in like a lamb, soon reverted to its old way of roaring like a lion. The thermometer fell seven degrees below freezing point, and made the premature flower buds look withered and scorched. The ground was white with snow, and a bitterly cold blizzard caused the fact to be realised that winter was not yet done with. On the 12th the wind was blowing a gale from the north-west, and in some parts of the coast almost with the force of a hurricane. This was due to a cyclonic disturbance which had its centre over the Baltic. The full moon being only two days old, and the tides near the time of the Equinox, were laid down as nearly a foot above ordinary spring tides, but due to the gale, and the direction of the wind, which was favourable to the making of high tide in the North Sea; all along the East Coast they were exceptionally high, the water on Monday rising nearly 3 ft. above an ordinary spring tide, and 2 ft. 4 in. above the predicted height. In the Thames the tide was 4 ft. 4 in. above Trinity high water mark, and rose nearly level with the Thames Embankment. A very large area of land along the river was inundated; the quays in many places were under water, and the warehouses and basements of houses flooded. At the mouth of the river the water was stated to be 7 ft. above its normal height in the Medway. The sea banks were broken through near Sheerness, Southend,

Herne bay, and Whitstable being flooded. At Harwich the tide was stated to be the highest known, overflowing the principal streets. Damaged foreshores and flooded houses were reported at Clacton, Walton-on-Naze, Kings Lynn and Lowestoft, where two more houses were washed down at Pakefield. At Boston the tide was 3 ft. above an ordinary spring tide, and in many places rose within a few inches of the top of the sea banks, and overflowed the main road.

On the Yorkshire coast, about 1000 acres of land near Kilnsea were overflowed, and considerable damage done all along the Holderness Cliffs; at Hornsea, damage estimated at £2000 was done to the promenade, and £500 at the Marine Hotel protection works.

Up the Humber, near Goole, the river overtopped the banks, and flooded several hundred of acres. A breach in the banks occurred near Rawcliffe Bridge, flooding the main road to Thorne, and several farmsteads.

The following are the heights of the tide above ordnance datum:—

	Feet.
Hull	15.42
Grimsby	14.75
Ferriby Sluice	17.00
London	16.83
Boston	16.12

◆◆◆

Alien Flora of Great Britain. By **S. T. Dunn, B.A., F.L.S.**
West Newman & Co. 1905.

This little volume will be welcomed by many students of our flora as a useful summary of the many facts concerning the origin and distribution of alien plants. It is well printed, very light, full of interesting details on the species concerned, and forms a useful addition to our floras. The author's appointment to a post in Hong Kong caused a hasty production of the work, and it is admitted to lack the finishing touches and wide outlook of the subject which it would otherwise have received. A German friend turning over its pages remarked, "Are these all the 'Aliens' you have in Britain? I thought you were overrun with them!" Certainly one would have expected a longer list, and we notice a number of omissions of North of England records. The author has acted wisely in including as aliens many of those species (of Labiateæ, &c.) which are too commonly classed as 'natives,' and it is well attention should be directed to a consideration of their true place in our flora. He dismisses in a few words attempts to classify these plants in this respect, but serious students require that this should be done, and it is hoped that in a future edition special attention will be paid to it. As we show on another page, something has been done in this way, and we believe one of the most interesting chapters in botany awaits the hand of one who will piece together the threads of the story of the origin and dispersion of aliens, for their study not only reveals to us some of the early stages of agriculture and civilisation, but furnishes interesting evidence of the very complex inter-relations of modern commerce.

MARINE BEDS IN THE COAL-MEASURES OF YORKSHIRE.

PRELIMINARY NOTICE.

WALCOT GIBSON, B.Sc., F.G.S.

RENEWED attention has been of late paid to the occurrence of a marine fauna at several horizons in the Middle or Productive Coal-measures of North Staffordshire. Until 1900, references to the existence of marine beds in the Derbyshire, Nottinghamshire, and Yorkshire Coal-measures, excepting the bed immediately above the Gannister Coal, were restricted to Green's note on the presence of *Aviculopecten* (*Pterinopecten*), and *Goniatites* below the Ackworth rock. During the re-survey of the Derbyshire and Nottinghamshire coalfields, Mr Wedd and myself have been enabled to detect at least three marine beds occurring at widely separated horizons in the Productive Coal-measures; and as regards Derbyshire, Nottinghamshire, and southern Yorkshire these are found to contain a constant fauna, and to occupy well defined positions in the Coal-measure sequence.

The lowest horizon occurs above the Alton Coal of Derbyshire (Gannister Coal of Yorkshire), and contains a rich *Goniatite* fauna. The next horizon is met with about 300 feet above the Deep Hard Coal (Park Gate, Old Hards, Two Yards, Brown Metal, and Firthfields coals of Yorkshire). The fauna consists of *Goniatites*, *Pterinopecten*, *Myalina*, *Lingula*, and *Productus*; the strata, consisting of black shales, layers of nodules of ironstones, and pale blue shales. A third horizon, of exceptional interest, has been traced from Gedling, near Nottingham, to Mansfield, and as far north as Doncaster, at a vertical distance, varying from 524 feet to 600 feet above the Top Hard Coal of Nottinghamshire (Barnsley Coal of Yorkshire), or 250 feet above the High Hazles Coal (Kents Thick Coal and Mapperwell Coal), or 200 feet above the Clowne Coal (? Wathwood Coal of Yorkshire). The fossils are found in pale blue shales; with a blue argillaceous limestone, weathering brown, near the base.

This horizon contains a unique Gasteropod and Fish fauna, and is also rich in marine Lamellibranchiata.

Apart from their scientific interest, considerable economic importance attaches itself to these marine horizons. Mining

engineers are universally agreed that the Productive Coal-measures contain few or no distinctive lithological characters by means of which the position reached in a boring or experimental shaft-sinking may be recognised. These marine bands appear to afford such a clue. To make this certain, it is necessary that the persistence of the bands should be definitely proved. This can only be done with the help of local geologists who will take the trouble to carefully examine all railway sections likely to intersect these horizons, and who will visit new sinkings, and examine at frequent intervals the material brought to the surface. In thus appealing to Yorkshire geologists, I do so with the perfect confidence that this appeal will not be in vain. Yorkshire geologists have examined the Chalk Formation for themselves: they will not hesitate to zone, even in a more systematic manner, their county's magnificent development of Coal-measures. In so doing, the debt owing by geologists to mining enterprise may be in part repaid; while the unique Fish fauna of the marine beds of the Coal-measures holds out hopes that he who cares to seek may add a link more to the well-forged chain of palæontological evolution.

**LIMNÆA PEREGRA MONST.
SINISTRORSUM, IN DURHAM.**

C. T. TRECHMANN, B.Sc.

HAVING read of the occurrence of this interesting monstrosity in North Leeds ('Naturalist,' July 1901), I should like to record the finding of this mollusc near Hesleden, Co. Durham.

The locality is a small pond, quite near the vicarage, where they were first noticed more than thirty years ago, as my grandfather informs me, by the late Canon Tristram, then rector of Castle Eden. Since then they were unnoticed till about 1895 when I obtained a few specimens while dredging for newts. I have repeatedly searched the pond since 1899 and have seen it practically trampled dry by cattle in the summer time, but it was not till July 1903 that I found them again; minute specimens crawling up the grass stalks in one end of the pond. Further searching resulted in the acquisition of quite a number, all about the size of a pin's head. They were put in an aquarium where they grew rapidly and spawned profusely during the spring and summer of 1904 and 1905.

Although none but the sinistral varieties were in the aquarium, nearly equal numbers of sinistral and dextral were produced, the sinistral slightly preponderating. They all grew to the usual size of the species and having come to the fullness of maturity, died.

The water in the pond is quite as pure as in similar ponds and the shells are not malformed. A pond about 12 feet away and separated only by a hedge contains none of them.

The other molluscan inhabitants of the pond are quite normal, including fine specimens of the type species: *Pisidium fontinale* in the mud, and the very small *Planorbis nautilus* living on the undersides of the duckweeds (*Lemna minor*).

The shell has not occurred in any of the other ponds in the neighbourhood, and the above facts I think are of interest in showing the persistence of the monstrosity.

NOTES ON SINISTRAL SHELLS OF *LIMNÆA PEREGRÆ.*

J. W. TAYLOR.
Leeds.

The persistent occurrence of this phenomenon, for so long a time within such a very limited area, strongly corroborates the belief that local environment is one of the contributory causes inducing this condition of shell and animal.

All embryonic gastropods are at first, what is termed Exogastric, that is, they have the spiral enrolled to the front and the excretory and other orifices behind, and whether the animal becomes sinistral or dextral depends on whether the twisting, which the body subsequently undergoes, takes place to the right or to the left, this movement transferring the anal and other orifices from the hinder part of the body to the front.

The cause of this reversal of the normal coiling is not understood, Bourguignat suggested that it might be caused by electrical conditions, while Prof. Carus believes that the direction of the coiling may be determined by the direction of the embryonal rotation.

The results of the breeding of sinistral specimens of *Limnæa peregra* by Mr. Trechmann establishes the inheritable nature of the variation and the relative number or proportion of sinistral

specimens produced may be said to conform with the theories of Mendel, who teaches that the characters of the germ-cells do not fuse with others but merely mingle, and that the pairing of two similar aberrant specimens of this character would result in the production not of a brood precisely similar to their parents, but of one, in which only half the offspring would resemble their immediate progenitors, and of these individuals thus externally resembling their parents, only a moiety (or 25 per cent. of the total number of young) are really purely sinistral, capable of breeding true; the remainder inheriting and transmitting a latent tendency to dextrorsity.

Similarly, of the dextral progeny of the sinistral parents, half will be purely dextral forms with power to produce only dextral offspring, whereas the other moiety, though also dextrally coiled, possesses a latent sinistral tendency, and their descendants would be composed of sinistral and dextral individuals in the same ratios of 25 per cent purely dextral specimens, 25 per cent purely sinistral, and 50 per cent of individuals combining the tendency to dextral and sinistral modes of convolution, the underlying principle being that although a particular individual may not display the special character in question, yet the peculiarity may still be possessed by its germ-cells, and will be transmitted to, and re-appear in the progeny.

It is to be hoped that further precise observations may be made on these most interesting points.



Last Words on Evolution: A Popular Retrospect and Summary. By **Ernst Haeckel**. Translated by **J. McCabe**. A. Owen & Co. 1906. 127 pages, 6/-.

In this volume Mr. McCabe has earned the gratitude of English naturalists not familiar with the German language, by enabling them to read for themselves Haeckel's matured views on the evolution problem, as put forward in his now famous Berlin lectures of 1905. It will be remembered that recently it was announced that Professor Haeckel had abandoned Darwinism and given public support to the teaching of a Jesuit writer. This was subsequently contradicted, but the result was a desire on the part of the educated English public to know more of Haeckel's precise attitude in this matter. The present volume contains the 'three famous lectures delivered at Berlin,' which 'are the last public deliverance the aged professor will ever make.' The chapters are (1) 'The Controversy about Creation, Evolution and Dogma,' (2) 'The Struggle over our Genealogical Tree, our Ape relatives and the Vertebrate Stem,' (3) 'The Controversy over the Soul, the Ideas of Immortality and God.' As an appendix there are some useful 'Evolutionary Tables.' Amongst the plates is an excellent portrait of Haeckel. The book is well produced.

THE FOSSIL PLANTS OF THE YORKSHIRE COAL MEASURES.

Part I.—What and How to Observe, Collect, and Record.

W. CASH, F.G.S.,
Halifax.

READERS of 'The Naturalist' are doubtless aware that there is in connection with the Yorkshire Naturalists' Union a 'Fossil Flora Committee,' which has already done good work under the guidance of its president, the well known Palæobotanist, Robert Kidston, Esq., F.R.S., of Stirling, N.B. The object of this committee is to investigate the Fossil Plants of the Yorkshire Coal Measures, and especially in three directions:—

1. As to distribution of fossil coal plants vertically (in time), and horizontally (in space), and particularly of *the common species*.

2. As to the discovery of species and genera new to the county or to science.

3. As to the correlation of the separate fragments of plants, so as to show new, or at present, unexpected relations between what are to-day regarded as distinct forms.

There is no doubt that many readers of 'The Naturalist' are qualified to help in this investigation, and some occupy positions particularly favourable to the production of most satisfactory results; to such persons, and to those to whom the subject may be at present somewhat unfamiliar, it is proposed in the following pages to strongly appeal.

Most excellent results in this department of scientific research were obtained by two men, the late James Binns and the late James Spencer. These men, under most unfavourable conditions and with the slenderest advantages, learned to Observe, Collect, and Record many new species of fossil plants, and even genera new to the county and to science; the result of their strenuous efforts and self-denying labours contributed greatly to the value of the fine monographs which the late Professor Williamson, F.R.S., of the Manchester University, published in the Royal Society's Transactions; nor were their names and work unknown to the leaders of fossil botany on the Continent, as may be seen by consulting the papers of such distinguished savants as Professor Renault and Dr. Hovelacque of Paris, Count von Solms Laubach of Berlin, and many others.

Binns and Spencer were not content to be mere collectors, they proceeded to sectionise their specimens, and to prepare them for microscopic study ; and the material from the Halifax Hard Bed enabled them to most successfully assist in the interpretation of the relationships of fossil plants to their modern descendants. Of the men of whom we now write it may be said, in the words of the late Professor Craik, 'Want of leisure, want of instructors, want of books, poverty, uncongenial and distracting occupations, the force of opposing example, the discouragement of friends, all separately or in various combinations, exerted their influence either to check their pursuit of knowledge, or to prevent the very desire of it from springing up. But they opposed the force of their strong natural passion and upward tending determination in vain.'

We doubt not there are similar men yet among us who will take up and continue the good work so faithfully initiated, whilst others more fortunately situated, and with greater advantages of culture, and with wider opportunities, may well also contribute their quota to the further extension of our knowledge in this fascinating department of natural science.

It is now recognised amongst scientific botanists that the value of a fossil plant is enormously enhanced by exact and accurate information as to the actual bed from which it was taken, and the name of the pit and of the locality where it was found ; it is only by the accumulation of a large amount of information of this character that important generalisations as to the distribution of fossils can be arrived at.

It is our intention in these pages to suggest in plain and simple language the best methods of collecting fossil plants, of recognising and naming the species and genera, of accurately recording the results of work done, and of indicating how and where assistance and guidance may be found for beginners and students.

The Collection and Preservation of Specimens.—Fossils may be said to occur :—

1. As Incrustations.
2. As Petrifications.

Under the head of *Incrustations* come the common and generally known forms, such as impressions on shales and sand stones, or in nodules of clay ironstone, and casts, where as in a mould a model of the once living plant has been left (though the organism itself perished long ago), and is now represented by a mass of sand or of some mineral substance. *Petrifications* are

much rarer, and in the area under our consideration are almost exclusively restricted to specimens found in the coal nodules of the Halifax Hard Bed. In these petrifications the conditions of fossilisation have permitted the smallest cells of the plant tissue to be filled with transparent carbonate of lime, and the cell walls have been mineralised in such a way that on making thin slices of the fossil and mounting them as microscopic objects, the minutest details are shown, and that as clearly as in sections from recent plants; spores, stomata, cell structure, wood, bast, leaf tissue being all preserved. On sending some such preparations to the late Charles Darwin, no wonder that he wrote:— ‘It is marvellous to see structure so admirably preserved for so many ages.’

Let those who may think they have not the skill to prepare microscopic slides of these wonderful fossil plants, be not discouraged on that account, for there is an easier way of showing up their minute structure, as follows:—having broken a coal nodule containing plant remains, rub the flat face of the specimen on a slab of stone until a smooth surface is produced, then dip the specimen for a short time in a dilute solution of hydrochloric acid, wash well in clean water, and wipe dry, when shortly the structure of the plant will show itself as a whitish pattern on a dark ground. I well remember how my old friend James Binns (whilst working as a quarryman, and at that time quite unable to purchase so costly a machine as a lapidary’s wheel) told me that he had rubbed holes in two sink stones in his kitchen, preparing sections of coal plants in the manner above described.*

The Naming of Specimens may be done in several ways:—

1. Robert Kidston, Esq., F.R.S., F.G.S., 12 Clarendon Place, Stirling, N.B., has kindly permitted us to say that he will name and return any specimens of Fossil Coal Plants sent to him for identification. As he is a recognised authority on the subject, he offers a fine opportunity to any student taking up the subject of Fossil Botany.
2. For our own part, we shall be pleased to advise anyone

* To those who, whilst willing to collect specimens, yet fight shy of preparing micro slides, we can confidently recommend the availing themselves of assistance from the well-known expert, Mr. James Lomax, of 65, Starcliffe Street, Great Lever, Bolton. He, for a small sum (from 6d. or 1s. per slide and upwards, according to size), will cut desired sections from material sent him for that purpose. He also sends out excellent elementary collections of typical coal plant micro slides, accurately named and localised, at a moderate cost.

sending nodules containing plant structure to 35 Commercial Street, Halifax (of course, in all cases the sender should pay the cost of carriage of the specimens).

3. At the University of Manchester Museum there are extensive collections to which the students may refer, and we doubt not that the courteous Curator will give every facility for study to any serious worker in fossil botany.

4. In these pages it is hoped descriptions sufficiently clear will be given to enable anyone to name at least most of the genera and the commoner species he may come across.

5. Collectors of fossil plants with structure will find the specimens offered by Mr. Lomax invaluable.

Unsolved Problems.—Let none imagine that the field of research is exhausted; on the contrary, there are a hundred questions yet unanswered.

(a) Do nodules containing plants with microstructure occur in any bed besides the Hard Bed?

(b) What fossils are restricted to particular beds or zones?

(c) To what plants do the many as yet uncorrelated and separate fragments and organs found in the coal measure belong?

(d) What new species and genera are yet undescribed?

(e) What new points in structure and affinity can yet be cleared up?

Notes for Guidance in working out the Vertical and Horizontal distribution of the British Carboniferous Flora.

1. As soon after collection as possible, label all specimens, stating—

(a) Full locality, giving name of pit, if collected at a colliery.

(b) Giving horizon,* where ascertainable.

(c) Name of collector.

2.—Collect all specimens, however small or uninteresting they may appear, and give great care to the collection of all fructifications—even when fragmentary—whether cones or fruit of ferns.

3.—On no account *varnish* the specimens, and if absolutely necessary to apply some preservative medium, use very weak,

* 'Horizon,' *i.e.*, the name of the coal seam with which the shale was associated that contained the fossil, or any other particulars that will enable the exact *position* of the rock to be determined from which the fossil has been derived.

watery glue, and apply it by "dabbing" gently with a soft sponge. It need hardly be added that all fingering of the surface of the specimen, or rubbing of any kind, ought to be avoided.

On collecting, wrap the fossils up singly in paper at once to prevent their being scratched or the carbon displaced while carrying them home. In mending broken specimens, gently heat each part before applying the glue.

4.—In packing fossils for transit, wrap each separately in paper and pack with additional paper, straw, hay, or shavings, in a strong box. *Never* use sawdust, husks, or any similar substance for packing.

5.—All specimens sent for examination to be numbered and accompanied with a list containing the numbers, localities, and any other additional particulars that may be thought necessary. Attention to this saves time and trouble to all parties.

Literature.—The first important book to study is always 'The Book of Nature.' Still, though no real knowledge can be got without actual personal contact with and study of the specimens themselves, both in the museum and the field, it yet remains true that good books are a great help.

From personal use we strongly recommend the following:—'Structural Botany (Flowering Plants)' and 'Structural Botany (Flowerless Plants)', by Dr. D. H. Scott. (A. & C. Black, London). These furnish a necessary preparation for the understanding of the structure of fossil tissues; 'Fossil Botany,' by Dr. D. H. Scott (Macmillan), an indispensable book, and 'Fossil Plants,' by A. C. Seward, 2 vols. (Cambridge University Press).

In conclusion, let Yorkshire colliery proprietors, mining engineers, and working miners, who have unexampled opportunities for doing so, help to elucidate the many problems which are so bound up with their self-interests, profession, and daily work, and so hasten the time when the far-reaching and wide generalisations may be reached that shall prove of the greatest benefit to mankind.

Twenty-ninth Annual Report and Proceedings of the Lancashire and Cheshire Entomological Society. Session 1905. 57 pp. 2/-.

In addition to detailed reports of the meetings and excursions held during 1905, this report contains an address by H. St. J. K. Donisthorpe on 'The Myrmecophilous Coleoptera of Great Britain;' 'Some Notes on Manx Coleoptera,' by J. R. le B. Tomlin; and 'Note on Birth and Infancy of *Dytiscus punctulatus*' by E. J. B. Sopp. A portrait of a vice-president of the Society, Mr. Richard Wilding, forms the frontispiece.

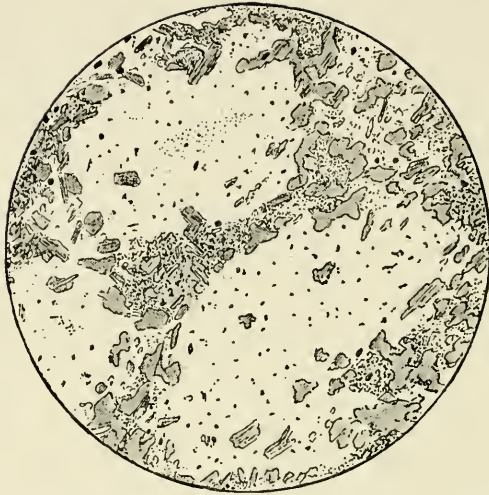


Fig 1. Cordierite-Mica-schist, Sinen Gill; x 25, natural light.
The clear spaces represent irregular crystal-grains of cordierite. The other constituents are biotite, muscovite, quartz, andalusite, and graphite.

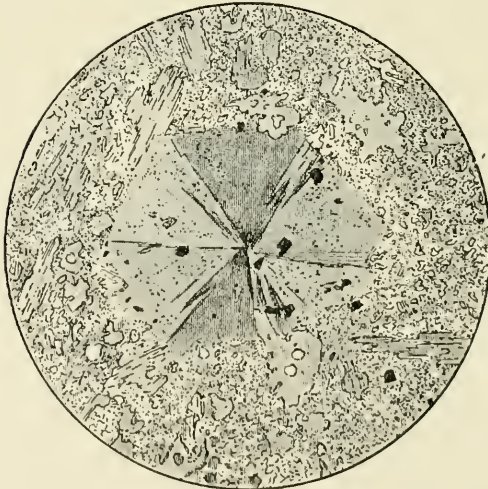
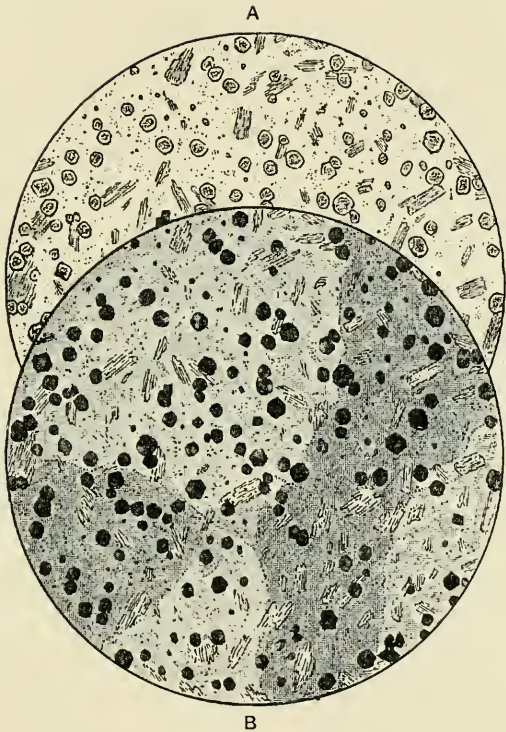


Fig. 2. Cordierite-Mica-schist, Burdell Gill, Caldew Valley; x 25, crossed nicols.
Showing a cross-section of a complex twin of cordierite.



Cordierite-Garnet-Mica-schist, Swineside, Caldew Valley; x 25;
A, natural light; B, crossed nicols.
This rock is made up of interlocking crystal-grains of cordierite, enclosing small garnets and flakes of biotite.

CORDIERITE IN THE METAMORPHOSED SKIDDAW SLATES.

ALFRED HARKER, F.R.S.

It is a reproach to English petrologists that no systematic study has yet been made of the metamorphosed Skiddaw Slates of Cumberland. Owing to the underlying situation of the Skiddaw granite,* the aureole of metamorphism occupies a considerable area, and different members of the Skiddaw Slate series are involved in it. The different types of argillaceous and gritty sediments, subjected to metamorphism in varying degree, have given rise to an interesting variety of secondary minerals, which have hitherto received but little notice. Clifton Ward† recognised three chief types among the metamorphosed slates, representing three successive stages of alteration: (1) Chiastolite-slate, (2) Spotted- (or Andalusite-) schist, (3) Mica-schist. Ward's work was done at a time when microscopical methods in petrology were still something of a novelty, and his account is not only very brief and partial, but is in some respects incorrect. Certain errors were pointed out by Rosenbusch, ‡ who, however, knew the rocks only from a few specimens. Since that time practically no further information has been published, except that in 1894, the present writer § noted the occurrence of cordierite in some of the metamorphosed slates.

The object of the present note is to draw the attention of north-country petrologists to a neglected field. The only new fact to be recorded is that cordierite, formerly described from a single locality, has a very wide distribution in the district, and indeed is probably more abundant than andalusite. The two minerals (including chiastolite as a variety of andalusite) are often found together; and in general one or other of them predominates, or occurs exclusively, according to the com-

* The several outcrops, in Sinen Gill, the Caldew Valley, and Grainsgill, are probably parts of one extensive mass, which is mostly concealed. See *Quart. Journ. Geol. Soc.*, vol. li. (1895) p. 140.

† *Quart. Journ. Geol. Soc.*, vol. xxxi. (1875), pp. 568-602; vol. xxxii (1876), pp. 1-34. *The Geology of the Northern Part of English Lake District*, *Mem. Geol. Sur.* (1876), pp. 9-12.

‡ *Die Steiger Schiefer*, *Geol. Sur. Alsace-Lorraine* (1877), pp. 211-213. A translation is given in *Naturalist*, 1892, pp. 119, 120.

§ *Geol. Mag.* 1894, pp. 169, 170.

position of the rock in each bed. There is no difficulty in distinguishing the two in thin slices. Cordierite is inferior to quartz in mean refractive index and in birefringence, while andalusite stands well above quartz in both characters. Further, the good prismatic cleavage, which is usually well seen in andalusite, is wanting in cordierite. The other common minerals in these metamorphosed slates are: biotite, constantly abundant in ragged flakes; muscovite, less plentiful and in smaller scales; chlorite, and sometimes ilmenite, with the same habit; quartz, in the more siliceous slates only; graphite or opaque carbonaceous matter, almost always present; minute crystals of magnetite; and sometimes garnets of microscopic size. In particular beds a certain mineral, such as quartz or white mica, may be specially abundant, as determined by the composition of the material metamorphosed.

The crystals of cordierite are rarely more than one-eighth inch in diameter, and often less than half that size. They elude observation, however, less by their size than by their capacity for enclosing other constituents of the rock. In thin slices, seen with natural light, the outlines are, as a rule, almost invisible; and the crystals may appear merely as relatively clear spaces, containing less brown mica than the rest of the rock (Plate X., fig. 1). With crossed nicols it is seen that the cordierite crystals are usually very imperfectly bounded. It is also seen that they are often not simple crystals, but complex twins. A cross-section then shows a division into six parts, representing repeated twinning on the prism-plane (Plate X., fig. 2). This is well known in cordierite, but it seems to be unusually prevalent in these rocks. The dividing lines are not very regular, and there are often narrow lamellæ or wedges included in one individual of the twin, which behave optically with the adjoining individual. A longitudinal section of such a twinned crystal shows rather irregular parallel or sub-parallel lamellæ in the direction of the long axis.

Like other aluminous silicates in metamorphosed rocks (andalusite, staurolite, &c.), cordierite has the property of enclosing a large amount of foreign material. When it occurs in isolated crystal-grains, it may include only small granules and flakes of the other minerals, the bulk of these being expelled beyond the border (Plate X., figs. 1 and 2). But in many of these metamorphosed Skiddaw slates, cordierite, making up the greater part of the rock, constitutes a kind of ground mass of irregular grains, fitting together without interspaces. The

other minerals are in this case scattered more or less uniformly through the mass (Plate XI.,). The boundaries of the cordierite grains are invisible in natural light, but become very evident with crossed nicols.

When large crystals of aluminous silicates are formed in slates which contain carbonaceous matter, the finely divided opaque inclusions often tend to arrange themselves in a definite manner. The most familiar example of this is the chialstolite variety of andalusite, which is well shown in many of the Skiddaw rocks. An analogous micro-structure is sometimes met with in staurolite. In cordierite any special arrangement of the carbonaceous inclusions seems to be rare, and I have seen it only in one locality, near the farm of Swineside in the lower part of the Caldew valley.* The cordierite in all these rocks is usually fresh, but in some cases the marginal part of a crystal is altered into an aggregate of minute flakes of a colourless micaceous mineral.

Summarily, cordierite is of very widespread occurrence in the metamorphosed slates surrounding the Skiddaw granite. So far as my examination goes, it is rarely absent, except in some of the more gritty beds, and it is often the principal constituent of the completely metamorphosed rocks. If Ward saw it, he perhaps mistook it for andalusite; but cordierite was probably absent from the examples which he studied more particularly, for, according to the chemical analyses, these contained only about two per cent. of magnesia. The specimens which I have examined came from the Caldew Valley and its neighbourhood, including Poddy Gill, Grains Gill, Burdell Gill, &c.; also from Lonscale Fell, Dash, and Sinen Gill.



Six Leçons de Préhistoire. Par **Georges Engerrand.** Bruxelles Imp. Veuve Ferd. Larcier. 263 pages, and 124 figures in the text.

In this little volume the author gives a useful summary of our knowledge of prehistoric man on the continent, under the heads of 'General Considerations,' 'Tertiary Man,' 'The Eoliths,' 'The Lower Palæolithic Age,' 'The Upper Palæolithic Age,' and 'The Neolithic Period.' Throughout, the work is profusely illustrated, almost every possible point being explained by a sketch or diagram. Some of these however are rather crude. There is a very good index. We should have preferred a much more substantial cover to the book—a paper covered book rarely reaches this country intact.

* See fig., *Geol. Mag.*, 1894, p. 169.

CLASSIFICATION OF ALIEN PLANTS ACCORDING TO ORIGIN.

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

THE publication of Dunn's 'Alien Flora of Britain' has revived an interest in these plants. Now that so large a number have been brought together, along with many details as to their origin and habitats, it may be worth while to notice what is being done on the Continent in classifying the heterogeneous mass of facts which have for many years been accumulating, in order to bring into prominence the chief points of interest concerning their origin and distribution. Dr. M. Rikli of the Polytechnicum, Zürich, has attempted to do this,* and his scheme of classification has been fairly generally recognised. It is adopted, with slight additions, by Naegeli and Thellung in their 'Flora of the Canton of Zurich,'† now in course of publication, and below I give a translation, with slight modifications,‡ of the more important features taken from Part I. of the latter work (Rudeval-und Adventivflora in genetische Gruppen). The names given to the different groups are not very inviting, and some are almost unpronounceable, but the method of grouping is very suggestive, and may be followed with profit in this country, where little advance has been made since Watson's time in this direction.

The plants here considered belong entirely to the youngest element in our flora, and its existence is bound up with the activity of man. We may therefore call it the 'Anthropophile' element, and the species belonging to it as 'Anthropophytes.'

We divide this Anthropophile element into two parts:—

A. Anthropochores (Rikli), those plants which were not originally wild in the country under consideration, but which, by man's activity, were either purposely or unconsciously introduced, *e.g.*, cultivated plants and herbs. To these may be added in consequence of their occurrence in artificial habitats—

B. Apophytes (Rikli) species, which were originally native

* 'Die Anthropochoren und der Formenkreis des Nasturtium palustre (Leyss) D.C.' Ber. d. Zürich botan. Gessell. 1901-3, p. 71-82; Bot. Centrabl. xcv. Nr. 1. 1904, p. 12.

† 'Die Flora des Kantons Zürich. 1 Teil: Die Ruderal-und Adventivflora, von O. Naegeli und A. Thellung. Zürich, 1905.

‡ These relate principally to groups 6 and 7, where I have ventured to make a sharper distinction between them than in the original.

in the country, but to some extent have now abandoned their natural habitats and gone over to the cultivated areas, and there more or less adapted themselves, e.g., *Nasturtium palustre*, native in wet places, goes over to the rubbish heap, and there takes on a changed growth, (f. *erectum*).

We can therefore define the Anthropophytes as follows :—

The Anthropophile element of a floral district includes all the plants of the artificial areas, and those not originally wild in the natural habitats; their representatives thus owe their importation, or at least their habitat, to the activity of man.

Each of the two divisions characterised above may be divided into nine categories :—

A. Anthropochores, brought into the country by man.

I. Intentionally introduced by man, e.g., foreign cultivated plants and their derivatives.

(1) *Ergasiophytes* (nob.), exotic cultivated plants including medicinal and ornamental plants which have reached their habitat (field, garden, &c.) by the conscious activity of man, and have been cultivated by him, e.g., *Secale cereale* (cultivated cereal), *Pelargonium zonale* (ornamental plant), *Althæa officinalis* (medicinal plant).

(2) *Ergasiolipophytes* (Naegeli and Thellung), relics of cultivation, were originally planted in natural habitats, and have maintained themselves without the intentional cultivation of man, e.g., *Acorus calamus*, *Fraxinus ornus*.

(3) *Ergasiophytophytes* (Rikli), fugitives from cultivation, which have reached other habitats without the assistance of man, i.e., grow 'wild' in :—

(a) *Artificial areas* (fields, ruderal habitats), e.g., *Lobelia erinus* (ornamental plant, 'wild' on rubbish heap). *Silene armeria* (ornamental plant, in grain). *Petroselinum sativum* (economic plant, in ruderal habitats), &c. The duration of these is for the most part temporary.

(b) *In natural habitats* (meadows, woods, &c.), e.g., *Robinia pseudacacia* (ornamental plant, 'wild' in woods). *Scorzonera hispanica* (economic plant, in meadows). From the duration and constancy of their occurrence, they are partly casuals (compare 7, e.g., *Gladiolus communis*), partly denizens (compare 5, e.g., *Robinia*).

11. Brought into the country by the unconscious intervention of man, *e.g.*, foreign weeds.

(4) *Archæophytes* (Rikli), plants which have occurred constantly with us since pre-historic times, originally, however, growing wild nowhere in the country, field and garden weeds, *e.g.*, *Centaurea cyanus*, *Agrostemma*, *Lolium temulentum*, as proved by Oswald Heer in the Lake Dwellings (compare *ga*, on native species which go over to cultivated land).

(a) From cultivated land (true Archæophytes).

(b) Apophytic, gone over to ruderal habitats (*Papaver* sp. *Centaurea cyanus*, &c.)

(5) *Neophytes* (Rikli), denizens, relatively frequent and constant in natural habitats, often associated with the native vegetation (*e.g.*, *Erigeron annuus*, *Solidago serotina*), and are thus not dependent on the continued activity of man for their persistence.

(6) *Epökophytes* (Rikli). Colonists. Of recent appearance, more or less numerous and constant in the country, but confined to artificial habitats (*e.g.*, *Lepidium ruderales* on waste heaps). They are so far dependent on man for their existence that their habitats require constant renewal. Ripe seeds are produced, but unless the ground is prepared for them they die out, being unable to withstand the competition of hardier native species.

(7) *Ephemerophytes* (Naegeli and Thellung), casuals, §aliens. Only a few and of casual occurrence, almost exclusively in artificial habitats. Owing to climatic conditions the seeds do not ripen, and the species disappear unless seeds are reintroduced.

(a) In cultivated land. Strangers, newly appearing in cultivated fields (*Centaurea solstitialis*), clover and lucerne fields (*Annu majus*), cornfields (*Vicia pannonica*, &c.), these after a short time again disappear.

(b) In ruderal habitats. Here belong, *e.g.*, a great part of the Railway flora (*Lepidium perfoliatum*, *Trifolium lappaceum*).

B. Apophytes. Originally wild in the country in natural habitats, but later have gone over to the cultivated areas.

I. Through the conscious activity of man.

(8) *Oekiophytes* (Naegeli and Thellung). Native cultivated plants, raised as ornamental or economic plants, *e.g.*, *Scilla bifolia*, *Convolvularia majalis* (ornamental plants), *Rubus idaeus*, *Fragaria vesca* (economic plants).

II. Spontaneously gone over from artificial habitats.

(9) Spontaneous apophytes (nob.). Deserters, emigrants.

(a) Apophytes of cultivated land, e.g., *Saxifraga tridactylites*. *Tonica prolifera*, *Cerestium* sp. (gone over from the dry sunny slopes in the fields.)(b) Ruderal apophytes, e.g., *Nasturtium palustre*, f. *erectum* Brügg., *Lamium* sp.

Naturally one and the same species may, even in different parts of our small country, belong to different categories. Further, the flora of the cultivated areas consists of a very heterogeneous element, e.g., the field weed flora is composed of at least two groups, the true Archæophytes (4a) and the spontaneous Apophytes (9a); but this not unimportant part of the field flora has till now been too little observed, and to these may also be added the garden fugitives, occasionals, &c. In the same way the ruderal flora consists of different elements, e.g., 3a, 4b, 6, 7b, and 9b In the list of Naegeli and Thellung special attention is paid to the Apophytes, which group is often very much neglected, as it offers but little interest in a floristic way, but certainly from the point of view of ecological plant geography it is not uninteresting to examine which of our native species are capable of going over and maintaining themselves in artificial areas.

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The Founders of Geology. By Sir Archibald Geikie. Second Edition. Macmillan & Co. 486 pages, 10/- net.

This volume is probably so well known to our geological readers that it is hardly necessary to point out the nature of its contents. We refer to the second edition, which has recently been issued at a cheaper rate, however, in order that any who have not already obtained the book, may do so. With the name of Sir Archibald Geikie on the title page, the 'readableness' of the contents of the volume is assured. 'The Founders of Geology' originated in a series of lectures delivered in America in 1896, in which he selected for full consideration 'the lives and work of some of the masters to whom we mainly owe the foundation and development of geological science.'

Creatures of the Night: A Book of Wild Life in Western Britain. By A. W. Rees. John Murray. 448 pages, 6/- net.

In this work Mr. Rees reprints a series of entertaining articles, which originally appeared in *The Standard*. The animals described are the otter, water-vole, fox, brown hare, badger, and hedgehog. The hare is included as 'in unfrequented districts where beasts and birds of prey are not destroyed by gamekeepers, the hare is as much a creature of the night as is the badger or fox.' The author is obviously well familiar with the subjects upon which he writes. The volume has eight full-page illustrations from drawings by Miss. F. H. Laverock. There is an index.

YORKSHIRE DIATOMS IN 1905.

M. H. STILES, F.R.M.S.,
Doncaster.

As a supplement to Mr. R. H. Philip's interesting report on Diatomacean gatherings made at two of the Y.N.U. Excursions in 1905, I send the following lists. They are the results obtained from gatherings collected at Askern (the Bog Pond), in March, and at Ilkley (a tiny streamlet running down the side of the hill, near the Tarn and towards the town), in September 1905.

The whole of the Ilkley list is given, but the Askern list is merely supplementary to that published in the 'Naturalist' for November 1900.

In going over my record of the Askern gathering, I found a note, made at the time of my examination, of the presence of a *Fragilaria* slightly inflated at the median portion of the



Fragilaria capucina var. *inflata*.

valve. After reading Mr. Philip's remarks on the occurrence of a new (?) variety of *F. capucina* in the Roche Abbey Lake, I again turned up the Askern slide, and now furnish a sketch of the Diatom in question.

The Ilkley gathering is remarkable for the great variety of forms present.

The Askern Diatoms have not been previously recorded. Those marked thus * are also new to the Doncaster list of November 1900.

- | | |
|---|---|
| <i>Amphora ovalis</i> Kutz., var. <i>affinis</i> . | * <i>Navicula Brebissonii</i> Kutz. |
| <i>Cymbella cuspidata</i> Kutz., var. <i>naviculiformis</i> . | * " <i>cincta</i> Kutz. |
| <i>Cymbella subaequalis</i> Grun. | " <i>Anglica</i> Ralfs. |
| * " <i>gastroides</i> Kutz., var. <i>minor</i> . | " <i>peregrina</i> Kutz., var. <i>menisculus</i> , form <i>Upsalensis</i> . |
| <i>Stauroneis Smithii</i> Grun. | * <i>Gomphonema gracile</i> Ehr. |
| * <i>Navicula limosa</i> Kutz., var. <i>gibberula</i> . | * " <i>montanum</i> Schum. |
| * " <i>ventricosa</i> Donk. | <i>Rhoicosphenia curvata</i> Grun. |
| " <i>elliptica</i> Kutz., var. <i>striata</i> . | * <i>Cocconeis scutellum</i> Ehr. |
| " <i>Iridis</i> Ehr. | <i>Eunotia lunaris</i> Grun. |
| " <i>viridula</i> Kutz., forma <i>minor</i> . | * <i>Synedra Vaucherii</i> Kutz. |
| " <i>Reinhardtii</i> Grun. | * " " " var. <i>perminuta</i> . |
| | * " <i>Ulna</i> Nitzsch, var. <i>longissima</i> . |

<i>Denticula tenuis</i> Kütz., var. <i>inflata</i> .	<i>Fragilaria capucina</i> Desmaz.
<i>Surirella ovalis</i> Breb. var. <i>ovata</i> .	„ „ „ forma
<i>Hantzschia amphioxys</i> Ehr., var. <i>intermedia</i> .	„ „ „ <i>nova</i> .
* <i>Nitzschia amphibia</i> Grun.	* „ „ <i>construens</i> Ehr.
* „ „ <i>paradoxa</i> Grun.	* „ „ <i>mutabilis</i> Wm. Smith.
	* „ „ <i>tenuicollis</i> Heib., var. <i>intermedia</i> .

Ilkley gathering—

<i>Amphora ovalis</i> , Kütz.	<i>Gomphonema gracile</i> Ehr.
<i>Cymbella cuspidata</i> Kütz., var. <i>naviculiformis</i> .	„ „ <i>olivaceum</i> Kütz.
„ „ <i>leptoceras</i> Kütz.	„ „ <i>parvulum</i> Kütz.
„ „ <i>cymbiformis</i> Ehr.	<i>Rhoicosphenia curvata</i> Grun.
„ „ „ var. <i>parva</i> .	<i>Cocconeis pediculus</i> Ehr.
<i>Encyonema ventricosum</i> Kütz.	„ „ <i>placentula</i> Ehr., var. <i>lineatu</i> .
<i>Navicula viridis</i> Kütz.	<i>Epithemia turgida</i> Ehr.
„ „ „ var. <i>commutata</i> .	„ „ <i>gibba</i> Kütz.
„ „ <i>gibba</i> Kütz.	„ „ <i>gibberula</i> Grun., var. <i>producta</i> .
„ „ <i>mesolepta</i> Ehr., var. <i>Termes</i> .	<i>Eunotia Arcus</i> Ehr., var. <i>bidens</i> .
„ „ <i>appendiculata</i> Kütz.	„ „ <i>gracilis</i> Ehr.
„ „ <i>subcapitata</i> Greg.	„ „ <i>lunaris</i> Ehr.
„ „ <i>radiosa</i> Kütz.	„ „ var. <i>bilunaris</i> .
„ „ <i>rhyncocephala</i> Kütz.	<i>Synedra pulchella</i> Kütz.
„ „ <i>cryptocephala</i> Kütz.	„ „ <i>ulna</i> Nitzsch.
„ „ „ var. <i>veneta</i> .	„ „ var. <i>oxyrhynchus</i> .
„ „ <i>Anglica</i> Ralfs.	„ „ <i>Vaucheria</i> Kütz., var. <i>parvula</i> .
„ „ <i>elliptica</i> Kütz., var. <i>ovalis</i> .	„ „ <i>Vaucheria</i> Kütz., var. <i>perminuta</i> .
„ „ <i>humilis</i> Donk.	<i>Fragilaria mutabilis</i> Wm. Smith.
„ „ <i>limosa</i> Kütz.	„ „ <i>construens</i> Ehr.
„ „ <i>Iridis</i> Ehr., var. <i>undulata</i> .	„ „ <i>tenuicollis</i> Heib.
„ „ <i>binodis</i> Ehr.	„ „ <i>undata</i> Wm. Smith.
„ „ <i>cocconeiformis</i> Greg.	<i>Diatoma elongatum</i> Ag.
„ „ <i>nana</i> Greg.	„ „ <i>hiemale</i> Lyngle, var. <i>mesodon</i> .
<i>Colletonema lacustre</i> Ag.	<i>Meridion circulare</i> Ag.
<i>Amphipleura pellucida</i> Kütz.	<i>Tabellaria flocculosa</i> Roth.
<i>Gomphonema constrictum</i> Ehr.	<i>Surirella ovalis</i> Breb., var. <i>ovata</i> .
„ „ „ var. <i>capitatum</i> .	<i>Nitzschia amphibia</i> Grun.
„ „ <i>acuminatum</i> Ehr., var. <i>coronatum</i> .	„ „ <i>sinuata</i> Wm. Smith.
„ „ <i>montanum</i> Schum.	„ „ <i>vitrea</i> Norman.
„ „ „ var. <i>commutatum</i> .	„ „ forma <i>major</i> .
	„ „ <i>thermalis</i> Kütz., var. <i>intermedia</i> .
	<i>Melosira arenaria</i> Moore.

In Memoriam.

JOHN GEORGE GOODCHILD.

1844-1906.

It is with very great regret that we record the death of Mr. J. G. Goodchild, F.G.S., of H.M. Geological Survey of Scotland. Mr. Goodchild, who was for many years editor of the 'Transactions of the Cumberland and Westmorland Association,' and wrote many most valuable papers in those transactions, certainly accomplished much in furtherance of natural science. He was one of the earliest of the workers in the field of glacial geology on modern lines. His paper on the 'Glacial Phenomena of the Eden Valley,' which appeared in the 'Quarterly Journal of the Geological Society,' has been justly described as 'one of the gems of glacial literature.' He also wrote 'On the New Red Series in Cumberland and Westmorland,' 'Ice-work in Edenside,' 'Notes on the Water Supply of Edenside,' 'Notes on Some of the Limestones of Cumberland and Westmorland,' 'Some Notes on Peat,' 'Granite Junction in Mull,' 'Auge Structure and Eruptive Rocks,' 'How to take Impressions from Fossils,' etc. He was formerly a frequent contributor to the scientific journals. To the 'Naturalist' he was an occasional writer, one of his best papers being 'Notes on the Glacial Phenomena of Upper Ribblesdale.' In recent years he has devoted the most of his time to the mineralogical collections, etc., in the Royal Scottish Museum at Edinburgh, and has written on 'Astronomical Models in the Edinburgh Museum,' 'On the Arrangement of Geological Collections,' 'On the Arrangement of Mineralogical Collections,' 'Simple Methods in Crystallography,' etc. In 1884 he was elected a Fellow of the Geological Society of London, and received the proceeds of the Wollaston Fund in 1893.

He joined the Geological Survey in 1867, and for many years was engaged in mapping areas in the North of England, and particularly in the neighbourhood of the Lake District. Thereafter he was removed to the Survey Office in Jermyn Street, London, and in 1887 was transferred to Scotland, where he was placed in charge of the collections obtained by the Scottish staff, and deposited in the Royal Scottish Museum, an appointment for which he was specially adapted. Possessing remarkable powers of receptivity, a mind extremely susceptible of new ideas,



J. G. Goodchild.

(To face page 130.)

and a facile pen, he contributed a very large number of papers—about 200—on a wide range of subjects to the transactions of various scientific societies in England and Scotland. He also edited the important work in two volumes on Scottish Mineralogy, by the late Professor Heddle, published some time after his death.

He was an ideal leader of an excursion, as the members of the Yorkshire Naturalists' Union can testify, and it was on such occasions that his familiarity with so many branches of science was revealed. Among the many interests upon which his versatile mind extended itself, must be mentioned Ornithology, with especial reference to the Raptores (see his paper on 'Crested Birds of Prey') and Folk-lore and Dialects.

Mr. Goodchild's artistic abilities found expression in beautiful and finished water-colour drawings of birds which he generously distributed among his friends. Many will miss Mr. J. G. Goodchild and the ready help he always offered to anyone seeking it. He leaves a widow and three sons.

T. S.

A History of Westmorland. By **Richard S. Ferguson.** Cheap Edition. Elliot Stock. 1905. 312 pages, 3/6 net.

This well known history of 'The land of Western Meres or Lakes' can now be obtained at the reduced price named, and all who have not the volume already on their shelves, should at once secure a copy. In the eighteen chapters in the book, the history of this important county is dealt with in a very careful and methodical manner, commencing with the pre-Roman times. Of special value for reference is the 'Classified List of Books, &c., relating to Westmorland,' which appears to be very complete. The volume also contains, what is almost a rarity nowadays, a very good index.

An Introduction to Geology. By **J. E. Marr.** Cambridge: The University Press. 229 pages, price 3/- net.

It seems almost necessary nowadays for every geologist of note to write a text book on geology. In the work under notice the Past-President of the Geological Society gives a volume, which 'it is hoped may be found useful to those general readers who wish to obtain some idea of the science, but do not desire to pursue its study far, but especially as an introduction for those who will subsequently proceed to the perusal of more advanced treatises.' There can be no question that the 'general reader' will profit by a perusal of the volume, and the author's reputation is such, that there will be little fear of the 'general reader' being led far astray. It is illustrated by several process blocks from photographs, those representing flint implements and fossils, however, taken by the enthusiastic Mr. W. G. Fearnside, are not so successful as we might have expected. 'A belemnite' on page 181, is surrounded by such an array of apparatus, &c., that we might not unnaturally assume that the 'taking' of a belemnite required the skill and care of a Kearton. And surely better examples of 'human implements' might have been selected for illustration than those on page 213.

FIELD NOTES.

LEPIDOPTERA.

Mamestra furva and *Cucullia verbasci* at Huddersfield.—

Recently Mr. James Lee brought me for confirmation two specimens of *Mamestra furva*, which he had taken last summer on the Deighton side of Huddersfield, where he said the species appeared to be fairly common. It is very many years since the species was previously taken in the district, but probably the spot where Mr. Lee took his examples had never been worked in the meantime, and it may have been there during all the long interval. Mr. W. E. L. Wattam, too, told me that a colony of larvæ of *Cucullia verbasci* was observed feeding near Newsome, Huddersfield, last year, thus confirming Mr. B. Morley's capture of an imago at Skelmanthorpe last summer, which was the first record for the district.—GEO. T. PORRITT, Huddersfield, March 7th, 1906.

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BIRDS.

The Brambling in the North of England.—This species has been exceptionally numerous in most of the southern counties during the past winter, but I have not been able to hear of any increase in the North of England. In this immediate neighbourhood it only occurs in small numbers, (probably owing to the absence of large beech woods), and this winter no increase has been noted. It would be interesting to know whether any reader of 'The Naturalist' in Yorkshire, or in the North of England, has noticed more than the usual numbers. Particulars of observation would be of interest and might tend to throw some light on the migratory movements of this northern breeding finch. In this district the Siskin has been much more common than usual (see page 100). If this has been generally so in the north, and the Brambling has certainly been much more numerous in the south, it would be interesting to endeavour to discover the cause, or causes, as the past winter cannot be described as having been a hard winter in these islands.—HARRY B. BOOTH, Spring Royd, Shipley, March 19th, 1906.

REVIEWS AND BOOK NOTICES.

More Natural History Essays. By G. Renshaw. Sherratt and Hughes. 243 pages, 5/- net.

Apparently in a previous volume, entitled 'Natural History Essays,' Mr. Renshaw dealt with African types of mammalia only; in the present work representatives of the mammalia from various parts of the world—bats, lemurs, shrews, tigers, whales, sea-cows, tapirs, ant-eaters, &c., are described in a careful manner, and in connection with most, the author has interesting anecdotes to relate. That he is also thoroughly up to date



Whale Room in the Natural History Museum, South Kensington.

is shown from the fact that in his description of the beluga or white whale, details are given of the records of this species at the mouth of the Tyne and at Scarborough in 1903, and in the Ouse in 1905, details of which duly appeared in this journal at the time. There are several illustrations, one of which the publishers kindly allow us to reproduce. It shows the half models of whales as arranged in our national collection by the late Sir W. H. Flower. In the foreground is a white whale and a narwhal. A fragment of an abnormal narwhal skull, with two tusks is also shown. A skeleton of a narwhal, with a fully developed tusk, and one only partially developed, is in the Hull Museum.

A Monograph of the British Desmidiaceæ. By W. West, F.L.S., and G. S. West, M.A., F.L.S., A.R.C.S. Vol. II. Ray Society. 280 pp., 32 plates. Price 25/- net.

The appearance of the second part of this valuable work will be welcomed by all students of our microscopic flora. The present volume deals with the

genera *Euastrum* and *Micrasterias*, and a portion of the very extensive genus *Cosmarium*. These comprise some of the most beautiful species of Desmids and we may especially particularize the gracefully fringed and ornamented cells of *Micrasterias*. An interesting point concerning distribution occurs in relation to this genus. It is, we are informed, generally found in the lakes and bogs of the older Palæozoic and Precambrian areas, and several species are exclusively confined to such localities. Thus we find that only one single record occurs for the East Riding of Yorkshire. *Micrasterias truncata* having been found in bogpools on Skipwith Common; but on the other hand, Wales, the Lake district and Scotland are localities for every species. Messrs. West do not theorize on these facts, but it is clearly significant as to the evolution and history of the Desmidiaceæ that its most highly developed genus should be thus limited.

The genus *Cosmarium*, it was hinted in the introduction to the first volume, would some day require to be split up into smaller genera, and the force of this remark becomes obvious when we come to consider the large number of species described under this heading. The present volume describes 50 species, an instalment of 126 which constitute merely the first division of the genus. We have indeed progressed far since Pritchard summed up all known species of the genus as 38 in number—not all of which would now be assigned to it at all. But, as our authors acknowledge, their classification of this genus is exceedingly artificial. For instance, the broad distinction drawn for the two large groups, the section with smooth cell walls and the section with rough cell walls, reminds us that in the case of other genera such a distinction is used merely for a variety and not even for a species—still less for a group of species.

The plates illustrating this book are well executed and do full justice to the beautiful forms of the Desmids. No higher praise could be given than to say that they quite maintain the high standard set by the first volume.

R. H. P.

NORTHERN NEWS.

We regret to record the death of Sir Robert L. Patterson, M.B.O.U., of Belfast, an occasional contributor to our Journal.

Part I. of 'School Nature Study' has appeared, and consists of 4 pages, price 2d. 'Further editions will be published in May and October.'

The Manchester Microscopical Society continues to do the good work for which it is so well known, judging from the circulars which are regularly received.

The *Zoological Record* for 1904, an invaluable volume, has been issued. Over two thousand new generic, etc., names are recorded, as a result of the work of naturalists for a single year!

A recently issued number of the 'Journal of the Manchester Geographical Society' contains a well-illustrated account of 'The National Antarctic Expedition,' by Captain R. F. Scott, R.N.

In the February *Entomologist's Monthly Magazine* Mr. R. S. Bagnall gives some 'Notes on Some Coleoptera imported into our Northern Ports [Newcastle, Sunderland and Hartlepool.]'

'Mainly about Books' is a gratis pamphlet issued three times a year by the Central Public Library and Museum of Bootle. It takes the place of the 'Quarterly Journal,' previously issued by the Bootle authorities.

In the February *Zoologist* the following records occur:—A small flock of Gull-Buntings on Jan. 23rd; a Shore Lark on Hilbre Island on Dec. 19th 1905; an Eider on Dec. 31st, and a Knot on Dec. 30th—all in Cheshire.

Naturalist,

The Council of the University of Liverpool has decided 'That a readership in ethnography be instituted in recognition of the scholarship of H. O. Forbes, LL.D., director of the Public Museums of Liverpool, and that Dr. Forbes be appointed to the said readership.'

We learn from a London daily of March 3rd, that 'a bird known to naturalists as the Pacific rider [eider], and which is said to be only the second ever captured in Europe,' has just reached Scarborough. It was shot a few days before in the Orkneys. We presume the specimen will not leave Scarborough so readily as did the previous specimen!

As the subject of his Presidential Address to the Bradford Scientific Association recently, Mr. H. E. Wroot dealt with the life, work, and scientific friendships of Dr. Richard Richardson of Brierley Hall, a well known botanist, and a contemporary of Abraham Sharp, the astronomer.

'Notes on Some Speeton-clay Belemnites' is the title of Hull Museum Publication No. 29, just issued (A. Brown & Sons, Ltd., Hull, one penny). It contains illustrations of some rare and curious Belemnites from the Speeton and Kimeridge clays, part of an extensive collection recently placed in the Hull Museum by Mr. C. G. Danford of Reighton.

A special effort is being made to secure a goodly list of new members for election at the first field meeting of the Yorkshire Naturalists' Union for 1906, which will be held at Ingleton from May 12th-14th. The Secretary of the Union (at the Museum, Hull) would be glad to hear of any person wishing to join, or would supply particulars of the work of the Union, &c., to anyone interested.

Various teachers in the East Riding, interested in natural history, have formed an 'East Riding Nature Study Association,' and have decided to affiliate with the Yorkshire Naturalists' Union. A list of excursions has been arranged, and early in October there will be an exhibition and conference at Pocklington. Mr. W. J. Algar, the Schoolhouse, Lockington, is the Hon. Secretary.

The County Press, of 19 Ball Street, Kensington, W., is issuing a novel series of educational post cards, the first example of which (natural history department) is a picture presentment, on seven cards, for the price of sixpence, of the whole of the British Ferns (42 species nature prints) from the illustrative plates of Mr. Francis George Heath's work, 'The Fern Paradise.'

A conference to consider the promotion of extension work in connection with the University of Leeds, was held at Leeds on Saturday, March 17th. The Vice-Chancellor (Dr. Bodington) presided. Sir John Gorst and others addressed the meeting. A general committee was appointed to promote the extension work of the University. The Yorkshire Naturalists' Union was invited to send a delegate, and was represented by Dr. E. O. Croft, Leeds.

At the annual meeting of the Yorkshire Naturalists' Union held at Bradford, the Fossil Flora Committee was enlarged in its scope, and will in future be known as the Fossil Flora and Fauna of the Carboniferous Rocks Committee. Added to it were several members interested in the mollusca of the coal measures, and doubtless good will result from the committee's labours. Messrs. Wheelton Hind, and Walcot Gibson, have kindly agreed to assist the committee in its work.

Several of our readers will be sorry to hear that the 'Leeds Mercury Supplement' has ceased to appear. In former years this paper was welcomed by all northern naturalists and antiquaries on account of the excellent articles, reports of meetings, &c., which there appeared. The editor, Mr. W. S. Cameron, was ever ready to further natural science in any way in his power. In recent times, however, the paper has changed considerably in its scope, to the regret of many of its readers. The death of the 'Leeds Mercury Supplement' leaves a distinct gap in Yorkshire journalism.

The following are places and dates for the excursions of the Yorkshire Naturalists' Union during the coming session :—

May 12th to 14th—Ingleton.

June 2nd to 4th (Whit week-end)—Flamborough.

June 30th, Saturday—Fewston, for Washburn Valley.

July 12th, Thursday—Askern.

August 18th to 20th—Guisborough.

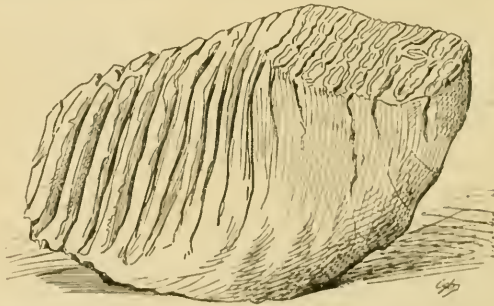
September 22nd to 26th—Fungus Foray at Farnley Tyas, near Huddersfield.

We learn from the *Huddersfield Chronicle* that the degree of Ph.D. has been conferred on Mr. T. W. Woodhead, F.L.S., lecturer in biology at the Technical College, Huddersfield, by the University of Zurich, Switzerland, where Mr. Woodhead has been working during the last few months in collaboration with Professor C. Schroter, the eminent authority on the Alpine flora. It will interest Dr. Woodhead's friends to know that this well-merited honour has been bestowed upon him for a paper on the 'Ecology of woodland plants in the neighbourhood of Huddersfield.'

A meeting of the Excursion Sub-Committee of the British Association was held at York on the 20th March, Dr. Tempest Anderson presiding. A number of places suitable for visits by the members of the Association was chosen. In connection with these, however, the early date of the Association was once more found to be inconvenient. We can imagine, for example, what the nature of a visit to Scarborough would be on August Bank Holiday or the Saturday preceding. There are also other attractions in the following few days, which will probably interfere with the most successful arrangements being made for the comfort of the visitors to the meetings of the British Association. It is sincerely to be hoped that the experiment of holding the meeting of the Association in the first week in August will not be repeated.

A conference was held at the Hotel Windsor, Westminster, on the 6th February, for the purpose of considering the question of national defence against the erosion of the sea. The following resolution was carried: 'That whereas it is a settled principle of the common and statute law that the responsibility of the sea defence works rests primarily on the nation at large, this representative meeting is of opinion that steps should be taken to obtain some assistance from the Imperial Exchequer towards the ever-increasing burden of expense which local authorities on the seaboard are compelled to bear owing to the constant erosion by the sea; and that with a view to carrying out this object a petition be presented to the King in Council praying that right may be done.' A committee was appointed to formulate a scheme and submit it at a future meeting.

By the courtesy of the editor of the *Yorkshire Weekly Post*, we are able to give our readers a drawing of the large mammoth tooth found at Withersea,



and described in these columns for November last (p. 348). The tooth figured is 10½ inches in length, and weighs 9½ lbs.

THE NATURALIST.

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

EDITED BY

T. SHEPPARD, F.G.S.,
THE MUSEUM, 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.,
Prof. P. F. KENDALL, M.Sc., F.G.S.,
T. H. NELSON, M.B.O.U.,

GEO. T. PORRITT, F.L.S., F.E.S.,
JOHN W. TAYLOR,
WILLIAM WEST, F.L.S.

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H. C. Lorby April 5th/16

PROMINENT YORKSHIRE WORKERS.

I.—HENRY CLIFTON SORBY, LL.D., F.R.S., F.S.A., F.G.S., etc.

(PLATE XIII.)

IT is proposed to give occasionally in these pages a brief account of the life of some of our leading Yorkshire workers. The selection of the first of the series has not been in the least difficult. In Dr. H. C. Sorby it can be safely said we have a scientific man, whose standing as such is of the highest possible. His reputation is world wide. During the past sixty years he has devoted some attention to almost every branch of natural and applied science, and everything he has touched has been the better for it. Probably no living man has accomplished so much in such a variety of ways as has the subject of our sketch, and few can boast of having occupied more official positions in so many scientific societies than has he. Besides all this, Yorkshiremen will for ever respect his name for the keen interest he has always taken in the scientific welfare of Yorkshire, and particularly the city in which his life has been spent—Sheffield. In the affairs of the Yorkshire Naturalists' Union he has at all times taken the keenest interest—has helped its work in every way in his power, and the Union conferred upon him the greatest honour in its power by asking him to be the first to occupy the Presidential chair.

Dr. Sorby has been fortunate in being able to devote his whole life to scientific research—an opportunity which is open to many but rarely taken advantage of. To a prize he obtained at school, entitled 'Readings in Science,' he partly attributes the desire he subsequently had for investigation. Later he had for a tutor one who was well informed in mathematics, chemistry, and anatomy, whose influence also left its impression upon the scholar. In addition to the subjects named, Dr. Sorby devoted some attention to optics and water-colour drawing, and all these he found of the greatest possible value to him in his subsequent career.

In 1897 he delivered an address to the Sheffield Literary and Philosophical Society, entitled 'Forty Years of Scientific Research,'* in which he points out that he worked in his young days '*not to pass an examination*' but to qualify himself for a career of original investigation. That such a course

* I am indebted to this for much of the information here given.

was beneficial is well proved by what has subsequently taken place, and a perusal of the list of memoirs at the end of these notes is evidence of the benefit of his early method of work. And it must be borne in mind that these memoirs are by no means of the ordinary class of papers, as many of them certainly indicate distinct epochs in the advance of our knowledge of the subjects dealt with.

It may not be without interest to briefly refer to a few of the subjects that have occupied his attention. To even mention them all would be a very serious undertaking, such has been the untiring energy which Dr. Sorby has shown all through his life. It can be safely said that he has never been idle, and when the writer had the pleasure of spending some hours with him only a few days ago, he was much impressed with the Doctor's energy—certainly far exceeding that of many men half-a-century his junior. And although he is in his eightieth year, and unable to walk, through an unfortunate series of accidents, he still spends many more hours a day at his work than do most 'business'-men, and he has as many 'irons in the fire' as ever.

His first papers dealt with animal and vegetable chemistry, and were published so long ago as 1847. About the same time, sheltering from a shower of rain in a quarry near Handsworth, his attention was attracted to what he afterwards called 'current structure,' viz., structures produced in stratified rocks by the action of currents present during their deposition. Since then many more papers on the subject have appeared from his pen, some of them being of a most important character.

It is in connection with his work with the microscope that Dr. Sorby is best known. His first piece of microscopical work had reference to the small shells of the so-called 'Bridlington Crag.' About the same time he made the acquaintance of the late Prof. Williamson, then practising as a surgeon in Manchester. Williamson showed him his collection of sections of fossil wood, teeth, bones, etc., and explained how they were made. In these Dr. Sorby found new fields for work, and in 1849 it occurred to him that much might be done by applying a similar method to the structure of rocks. He was the first to prepare transparent microscopic sections of rocks. Not unnaturally his earlier efforts were laughed at—had not Saussure stated that mountains must not be examined with microscopes. Our present knowledge of the structure of rocks, however, is largely due to the fact that Sorby studied on heedless of his critics.

In the following year, 1850, the first of a lengthy series of papers on the microscopic structure of rocks appeared, and dealt with the Calcareous Grit at Scarborough, and even at that period practically all the methods of examining rock sections known to-day had been developed by Dr. Sorby.

A year later some papers in the Quarterly Journal of the Geological Society, dealing with slaty cleavage, directed his attention to that subject. Up to that time various theories had been advanced to account for this structure, and at the Museum of Practical Geology an experiment was made which 'proved' that cleavage was 'due to the action of weak electric currents passing through deposits!' The late Sir Henry de la Beche told Sorby that the question had been thoroughly settled at the Museum. Still working on his own lines, however, Sorby eventually demonstrated that 'slaty cleavage was due to mechanical pressure, acting in a peculiar way and developing its characteristic structure in a plane perpendicular to it.' His paper on the subject was sent to the Geological Society, but the then President (Wm. Hopkins) had a theory of his own that cleavage was developed at an angle of 45 degrees to the pressure! A lengthy correspondence followed, and eventually the paper was withdrawn and published elsewhere. Since that time Dr. Sorby has heard nothing of either Mr. Hopkins' or the electric theory of slaty cleavage! Work amongst the schistose crystalline rocks was next taken up with good results.

His examinations of thin sections of limestone rocks showed that a knowledge of the microscopic structure of shells, corals, and other marine calcareous organisms was necessary before the rock sections could be properly understood. In this connection it soon became evident that the question as to whether the shells were of calcite or aragonite was a matter of paramount importance. This subject has since been followed up by Prof. P. F. Kendall.*

The microscopic structure of minerals then occupied his attention, his work thereon being such that on the formation of the Mineralogical Society of Great Britain and Ireland he was elected the first President. Sorby was the first to point out the existence in certain igneous rocks of what he called 'glass cavities,' analogous to 'fluid cavities,' only that when the crystalline minerals were formed they caught up a liquid which on cooling solidified into glass. It was thus proved that the

* "Calcareous Organisms," *Geol. Mag.*, Feb. 1888.

minerals in these rocks crystallised out from a solvent in the state of glassy fusion. 'This fact at once settled the question so long disputed between the Wernerians and Huttonians.' These inclusions in minerals indicated whether the rocks had been formed by the action of water or of fusion or by the two combined under pressure.

In 1858 he read a paper to the Geological Society on 'The Microscopical Structure of Crystals, indicating the origin of minerals and rocks.' The late Leonard Horner, the only surviving original Fellow, was in the chair, and after the paper was read stated that he had been a member of the Society ever since its foundation, but 'did not remember any paper having been read which drew so largely on their credulity,' the facts being so new and remarkable! Sorby was also the first to point out that certain minerals contained liquid carbonic acid, and described its striking properties.

The microscopical character of loose sand-grains then occupied his thought, and they were found to possess features having an important bearing upon the origin of certain sandstone rocks. Next followed his explanation of the so-called 'crystalline sands,' which contain crystals of quartz due to the deposition of crystalline quartz around ordinary grains of sand which had acted as nuclei. A study of pseudomorphs—crystals in the form of one mineral, but with the chemical composition of another—resulted in many important discoveries. About 1860 he made a whole series of artificial pseudomorphs by the action of cold or highly-heated solutions. It was demonstrated that certain rocks, such as the Cleveland ironstone, 'were originally composed of carbonate of lime, but have been altered to carbonate of iron, the carbonate of lime having been dissolved, and carbonate of iron derived from the associated strata deposited in its place.'*

Following on this line of research upon the structure of rocks, he eventually proved that there is a direct correlation between mechanical pressure and certain kinds of chemical action, and gave the results of his work in a paper to the Royal Society, which formed the Bakerian Lecture for 1863.

Experiments on the freezing point of water and on the expansion of water and saline solutions at high temperatures

* In connection with the Guisborough meeting of the Yorkshire Naturalists' Union, to be held in August next, the question of the origin of the Cleveland Ironstone is to be discussed. Dr. Sorby has kindly agreed to contribute a paper on the subject on that occasion.

followed, by the aid of which it was possible to calculate the approximate temperature at which certain minerals had been formed in Nature.

From the foregoing notes it will be seen how deeply indebted present-day geologists are to Sorby's pioneer work in regard to the microscopic structure of rocks. In fact, a study of Dr. Sorby's work is almost an epitome of the history of geological science in recent years.* So long ago as 1872 the Dutch Society of Science awarded him the first large gold Boerhaave medal for having done more than anyone else to advance the sciences of geology and mineralogy during the preceding twenty years.

From the study of the structure of rocks followed that of meteorites, and in order to properly consider the latter an investigation of artificial iron was started. This was in 1863, and in the following year a paper was read to the British Association on the subject, the full economical value of which remained unrecognised for over twenty years. In 1887, however, the Iron and Steel Institute appointed Dr. Percy, Sir Henry Bessemer, and Dr. Sorby to decide upon the best method of illustrating a complete paper on the subject. Since then the importance of a microscopical investigation of iron and steel has been generally recognised. 'In those early days,' writes Dr. Sorby, 'if a railway accident had occurred, and I had suggested that the company should take up a rail and have it examined with the microscope, I should have been looked upon as a fit man to send to an asylum. But that is what is now being done.' What Dr. Sorby proved was that various kinds of iron and steel consist of varying mixtures of well-defined substances, and that their structure is in many respects similar to that of igneous rocks.

Following this much work was accomplished in connection with blow-pipe chemistry, and he showed that much could be learned by studying the microscopical character of the crystals deposited in blow-pipe beads allowed to cool very slowly over a lamp.

Continual work with the microscope, particularly relating to the study of meteorites, led to several improvements being made in connection with the instruments. He invented the spectrum microscope, with a new arrangement to get what is

* In the 'list of authorities' in Geikie's 'Text-book of Geology' Dr. Sorby is responsible for more references than is any other author. He is also one of those included in Geikie's 'Founders of Geology.'

called 'direct vision.' Then followed lengthy researches upon various branches of enquiry in which colour plays a part—about forty papers being written on these subjects. In these the colouring matters of human hair and of birds' feathers, the pigments in birds' eggs, and the numerous colouring matters met with in almost every group of plants, were dealt with. From these it was an easy step to the detection of blood stains, work which has since proved exceedingly useful in connection with criminal investigation. The microscopical examination of sewage also followed, and, like most of Dr. Sorby's work, with most useful results from an economical point of view.

From 1879, and until his accident a few years ago, Dr. Sorby lived about five months of each year in his yacht the 'Glimpse.' This naturally necessitated a change in his work. On board the 'Glimpse' investigations were carried on in connection with the seas and estuaries, and their animal and plant and inorganic contents. The results of some of these investigations have appeared and are appearing in the Victoria County Histories (Essex, Kent, and Suffolk). In addition to paying attention to meteorology, the colour of the sea and sky, and taking observations extending over several years on the temperature of seas and estuaries and the amount of salt present in the water, he collected and preserved various marine objects. The colouring matters of these were studied, and extensive experiments made as to the best methods of preserving both the organisms and their colours. Details of these have already been contributed to this Journal by Dr. Sorby.* More recently, attempts to shew both marine animals and plants as transparent lantern slides have met with great success.

In the Thames, Dr. Sorby has spent much time studying the changes which take place in connection with the sand-banks in the estuary and other changes which take place. In connection with the Royal Commission on the drainage, he in 1882 occupied seven hours a day for 240 days in studying the Thames.

Thus in matters geological, physiographical, biographical, physiological, botanical, and hydrographical has Dr. Sorby worked, and worked well. But these are by no means the only subjects which have occupied his attention. His researches relating to the changes in the vicinity of the Isle of Thanet necessitated his acquaintance with archaeological matters. He

* 'On the Preservation of Marine Animals.' 'Naturalist,' Nov., 1903, pp. 437-440.

examined Roman, Saxon, and Norman buildings, and this led to a detailed study of the structure of building materials and experiments thereon. The dimensions of bricks used in the buildings of various periods were also carefully worked out.

Whilst at work on Norman and Saxon architecture he examined various early illustrated manuscripts in the British Museum and elsewhere. These showed a varying length of unit used by the scribes in making manuscripts, a knowledge of which Sorby has shown to be of value in ascertaining where the manuscripts were prepared. 'Some of the early Irish scribes seem to have used the old Greek foot. Other manuscripts are on the scale of our present English foot, which was used extensively in Saxon times. Very early manuscripts, probably made in Italy, are written to the scale of the old Roman foot; whereas certain Continental manuscripts are written on the scale of the much larger old French foot.'

This archæological work led Dr. Sorby to study early cosmogony and geography, and also the archæology of natural history, in order to explain the origin of ideas with regard to a great number of the more or less mythological animals met with in early art. To carry out this thoroughly, a knowledge of the early Egyptian hieroglyphic language was necessary, and in his characteristically thorough manner, this was mastered. He has gathered together a vast collection of most of the original works of importance bearing on the subject, from the earliest period down to mediæval times, and he hopes that their study will lead to important conclusions in connection with the history of science and art.

Such is a brief summary of the principal lines of investigation which have occupied the attention of Dr. Sorby, who is yet as hard at work as ever. In addition to the work for the Victoria County Histories, and the other items referred to, he is at present busy applying quantitative methods to the study of the structure of almost every geological formation, a work which, when completed, will unquestionably hold a foremost position amongst the many fine achievements that stand to his credit.

It is only natural that one who has done so much for science should be recognised by the scientific world. Honours have deservedly been showered upon him from all parts. He was elected a Fellow of the Geological Society in 1853, a Fellow of the Royal Society in 1857, a corresponding member of the Academy of Natural Sciences of Philadelphia, and of the Lyceum of Natural History of New York in 1858, a member

of the Imperial Mineralogical Society of St. Petersburg in 1862, an honorary member of the Manchester Literary and Philosophical Society in 1869, and a Foreign member of the Royal Dutch Society of Science in 1872, and he is a member of the Academy of Lynxes of Rome, Foreign member of the Microscopical Society of Brussels, and of the American Academy of Arts and Sciences, honorary member of the Natural History Society of Torquay, a Fellow of the Society of Antiquaries, and of the Zoological and of the Linnean Societies. In 1879 the degree of LL.D. was conferred upon him by the University of Cambridge.

The Geological Society awarded to him the Wollaston Medal in 1869; in 1872 he received the first large gold Boerhaave medal issued by the Dutch Society of Science; and in 1874 he received a Royal medal from the Royal Society of London.

He has been through the Presidential Chair of several important societies. In 1878-80 he was president of the Geological Society of London. He was the first president of the Mineralogical Society, and president of the Microscopical Society of Great Britain and Ireland in 1875-1878, and of the Geological Section of the British Association in 1880. He was the first to occupy the presidential chair of the Yorkshire Naturalists' Union, as at present constituted. In 1852, 1870-1-2, 1879, 1894, 1897, and 1898 he was elected president of the Literary and Philosophical Society in his native city, Sheffield, a city which has greatly benefitted by his presence therein. A few years ago the Sheffield Literary and Philosophical Society presented him with a handsome portrait of himself, in commemoration of his fifty years connection with the Society. This was painted by Mrs. M. L. Waller, and by the kindness of the publishers of this journal, we are able to give each of our readers an excellent though small copy of this (plate XIII.). In February last a replica of the portrait painted by Mrs. Waller was presented to the Sheffield University, of which Dr. Sorby is one of the founders and has taken such a practical interest in since its foundation. We can only hope that Dr. Sorby may long be spared to continue his useful work.—T.S.

(The list of Memoirs, etc., by Dr. Sorby will appear in our next issue).



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.

Yorkshire Bats.

THE DEVELOPMENT OF THE SENSES IN BATS.

(PLATE XIV.)

ARTHUR WHITAKER,
Worsbrough Bridge, Barnsley.

PROBABLY the personal acquaintance of many of the readers of the 'Naturalist' with bats is no greater than has been afforded by occasional glimpses of these creatures flitting about at dusk of a summer's day, and a few notes on them when under closer observation may consequently be of some interest.

Bats are highly developed animals, so much so that Linnaeus was led to give them a place in his highest order of the Mammalia, the Primates, along with Man and the Apes; nor is their position very materially altered in our present classification, though they are now ranked as the first sub-order of the second great order Carnaria, instead of the last sub-order of the first order Primates.

Classification is principally based on physical structure, but broadly speaking as the scale of animal life is ascended, we find a gradual development of mind and senses, as well as a structural development.

It is, then, a subject worthy of attention to try to ascertain if bats exhibit that development of the senses which their high position in the scale of animal life would lead us to expect.

Before trying to estimate the development of any animal, we should try to dispossess our mind of the idea that every physical and mental power is highly developed or otherwise just in proportion to its approximation to our own.

As the focus of the eye must be proportionate to the size of a creature, so must its other senses and mental powers be of that 'focus' which will be most useful to their possessor. Milton's words apply not only to man, but to all creatures:—

'Not to know at large of things remote from use, obscure and
subtle,
But to know that which before us lies in daily life,
Is the prime wisdom.'

Thus we should not call a dog more intelligent than a sheep merely because it understands a few words which we may say to it. The mountain sheep knows what the weather will be for many hours in advance, and ability in one direction must be set against ability in another. Nor is the sight of a cheese mite better than your sight or mine, although it can see its fellow. It

is only the focus that is different. Each creature sees and knows what it is most needful that it should see and know.

These facts we must try to bear in mind whilst briefly reviewing the senses as exhibited in the Cheiroptera.

First, let us take *hearing*. This sense appears to be highly developed in the creatures under our notice. When a bat is placed in a cage or box (especially if it be a cardboard one) it is interesting to touch the outside at any point lightly with one finger, after it has been undisturbed for some time, and to note the start the little occupant will give, and the rapidity with which it will turn its head towards the place from whence the sound came. If the finger be drawn slowly backwards and forwards, the uneasiness of the bat is still greater.

In captivity, bats take some little time to get accustomed to the various household sounds. A Noctule Bat (*V. noctula*) which I kept in my office for some time last summer, became accustomed to most sounds after a few days, and took little or no notice of them; but for some reason which I cannot even surmise, as long as I kept it it always started and displayed considerable uneasiness at the sound of tearing paper, though it would quite disregard many much louder noises. During a thunder-storm I observed it, and found that the most sudden and violent concussions did not appear to cause it uneasiness.

The voices of persons in ordinary conversation it never seemed to take much notice of, but a chirruping or squeaking noise made by drawing in the air through one's closed lips would attract its attention at once, and this was the sound I always made to it when feeding it, and to which it became so accustomed after a few days that it would wake up and come quickly crawling to the cage door as soon as anyone made the noise.

A low note on the piano or organ it scarcely appeared to notice, but a high one would attract its attention at once. This, of course, is exactly what one would be led to expect from the notes or noises produced by bats themselves, for the noises made by any creature are of course always of the pitch and strength best adapted to its own hearing and the hearing of its fellows, and consequently can always be taken as a clue to the scope of the hearing powers. Now the note of bats is exceedingly high in pitch, so much so in fact, that the sound has been compared by the Rev. J. G. Wood to that produced by drawing a scratchy slate pencil, held vertically, over a slate; only, he says, the noise of bats is several octaves higher.

All these things point to the conclusion that a bat's sense of hearing is adapted to sounds of a much higher pitch than our own and than that of most animals. Probably bats can plainly hear, and locate with precision, many sounds which, on account of their high pitch, we either could not detect at all, or could do so only in such an imperfect way as to be afforded no clue as to the direction from whence the sound came. On the other hand, it is probable that a low-pitched sound, even though of great volume, may be outside the scope of a bat's hearing, and the sound of thunder be less obtrusive to it than the high note of a violin string.

Now, as all senses are so developed as to be of the greatest possible use to their possessor, it follows that the sounds which it is most important for a bat to hear are ones of very high pitch indeed, and it is not improbable that its hearing may assist it in search of food, and the sound produced by the most minute gnats and other insects be plainly audible to it.

In matters of *taste* the bat is somewhat of an epicure, and holds decided likes and dislikes with regard to its food, for not only is one kind of food preferred to another, but different individuals show different fancies, and whilst one bat in captivity will feed readily on raw beef, another specimen of the same species cannot be induced to touch it.

All our British bats of which I have any knowledge show a great weakness for mealworms, the larva of the common Meal Beetle (*Tenebrio molitor*), and will go on eating these, evidently because they like the taste so much, after they have so far satisfied their hunger that other ordinary welcome food would be rejected. This is the more remarkable, as mealworms are certainly not a food procurable by bats in a natural state. Insectivorous birds share the same weakness, as all bird-fanciers know, so that there appears to be a strong concensus of opinion that mealworms are *par excellence* as an article of diet—" *de gustabus non disputandum.*"

One day I was feeding a Pipistrelle Bat (*Vesperugo pipistrellus*) with some moths, and after giving it several different species (*M. fluctata*, *M. strigilis*, *A. basilinea*, and *M. brassicae*, &c.), I offered it a Magpie Moth (*Abraxas grossulariata*). It took a good bite at this, and then spat it out, and backed away to the far side of its cage, coughing and spluttering in the most ludicrous manner; and moreover, it was some little time before it would trust me sufficiently to take even a mealworm from my fingers, so bad an impression had the taste of *grossulariata* made

upon it. Here again we have an interesting parallel between the taste of birds and bats, for, so far as I know, *grossulariata* is one of the very few moths which insectivorous birds refuse to touch.

I have never made any experiments to try to determine the extent to which the sense of smell is developed in bats.

The sense of touch, or perhaps I should say some nervous sense akin to it, is most incomprehensible, and probably without parallel in the animal kingdom.

Having read of experiments conducted by several eminent scientists, who have blinded bats by the complete removal of their eyes, and found that they were still able to direct their course when flying, even in a strange place, so as never to come in contact with any obstacle, and seemed, in fact, to be able to recognise the nature and locality of their surroundings quite independently of sight, I thought it would be most interesting to repeat the experiment, and give my own results.

Accordingly I took a Reddish Gray, or Natterer's Bat (*Vespertilio nattereri*, see Plate XIV., fig. 1), and covered its closed eyes carefully with wax, and after some little difficulty satisfied myself that I had rendered it for the time being, to all intents and purposes, 'stone' blind. I then liberated it in a room in which it had not been before, and was not only quite unfamiliar with its size and shape, but also with the position of the gas chandeliers, of which there were two, chairs, tables, and other furniture. I often allow bats to exercise themselves in this room, and their usual behaviour is to circle round close to the ceiling.

The behaviour of this temporarily blinded bat was somewhat different. When released it commenced to fly in a rather slow and hesitating manner, but with rapidly-growing confidence. It went first straight for the closed door, and, I thought, was about to fly right against it, but it suddenly turned itself when but a few inches off, and hovered slowly once or twice along the top edge and down the side, still without touching, but following, I feel convinced, the slight draught of air admitted. Having apparently satisfied itself that there was no exit large enough for it there, it turned round, and flew the length of the room, straight for the fireplace, still, I believe, following the draught. When it got near the fire it turned, warned, no doubt, by the heat, and then commenced to fly slowly and cautiously about the room at a height of about six inches from the floor, and I noticed it repeatedly pause and hover in front of the wainscote

at one point where it had sprung slightly from the wall and admitted a distinct current of air. Although it flew fairly quickly, and kept passing underneath the chairs, of which there were over a dozen in the room, it never once, so far as I could see by lying down to watch it, even touched anything with the tip of its wings. An attempt on my part to catch it caused it to fly up to the ceiling, and just below this it commenced circling round and round rapidly, repeatedly dipping to pass under a beam crossing the centre of the ceiling. I tried holding a walking-stick perfectly still in its path, but it would swerve suddenly when but a few inches from it. After flying for over twenty minutes it suddenly settled on a chain supporting one of the weights on the gas chandelier, and that it could settle in such a place is in itself a wonderful proof of the accuracy of this 'second sight.'

I stood on a chair and approached my hand very slowly in order to catch it again, but when my hand was within about a foot of it, it commenced to turn its head nervously and jerkily from side to side (an action characteristic of a bat when disturbed), and flew again before I could get hold of it.

Eventually I was obliged to get out my butterfly net to catch it, and even then had some little difficulty—and by the way, netting bats indoors is decidedly exciting, and apt to become rather an expensive amusement, and one productive of serious domestic disturbances should an ill-judged stroke sweep half-a-hundredweight of best mixed crockery off the mantel-piece.

When I caught my bat again I found the wax still adhering properly and quite covering the eyes. Although the little fellow had got on so well without the use of his eyesight, he nevertheless seemed glad when I removed the wax and he got it back again, and I was amused to note how long he stood by the side of the water pot in his cage, alternately dipping his face in the water and scratching it.

This experiment and many others which have been made with similar result seem to indicate that in the deep caverns and other pitch-dark places to which many kind of bats resort for hiding, they are guided by some sense other than sight. The opinion arrived at by Cuvier, and now generally accepted, is that it is an abnormal development of the sense of touch, based, I should be inclined to say, upon an almost incomprehensibly acute perception of atmospherical currents, vibrations, and resistance, and residing, it is believed, in the delicate

expanse of the wing membranes—the wings being literally a mass of nerves. In support of this, it is worth noting that those species which seek the darkest retreats in the daytime, and fly the latest at night, are furnished not only with large and sensitive ear membranes, but have additional developments of sensitised skin which appears expressly designed to aid this mysterious sense. This additional development of sensitive skin, which is frequently of a leaf-like shape, is undoubtedly placed in the position where it will be of most use, *i.e.*, on the top of the nose, so that these creatures, at least, can safely be advised to follow their noses when in a dark place.

Whatever explanation be accepted of the power of bats to recognise the nature and locality of objects independently of sight, it is a wonderful thing, for all other living creatures, so far as we know, derive such impressions almost exclusively through the medium of light and reflection. That this is not so with bats is easily shown. As their early progenitors became more and more nocturnal in habits, and darker retreats came to be sought in the daytime, more acute perception of objects in the dark became necessary to them. If light had played any part in this essential perceptive development, the eyes and optical nerves already sensitised to it would have been developed to the required degree, and not the nerves in other parts of the body, sensitive not to light but to touch.

It is most difficult to estimate to what extent the true eyesight of bats is developed, the sense we have just been considering and classed with touch approximating so closely in the impressions it conveys to the sense of sight, that, although we know that a bat has received certain knowledge of its surroundings, it is often very difficult to say through which medium the impression has been conveyed to it. Nevertheless, a bat has eyes and can see, and the saying 'as blind as a bat' is certainly anything but a happy one, for it is almost certain that it is, partly at least, by sight that a bat is enabled to catch the minute insects on which it feeds, when flying rapidly, in almost total darkness.

Still it is strange, very strange, that whilst in the case of most nocturnal animals the eyes have become exceptionally large and convex in order to take in as much light as possible, in the case of bats, where one would have looked especially for such development, the eyes have become reduced to the most minute size. We can understand the similar paradox in the case of the mole, for in its subterranean workings it can rely

mainly upon touch and hearing, and large eyes would obviously be a disadvantage to it in its burrowing operations.

There is no doubt that a bat uses its true eyesight to some extent. In captivity I have observed one display considerable uneasiness at the flashes of lightning during a thunder-storm. It would start at each flash, and upon an unusually bright one it once or twice threw one wing quickly over its face, and then gradually withdrew it. Of the thunder it seemed to take no notice, as before mentioned.

A Lesser Horseshoe Bat (*Rhinolophus hipposiderus*, see Plate XIV., figs. 2-3) which I allowed to fly about in a room with a large mirror about six feet by four at one end, kept persistently flying at the mirror, and though it never actually touched it, it hovered in front of it in such a way as to indicate clearly that it was in some way deceived by it. This is the more curious, as the window of a room, which one would naturally have thought would be the more deceptive of the two, never seems to deceive a bat at all, though I have known one effect a very speedy escape through a small hole in the pane of a wash-house window. By swinging round an artificial fly at the end of a long fishing line and rod, I have attracted several Noctule Bats, which circled round ten or a dozen times, closely following the fly, and probably guided by sight.

The strong predilection of bats for dark corners is also suggestive. In one case which came under my observation this instinct was attended with disastrous results. A Long-eared Bat (*Plecotus auritus*, see Plate XIV., fig. 4) which I had obtained one day, was placed, on my arrival at home, in the first receptacle handy, which happened to be a box containing several large shells. In obedience to its usual desire to try to get into the darkest corner, the bat squeezed itself so far into one of the shells as to be unable to extricate itself again, so that on opening the box a few hours later I found it dead, and wedged so firmly in the shell that I had difficulty in withdrawing it (see Plate XIV., fig. 5).

This brief review seems to indicate that the Cheiroptera have all the five senses well developed. The photographs, reproduced on Plate XIV., have very kindly been taken for me by my friend Mr. E. H. Wakefield.



Mr. Edgar R. Waite, formerly of Leeds, and at one time Editor of the *Naturalist*, and recently Zoologist at the Australian Museum, Sydney, has been appointed Curator of the Canterbury Museum, Christchurch, New Zealand.

ON THE BELEMNITES OF THE CHALK OF YORKSHIRE.

(PLATE XV.)

By C. DAVIES SHERBORN, F.G.S.

So far as at present known, the Belemnites found in the Chalk of Yorkshire are limited to five forms—

Actinocamax granulatus (De Blainville). *Micraster cor-anguinum* zone to *A. quadratus* zone.

Actinocamax verus Miller. *M. cor-anguinum* zone to *A. quadratus* zone.

Actinocamax grossouvrei Janet. The subject of a special note by Mr. Crick (page 155.)

Actinocamax plenus (De Bainville). *A. plenus* zone.

Belemnites minimus (Sowerby *ex* Lister). Red Chalk.

B. minimus, the common fossil in the Red Chalk, can easily be found in those beds as exposed on the shore at low tide under the Speeton Cliffs. The shape and length of this species varies considerably with age.

A. plenus, long known from the zone to which it gives its name, from Lincolnshire to the South of England, has only recently been found in Yorkshire. (C. Thompson, *Naturalist*, July, 1905, p. 202.)

A. verus, usually common in the *Uintacrinus* band of the *Marsupites* zone in the South of England and for many years known only from the top of the *Micraster cor-anguinum* zone of Micheldever in Hampshire and Northfleet in Kent, was found by Dr. Rowe in the same position at Walmer in Kent in 1903. In Yorkshire, though rare numerically, it has a much more extended range vertically, and Dr. Rowe and I have collected it on the Yorkshire coast from within fifty feet of the flinty chalk of the *Micraster cor-anguinum* zone to the south of High Stacks, right through the *Marsupites* and *A. quadratus* zones to within 25 feet of the highest part of the latter zone as exposed at Sewerby Cliff. We did not, however, find it in the successively higher *quadratus* chalk as exposed in the pits between Sewerby and Ruston Parva. Mr. Mortimer showed us an undoubted example of this form, which he says came from the flinty chalk of Fimber. This gives an undoubted range of 650 feet for *A. verus*, a range in striking contrast to that of 68 feet at Margate,



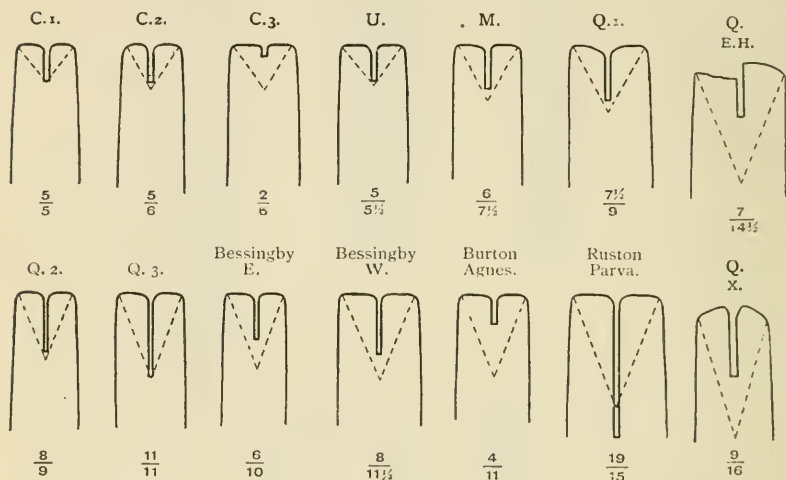
1. *Actinocamax plenus*. *A. plenus*-zone. Blue-Bell Hill Pit, Burham, Kent. B.M., C. 8563.
2. *Actinocamax granulatus*. *Micraster cor-anguinum*-zone. Northfleet, Kent. B.M., C. 8590.
3. *Actinocamax granulatus*. *Marsupites*-band (above the Bedwell line). Rifle Butts, Margate. B.M., C. 7273.
4. 5. *Actinocamax verus*. *Urtacrinus*-band (below the Bedwell line). Botany Bay, Margate. B.M., C. 7261.
6. *Belemnites minimus*. Red Chalk, Speeton, Yorkshire. B.M., C. 3001.

which, so far as is known at present, is the greatest measured thickness for this Belemnite in the South of England.

A. granulatus, known only from the upper part of the *Micraster cor-anguinum* zone at Gravesend in Kent, passes through the *Marsupites* zone, where it is common, and occurs somewhat abundantly in the lower 150 feet of the *A. quadratus* zone in the South of England. In Yorkshire, not only is it found in the flinty base of the *M. cor-anguinum* zone at Fimber (Mortimer : See Rowe, Proc. Geol. Assoc., XVIII. (4), 1904, p. 270), but Dr. Rowe and I have traced it right through the remainder of this zone on the Yorkshire coast, up through the zone of *Marsupites* to the top of the highest *quadratus* chalk as exposed at Sewerby. Further than this, we have followed it successively through the higher beds of this zone from Bessingby to Carnaby, Burton Agnes and Ruston Parva, thus demonstrating an unbroken range in Yorkshire for this form of about 800 feet, or nearly five times as great a range as known in Sussex, hitherto the greatest known. Moreover, throughout the whole of this great thickness it is clear that it is only one form, and the slow evolution of the species can be traced, step by step, until at last we are at the point, so to speak, of the next form, the so-called species *Actinocamax quadratus*, which gives its name to the zone. But a true specimen of the deep and quadrate alveolated form known as *A. quadratus* has not yet been found in Yorkshire ; and if, as is probable, that Ruston Parva gives us the highest part of the *quadratus* zone which has escaped denudation in the county, it never will be found, for the true *quadratus* occurred in the higher beds which have long since been destroyed.

For further particulars of Yorkshire Chalk Belemnites, that is the two latter forms, the reader must refer to the paper mentioned above (Rowe, Proc. Geol. Assoc., XVIII. (4), 1904, pp. 193-296), where the whole of the White Chalk and its fossils of the Yorkshire coast is described. I reproduce here the figure and legend there given of the alveolar ends of *A. granulatus*, showing the progressive deepening of the alveolar cavity as the belemnite ascends in the zones. I also give figures of the five forms discussed for handy reference (plate XV.), and call attention to a remarkable deformed specimen of *A. granulatus* described by Mr. Crick in an appendix to Dr. Rowe's paper, and reproduced in the 'Naturalist' for May, 1904.

- C. 1.—From the base of the *Micraster cor-anguinum*-zone, High Stacks.
 C. 2.—From the *Micraster cor-anguinum*-zone, between High Stacks and South Sea Landing.
 C. 3.—From the upper part of the *Micraster cor-anguinum*-zone, west of South Sea Landing.
 U.—From *Uintacrinus*-band, between South Sea Landing and Danes' Dike.
 M.—From *Marsupites*-band, west of Danes' Dike.
 Q. 1.—From *quadratus*-zone, Sewerby Cliff.

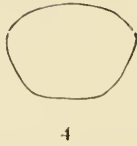
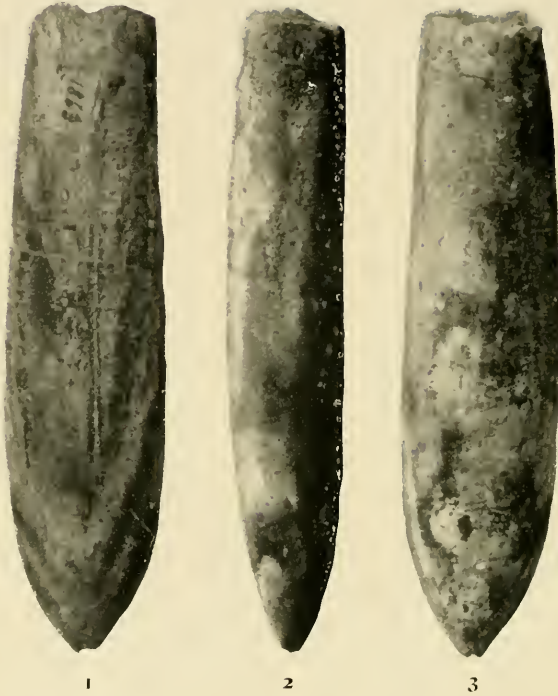


Drawings of Alveolar-Ends of *Actinocamax granulatus*, showing Progressive Deepening of the Alveolar Cavity as the Belemnite ascends in the Zones.

(Measurements in millimetres.)

(By permission of Dr. Rowe and the Council of the Geologists' Association.)

- Q. 2.—From *quadratus*-zone, Sewerby Cliff.
 Q. 3.—From *quadratus*-zone, Sewerby Cliff.
 Bessingby E.—From *quadratus*-zone, East Bessingby.
 Bessingby W.—From *quadratus*-zone, West Bessingby.
 Burton Agnes.—From *quadratus*-zone at Burton Agnes.
 Ruston Parva.—From *quadratus*-zone at Ruston Parva.
 Q. x.—Typical example of *Actinocamax quadratus* from the *quadratus*-zone of Harnham, Salisbury. This specimen shows the deep alveolus of the true *quadratus* form, and the cross-section of that cavity is of the typical quadrangular shape.



Actinocamax Grossouvrei. Chalk (*Micraster cor-anguinum*-zone). Fimber, Yorkshire.
In the Collection of Mr. J. R. Mortimer, Driffield, Yorkshire. Natural size.

FIG. 1. Ventral aspect.

FIG. 2. Left lateral aspect.

FIG. 3. Dorsal aspect.

FIG. 4. Transverse section at alveolar end.

NOTE ON A RARE FORM OF *ACTINOCAMAX* (*A. GROSSOUVREI*) FROM THE CHALK OF YORKSHIRE.

(PLATE XVI.)

G. C. CRICK, F.G.S.
British Museum (Natural History).

THE interesting fossil which forms the subject of the present note belongs to Mr. J. R. Mortimer, of Driffield, Yorkshire, to whom I am greatly indebted for the loan of the specimen. My thanks are also due to Mr. Sherborn for calling my attention to it. Mr. Mortimer says the fossil was collected in 1863 close to Fimber, in Yorkshire, from the flinty chalk. This flinty chalk is assigned to the base of the *Micraster cor-anguinum* zone by Dr. Röwe,* who records from it, besides other fossils, three examples of *Actinocamax granulatus* and an undoubted specimen of *Actinocamax verus*.

The fossil under consideration is undoubtedly referable to the species which M. Janet † described in 1891 as *Actinocamax Grossouvrei*. The following is a summary of M. Janet's description, which was based upon three specimens, from the Cretaceous rocks of France, exhibiting different stages of growth.

The guard at an advanced stage of development is rather massive and much depressed, having, when viewed from a ventral aspect, its point of greatest width at about three-fourths of its length from the alveolar end; from the point of greatest width it tapers gradually and regularly up to the alveolar extremity, whilst in the opposite direction it tapers much more rapidly and forms an ovoidal point.

In the very young stages of development the transverse section is, as shown by fractures of the guard, quite circular, but with growth this section assumes a more and more flattened form. A medium-sized specimen presents in a ventral aspect a long and fusiform outline; its point of greatest width is situated, as in an example at a more advanced stage of development, at about three-fourths of its length from the alveolar extremity, but from this point it decreases much more rapidly than in the older individual up to the level of the ovisac, ‡ where

* Proc. Geol. Assoc., vol. xviii., part 4, Feb. 1904, pp. 251, 252.

† Bull. Soc. géol. France, sér. 3, tom. xix., No. 9, Nov. 1891, pp. 716-719, pl. xiv., figs. 1, 2, 3, and text-figs. 2 and 3.

‡ The ovisac is the small globular body at the apex of the phragmocone, and is therefore situated at the bottom of the alveolar cavity.

it has its least diameter; from this level up to the border of the alveolus it enlarges slightly.

None of M. Janet's specimens showed the ventral fissure quite clearly. They exhibited only a slight indentation of the border of the alveolus prolonged or not by a very slight and very short groove.

The dorso-lateral grooves are not very deep, but wide and distinct, and extend over more than three-fourths of the length of the guard.

The alveolus was preserved in only two of M. Janet's specimens. In one it was moderately deep, and its surface rendered irregular by radiating ridges; in the other it was very smooth, without radiating striæ or concentric ridges, only very slightly excavated, and with a small but distinct pit in the centre.

The surface of the guard is smooth and without any granulation, 'but,' says M. Janet, 'the superficial layers have been peeled off especially at the lower part of the ventral surface, so that near the extremity there is seen to appear the very oblique section of the concentric layers nearest the apical axis. The base of a coral which remains attached to one of our specimens proves that this alteration is not recent, and is due without doubt to the fact that in this part of the guard, as in the neighbourhood of the alveolus, calcification was less than in other parts.'

'This alteration,' continues M. Janet, 'has caused to disappear, if however it ever existed, the mucronated point so clear in *Belemnitella mucronata*, *Actinocamax granulatus*, and *Actinocamax subventricosus*.'

Mr. Mortimer's specimen (Pl. XVI., figs. 1-4) agrees very closely with M. Janet's largest example. For the sake of comparison, the dimensions of these two specimens are given in the following table; the English specimen is obviously, however, more incomplete anteriorly than the French example, because it presents no indication of the alveolus, and appears therefore to be somewhat shorter, although the other dimensions are almost the same.

	Dimensions of Yorkshire specimen.	Dimensions of M. Janet's largest example.
Length in millimètres	92	97?
Ventro-dorsal diameter at the most inflated part	15	16
Transverse diameter at the most inflated part ...	22	20
Ventro-dorsal diameter at the narrowest part, <i>i.e.</i> , at the anterior end	14	14
Transverse diameter at the narrowest part, <i>i.e.</i> , at the anterior end	18	17

Naturalist.

The Yorkshire fossil is much depressed, especially its posterior half, and is slightly curved towards the dorsal surface (see fig. 2), just as is shown in the lateral aspect of M. Janet's example (*loc. cit.*, Pl. XIV., fig. 1c). Its anterior end is imperfect, and shows no trace of the alveolus. Its broad and not very deep dorso-lateral grooves are well shown (see figs. 2 and 3), extending over fully three-fourths of its length. Its surface, where not eroded, is quite smooth, and its ventral portion exhibits the exfoliation of the superficial concentric layers, as mentioned by M. Janet in his largest specimen. In M. Janet's specimen, however, this exfoliation, doubtless resulting as that author points out from the imperfect calcification of these layers, was most marked at the *lower* part of the ventral surface, but in the present example it does not extend so far back as the posterior extremity of the guard, and is due to the imperfect calcification of almost the whole of the ventral portion of the superficial layers. The calcified portions of these layers cover, therefore, only the dorsal surface, the sides, and the posterior part of the guard like successive sheaths, which are open over the greater part of the ventral surface. (Two of these sheaths are plainly visible in fig. 1.) Possibly the present specimen had not reached such an advanced stage of development as M. Janet's largest example.

The posterior part of M. Janet's examples was not sufficiently well preserved to show if the guard possessed a mucronated point, but though the point of the Yorkshire specimen is not quite perfect, there is enough to show that the guard, as Grossouvre* has already pointed out, was mucronated (see specially fig. 3) as in *Belemnitella mucronata* Schlotheim, *sp.*,† *Actinocamax quadratus* Blainville, *sp.*,‡ and *Actinocamax subventricosus* Wahlenberg *sp.*§

As M. Janet observes *Actinocamax Grossouvrei* most closely resembles *Actinocamax subventricosus*, Wahlenberg, *sp.*

* Bull. Soc. géol. France, sér. 3, vol. xxvii., No. 2, June, 1899, p. 129.

† Taschenbuch für Mineralogie, tom. vii., 1813, p. 111. See also C. Schlüter, Palaeontographica, Bd. xxiv., p. 80, pl. lv., figs. 1-12.

‡ Mém. sur les Belemnites, 1827, p. 62, pl. i., fig. 8. See also C. Schlüter, Palaeontographica, Bd. xxiv., p. 77, pl. liv., figs. 1-13; pl. liii., figs. 20-25.

§ Petrificata Telluris Suecana (Nova Acta Reg. Soc. Scient. Upsal., vol. viii., 1821), p. 80. See also C. Schlüter, Palaeontographica, Bd. xxiv., p. 75, pl. liii., figs. 1-9.

[=*Actinocamax mammillatus* Nilsson, *sp.**], but it differs from that species in having the section of greatest diameter lower than in *A. subventricosus*, in being more depressed, in having a shallower alveolus, in having the transverse section of the alveolar end somewhat trapezoidal instead of subtriangular, and in several other minor characters.

M. Janet's largest specimen was found in the neighbourhood of Beauvais (Oise), France, in the Marsupite chalk; the second, a younger and more elongated form, was obtained from the magnesian chalk at Margny-lès-Compiègne (Oise), France; whilst the third, a still younger and more elongated form than the second, was collected at Beauvais at the same horizon as the largest specimen, together with *Actinocamax verus* and *Marsupites ornatus*.

In the paper to which reference has already been made, M. Janet † founded the species *Actinocamax Toucasi* upon a single specimen, which differed from *Actinocamax Grossouvrei* in being relatively much smaller at the alveolar end and much wider at its most inflated part, but M. Grossouvre ‡ has since pointed out that *A. Grossouvrei* and *A. Toucasi* are not distinct species, but extreme forms of the same type connected by a series of intermediate forms.

In France, then, the species occurs in the Upper Santonian and the Lower Campanian. ||

Actinocamax Grossouvrei is a widely distributed species; it occurs in the north of France, in the north of Germany, and in Scania, but everywhere it appears to be very rare. M. Grossouvre, § however, states that in the Pyrenean region, judging from the numerous fragments which have been found, it would appear to be relatively abundant. Wherever the species is found it occurs on the same horizon as *Actinocamax granulatus* and *Actinocamax verus*. It is interesting therefore to note that in Yorkshire also it is associated with the same two species of *Actinocamax*.

* Petrificata Suecana, 1827, p. 10, pl. ii., fig. 2. See also J. C. Moberg, Cephalopoderna i Sveriges Kritsystem, pt. 2 (Sverig. Geol. Undersök., Afhandl., Ser. C., No. 73, 1885), p. 53, pl. v., fig. 27; pl. vi., figs. 1-12.

† Bull. Soc. géol. France, sér. 3, vol. xix., No. 9, Nov., 1891, pp. 719, 720, pl. xiv., figs. 4a, b, c, and text-fig. 1.

‡ Bull. Soc. géol. France, sér. 3, vol. xxvii., No. 2, June, 1899, pp. 129, 130.

§ *Ibid.*, p. 133.

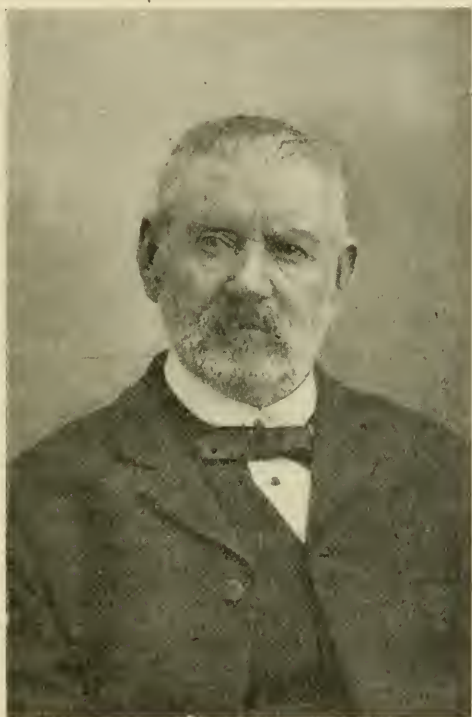
See A. de Grossouvre, 'Recherches sur la craie supérieure,' pt. i., fasc. 2, 1901, pp. 796-801.

In Memoriam.

WILLIAM NELSON.

Born November 9th, 1835, Died January 28th, 1906.

By the death of William Nelson, which took place at his residence at Crossgates, near Leeds, Yorkshire naturalists have lost a friend and companion—one of that sturdy band of working-man naturalists, who, by their unwearying activity



William Nelson.

and enthusiasm in the field, and by the influence of their personal example, have done so much to place, and to keep, the North of England in the fore-front of scientific research, and who—themselves the 'hewers of wood and drawers of water' (as he himself so happily put it)—have contributed largely to the accumulation of the stores of facts upon which the more venturesome are able

to build the superstructures, more or less elaborate, which summarise the labours of many workers.

Our deceased friend was one of those lovable persons whose influence is magnetic and whose enthusiasm is largely instrumental in drawing others into the field, and in this way it is to him in great measure that is owing the making of many proselytes, and the foundation of various societies, and of one periodical.

Born in Leeds about 70 years ago, he learnt early to observe and to study the shells, the plants, the insects, and the birds of the eastern outskirts of the town, and in 1862 he was mainly instrumental in founding the East End Naturalists' Society, the lineal forerunner of the present Leeds Naturalists' Club.

A carrier by trade, he left Leeds about 1865 and settled in Birmingham for about seven or eight years, taking an active interest in the natural history of that town, the results of his work there being embodied in a published paper on 'The *Limnæide* of Birmingham.'

It was not long after his return to Leeds that he—with three other conchologists—helped to found and was the first president of the Leeds Conchological Club, which afterwards, by a somewhat natural process of evolution, became what is now the Conchological Society of Great Britain and Ireland. The first president, he at various times filled all the other offices, and always continued to take a prominent part in the proceedings until the Society's headquarters were removed to Manchester. The Leeds Conchological Club thereupon resumed its separate existence, and in its proceedings and work Mr. Nelson continued to join till near his end.

In 1892 he was elected one of the ten Honorary Members of the Conchological Society. He was one of the compilers of its Official Catalogue of the British Land and Freshwater Mollusca.

He was not, however, a prolific writer, and his scientific papers were but few in number. His excessive caution, amounting almost to timidity and to distrust of his own judgment, deterred him from publishing until he should feel that he had completely verified and confirmed all his data.

His scattered records and field notes were, however, more numerous, and it was in such papers as the 'Extracts from a Conchologist's Note-book,' which appeared at intervals in the *Naturalist* from 1891 to about 1900, that his literary style most appropriately manifested itself, and revealed the true inward bent of his mind.

He was pre-eminently a field-naturalist, and was the happy combination of one who took interest in all the objects seen in the country-side and of a specialist, his particular field of research being the family *Limnæide*, which he studied and collected throughout his whole career, and of which he accumulated a very extensive and complete collection.

As a man, his sturdy, well-knit, and thickset frame, with close-trimmed hair and full beard, and a fine round open countenance beaming with smiles, showing a genial and hearty disposition, was always a welcome sight to his friends, and his peculiarly and inimitable subtle, dry, and yet inoffensive humorous remarks always added a spice of genial interest to a naturalists' discussion.

He was twice married, and leaves children of two families, one much older than the other. His first wife died in 1891, a year in which he took up his abode at Crossgates, in the immediate eastern outskirts of Leeds.

For some time before his death he had been visibly failing in health. He was subject to heart weakness, which interfered much with his work and his recreation alike, and was also subject to attacks of hemiplegia, to one of which he succumbed on the 28th of January this year. He was out collecting shells the day before, and was examining his captures during the day (Jan. 21st) on which he had the fatal stroke to which he succumbed a week later.—R.

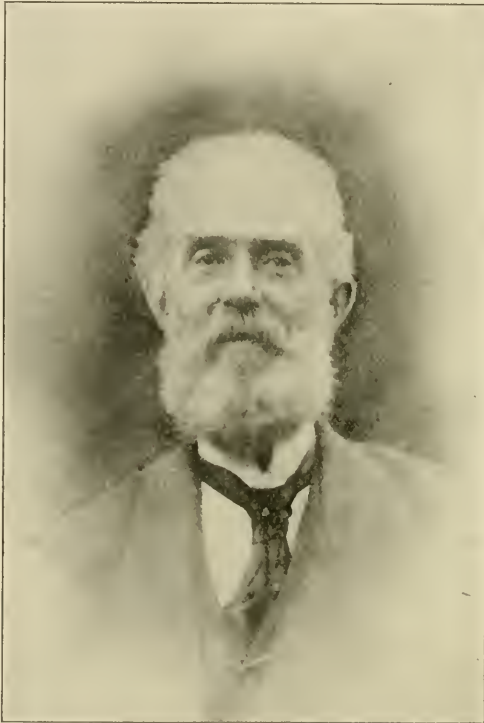
WILLIAM CUDWORTH.

1830-1906.

ON March 20th the Bradford Naturalists and Antiquaries lost one of their most enthusiastic members, William Cudworth, who died at the ripe age of seventy-five. Mr. Cudworth had been ailing for some time, and he was in anything but robust health when he attended the recent annual meeting of the Yorkshire Naturalists' Union at Bradford, where many of us saw him for the last time.

Whilst on the staff of the *Bradford Observer*, Mr. Cudworth developed a taste for Antiquarian research, and he subsequently published a number of books, &c., the most important being the 'Life and Correspondence of Abraham Sharp, the Yorkshire Mathematician and Astronomer,' (1889). He also wrote

'Historical Notes on the Bradford Corporation,' 'Round about Bradford,' 'Rambles round Horton,' &c. In more recent years he developed a taste for geology and natural history. In glacial geology particularly he was a keen student, and read papers thereon to the Bradford Scientific Society. In July 1903, he contributed to this journal an article on 'Carboniferous Vegetation



William Cudworth.

near Bradford,' in which a description was given of a fine fossil tree and roots (*Sigillaria* and *Stigmaria*) recently unearthed.

Mr. Cudworth was perhaps best known from the interest he took in collecting Roman and British Antiquities. Of the former period he gathered together a magnificent series of lamps, which is now in possession of a collector at Skipton. A well-illustrated catalogue of these lamps was prepared by Mr. Cudworth. Of British remains he had a fine series of implements from the Yorkshire Wolds and Moors, and it is pleasing to

record that these have found a permanent home in the Cartwright Memorial Museum. In connection with this building Mr. Cudworth took a great interest, and was a strong advocate in favour of it being a museum devoted to local geology, natural history, and antiquities. He took a leading part in the formation of the Museums at Ilkley and Grassington, and was also instrumental in founding the Bradford Historical and Antiquarian Society, and for many years edited the Society's journal.

Not in Bradford only (his native place), but much farther afield, will his loss be felt. We are indebted to Mr. H. E. Wroot for the photograph accompanying these notes, as well as for some of the information.—T. S.

—◆◆—

MOLLUSCA.

***Cœcilioides acicula*, &c., in East Yorks.**—I have pleasure in recording another locality for *Cœcilioides acicula* in this district.* Yesterday I found *three shells* in a chalk pit in Southburn parish, about three miles from the pit in which I was fortunate enough to find the same species two years ago. I found quite a colony of *Vitrea crystallina* and *Vallonia pulchella* associated with *Cœcilioides* yesterday.—Miss L. F. PIERCY, Driffield, April 3rd, 1906.

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NEUROPTERA.

***Hemerobius concinnus* var. *quadrifasciatus*, near Sheffield.**—Whilst collecting with Mr. L. S. Brady in a wood near Sheffield on the 29th June last I took specimens of the local *Hemerobius concinnus* var. *quadrifasciatus*. As at Sledmere, only the variety occurred, and as the form is so very different to the type, and so seldom occurs with it, notwithstanding its apparent structural identity, it is difficult to believe the forms do not represent two species.—GEO. T. PORRITT, Huddersfield, March 5th, 1906.

***Hemerobius marginatus* at Grassington.**—When working in the Grass Woods, Grassington, with Mr. J. W. Carter, on October 14th last, I was pleased to find a fine specimen of this pretty and rather rare species on a pine trunk.—GEO. T. PORRITT, Huddersfield, March 5th, 1906.

* See Petch, "The Published Records of the Land and Fresh Water Mollusca of the East Riding, with Additions."—Trans. Hull Sci. and Field Nat. Club, Vol. 3, No. 2, 1904, pp. 151-152.

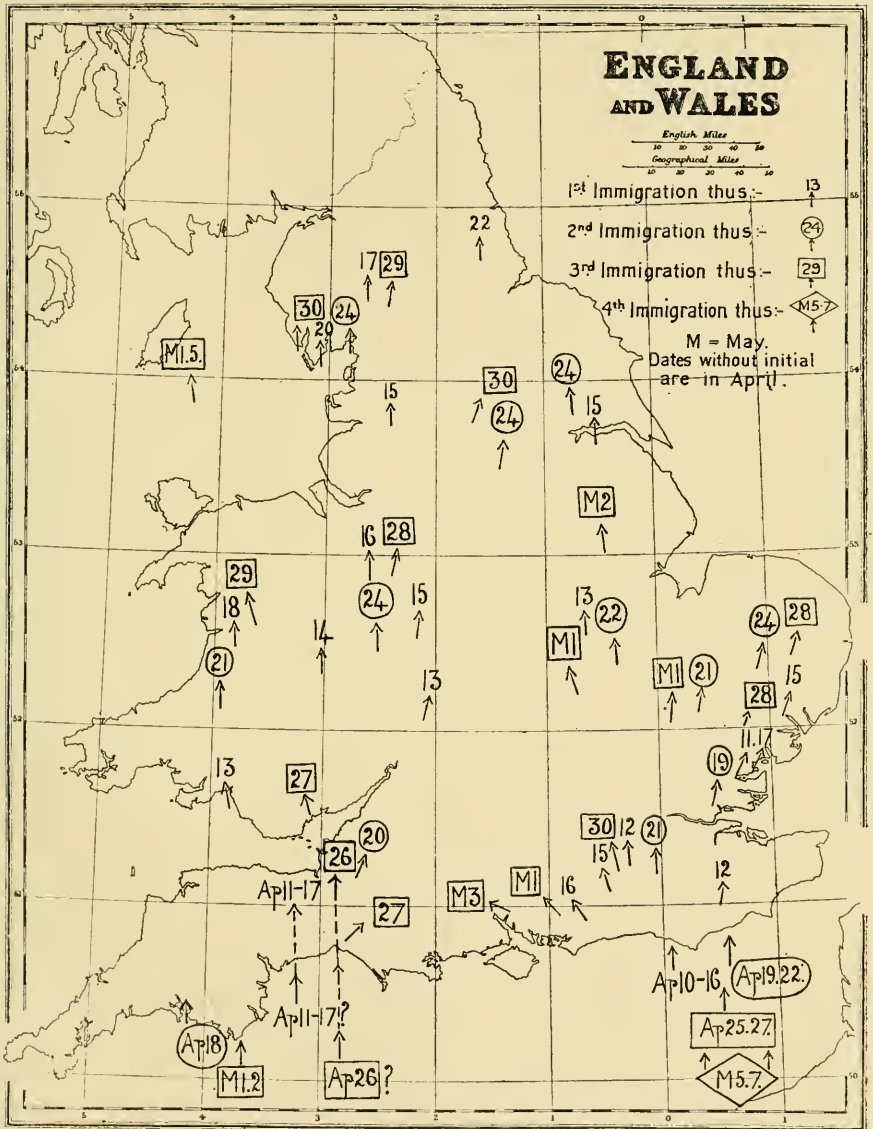
BIRD MIGRATION.

(PLATE XII.)

H. B. BOOTH.

A REPORT recently issued by the Migration Committee of the British Ornithologists' Club* is an earnest attempt to trace the arrival and dispersal of our spring migratory and immigratory birds. The members of the British Ornithologists' Union and other competent ornithologists throughout England and Wales, were supplied with specially prepared schedules for each week during the time of the vernal migrations. By the kind permission of the Master and Elder Brethren of the Trinity House, the keepers of the lighthouses and lightships on the south and east coasts of England were allowed to fill in schedules and to forward the wings of birds killed at their lanterns. By this arrangement the birds were properly identified, and, as might be expected, the correct names were in marked contrast to those filled in by the lightkeepers, who described most species either as Wrens or Flycatchers. The work is intended to supplement the work done by the British Association Migration Committee (so ably classified and edited by the President of the Yorkshire Naturalists' Union, Mr. W. Eagle Clarke), so far as the arrival and settling down of the summer migrants is concerned. The British Association Committee relied almost entirely on the reports of the lightkeepers for a number of years, not having had any land observers. In the present case the number of observers was 172, who returned 738 schedules; and the keepers of 31 lights returned reports and wings. The total number of separate records reached 15,000. In tabulating the returns the Committee has endeavoured to trace where the birds first entered the country; the number of separate immigrations of each species; the dispersal and settling down of the various batches for nesting purposes; and the passing forward of the remainder. In many cases they have disregarded the records of the very early stragglers, or other apparently abnormal arrivals, with the object of discovering the general trend of the immigrants. A map is devoted to almost every one of the twenty-nine species under observation, while the immigrations and dispersal of the

* Report on the Immigrations of the Summer Residents in the Spring of 1905, by the Migration Committee of the British Ornithologists' Club. Edited by W. R. Ogilvie-Grant. Witherby & Co., London. 127 pp. and 32 maps. 6s. net. (paper cover).



Map showing the Migration of the House Martin, 1905.

Swallow and the Chiffchaff have each required two maps. A table giving the weather and wind conditions prevailing on each side of the English Channel from April 7th to May 10th, and showing at the same time the number of immigrations noted each day, is a valuable addition. From these it would appear that the chief periods for migrants crossing the Channel in 1905 were respectively April 9th to 12th, April 26th to 28th, and May 7th to 9th, almost irrespective of weather conditions. The map, reproduced by the permission of the committee (Plate XII.), illustrates the four chief immigrations of the House Martin, as gathered from the records for this species. Leaving out the early stragglers (amongst which are Radnor April 3rd and Yorkshire April 11th), it would appear that the House Martins arrived at certain parts of the south coast *only*, none having been noted in the centre (*i.e.*, the Hampshire and Dorset coasts). This was in great contrast to that of the Swallow, which appeared to arrive in a broad front along the whole of the south coast. The respective immigrations of the House Martin made their appearance on the south coast of England as follows: April 10th to 16th, April 18th and 19th, and April 24th to 27th. The birds forming the above three immigrations can be traced northwards through the country by the reference dates on the map. The fourth immigration was noticed on the coasts of Sussex and Kent on May 7th and 8th, but the course of this last batch was not traceable further, and these birds probably passed forward to more northern breeding grounds than England.

Besides a short written account, a 'Chronological Summary of the Records' is published with each species. We think it would have been better to have published *all* the reliable records in full, and more particularly all those that are shown on the maps. These omissions render comparisons and deductions very confusing to the student. Using selected records also is liable to give a wrong impression, and to bring to mind the saying that 'Statistics can be made to prove anything.' The altitude above sea level of the various observatory stations would have been an improvement. The bare description 'Yorkshire,' for instance, is very vague, when we know that the arrival and settling down of many species is governed to a certain extent by the varied geographical 'face' of our county of 'broad acres.' A list of those who made the observations would have added additional value and authority to the records. The committee, however, are to be complimented on the success.

of their undertaking, and on the manner in which they have dealt with such a large amount of material. They expressly point out that the first year's work can only be regarded as approximate, and that they are unwilling to generalise to any great extent on the results. They desire to carry on the work for a number of years, and hope to take in hand the autumn migratory movements as well, at some future time. All interested in the migrations of birds will wish them success, and for our part we should like to see similar reports added for Scotland at least, which would show the further northern movements of many species.

Some significant facts, brought to light by this investigation (subject of course to confirmation by future years' reports), are that certain birds, including the Tree Pipit, Whinchat, Redstart, Lesser Whitethroat, and Red-backed Shrike, which are rare or unknown in Ireland, were found to enter England on the south-east coast only. On the other hand, the Ring Ouzel, Garden Warbler, Swift, and Landrail, appear to have arrived solely on the western half of the south coast. It would be interesting if these observations could be confirmed. Unfortunately the two most important counties for noticing the first arrivals on our shores (Kent and Cornwall) were practically without observers. We trust the committee will be able to remedy this serious defect in the future. Recorders were also rather sparse in the Midland Counties, including Norfolk, a most important county for the purpose. Yorkshire was represented by about nine recorders, who were fairly well distributed over the county.

For the purpose of recouping part of the necessarily heavy expenses, the 'Report' has been issued to the public. The text is ably and clearly written.



At a recent meeting of the Lancashire and Cheshire Entomological Society a paper was read by Mr. W. Mansbridge upon some of the microlepidoptera of the Liverpool district. About twenty species were dealt with, some of them new to the county list. Among the more interesting records was that of the moth *Myelois ceratoniae* and its aberration *pryerella* with an intermediate form; these were bred from larvæ found in dates purchased in Liverpool. Another interesting insect was a specimen of *Dioryctria abietella*—a very dark form captured in Delamere Forest. A bred series of the local tortrix, *Peronea permutana* from Wallasey, was also referred to by the author, who exhibited most of the species noted in illustration of his paper. Other exhibits were a series of *Semasia Waberania*, bred by Mr. G. L. Cox, from larvæ found in cherry bark at Oxtou; Mr. E. J. B. Sopp, F.E.S., the exotic cockroaches *Nyctibora holosericea* and *Panchlora virescens* from the ship canal docks at Manchester.

NORTHERN NEWS.

Mr. W. E. L. Wattam is President of the Lindley Naturalist and Photographic Society for the present year.

Mr. E. P. Butterfield gives some notes on Cuckoo's eggs in Twites' nests in the April *Zoologist*, based upon observations on Yorkshire moors.

Mr. W. Denison Roebuck, F.S.L., has returned from his travels abroad, having visited various parts of New Zealand, Australia, South Africa, India, &c.

In the 'Transactions of the Yorkshire Dialect Society,' part 7, recently published, the Rev. E. M. Cole has a note on 'Ancient Danish "Mens-names" in Yorkshire.'

Under the heading '*Lathrobium lævipenne* Heer: An Addition to the British List of Coleoptera' in the *Entomologist's Monthly Magazine* for March, Mr. W. E. Sharp records the occurrence of *L. boreale* in Cumberland.

In *Knowledge and Scientific News* for March, Mr. E. A. Martin has a paper on 'Coast Denudation in England,' in which he refers to the Yorkshire coast.

We understand the Scarborough Societies are considering the advisability of making a special effort to raise funds to put their museum in proper order. We trust the effort will be successful.

By the kindness of Mrs. Goodchild, we are able to reproduce a photograph of the late J. G. Goodchild in the current issue (Plate XVII). See notice in the April 'Naturalist,' pp. 130, 131.

The April *Zoologist* contains some 'Rough Notes on Derbyshire Ornithology' (why 'rough?'). The same Journal has a record of a 'Continental Longtailed Tit' at Kirkham Abbey.

In the March *Entomologist's Record* Mr. J. W. H. Harrison has a note on the causes of variation of *Polia chi*. His observations are largely based on specimens from Yorkshire, Durham, and Cumberland.

A paper on 'The Home of the Sea-Gull' appears in the April *Animal World*. It is illustrated by photographs of Fleetwood, once the Sea-Gulls' home, Cockerham Moss, &c.

'Keighley Museum Notes' are sheets printed at the Museum as labels, for use in connection with elementary schools, and for purposes of exchange with other museums. Twenty-four have already been issued.

Mr. Cosmo Johns, F.G.S. (Sheffield) contributes a note on 'Allotropic Forms of Silica as Constituents of Igneous Rocks' to the March *Geological Magazine*.

The Rev. Canon Greenwell, of Durham, the well-known archæologist, is said to have recently celebrated his eighty-sixth birthday by catching a 72 lb. salmon in the Tweed. 'A less truthful man,' says *Punch*, 'would have caught an 86 lb. salmon!'

In the February *School World* Mr. Hugh Richardson, of York, gives some useful hints on 'School out of Doors,' which might well be followed by other schools. He shows several ways in which valuable work may be done by scholars in the fields.

A new British fish, to which the name of *Coregonus gracilior* has been given, is recorded in the February *Annals and Magazine of Natural History*. It is recorded from Derwentwater, and is allied to the vendance of Lochmaben.

At a recent meeting of the Lancashire and Cheshire Entomological Society, Dr. J. Cotton exhibited a long series of *Triphana fimbria* and *T. pronuba*. The series represented the range of variation as met with in the St. Helens district very fully, the rarest form shewn being of a unicolorous dull brown with none of the usual markings visible.

We much regret to record the death of Mr. G. W. Lether, of Scarborough. Mr. Lether was a keen geologist and knew every quarry and section for miles around, and was exceptionally familiar with the various fossils found therein. He frequently obliged the Yorkshire and other societies by conducting them round the quarries when they visited the Scarborough district.

A 'Nature-Study' Conference was held at the Keighley Museum on March 31st. A special collection of specimens illustrating the natural history of Airedale was on view. Mr. A. E. Benney read a paper entitled 'Pleasures and Benefits of Nature Study,' and Mr. S. L. Mosley, the Curator, read notes on 'Our Museum: Past Achievements and Future Ideals.'

We notice in the current *Bradford Scientific Journal* that a writer is there criticising an 'unfortunate inaccuracy' which is alleged to have appeared in the 'Naturalist' in reference to taking a nightingale's nest near Selby. Whether the nest and eggs were 'stolen' or not, perhaps it will be admitted that at any rate one of the eggs was subsequently stolen—properly 'stolen' this time, from Bradford!

With the 'Proceedings of the Liverpool Geological Society—Session 1904-5,' this society commences its tenth volume. Amongst the papers are 'Some Geological Problems in South-West Lancashire' (President's address) by T. H. Cope; 'The Glacial Geology of Anglesey,' by W. Edwards; 'Notes on Some Specimens of Lancashire Boulder-clay,' T. Mellard Reade; 'Notes on a Recently Explored Fault-Fissure on Ingleborough,' by H. Brodrick; and 'Sands and Sediments,' by T. M. Reade and P. Holland.

Amongst the many valuable notes appearing in the April *Bradford Scientific Journal*, the following may be referred to on account of their local interest: Obituary notice of the late William Cudworth; The Wild Boar and its Associations; Return of Local Gulls; The Common Wren; Yorkshire Naturalists at Bradford; and Museums and Nature Study. The Journal also contains the concluding portion of 'The Glacial Geology of the Bradford and Keighley District,' which is accompanied by a useful map shewing the various positions of the ice-front in the Cottingley Valley.

'The Fifty-third Annual Report and Transactions of the Nottingham Naturalists' Society for 1904-5' has just been issued. In addition to the list of members, etc., this Report contains the Presidential Address by Mr. H. Mellish, on 'Some Aspects of Meteorology,' with charts; and 'Notes on the Botany of Nottinghamshire,' by Prof. J. W. Carr. A list of plants which do not occur in 'Topographical Botany,' nor in any of the county 'Floras,' is given, thus bringing the Nottinghamshire list up to date.

A valuable 'Catalogue of the Manx Museum (Antiquities), Castle Rushen, 1905' (32 pp.), has been published. It is written by Mr. P. M. C. Kermode, and contains particulars of the various objects, dating from pre-historic times to the present day, which are housed in the Isle of Man Museum. Judging from the catalogue, the collection is an admirable one; and we trust the author's appeal for more suitable objects will be responded to. There are certainly many Manx antiquities in the hands of private collectors which would be more useful if at Castle Rushen.

THE NATURALIST.

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

EDITED BY

T. SHEPPARD, F.G.S.,
THE MUSEUM, 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.

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NOTES AND COMMENTS.

UNCONFORMITY IN THE NORTHUMBERLAND COAL-MEASURES.

AT a recent meeting of the London Geological Society, Prof. Lebour and Dr. J. A. Smyth described an interesting case of Unconformity and Thrust in the Coal-measures of Northumberland. The sections described occur on the coast north of the Tyne, near Whitley sands. The base of the 'Table-Rocks Sandstone' is found to rest unconformably upon a series of alternating shales and sandstones, among which is a well-marked band of clay-ironstone crowded with *Carbonicola acuta*, one of those 'mussel-beds' which are found to be perhaps the most remarkably-persistent strata in the North-of-England Carboniferous rocks. The entire junction, so far as it can be seen at the base of the cliffs and on the foreshore, many parts of which are only swept clear during exceptional weather, has been studied as opportunity offered during a series of years. The unconformity is shown by discordance in dip, by overlap of the Table-Rocks Sandstone, and by the existence of a pebble-bed, containing fragments of the mussel-band and other parts of the underlying series, in the lower part of this sandstone. But the upper, more massive, beds in the section have been thrust in a northerly direction over the lower and more yielding beds, the plane of gliding corresponding accurately along parts of the section with the plane of erosion. Towards the north of the section the beds of the upper series are weakened by intercalated bands of shale, and then differential action has been set up. The result is that the thrust-plane is no longer a simple one coinciding with the unconformity, but extends some way above it. The effects of the thrust are seen in the ploughing-up, folding, and faulting of the lower series, in the penetration of tongues of sandstone from the upper series into the lower, in the curling-up and shattering of the pebble-bed, in the puckering and hardening of the shale, and in the blending of fragments of the various rocks subjected to its influence.

GEOLOGICAL SURVEY MAPS OF EAST YORKSHIRE.

The geologists of Yorkshire, and those who visit the county to study its splendid development of Jurassic and Cretaceous rocks will rejoice to learn that a new edition of the official maps is being undertaken, and the more so as it has been decided to produce them by colour-printing. The advantages of this method are many; not only will the price be reduced from 3s. a

sheet to 1s. 6d. (when may we hope to see the price reduced to the popular and convenient 'bob'?) but geologists have the assurance that when once the final proofs have been revised no colourists' errors or omissions will insidiously vitiate the work. We have known rather important generalisations to be made on the basis of a supposed unconformable overlap when the actual junction was a faulted one, but the colourist had omitted the necessary streak of Chinese white. Colour printing, it is to be hoped, will secure uniformity of shade in contiguous maps, and in this respect great improvements have been effected since the production of the Geological Index Map (four miles to the inch), in which the contrasts between what should have been identical tints on adjacent sheets gave the mounted map somewhat the aspect of a chequer-board. While we are speaking of the Index, we may venture to utter a gentle protest against the short-sightedness—not, we believe, at Jermyn Street—which permitted the first edition of the Index Map to run out of print before a new edition was ready to replace it; the consequence is that students and others desiring a copy of this most useful and admirable map have been waiting weeks or months, and may have an equal time still to wait before the maps are on sale.

Is there no chance of our finding some knight-errant M.P. who will undertake the righting of all the wrongs we have suffered at the hands of the Ordnance Survey or the Treasury—we cannot apportion the blame—in the matter of good, cheap and easily purchasable maps. Much has been done, but more remains to do, and many geologists, to say nothing of engineers, sanitarians, and land owners, lament the falling off in the quality of the work put into our six-inch maps since photo-zincography took the place of the old methods of producing plates.

LEPIDOPTERA ILLUSTRATING MELANISM.

At the meeting of the British Association to be held this year at York (August 1-8), it is proposed that there shall be an exhibition of British Lepidoptera illustrating Melanism. The Organising Committee of the Zoological Section invite those who are willing to take part to communicate with Mr. L. Doncaster, Zoological Laboratory, Cambridge, stating the species and number of specimens which they are prepared to send. It is expected that a paper on 'Melanism' will be read at the meeting by Mr. G. T. Porritt, of Huddersfield, and that it will be followed by a discussion.

THE USE OF MAPS IN BOTANY.

W. G. SMITH, Ph.D.,
University of Leeds.

THE naturalist who has made a fair trial of the use of maps in his rambles will need little argument to convince him of their utility. When feeling one's way over a new country, a good map is not only a guide as to routes, but also indicates many features which might otherwise be passed unheeded. Whether one goes into the country for pleasure or with some definite object in view, it is surely a matter of general education to know the topographical features, the course and direction of the rivers and streams, and in other ways to absorb on the spot the information which a map can convey. A map may appear at first sight to be matter of fact and uninteresting, yet with the Ordnance Survey sheets as sole companions, one may learn many things about a district as it is to-day, and as it was in days gone by before industry had obliterated natural features, and one may even obtain glimpses of a still earlier period when the Romans and early Britons made their settlements and roads. The value of the information conveyed by the one-inch Ordnance maps, for example, may be appreciated in some degree if one could imagine a large tract of country uncharted. How much information could any of us gather respecting such a district in, say, a year of residence there? If circumstances demanded that we should try to make a picture of the district, how far should we progress in a year? Of course, much local knowledge has been gathered by many people who have rarely or never seen a map of their district. There is, however, this difference between the man who tries to make a map of his own locality and the man who only knows it mentally, that the former leaves documents which may benefit posterity, whereas the latter carries his local knowledge away with him. This is too often the case with local natural history. The few make notes, and in after years the few records actually made are all that the generation of that time has acquired; the observations made but not recorded are either altogether lost, or the facts are too indefinite to be accepted without re-examination. In reading over the notes of some old observer, one often feels how much more satisfactory it would have been if he had amplified his description in words by calling in the aid of some other method. The preservation of specimens of plants, animals, rocks, and other objects is fundamentally a means of amplifying the written record, since in this way one can refresh one's own memory as

to the facts, or convey the impression of what the object really looks like by showing it to others. The sketch and the photograph, the rough chart and the map, are all means of illustrating what one wishes to convey. The map is a form of illustration which has long been used by the geologist, but has not been valued at its true worth in other branches of natural history. In Botany the small map showing the distribution of a natural order has been in use for some time, but the use of large-scale maps to show the features of a small area is comparatively recent. The success of these has attracted attention to their use as records of local natural history. Recent volumes of the *Naturalist* contain several suggestions of this kind,* and the present notes are mainly intended to be supplementary to the extremely practical hints on map-records by Messrs. Cosmo Johns and Alfred Harker in last year's volume. The former author has suggested so many ways in which maps may be used to record facts in natural history that we need not tarry over this side of the matter.

One of the first points to be decided is the kind of map to use. Those available for field-work are generally known by some name indicating the scale used to represent a mile; the more important are:—

(a) 'Quarter-inch,' or 'four miles to one inch.' Here each inch represents four horizontal miles, and the numerical reduction is 1 : 253440 of actual length on the ground.†

(b) 'Half-inch,' 'two miles to one inch,' or 1 : 126720.

(c) 'Inch,' one inch to one mile, or 1 : 63360; sheets (12 × 18 miles) cost 1s. each.

(d) 'Six-inch,' 'six inches to one mile,' or 1 : 10560; sheets (6 × 4 miles) 2s. 6d., or quarter sheets (3 × 2 miles) 1s.

(e) 'Twenty-five-inch,' or 'twenty-five-inches to one mile.' The numerical reduction here is 1 : 2500 of actual length on the ground (this is the easiest numerical ratio to remember), and a mile is actually 25.344 inches on the map. It is also useful to remember that one square inch of this map approximately represents one acre.

The Ordnance Survey Department publish maps on all the scales given above, except the half-inch, and they are the best maps obtainable in Britain. Convenient maps on the quarter-

* Maps and Records. Cosmo Johns (September, 1905, pp. 260-263). The Recording of Localities. Alfred Harker (November, 1905, p. 331).

† The numerical reduction should always be given in the case of publication, as it is much more convenient for comparison with foreign maps than the English inch scale.

inch and half-inch scales are issued by the various firms of map publishers, but as the main object of these is to serve as road-maps, they do not show much detail. The Ordnance maps on the one inch and larger scales show contour lines, altitudes, and boundaries, as well as woods and uncultivated land, which are useful guides in botanical work. A useful explanation of the symbols used on these maps, with examples of the different scales, is published in a pamphlet—the characteristic sheet—which can be purchased (price 6d). The maps may be obtained from agents in the larger towns, and also from many of the post-offices. The 'one-inch' map is printed in four styles, but the unshaded outline maps are the best for recording.

Some consideration must be given in selecting a scale suitable for the records to be made. The quarter-inch maps will be found too small for most purposes. The half-inch maps of Bartholomew were used as the basis for the colours showing vegetation in the published maps of botanical survey in Yorkshire* and Scotland.† This scale is only suitable, however, for showing general features of the vegetation, and in every instance the actual field-work was done on Ordnance maps of a larger scale. In publishing the results of botanical surveys of Westmorland (F. J. Lewis ‡) and Dublin District (G. H. Pethybridge and R. L. Praeger §), the authors found that the inch scale was necessary to record the observations made.

An examination of these published papers will indicate how much can be shown on maps of the scales mentioned. In choosing a scale map for field-work, much depends on the kind of records to be made. The work in progress in botany is capable of expansion in many directions, but at present it may be grouped into the recording of plant species and the recording of plant associations.

Recording of species. The topographical botany of H. C. Watson has led many naturalists to follow up the work, and we believe that maps will prove the best method of making records of this kind. There is now in progress, under the guidance of Professor Traill, a very systematic system of recording the occurrence of species of plants in the north-east of Scotland. Map tracings have been distributed to a large number of

* *Geographical Journal*, April and August, 1903.

† *Scottish Geographical Magazine*, July and August, 1900, December, 1904, January, February, March, 1905.

‡ *Geographical Journal*, March and September, 1904.

§ *Proc. Roy. Irish Academy*, xxv., December, 1905.

recorders with a list of plants which they are asked to record. The maps are sub-divided by squares into small areas, so that the position of a single plant or group of plants of a species can be marked with great accuracy. The district is a good one for examining the upper limits of lowland plants and the lower limits of Alpine species, and the object is to ascertain these and other facts regarding the distribution of plants. It is not sufficient to state that some particular plant occurs in a Watsonian vice-county, or in a parish, river basin, or some similar division of Britain. It is a familiar fact in Yorkshire that there may be considerable variations in altitude and in the geological formations and soils within a single square mile; these have each an influence on plant growth, because they bring about changes in the climate and the soil conditions. The occurrence of a particular species may also be due to the presence or absence of trees or shrubs, and may have little relation to altitude or latitude, except in so far as these influence the tree-growth. The mere recording of the stations for a species may not be scientific work of a high order, yet if a large number of records were correlated by a competent organiser, as in the case just mentioned, results of importance could be attained. For records of this kind the one-inch Ordnance maps are too small, and the six-inch or twenty-five-inch maps would be necessary. The expense is an objection which will be considered later. The suggestions of Mr. Cosmo Johns and Mr. Harker will be seen to apply definitely where map-records of this kind are made, and one or other system should be adopted in the work. We should also like to re-emphasise Mr. Harker's advice to make the record *on the spot*.

Recording of plant associations. The choice of a suitable scale of map depends on whether the association to be recorded covers (or is likely in every case to cover) a large area or a small one. If, as in the Yorkshire botanical surveys, Heather, Grass, Cotton Grass, and other large moorland associations, with three or four types of woods are the only things shown on the map, then a careful observer may find the one-inch map sufficient. Yet almost all who are now engaged in similar work find the six-inch maps more useful, because they contain so many more landmarks by which to determine one's position. There need be no hesitation in strongly recommending the six-inch maps for the work of local societies, and, as Mr. Cosmo Johns states, these are already in use at Sheffield. There is, however, a system of botanical survey for which even the six-inch

maps may prove too restricted. Dr. T. W. Woodhead's surveys of woods showing the distribution of the Bluebell, &c. (*Naturalist*, 1904, pp. 41-48, 81-88), were carried out on twenty-five-inch maps, although the striking results obtained were lost to some extent on the small published maps. The writer has assisted in a botanical survey of a salt-marsh in which even the twenty-five-inch scale was too small to exhibit the features which it was necessary to show. In this case a survey of the area was made with chain, level, and theodolite, and the results were plotted to a scale of 1 : 500 or 10.5 feet to a mile (Oliver & Tansley *New Phytologist*, iii., p. 228, 1904).

The cost of the Ordnance Survey maps is sufficient to deter many from attempting to use them over large areas, and in the case of the six-inch maps is too great for most individuals to bear single-handed. It is not, however, beyond the means of many of the Societies of the Yorkshire Naturalists' Union to acquire the maps of their own district, and the providing of such a set of maps is thrown out as a suggestion to any prospective donor who would secure a permanent souvenir of his generosity. If the Society's set of maps were ruled in squares as suggested by Mr. Cosmo Johns, any worker by using note-books ruled in squares could make his records without defacing the maps themselves. Dr. Woodhead, at the British Association Meeting at Cambridge, described a process of manifolding copies of small areas from the Ordnance maps, which would solve the difficulty of providing several copies at small cost. Personally we are not inclined to cut the maps up to the extent proposed by Mr. Harker, because marginal work on a map is rather liable to be irritating. A well-known ex-president of the Yorkshire Naturalists' Union contrives to carry the quarter sheets of the six-inch map in a capacious pocket, which may not be conducive to external appearance, but is very efficient. The method of carrying the map sheets in a portfolio is probably the best yet devised. These, however, are details which may be left to the individual to deal with.

In closing these notes on the use of maps, it may be added that the subject has been submitted to the Yorkshire Naturalists' Union Committee for Suggestions, and will be brought up for discussion at one or more of the Field Meetings this year. It will facilitate the preparation of a scheme of work if those who have anything to add to the subject will communicate it either through the *Naturalist* or to the meeting, of which notice will be given in the Excursion circular.

THE PERMIAN SALT LAKE.

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

THAT the Permian rocks east of the Pennines differ from their representatives in the west is a well known fact. That they were deposited in an inland sea under conditions unfavourable to animal life has long been recognised. The peculiar character of the deposits, that is, so far as this island is concerned, and the evidently abnormal conditions attending their deposition, render them deserving of far more attention than they have received. In a short paper like this a detailed discussion of the many interesting features presented would be out of place, if not impossible, so its scope will be limited to a study of the climatic and other conditions that must have prevailed during the time the upper marls were being laid down.

The particular section of the upper marls to be discussed is that furnished by the core of the well known South Carr* or Haxey deep boring. In the greater portion of the Midland coalfield the Trias overlaps the upper marls which were laid down in the shrunken relic of the great Permian Sea. The eastern representatives of the Permian rocks carry in their changing features, as we examine them as an ascending series, every evidence that the sea in which they were deposited had not only become land-locked, but that evaporation was proceeding apace and increasing salinity was accompanying the decreasing volume as might naturally be expected. In upper marl time the dwindling sea had become a veritable salt lake—not only salt, but saturated with salt—the evidence for which will now be discussed.

Towards the top of the upper marls we find a thin bed of gypsum, and above it, but separated by more marl, a bed of anhydrite 9 feet in thickness. This anhydrite is remarkably pure and, so far as can be seen,† its formation was not interrupted by any sediments coming in. This very pure bed is followed by marls, then comes another thin gypsum band. A little marl follows, and then the Triassic sandstone appears. There are good reasons for believing that this bed of anhydrite extends over a fairly large area of the coalfield, but it is probably not continuous with the thick deposit which lies at the top of the Permians at Hartlepool.‡ The sequence is complete, and the

* Trans. Manchester Geol. Soc. 1902, p. 58. Trans. Fed. Inst. M.E. vol. xii. 1897, p. 518.

† Private communication to author.

‡ Geikie, 'Text Book of Geology,' 1903, p. 1071, footnote.

evidence required for our investigation is all that one could ask for.

Gypsum is of course sulphate of lime, with its water of crystallisation, and may be represented by its formula, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. Anhydrite is sulphate of lime without the water. Now gypsum is a very ordinary deposit in a salt lake which has reached a certain degree of concentration, but the formation of anhydrite only takes place under certain well defined conditions. These conditions were determined during the investigations* of Vant' Hoff and his pupils on the famous Stassfurt salt deposits. It will now become clear why stress has been laid on the presence of gypsum beds both above and below the anhydrite, and separated from it by marl. It is the fact that they appear in these positions that supplies the proof that the conversion of the gypsum into anhydrite was contemporaneous, and that the particular conditions attending its formation must have been peculiar to upper marl time.

Vant' Hoff's experiments † prove that gypsum is converted into anhydrite only when the temperature is about 30°C . and in the presence of a saturated solution of sodium chloride, common salt. The conversion is a slow one, and though it might have a slight range above and below, it affords us a reliable figure for determining the temperature of the lake for a considerable period. The lake was shallow, and the effect of pressure on the transformation temperature would be so small as to be negligible. We are thus presented with interesting data of an unexpected character, and a discussion of the climatic conditions at that remote period has in this particular instance the advantage of being based on something better than doubtful lithological features or obscure paleontological evidence.

The simple character of the salts in the Haxey bore, *viz.*, gypsum and anhydrite, differentiate these deposits from those composing the Stassfurt beds, where there is ample evidence that the sea had access at times to the basin in which the complex series of salts found there were being deposited. In our shrunken Midland basin the lake was landlocked, and there is no evidence of occasional inroads of the sea. The marls testify to rushes of fresh water bringing down sediments from the surrounding land surface, and the gypsum is evidence that

* A resume of Vant' Hoff's work by Professor Armstrong appeared in 'Rep. Brit. Assoc.', p. 262, *et sequa*. References occur in various Nos. of 'Science Abstracts' during recent years.

† 'Archives Néerlandaises' 6, pp. 471-489, 1901. Reference in 'Science Abstracts' 1902, p. 219.

salinity was increasing notwithstanding. The succeeding marl notes the appearance of more sediment-bearing water, and then we have the thick bed of anhydrite, during which concentration of the salt constituents of the lake must have reached the point of saturation for sodium chloride. It should now be made clear that in the case of sodium chloride, complete saturation means that some of the salt must have been present in the solid form. The purity of the anhydrite, and its freedom from interbedded sediment indicates the extreme aridity of the climate just as clearly as the extreme salinity of the water does.

Another influx of muddy water left its sediment lying on the anhydrite, and after the last layer of gypsum had been deposited from the now less salt-laden water, a final layer of marl brought the Permian period to a close. With it ended the Palæozoic era that had been born when the mighty Cambrian sea, with its wonderful Trilobitic fauna, flowed over the pre-Cambrian land surface—it expired in the miserable salt lake of the Permians, now buried deep below the surface of the fertile Vale of York. Yet before the wind-blown* sands of the Triassic desert had hidden its last sediments, an obscure chapter had been written on the saline pages of the upper marls. It was written in characters hard to decipher, but yielding at last their secret story to the patient worker who, in his laboratory, spent ten years in the laborious task. All honour to Vant' Hoff and his brilliant helpers.

Those who take the trouble may now learn how the humid swamps and morasses of the coal measures subsided under the waters of the Permian Sea. How stage by stage that sea contracted in volume, laid down the massive lower Magnesian Limestone, and then after the middle marls came the thinly bedded upper limestone in a much diminished sea. Then came the final dwindling into the salt lake whose history we have been discussing.

This lake was saturated with common salt, and its temperature for a considerable time must have been 30° C., that is 86° F.

It does not require much imagination to conjure up a picture of that dwindling and shrunken salt lake, its sun-baked shores, and the distant but lowly Pennines dried and parched, from whose surface the western winds and occasional torrents were to carry the sands of the Triassic desert, and usher in the Mesozoic era.

* Walcot Gibson, 'North Staffordshire Coalfields' 1905, p. 139.

THE PLANT CELL: A HISTORICAL SKETCH.

AGNES ROBERTSON, D.Sc.

CYTOLOGY, the study of the cells, or elementary units of which all living things are built up, is a comparatively young science, dating back less than three centuries. Some branches of botany are comparatively independent of special methods of observation. For instance, the systematic botany of flowering plants may well be studied with no external aids at all; with Cytology on the other hand the case is quite different. We can have no knowledge whatever of cell structure without the aid of lenses, and each fresh development of the subject has had the way paved for it by some fresh development in optics. Some of the first observations with magnifying glasses of which we have a record are those of the Dutchman Leeuwenhoek (1632-1723) who examined an infusion of pepper with the aid of lenses, and saw minute living creatures swimming in it. Many people were sceptical about Leeuwenhoek's results, to his great indignation. 'I have often heard,' he says, 'that many persons dispute the truth of what I advance in my writings, saying that my narratives concerning animalcules, or minute living creatures, are merely my own invention. . . . For my own part, I will not scruple to assert that I can clearly place before my eye the smallest species of these animalcules concerning which I now write, and can as plainly see them endued with life, as with the naked eye we behold small flies, or gnats sporting in the open air, though these animalcules are more than a million degrees less than a large grain of sand. For I not only behold their motions in all directions, but I also see them turn about, remain still, and sometimes expire; and the larger kinds of them I as plainly perceive running along as we do mice with the naked eye. Nay, I see some of them open their mouths, and move the organs and parts within them; and I have discovered hairs at the mouths of some of these species, though they were some thousand degrees less than a grain of sand.' In justice to Leeuwenhoek, I ought to explain that when he uses the size of a 'grain of sand' as a term of comparison, it is by no means as vague as the size of a 'lump of chalk!' In the days when hour-glasses were universal, the different qualities of sand were most carefully sifted, and our author explains somewhere

that he always has in mind a certain sand of a specified degree of fineness. Leeuwenhoek's observations were apparently quite discredited in England until Robert Hooke confirmed the existence of these 'infusoria,' and exhibited them under his microscope in 1667 at a meeting of the Royal Society. The importance of this observation was felt to be so great, that a document attesting to its truth was drawn up and signed by all those who were satisfied on the evidence of their own eyesight. Two years earlier, Robert Hooke had published a book called the 'Micrographia,' in which he figures the cellular formation of various plant tissues, such as cork and charcoal, which he had observed under his compound microscope. His description of his method of observation has some interest:—'I took a good clear piece of cork, and with a penknife, sharpen'd as keen as a razor, I cut a piece of it off, and thereby left the surface of it exceeding smooth, then examining it very diligently with a *Microscope*.' The structures which Hooke saw, and to which he gave the rather unfortunate name 'cells,' from their resemblance to the compartments of a honey-comb, were not the living cells at all, but the dead cell-walls. It was probably because plant cells are characteristically clothed with cell-walls, while animal cells, as a rule, are naked, that cells were seen in plants before they were recognised in animals. The existence of the living jelly, protoplasm, which we now know to be the essential part of the cell, corresponding to the honey in the honey-comb, was not realised in Hooke's day.

The Italian, Marcello Malpighi, and the Englishman, Nehemiah Grew, followed Hooke a little in point of time, but have more claim than he to be regarded as the fathers of plant histology. They were the first to begin to realise the real importance of the cell. Grew's description of the structure of the soft tissue of the root (in the book which he published in 1672, and modestly called 'The Anatomy of Vegetables begun') though it sounds quaint in our ears, yet shows that he had quite a good idea of its nature. 'The Contexture of the *Cortical Body* may be well illustrated by that of a *Sponge*, being a Body Porous, Dilative, and Pliable. Its Pores, as they are innumerable, so extream small. These Pores are not only susceptible of so much moisture as to fill, but also to enlarge themselves, and so to dilate the *Cortical Body*, wherein they are; . . . 'tis a body also sufficiently pliable, or, a most exquisitely fine-wrought *Sponge*.' Grew speaks with respect of his countryman, Robert Hooke, saying in his chapter called 'Of the Trunk,' 'that

Worthy Person *Mr. Hooke* sheweth us, that the Pores of the *Pith*, particularly of *Elder-Pith*, as far as they are visible, are all alike discontinuous, and that the *Pith* is nothing else (to use his own words) but an Heap of Bubbles.' Respect, however, is singularly wanting in Grew's treatment of the unfortunate engraver who executed his illustrations. To one of the figures in his book called 'An Idea of a Phytological History Propounded,' he appends the concise note, 'This sculpture is utterly false!'

It is perhaps hardly surprising that even after making such a good start, Cytology remained dormant, or else spent its time in mistaken speculations, right through the eighteenth century, since that century was in so many other ways a time of intellectual barrenness. The great botanist Hugo von Mohl, who flourished in the first half of the nineteenth century, says 'The works of the plant anatomists of the eighteenth century did not further the knowledge of cell tissues in the smallest degree.' Some of the botanists of the period, seeking an analogy with animal cellular tissue, fell into the error of describing vegetable cellular tissue as a mass of irregular fibres and lamellae interwoven together; whilst others regarded it as a homogeneous mass hollowed into holes and canals.

It was not until the nineteenth century that the study of the cell obtained a new lease of life, chiefly through the exertions of Hugo von Mohl, Robert Brown, Schwann, and Schleiden. We may perhaps connect this renaissance with the fact that Amici and Fraunhofer made the first achromatic objectives in 1815—an immense advance in the development of the microscope. In 1828 von Mohl in a brilliant paper elucidated the nature of pitted membranes, and three years later Robert Brown discovered the nucleus, the central organ of the cell which presides over all its activities. The nucleus is so extraordinarily important in Cytology that I think it is worth while to quote the words in which Brown announced his discovery. The passage occurs incidentally in a paper on the Orchidææ. 'In each cell of the epidermis of a great part of the family, especially of those with membranaceous leaves, a single circular areola, generally somewhat more opaque than the membrane of the cell, is observable. This areola, which is more or less distinctly granular, is slightly convex, and although it seems to be on the surface, is in reality covered by the outer lamina of the cell. There is no regularity as to its place in the cell; it is not infrequently, however, central or nearly so This areola, or nucleus of

the cell, as perhaps it might be termed, is not confined to the epidermis, being also found, not only in the pubescence of the surface, particularly when jointed, as in *Cypripedium*, but in many cases in the parenchyma or internal cells of the tissue The nucleus of the cell is not confined to *Orchideæ*, but is equally manifest in many other Monocotyledonous families; I have even found it, hitherto however, in a very few cases, in the epidermis of Dicotyledonous plants.'

The most epoch-making work of this period was Schwann's '*Microscopische Untersuchungen*,' (1839), which laid the foundations of the cell theory. The keynote to Schwann's remarkable book is found in the sentence 'It may be asserted that there is one universal principle of development for the elementary parts of organisms, however different, and that this principle is the formation of cells.' This theory is now so completely taken for granted that it is quite difficult to realise that there was a time, not so very long ago, when it was new and revolutionary. The year 1839 may perhaps be regarded as the biological '*annus mirabilis*' of last century, marked as it was by the foundation of the cell theory, and also by the first clear conception by Charles Darwin of the idea of Natural Selection.

As soon as the truth of the cell theory had been really demonstrated, the question arose—how do the cells of the body originate? Most unluckily Schwann and Schleiden made the mistake of supposing that cells might arise in two different ways, either by division of a pre-existing cell, or by crystallising, as it were, out of a formless medium. They thought the latter process the usual and typical one. Schwann says 'A structureless substance is present in the first instance, which lies either around or in the interior of cells already existing; and cells are formed in it in accordance with certain laws, which cells become developed in various ways into the elementary parts of organisms.' Hugo von Mohl had recognised, as early as 1835, what we now know to be the true view, namely that no cell can arise except from a pre-existing cell by division, but it was not until twenty years later that the pathologist Virchow actually drove it home, and insisted that '*omnis cellula e cellula*.' To von Mohl, who in so many ways was ahead of his age, we owe the word '*protoplasm*,' which he first used in 1846. After speaking of the nucleus he says, 'The remainder of the cell is more or less completely filled with an opaque, viscid fluid of a white colour, having granules intermingled with it, which fluid I call *protoplasm*.' It was Huxley who brought the word

'protoplasm' into such popular prominence when he named it 'the physical basis of life.'

In such a short historical sketch as this, we cannot do more than just mention one or two men connected with each main advance, and name them crudely 'the discoverers.' But it goes without saying that this is only a shorthand manner of speech. Each great discovery is arrived at by a gradual building up process in which many hands take part, though as a rule it is only the man who at the eleventh hour sets the coping stone who is remembered in after years.

FLOWERING PLANTS.

***Plantago coronopus* at Beverley.**—My attention has been drawn to *Plantago coronopus* growing on the side of the Beverley Beck. It seems to have wandered a long way from its proper home, Flamborough Head, though I see it noted in Robinson's East-Riding Flora at South Cave and on the Wolds.—J. J. MARSHALL, Beverley, May 1st.

A Budded Ash.—Near the Churchyard at Cadney, in the Manor House stackyard, grows an ash about fifty years old. One large branch of this tree puts out leaves a fortnight before the rest of the tree, and in the autumn the leaves come off a fortnight earlier. This branch was budded into the tree by one Joe Dunn, now in foreign parts if alive, along with a number of other buds, for the purpose of making a 'weeping ash.' Only one bud lived, and it 'weepeth not.' In summer the tree looks normal, but at leafing and the fall abnormal.—E. ADRIAN WOODRUFFE-PEACOCK, Cadney, Brigg, May 12th, 1906.

***Primula elatior*, Jacquin, in Lincolnshire.**—Mr. J. Hawkins, of Grantham, recorded this species as a native on the Chalky Boulder Clay in 1905 in *The Field*. I was more than sceptical about it, as I have had quite a hundred hybrids between *Primula acaulis* Linn., and *P. officinalis* Linn., gathered in Lincolnshire, through my hands in the last thirty years. On the 27th of April he fulfilled his promise by putting a specimen into my hands. There is no question it is the true plant of Jacquin, not a hybrid. There are several roots growing on a bank of Chalky Boulder Clay under a hedge in an arable field, bordering the road, not far from Hazel Wood, near Great Ponton. This adds South Lincs. 53 to the four other vice-counties already recorded for the species.—E. ADRIAN WOODRUFFE-PEACOCK, Cadney, Brigg, May 3rd, 1906.

NOTES ON SECTIONS IN GRAVELS NEAR DONCASTER.

GEO. GRACE, B.Sc.

OVER the district to the east of Doncaster are scattered large patches of gravel. They generally rest on the Bunter Sandstone, and have been mapped by the Geological Survey as of the same period, but there seems room for doubt as to whether they may not be much later. They consist of beds of sand alternating with layers of well rounded pebbles of vein quartz, quartzite,



Section in Gravels at Armthorpe.

sandstone, ironstone, and cherts of various colours. The last three are most probably of Carboniferous origin, but the former two, which are the most numerous, are of unknown age. They are strikingly current-bedded, and the directions from which the streams which have arranged them appear to have come vary very much. A fuller account of them has been given by Mr. H. H. Corbett in a previous volume of the 'Naturalist.'*

During the construction of the new South Yorkshire Railway, a cutting has been made through one of these gravel heaps near

* Glacial Geology of the Neighbourhood of Doncaster, Feb. 1903, pp. 47-50.

Armthorpe, about $2\frac{1}{2}$ miles N.E. of Doncaster. The section exposed runs nearly north and south, and when first made showed very clearly the current-bedding of the gravels. Taken as a whole the appearance was that of an anticline, the northern part of the section dipping to the north, and the southern part to the south; but, examined in greater detail, the individual beds did not agree with this, especially in the case of the gravels. One thick lenticular piece had a clear dip to the N.E., whereas a little further away the dip became distinctly southward. Also



'Pipe' in Gravel at Armthorpe.

the beds of gravel and sand thin off and run into one another so frequently that they cannot be very well separated.

The clearest fact in connection with the exposed part of the beds is that they, so far as can be seen, rest on a horizontal bed of sand which is continuous the whole length of the section, but does not appear to belong to the underlying Bunter Sandstone.

The first photograph reproduced shows one of the lenticular sections of gravel resting on the horizontal sand and covered by another thinner bed of sand and more gravel.

The second photograph shows, what may perhaps be regarded as an incipient fault, or else as a pot hole, which runs the

whole depth of the section, and down which the drainage has carried the contents of the higher beds. There does not appear to have been any vertical displacement or downthrow, as the top surface of the bottom sand appears to be in the same line on both sides of the crack, but the way in which the ends of the thin gravel beds have been turned down near it is very striking.

It was not easy to find out how far this crack had extended laterally, there was no sign of it on the other side of the line, and a few weeks later when the face had been removed from the section photographed for a depth of two yards, all signs of the feature had disappeared, so that it may be regarded as nearer akin to a sump or pot hole than to a fault in the ordinary sense of the word.



Transactions of the Hull Scientific and Field Naturalists' Club for the Year 1905.*

Always interesting and valuable, the part before us is exceptionally so. Indeed, we seldom read a part of Transactions of any society with so much pleasure as this has given us. The papers embrace such a variety of subjects, yet are all well written, and whether strictly scientific, historical, or biographical, are valuable contributions; Mr. T. Petch's 'Mycetozoa of the East Riding,' and Mr. T. Sheppard's just claims as to the Educational value of the Hull Museum, together with the biographical account of the well known Hull lepidopterist, Mr. J. W. Boulton (of whom an excellent portrait is added), may be taken as well representing the sort of contributions the part contains. The other papers are - 'Natural Aspects of Hull and District,' by J. Fraser Robinson; 'Notes on Local Diatoms for 1904-5' (with plate), by R. H. Philip; 'In Memory of Thomas Blashill' (with photograph); 'Notes on the Reclaimed Land of the Humber District,' by T. Petch; various East Riding notes, including a portrait of Mr. G. H. Hill; and lastly, but by no means of less importance or interest, 'The Committee's Report on the Work of the Club during 1905,' showing the Club to be doing highly successful and useful work, and in a generally prosperous condition.—G.T.P.

* Vol. 3., Pt. 3. Edited by T. Sheppard, F.G.S. A. Brown & Sons, Ltd., Hull. Pages 189-246. 4 plates. 2/6 net.

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W. INGHAM, B.A.

York.

MOSSES. On 16th August 1905, I found the minute moss *Physcomitrella patens* B. & S. on the bed of a dried up pool on Skipwith Common—a new habitat for the East Riding. On 5th September 1905, I noticed the same rare moss in a similar situation at Heworth, half-a-mile from York. Both gatherings were in abundant fruit, and both are new habitats.

On 18th May 1903, I found the rare moss *Weisia mucronata* B. & S. on the side of a path at Ravenscar, on the descent to Robin Hood's Bay. To my list of Mosses of Askrigg and District in the 'Naturalist' for 1905 (page 278) must be added *Bryum murale* Wils., which I obtained in Whitfield Gill at the meeting of the Yorkshire Naturalists' Union, an addition to North Yorkshire mosses. I got the same *Bryum* in Jackdaw Crag Quarry, Tadcaster, 16th March 1900, an addition to West Riding mosses. Mr. Dixon has seen both gatherings, and agrees that they are certainly *Bryum murale*.

HEPATICS. *Jungermania Goulardi* Husnot. This Hepatic I found on the face of a rock in a wood near Falling Foss, North-East Yorkshire, in September 1905. Mr. Macvicar has examined it also, and agrees that it would be better to make it a variety of *Jungermania sphaerocarpa*. The Hepatic is new to the British Isles.*

Mr. Slater asked me to let him see my gathering, and in 'North Yorkshire,' p. 627, he seems to have determined some of his early gatherings as *J. Goulardi* after seeing my specimen. Mr. Slater appears to have forgotten that I first recorded this Hepatic for Britain, for it is not entered on p. 627 of the new part of 'North Yorkshire.'

* See *Revue Bryologique*, Jan., 1906.

The 'Country Press,' 19, Ball Street, Kensington, has issued twelve post-cards for one shilling, including facsimile prints, popularly and scientifically named, of the leaves of the principal British trees and shrubs. These prints show in their design by Mr. Francis George Heath, the exact venation, or system of veins, in the cellular tissue of each leaf, giving to each figure represented a very marked and interesting individuality.

ABNORMAL IMMIGRATION OF FIELDFARES.

H. B. BOOTH.
Shipton.

SOME weeks after the Fieldfares, which have spent the winter in the Bradford neighbourhood, have departed, we each year notice flocks of immigrant Fieldfares passing through this district in a northerly direction, and very often in a rather leisurely manner. This usually takes place towards the end of April, and occasionally small flocks are seen as late as the first week in May. The numbers seem to vary considerably each season, but this year they have completely eclipsed in numbers all previous records. For the past fortnight Fieldfares have been in evidence almost daily in small parties, but on April 21st and 22nd great numbers were seen slowly passing northwards, and every now and then settling. Some of the largest flocks on these two days were estimated at quite four hundred birds. Since then only straggling birds, or small parties, have been observed. On the evening of the 12th of April (which would be about the commencement of the movement through this district), Mr. Rosse Butterfield noticed a flock of several hundreds flying towards the north. All the birds seen were on the west side of Bradford, and were noted near Denholme, Wilsden, and Bingley, but I have no proof that others did not pass to the east of Bradford as well, although I have not heard of them. It would be very interesting to know from whence all these birds came, and in what direction they left these Islands.

Other observers doubtless will have noticed them in other districts, and records would be most interesting.—April 26th, 1906.

P.S.—Since writing the above note, stray parties of Fieldfares have been seen in the same districts, and generally working northwards, the last stragglers being noticed on May 4th. I have been in constant communication with Mr. R. Fortune, of Harrogate, and he has repeatedly informed me that he has not seen a single Fieldfare there during this immigration. This is as interesting as it is curious, because Harrogate only lies a little to the east of the route which they appeared to be taking.—H. B. B., May 10th.



On May 12th the 'Boston Antiquarian and Naturalists' Rambling Society,' was founded. The Mayor (Councillor H. Barron Clarke) is the first President, and Mr. T. A. Marris is the Hon. Secretary.

YORKSHIRE NATURALISTS AT INGLETON,

MAY 12-14, 1906.

THE opening excursion of the Yorkshire Naturalists' Union for the present year was held at Ingleton in the middle of May, and many members took part therein. As might be expected from the nature of the area, the geological party was the strongest, and included several of the Union's most prominent workers. Other sections devoted their attention to the vertebrate zoology, conchology, entomology, and botany of the district.



Ingleton 'Granite' Quarry.*

Particulars of the work accomplished in the different sections are given below.

About fifty members assembled at the Ingleborough Hotel, Ingleton, where, after tea, the meetings were held. Representatives from nineteen affiliated societies were present. Mr. Cosmo Johns, F.G.S., President of the Geological Section, took the chair. Before the ordinary business was proceeded with, a hearty welcome was accorded to Mr. W. Denison Roebuck on his return from his travels in India, Australia, New Zealand,

* Block kindly lent by the Yorkshire Geological Society.

and Africa. Sixteen new members were elected, and four societies became affiliated with the Union. A vote of thanks to the divisional secretary, Mr. W. Robinson, was passed for his pains in arranging for the excursion.

We have since received the following reports on the excursion :—

The Ornithologists, led by Mr. A. White, F.Z.S., at once made for the fell sides of Ingleborough, from which they obtained a glorious view of the surrounding district. A pair of corvinae was noticed, and a marshy piece of ground was inhabited by curlew. Sandpipers were in plenty, as was also the dipper, a nest with one egg belonging to the latter being observed. Many dead birds were met with during the day, including a red-shank with the breast only eaten away, which was evidently the work of a hawk. Several eggs of the lapwing were also noticed with two holes in them, close together, which had been made by some bird. Owing to the scarcity of the rook in this district, that bird can hardly be blamed this time. Numbers of young lapwings were watched and photographed. Wagtails were common; the pied grey and yellow wagtails being observed. The last appears to be increasing. Other species noted were pipit, whin-chat, wren, blackbird, thrush, and missel-thrush.

The Conchological Section was represented by its president, Mr. W. Deuison Roebuck, F.L.S., of Leeds, and its secretary, Mr. Thomas Castle, of Heckmondwike, and also by Mr. John Wm Carter, F.E.S., of Bradford. The day was spent in Helks Wood, and the following thirty-one species were collected, six slugs and two freshwater species being included :—

<i>Carychium minimum</i> Müll.	<i>Cochlicopa lubrica</i> (Müll.).
<i>Ancylus fluviatilis</i> Müll.	<i>Vitrina pellucida</i> (Müll.).
<i>Limnæa pereger</i> (Müll.).	<i>Hyalinia cellaria</i> (Müll.).
<i>Helix aspersa</i> Müll.	„ <i>alliaria</i> (Müll.).
„ <i>nemoralis</i> L.	„ <i>nitidula</i> (Drap.).
<i>Hygromia rufescens</i> (Penn.).	„ <i>pura</i> (Ald.).
„ <i>hispidula</i> (L.).	„ <i>crystallina</i> (Müll.).
„ <i>granulata</i> (Ald.).	<i>Agriolimax agrestis</i> (L.).
<i>Vallonia pulchella</i> (Müll.).	„ <i>lævis</i> (Müll.).
<i>Buliminus obscurus</i> (Müll.).	<i>Arion ater</i> (L.).
<i>Pupa secale</i> Drap.	„ <i>subfuscus</i> (Drap.).
„ <i>cylindracea</i> (DaC.).	„ <i>hortensis</i> Fér.
<i>Vertigo pusilla</i> Müll.	„ <i>circumscriptus</i> Johnst.
<i>Balea perversa</i> (L.).	<i>Pyramidula rotundata</i> (Müll.).
<i>Clausilia bidentata</i> (Ström.).	„ <i>rupestris</i> (Drap.).
„ <i>laminata</i> (Mont.).	

In reporting, the sectional president referred to the district being very rich in land shells, and that the day's collecting was by no means representative. Mention was made that the var. *violaceu* of *Agriolimax agrestis* was found as well as the usual double types, *pallida* and *reticulata*, and that *Arion circumscriptus* was abundant and very large in size. The other species called for no particular remark.

Mr. J. W. CARTER states that few species of Coleoptera were met with owing to the fact that Ingleboro' was not investigated. The district worked was Helk's Wood, and the species noted were what one would expect to find in almost any part of the county, viz., *Nebria brevicollis*, F; *Loricera pilicornis*, F; *Notiophilus biguttatus*, F; *Pterostichus madidus*, F; *P. niger* Schal; *P. vulgaris*, L; *P. striola*, F; *Ocytus ater*, Gr.; *Tachinus collaris*, Gr.; and *Agriotes obscurus*, L.

Of Hymenoptera, Mr. T. Castle captured an ichneumon in Helk's Wood, which Mr. Claude Morley has identified as *Ichneumon confusorius* Gr.

Dr. W. G. SMITH writes:—One section of botanists proceeded towards Crina Bottom and spent the first part of the day on the Limestone of White Scars (1200 to 1300 feet), with the object of examining the vegetation and comparing it with the results obtained on the Upper Wharfedale and Airedale Limestone during the botanical survey of that area.* It was too early for many flowers on the Limestone Pastures, and even the leaves of many species were scarcely recognisable. *Arenaria verna*, *Draba verna*, *Luzula campestris*, *Sesleria coerulea* with early Dandelion and Lady's Mantle were almost the only species in flower. At one place three species of *Lycopodium* (*L. Selago*, *alpinum*, *cluvatum*) were found together, and the two first-named were frequently met with about this altitude; they ought therefore to be included in the plants of the Limestone Pasture of Ingleboro'. A soft mossy turf, consisting largely of *Saxifraga hypnoides* was also common; this we have met with frequently on the Ingleboro' Limestone up to the Encrinite strata near the summit. The Limestone Pavements were found to harbour in their crevices almost all the species already recorded at Malham and in Upper Wharfedale. The Anemone was particularly showy with large flowers. These pavement plants are almost all species found in the valley woods, and were seen there later in the day, but they are absent on the

(* See Smith & Rankin, 'Geographical Distribution of Vegetation in Yorkshire, Part II., 1903.')

open pastures ; it is probably the case that they were brought up by birds (*e.g.* Ivy berries) or by wind (*e.g.* Hogweed), and have found in the pavement fissures at this altitude, conditions suitable for growth. On descending to the Granite Quarry, a line of springs was found where the geologists were searching for the basement beds of the Limestone. *Primula farinosa* (almost in flower) and the Butterwort were conspicuous here.

The later part of the day was spent in the woods from Thornton Force down to Ingleton. The vegetation here was a marked contrast to the dry, small-leaved, wiry vegetation of the Limestone Pastures, and most of the pavement species were seen again. Hazel is the dominant element in these woods, and at this season its light foliage showed up the dark Yew bushes scattered amongst it. Ash is fairly abundant, only just coming into flower, Mountain Ash and Thorn were breaking into leaf. The wood is on the whole a good example of the Ash-Hazel copse of Upper Wharfedale, but Oak was distinctly more abundant, and was present as far up the valley as the rocks above Thornton Force. The close carpet of undergrowth was also found to be made up of species recorded in the Scar woods round Kettlewell. The most abundant grass is *Brachypodium sylvaticum*, the broad, light-green leaves of which were very conspicuous. Some of the wood plants seen in flower were Sanicle, Woodruff, Early Purple Orchis, Bluebell, Primrose, Lords and Ladies, Mercury, Wood Rush and Melic Grass. An evening exploration of the Hazel copses on Meal Bank, between the two streams at Ingleton, added to the list Goldilocks and Herb Paris in flower, with Globe Flower, Lily of the Valley, and *Thalictrum* in bud. We have given the results at some length, because we consider that the Botanical Survey of Yorkshire has gained something profitable from this excursion of the V.N.U.

Mr. C. A. CHEETHAM adds :—In the evening we climbed the hill between the two becks and behind the limekiln ; on the way up we saw *Sesleria caerulea*, *Carex verna*, and *Carex flacca* in flower. In the wood on the top the Bird Cherry was very fine. Flowerless plants of the Hairy Violet, Stone Bramble, Bird's Eye Primrose, &c., were seen.

The following day we took up the Thornton beck gyll, and the first noted were the fertile stems of *Equisetum arvense* and *E. maximum*, also the barren stems of *E. hyemale*. The plants in flower were whitlow grass, scurvy grass, moschatel, thale cress, and hairy rock cress.

On crossing over the limestone to the Ingleton beck, a field full of the wood anemone attracted the eye, and in the beck there was a good deal of *Myriophyllum alterniflorum*, which does not appear to be noted for the Lune drainage. Across the foot-bridge the appearance of *Sphagnum* with sundew was very interesting, showing the absence of limestone and presence of the grit rocks. Another ecological fact was shown by the sand wort and Alpine penny cress, which always prefer the lead workings, and were here growing in profusion where the debris from the lead workings was strewn around.

Near at hand the presence of *Erica*, *Calluna*, *Vaccinium*, and *Empetrum* showed that the limestone was well covered with drift, either glacial or detrital.

On the main limestone of the Yoredales the purple saxifrage was still in flower, and many plants of the yellow saxifrage were seen. The rose root was just starting for the year's growth.

Mr. C. CROSSLAND reports that on Monday, in Helk's Wood, he and Mr. Broadhead met with the following Fungi:—*Pleurotus mitis* on dead stump, *Naucoria semiorbicularis* among short grass; *Psilocybe subericeus* among grass; *Xylaria Hypoxylon* in very good fruit on stump; *Morchella esculenta* on moist grassy bank on stream side; *Uromyces pore* on leaves of *Ranunculus Ficaria*.

(Further reports will appear in our next issue.)

MAMMALS.

Strange Behaviour of a Hare.—On April 24th my son Dennis took our spaniel for a walk. He saw an incident the like of which I have never witnessed. Doe hares often drive off cattle when grazing near their forms, when they have leverets, but I have never heard of them doing this to a dog. Dennis, however, reported as follows: 'Bogey was smelling in some rough grass along a hedge side in a ploughed field. A hare ran up wind, and kicked—or rather struck in passing—the dog with its front paws on the nose and side of the head. The dog was quite startled and frightened, but, seeing or getting wind of its assailant, followed after it at his best pace.' There can be little doubt, I take it, the hare had a form of newly-dropped leverets close by.—E. ADRIAN WOODRUFFE-PEACOCK, Cadney, Brigg, April 24th, 1906.

LIST OF PAPERS AND MONOGRAPHS

By Dr. H. CLIFTON SORBY, F.R.S. &c.

(Continued from page 144.)

On the Amount of Sulphur and Phosphorus in various Agricultural Crops. Chem. Soc. Mem., III., 1845-48, pp. 281-284; Froriep's Notizen, IV., 1847, col. 35-37; Phil. Mag., XXX., 1847, pp. 330-334.

On the Formation of the Valleys; and on the Modern and Ancient River Action in the Neighbourhood of Sheffield. Sheffield Lit. and Phil. Soc. Rep., 1847, Aug. 6th and Dec. 3rd; 1848, March 3rd.

On the Geology of the Malvern Hills. Sheffield Lit. and Phil. Soc. Rep., 1849, p. 15.

On the Probable Former Existence of a Tract of Land between Norway and Scotland, as indicated by the Fossils and Structure of the Oolitic Rocks of the Yorkshire Coast. Sheffield Lit. and Phil. Soc. Rep., 1850, p. 7.

Observations on the Northern Drift or Diluvium, together with a General Outline of the Present State of the Theories of the Origin of these and Similar Deposits. Sheffield Lit. and Phil. Soc. Rep., 1850, p. 13.

On the Tetramorphism of Carbon. Brit. Assoc. Rep., 1850 (pt. 2), p. 62.

On the Existence of Four Crystalline Species of Carbon. Proceed. West Yorks. Geol. Society, III., 1850, pp. 159-168.

On the Excavation of the Valleys in the Tabular Hills, as shown by the Configuration of Yedmandale, near Scarborough. Proceed. West Yorks. Geol. Soc., III., 1850, pp. 169-172.

On the Tetramorphism of Carbon. Edinb. New Phil. Journ., L., 1851, pp. 149-159.

On the Microscopical Structure of the Calcareous Grit of the Yorkshire Coast. Geol. Soc. Journ., VII., 1851, pp. 1-6; Proceed. West Yorks. Geol. Soc., III., 1851, pp. 197-206.

On the Contorted Stratification of the Drift of the Coast of Yorkshire. Proceed. West Yorks. Geol. Soc., III., 1851, pp. 220-224.

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On the Oscillation of the Currents drifting the Sandstone Beds of the South-East of Northumberland, and on their General Direction in the Coalfield in the Neighbourhood of Edinburgh. Proceed. West. Yorks. Geol. Soc., III., 1852, pp. 232-240.

On the Existence of an Analogy between the Symmetrical Development of Organised Beings and Crystallized Bodies. Sheffield Lit. and Phil. Soc. Rep., 1852, p. 7.

On the Microscopical Structure of some British Tertiary and Post-tertiary Fresh-water Marls and Limestones. Geol. Soc. Journ., IX., 1853, pp. 344-346.

On the Origin of Slaty-cleavage. Edinb. New Phil. Journ., LV., 1853, pp. 137-150.

On the Origin of Slaty-cleavage. Proceed. West. Yorks. Geol. Soc., III., 1853, pp. 300-311.

On the Microscopical Structure of British Calcareous Rocks, including those of the Recent, Post Tertiary, Tertiary, and Cretaceous Periods. Sheffield Lit. and Phil. Soc. Rep., 1853, p. 9.

Observations made during a Three Months' Geological Tour in the South-West of England. Sheffield Lit. and Phil. Soc. Rep., 1853, p. 13.

On Yedmandale, as Illustrating the Excavation of some Valleys in the Eastern part of Yorkshire. Geol. Soc. Journ. X., 1854, pp. 328-333.

On the Motions of Waves as Illustrating the Structure and Formation of Stratified Rocks. Proceed. West. Yorks. Geol. Soc., VII., 1854, pp. 372 et seq.

On Determining by Mathematical Calculation the Form of the Ultimate Atoms of Crystalline Substances from a Comparison of their Specific Gravities and other Properties. Sheffield Lit. and Phil. Soc. Rep., 1854, p. 5.

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On the Motion of Waves as Illustrating the Structure and Formation of Stratified Rocks. Proceed. West Yorks. Geol. Soc., III., 1855, pp. 372-378.

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On Some of the Mechanical Structures of Limestones. Brit. Assoc. Rep., 1855, (pt. 2), p. 97.

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On the Origin of the Cleveland Hill Ironstone. Proceed. West. Yorks. Geol. Soc., III., 1856, pp. 457-461.

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On the Crag Deposit at Bridlington, and on the Microscopical Fossils occurring in it. *Proceed. West. Yorks. Geol. Soc.*, III., 1857, pp. 559-562.

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(A further list of Papers, etc., will appear in our next issue)

BAKER'S 'NORTH YORKSHIRE.'*

IN this handsome volume Mr. J. G. Baker gives a valuable account of the North Riding of Yorkshire—its Geology, Physical Geography, Flowering Plants, Ferns, &c. The first edition of the work (300 copies), which was printed at Thirsk in 1863, contained 353 pages and four maps. Some copies were sent out to subscribers, &c., but the remainder was unfortunately destroyed by fire at the author's residence. The present 'second edition, which is about twice the size, may, therefore, be looked upon as an entirely new work, and, with F. A. Lees' 'Flora of West Yorkshire,' published by the Yorkshire Naturalists' Union, and J. F. Robinson's 'Flora of the East Riding,' published by the Hull Scientific and Field Naturalists' Club, completes the account of the Flowering Plants, Ferns, Mosses, and Hepatics of the county. Masseur & Crossland's 'Fungus Flora of Yorkshire,' and W. & G. S. West's 'Alga Flora of Yorkshire,' also published by the Union, unquestionably complete a series of works dealing with the Flora of the County of which any Society might be justly proud.

From a geological point of view also it is welcome, as, together with Davis & Lees' 'West Yorkshire,' and Sheppard's 'Geological Rambles in East Yorkshire,' the general geological features of the three Ridings may now be said to be fairly described.

As an example of the thoroughness of Mr. Baker's work, it might be pointed out that, notwithstanding the fact that numerous ardent botanists have been at work in the Riding, only fifteen flowering plants and ferns (not reckoning aliens) have been added to the Riding since 1863. The section devoted to the Mosses and Hepatics, however, for which Mr. M. B. Slater is responsible in the present work, shows up rather differently. Not only has the number recorded for the Riding been increased from 309 to 418, but particulars of numerous additional localities have been added, as well as a list of Hepatics (124) which is almost entirely new.

The principal contents of the book are Introduction, Geology (with map), Lithology (with map), Climatology (with map), Topography, and Physical Geography, description of

* North Yorkshire: Studies of its Botany, Geology, Climate, and Physical Geography, with a chapter on the Mosses and Hepatics by M. B. Slater, F.L.S. Second edition. By John Gilbert Baker, F.R.S., F.L.S., &c. 1906. A. Brown & Sons, 5, Farringdon Avenue. 680 pages, eight maps. Price 15s. net.

the West Tees District, the West Swale District, the Yare District, the Nidd and Wharfe District, the East Tees District, the Esk District, the Derwent District, the East Swale District, the Ouse and Foss District, and the Flora (Flowering Plants, Ferns, Mosses, and Hepatics). Mr. Slater has also written a lengthy and useful introduction to the Mosses and Hepatics. In the matter of Indices, the volume is likewise well supplied, there being a Geographical Index, an Index to the Flowering Plants and Ferns, an Index to the Mosses, an Index to the Sphagnum, and an Index to the Hepatics. All these have been carefully compiled, and are an exceedingly valuable addition to the work. It is a pleasure to see a volume of reference, such as this will be for all time, so well indexed.

The Yorkshire Naturalists' Union is certainly to be congratulated on being the means of presenting so useful a work to the scientific world, and it is a matter for regret to learn that this edition is so very limited, and will probably soon be out of print. The volume is very reasonable in price, and anyone interested in the county should not hesitate to buy a copy at once.

It is gratifying to find that Mr. J. G. Baker, who published the first edition so long ago as 1863, has been able to see the present work through the press.

FIELD NOTES.

BEES.

Lincolnshire Aculeate Hymenoptera.—In the April number of the *Naturalist* for 1888 will be found a list of Aculeate Hymenoptera collected by myself. I should like to put on record half-a-dozen more named for me by the Rev. A. Thornley. They are as follow:—

ANTHOPHILA.

Halictus nitidiusculus Kirby.

Nomada succincta Panz.

Epeolus rufipes Thoms.

Melecta armata Panz.

Megachile circumcincta ? Sep.

Osmia cwrulescens Linn.

The specimens of this last bee were taken out of a nest made in the wall of an orchard house at Kirton-in-Lindsey. It is a very pretty little bee. The sexes are so remarkably different in

appearance that they are apt to be taken for two different species. Of course, the presence of the Aculeus in the female, and its absence in the male, together with the peculiar forceps, are diagnostic of the sexes.—C. F. GEORGE.

—: o :—

LEPIDOPTERA.

***Gelechia scalella* Scop. near Wakefield: an addition to the List of Yorkshire Lepidoptera.**—Recently the Rev. T. B. Eddrup sent me a box of Micro-Lepidoptera for determination, among which was a good specimen of *Gelechia scalella* Scop.—a *Fleella* Tab—a species hitherto unrecorded for Yorkshire. Mr. Eddrup tells me he took several specimens, and that there were others at rest on oak trunks in Coxley Wood, Horbury, on June 3rd and 7th last.—GEO. T. PORRITT, Huddersfield, May 2nd, 1906.

—: o :—

SPIDERS.

New Yorkshire Spider Records.—The following appear to be new records of Spiders for Yorkshire:—

Dysdera cracota C.L. Koch. ♀ Scarborough.

Tetragnatha extensa Linn. ♀ Harwood Dale.

Celotes terrestris Wid. ♀ Cayton Bay.

The last named is the third record of this rare species for Britain.—R. GILCHRIST, Scarborough.



NORTHERN NEWS.

In the April 'Irish Naturalist,' Mr. R. Lloyd Praeger has a paper on 'A Simple Method of representing Geographical Distribution.'

Mr. G. T. Porritt adds Lathkildale, Derbyshire, and Alford, Lincolnshire, to the localities for *Halesus guttatipennis* (*Entomologist's Monthly Magazine*, April).

At the annual meeting of the Leeds Philosophical and Literary Society, held recently, Prof. P. F. Kendall, F.G.S., was elected one of the hon. secretaries of the society.

Mr. E. A. Newbery shews (*Entomologist's Monthly Magazine*, April) that *Thyamis curta*, recorded for the Isle of Man, is certainly not *curta*, and has, therefore, no place in the British list.

Mr. D. Thoday has a note 'On a suggestion of Heterospory in *Sphenophyllum dazsoni*,' in the *New Phytologist* for April 30. His remarks are based on a section from Shore, Littleborough, Lancashire.

'Manuring,' by Edward Owen Greening, F.R.H.S., &c. London: Agricultural and Horticultural Association. Price one penny. This practical handbook clearly explains the principles and practice of manuring, and is very fully illustrated.

THE NATURALIST.

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

EDITED BY

T. SHEPPARD, F.G.S.,
THE MUSEUM, 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.

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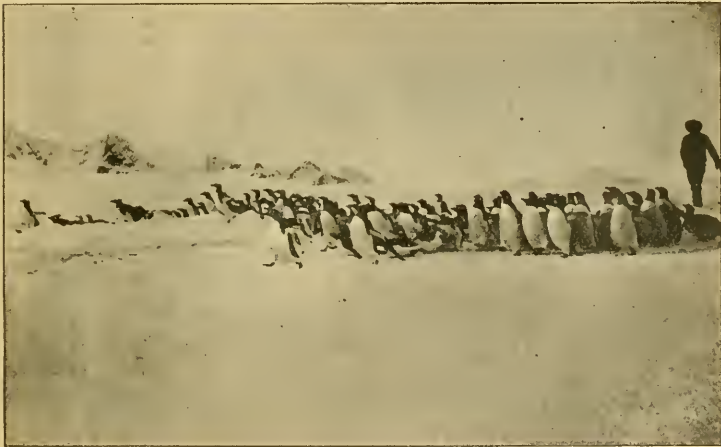
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NOTES AND COMMENTS.

ANTARCTIC BIRDS.

MR. W. Eagle Clarke, the President of the Yorkshire Naturalists' Union, has contributed to the 'Ibis' an exceedingly valuable paper on 'Ornithological Results of the Scottish National Antarctic Expedition,' the present paper dealing with the birds of the South Orkney Islands. In Mr. Clarke's monograph are several items of great interest. He describes rookeries of three species of Penguin, some of which 'contain several millions of inhabitants, and their daily life presented scenes so remarkable as to be almost beyond description. The Ringed



Departure of Gentoo Penguins.

(Scotia Bay.)

Penguin, hitherto regarded as being nowhere an abundant species, was found to have its metropolis at the South Orkneys, where the summer population on Lawrie Island alone was estimated at not less than one million birds.' Eggs of the familiar Cape Petrel (hitherto unknown to science), and the chicks and young of the Ringed Penguin and Snowy Petrel, and eggs of Wilson's Petrel, the Sheathbill and the Blue-eyed Shag, were also taken in abundance. 'The series of bird skins is one of the most important ever made in the Antarctic Seas. It comprises one hundred and forty-three specimens, representing sixteen out of the eighteen species now known to frequent the

island.' Many of the skins enable Mr. Clarke to describe for the first time the young and immature stages of some of the birds. Mr. Clarke's monograph is illustrated by coloured plates and several blocks from photographs, one of which the editor of the *Ibis*' kindly permits us to reproduce.

A DEFORMED STOAT.

In the recently issued 'Transactions of the Lincolnshire Naturalists' Union,' the Rev. E. A. Woodruffe Peacock has a paper on 'The Stoat and its Ways,' in which he says that plenty of proof exists that the male will destroy or maim the young at times. Tailless and injured stoats are recorded, and



from the peculiar character of their losses, the work of the male may be suspected.' The accompanying photograph, which we are permitted to reproduce, shows a stoat 'destitute of both fore limbs, taken off close to the body, not in the least like the way a trap could injure one.'

PEREGRINES AT FLAMBOROUGH.

'At a recent meeting of the Yorkshire Naturalists' Union at Flamborough, the members observed with pleasure that a pair of peregrine falcons have at last successfully nested on the cliffs. The Union's Wild Birds' Protection Committee was represented by some of the leading ornithologists in the North of England, and has offered a reward to the men in charge of that particular

section of the cliffs if the young birds get safely away. A substantial reward will also be paid to any person giving information which should lead to the prosecution of any person interfering with the nest or shooting the birds. It is hoped that the publicity given to this note will prevent any ardent collector from interfering with them, particularly in view of the fact that the peregrine is one of our disappearing birds, and has for years unsuccessfully attempted to nest at Flamborough. The peregrine is supposed to be protected by the Wild Birds' Protection Act, but past experience has proved this to be very largely a farce. It is the intention, however, of the Yorkshire Naturalists' Union, which is some 4,000 strong, to suitably deal with any individual molesting the birds in any way.'

The above is a copy of a communication made to the press by the Hon. Secretary of the Yorkshire Naturalists' Union, at the request of the members attending the general meeting of the Union on Bank Holiday. It was by no means a secret that the peregrines had at last successfully nested on these famous cliffs, after an absence of a quarter of a century or more, and it was thought that the best way to ensure the safety of these birds was to offer a greater reward for the successful rearing of the brood than would be obtained for the dead birds. It was subsequently ascertained that three young ones were in the nest almost ready for flight.

These have since safely 'got off' and it is to be hoped that the peregrine may in future be included as one of the regular breeding birds of the headland.

PEREGRINES AT INGLETON.

As a contrast with the instance of the Flamborough falcons, we give below an extract from a recent issue of the *Lancaster Observer*.

'On Monday Messrs. Ormrod and R. Sutton had a day's hawk hunting at Ingleborough. Being aware of the existence of peregrine falcons, they spent a considerable time in searching, and were eventually rewarded by seeing a fine specimen at Foals Foot, the north-western side of Ingleborough. After considerable trouble, and at great hazard to themselves, they reached the nest, which contained a young falcon. The wary parent birds, however, kept out of the range of Mr. Ormrod's gun, and although he had two shots, the range was too great. A curious point is that in the nest they found a half devoured pigeon, from whose leg they extracted the ring. In addition to

this there was a plentiful supply of bones and carcasses. The nest was left with a nicely covered trap set.'

No doubt Messrs. Ormrod and Sutton have been exceedingly clever, and it is not surprising that their grand achievement should be chronicled in the press. But what is perhaps astonishing is the apathy of the police! However, if they cannot see their way to take the case up, someone else must. It is in consequence of the doings of such individuals as Messrs. Ormrod and Sutton that we are losing—for ever—some of our finest birds.

THE PROTECTION OF BIRDS.

The Yorkshire Wild Birds' and Eggs' Protection Committee, supported by the Yorkshire Naturalists' Union, is determined to use every possible effort to protect the birds of the county. In addition to watching such instances as these referred to above, it will also look after the colony of terns at Spurn, and pay watchers to look after the nests and eggs of rare birds in other parts of the county. This will require financial assistance—though not of a very serious character—and subscriptions for this purpose will be gladly received by the Secretary of the Union, at the Museum, Hull, or by any of the members of the Birds' Protection Committee. Without any request whatever, some amounts have already been received, and others promised, particulars of which, as well as of the way the funds are disposed of, will appear in due course. In the meantime, will those who are willing to help kindly inform Mr. Sheppard.

VANDALISM AT FLAMBOROUGH.

The following letter was sent to the press by the Secretary of the Yorkshire Naturalists' Union immediately after the Flamborough excursion:—

'I am requested by the members of the Yorkshire Naturalists' Union, considerably over a hundred of whom were present at the meeting at Flamborough on Monday last, to draw your attention to a hideous method of spoiling the landscape, which has recently been perpetrated on the headland. On the beautiful grassy slopes of North Landing, Flamborough, one of the most charming pieces of cliff scenery on the East Coast, a certain firm's starch and another's lung tonic are advertised by means of large white chalk boulders forming letters of some five feet in height. These can be seen at a

considerable distance, and it is pretty obvious that unless something is at once done to prevent the spoliation of the landscape, all the numerous green-clad slopes of Flamborough Headland and district will be similarly 'ornamented,' and one of nature's beauty spots will be quickly transformed into a bilious-pilled, soap-sodden advertising station, which will result in Flamborough Headland being as attractive a holiday resort as an average railway terminus. We were informed by an individual well known in Hull that he had rented the piece of land for the purpose of the advertisements, but we feel sure that the two firms can have no idea of the amount of damage they are likely to do to the district, and it is a matter of surprise that the people of Flamborough themselves, in their own interests, should not have protested against advertising materials, one of which, at any rate, should not be required in that district.

'A resolution is being sent to the two firms in question, and also to the landowners, which it is hoped will have the desired effect; but in the meantime we trust that the publicity you give to the matter will be beneficial.'

Strangely enough, enquiry shows that neither of the two firms in question had given any authority for the advertisements to be displayed, nor knew of them until their attention was called to the matter. Apparently they were put up as a speculation by an enterprising individual, and it is perhaps some consolation to know that he will not be paid for his pains. The carting of the large boulders from the beach to the top of the cliffs would be no easy task. To throw them down again would be much easier!

YORKSHIRE HYMENOPTERA.

In connection with the list of the County Hymenoptera which Mr. W. Denison Roebuck is preparing for the 'Victoria History of Yorkshire,' we are asked to state that he will be glad to receive any unpublished records of bees, wasps, ants, saw-flies, gall-flies, ichneumons, and other hymenoptera, or references to any published records he may possibly have missed, for the better completion of the list. That there is much to be expected may well be imagined when it is stated that of consignments of five species of aculeates sent by Mr. E. G. Bayford, a similar number sent by Mr. W. E. L. Wattam, a small lot of ichneumons of Mr. Roebuck's own collecting in his infantile days as a naturalist, and the two saw-flies collected by Mr. Porritt at Flamborough, all submitted to Mr. E. Saunders, Mr. Claude

Morley, and the Rev. F. D. Maurice, the results were: two species new to Yorkshire from Mr. Bayford, one species new to the British Isles from Mr. Wattam, three ichneumons and one ant new to Yorkshire from Mr. Roebuck, and two new saw-flies from Mr. Porritt. Lepidopterists can materially assist by submitting the ichneumons they rear to Mr. Claude Morley, partly to assist Mr. Morley in his Monographic Papers, and partly to help the Yorkshire List.

NATURAL HISTORY AS A BUSINESS.

We recently referred in these columns to a new magazine, *The Naturalists' Quarterly Review*, which we suggested was apparently published for the benefit of two individuals—the editor, Mr. Davis, a dealer in natural history requisites; and Mr. Westell, who gives ‘popular extempore lectures,’ and writes books. Part II. of this ‘Review’ has appeared, and confirms our former supposition. In this, the first article is on ‘Forming a Collection,’ by Mr. Davis (6 pp.). Mr. Westell follows with ‘Some Birds of Spring’ (4 pp.). Mr. Davis next gives ‘Localities for Lepidoptera around London’; and Mr. Westell follows with ‘The Country Lovers’ Library.’ From this last it is obvious that if one is writing a book, and wishes to have it said that ‘no library is complete without it,’ or that it is ‘sure to receive a cordial reception,’ or that ‘no student can possibly afford to be without it’—send it to Mr. Westell! We notice that articles on ‘good collecting localities’ are asked for, and one such article appears in the present issue, in which even a detailed plan is given, showing the collecting ground of a rare species, where the author and a friend ‘netted three dozen apiece.’ We suggested a title for the new magazine in our previous notice. This suggestion has not been acted upon! May we make another try—‘The Collector’s and Exterminator’s Review’ is certainly more appropriate.



GEOLOGY.

Fossil Tusk at Bridlington.—On March 17th Mr. S. Purvis, of Bridlington, found a very fine tusk of *Elephas antiquus* on the cliffs near Sewerby. It is entire, and about 3 ft. 6 ins. in length, 11 ins. in diameter in the middle, and 13 ins. in greatest diameter. It is exhibited in a shop window at Bridlington, and was seen at the recent meeting of the Yorkshire Naturalists’ Union.—T. S.

NOTES ON THE UPPER CHALK OF LINCOLNSHIRE.

ARTHUR BURNET.
Leeds.

THE following description of the Upper Chalk of Lincolnshire is based upon field work done by myself in 1902 and 1903,* and may be considered supplementary to that of Mr. William Hill, who had visited Lincolnshire a few years previously, and had discovered the existence of Upper Chalk in that county.

There is now no doubt whatever that the zone of *Holaster planus* can be traced continuously from a point just north of Louth right up to the Humber, but we have as yet no positive information as to the western boundary of this zone. The general direction of the dip of the beds is north-easterly, but it is very slight, and there are few faults or flexures of any magnitude.

In its lithological aspect, the chalk of the *Holaster planus* zone of Lincolnshire presents a marked contrast to that of the zone below, for, in addition to the scattered nodular flints which characterise the *Terebratulina* zone, there is in the higher zone a large number of immense bands of continuous tabular flint. The chalk is hard, and fossils are usually rare, and difficult to extract in good condition. Seams of grey or yellow marl, about two or three inches in thickness, are not uncommon. In the upper part of the zone the chalk becomes a little softer and rather flaggy in places. Above this there are some bands of continuous tabular flints intermingled with chalk. These bands are probably the base of the *Micraster cortestudinarium* zone. There are no beds having the lithological peculiarities of the 'Chalk Rock' of the southern counties. The following account of the sequence of the beds near North Ormsby is taken from the Geological Survey Memoir on 'Cretaceous Rocks,' vol III, p. 273, and may be regarded as fairly typical of the exposures in other parts of the Upper Chalk area in North Lincolnshire.

	ft.	in.
Thin-bedded white chalk with flint nodules ...	6	0
Course of grey flint interlaminated with chalk ..	6	
Firm creamy white chalk	3	0
Seam of dark grey shaly marl	3	
Hard dull white chalk with flat lenticular flints ...	6	0
Continuous floor of flint	6	
Hard white chalk in thick beds without flints ...	7	6
Hard dull white chalk with small lenticles of flint	10	0
Hard white chalk in more massive beds	6	0

* See also *Geol. Mag.*, 1904, pp. 172-176.

One of the most southerly exposures of Upper Chalk is the quarry at Boswell, near North Elkington. As Mr. Hill had previously visited this quarry, and had fully described it in his note in the *Geological Magazine* for September, 1902, I did not make a lengthy search for fossils here. They are, however, not difficult to find in this pit, and, so far as I know, it is the only quarry in Lincolnshire where *Micrasters* are at all common.

Two other very typical sections of *Holaster planus* chalk occur at Fotherby. The first of these, three quarters of a mile W.S.W. of the village, shows about 25 feet of hard white chalk with bands of dark tabular flint, and a seam of dark yellow marl.

From this quarry I obtained the following fossils :—

<i>Septifer lineatus.</i>	<i>Echinocorys scutatus.</i>
<i>Inoceramus brongniarti.</i>	<i>Goniaster</i> sp.
<i>Plicatula sigillina.</i>	<i>Rhynchonella cuvieri.</i>
<i>Ostrea vesicularis.</i>	<i>Terebratula carnea.</i>
<i>Ostrea normaniana.</i>	<i>Terebratula semiglobosa.</i>
<i>Holaster planus.</i>	<i>Terebratulina lata.</i>
<i>Holaster placenta.</i>	<i>Kingena lima.*</i>
<i>Cyphosoma</i> (spine),	

As in many other quarries on this horizon, fragments of very large *Inoceramus* shells are somewhat abundant.

The other quarry lies a little to the west of Fotherby Grange, and here I found *Holaster planus*, *Rhynchonella cuvieri*, *Terebratula carnea*, *Terebratulina lata*, and *Terebratulina striata*.

At North Ormsby there are three quarries, all showing the same series of beds. They are situated as follows : half a mile S.S.E. of the Church ; about 360 yards north of the Church ; and three-quarters of a mile N.N.W. of the village. From these sections I obtained the following :—

<i>Inoceramus cuvieri.</i>	<i>Rhynchonella cuvieri.</i>
<i>Holaster planus.</i>	<i>Terebratula carnea.</i>
<i>Holaster placenta.</i>	<i>Terebratulina lata.</i>
<i>Echinocorys scutatus.</i>	<i>Kingena lima.</i>

On the high ground to the west of the village there is a small pit showing bands of the imperfect tabular flint already referred to. This quarry yielded the following : *Micraster corbovis*, *Holaster placenta*, *Rhynchonella cuvieri*, *Ostrea* (a small species), *Ostrea vesicularis*, and *Kingena lima*.

Further west, at Lamberoft, there is another section where

* In *Geol. Mag.*, 1904, this fossil was recorded as *Magas pumilis*. It has now been shewn by Dr. Rowe that *Magas* is confined to the *Belemnitella mucronata* zone—a zone not represented in Lincolnshire.—Eds.

these same beds are seen, but the only fossils that I could find were *Rhynchonella cuvieri*, *Kingena lima*, and a spine of *Cidaris peronata*. This pit is about 400 feet above O.D.

At Beesby, about a mile south of Hawerby, there is a fairly good section showing beds which are slightly different from any seen at Ormsby or Fotherby. The chalk is flaggy, and not hard, but fossils seem to be rare. The only ones that I found were *Ostrea vesicularis*, *Terebratula carnea*, and *Inoceramus* sp. Lower beds than these are seen at Wold Newton at a quarry S.S.E. of the village, where there is an exposure of about 30 feet of hard chalk with thick tabular flints, and the following fossils: *Rhynchonella cuvieri*, *Kingena lima*, and *Holaster placenta*?

At Beelsby there is a fairly large quarry near the Church. The chalk is rather flaggy and is not hard, but fossils are scarce. Those found were: *Rhynchonella cuvieri*, *Terebratula carnea* and *Inoceramus* (an unnamed species). Similar beds are to be seen in a quarry south-east of Irby. Here are exposed about 25 feet of rather flaggy chalk, with tabular bands, and scattered lenticles of flint, and containing *Inoceramus cuvieri*, *Spondylus latus*, *Holaster planus* (or *placenta*), *Rhynchonella cuvieri*, and *Terebratulina lata*.

At Great Limber there are two very good sections. From the quarry a little to the west of the Church I obtained *Parasmilia centralis*, *Rhynchonella plicatilis*, var. *octoplicata*, *Rhynchonella cuvieri*, and *Infulaster excentricus*. The other quarry is a mile south-east of the village, and here I found *Spondylus latus*, *Echinocorys scutatus*, and *Terebratula carnea*.

There are no good sections in the neighbourhood of Brocklesby. There is an old quarry half a mile south of the village, and another at Limber Parva, just inside the park, but both are much overgrown, and the only fossils found were *Holaster placenta* and *Serpula* sp. from the latter pit.

From the quarry at Kirmington, described by Mr. Hill in his 'Note on the Upper Chalk of Lincolnshire,* I obtained *Holaster planus*, *Kingena lima*, *Rhynchonella cuvieri*, and *Inoceramus cuvieri*.

There is a very large quarry near the railway about a mile south of Ulceby. The beds are horizontal, and these contain scattered flints. There are also a few tabular bands. The fossils found here were *Terebratula carnea*, *Kingena lima*, *Rhynchonella cuvieri* (or *reedensis*), and *Ostrea vesicularis*.

* *Geol. Mag.*, Sept., 1902.

There is a very interesting exposure in the quarry a mile west of Ulceby, which shows about 30 feet of comparatively soft chalk, with bands of imperfect tabular flint. The beds have a slight easterly dip. The fossils found here were:—

<i>Micraster cortestudinarium.</i>	<i>Rhynchonella cuvieri.</i>
<i>Holaster</i> (either <i>planus</i> or <i>placenta</i>).	<i>Terebratulina lata.</i> <i>Terebratula carnea.</i>
<i>Rhynchonella reedensis</i> ?	<i>Ostrea vesicularis.</i>

From this point northward to the Humber there are numerous quarries showing similar beds to those already mentioned, but I have not yet had an opportunity to make a lengthy examination of them. A very good section is to be found in a large quarry three-quarters of a mile west of Thornton, where there are about 35 feet of hard white chalk with immense tabular bands of dark flint. Fossils are rare, and the only ones found here, and in one or two other pits in the vicinity, were: *Inoceramus cuvieri*, *Rhynchonella cuvieri*, *Terebratulina lata*, *Terebratulina striata*, and *Cidaris* spines.

There are, however, some very large quarries just south of Barrow, and here I found:—

<i>Echinocorys scutatus.</i>	<i>Kingena lima.</i>
<i>Terebratulina lata.</i>	<i>Rhynchonella reedensis.</i>
<i>Terebratula</i> sp.	<i>Holaster placenta,</i>
<i>Rhynchonella cuvieri.</i>	<i>Inoceramus</i> sp.

As regards the zoological characteristics of the Upper Chalk of Lincolnshire it will be noted that while there is a general resemblance to that of the same horizon in the south of England, there are, on the other hand, certain local peculiarities.

The Lamellibranchs found in these beds do not call for any particular comment, with one exception. The example of *Septifer lineatus* which I found at Fotherby is the only specimen hitherto obtained from either Lincolnshire or Yorkshire. It is a species characteristic of the 'Chalk Rock,' and is described by Mr. H. Woods in his paper on 'The Mollusca of the Chalk Rock.'*

Among the Brachiopods *Terebratula carnea* is the most common. *Terebratula semiglobosa*, a form very common in the Middle Chalk, is extremely rare. I have obtained three specimens of *Terebratula* from the quarry at Fotherby, which Dr. Kitchin says are probably referable to this species. They differ very much in both size and form from the normal type, and he

* *Quart. Journ., Geol. Soc., Vol. LII., 1897.*

informs me that they may be either dwarfed adults or immature specimens (the plicated stage not reached).

R. cuvieri is the commonest species of *Rhynchonella*, but it is, generally speaking, much below the average size. *R. limbata* and *R. plicatilis*, var. *octoplicata* are quite characteristic of Upper Chalk.

The common occurrence of *Kingena lima* in this part of the chalk is a feature peculiar to Lincolnshire, or perhaps it would be more correct to say, peculiar to the northern chalk. It was first found in the Upper Chalk of Lincolnshire by Mr. W. Hill, who also discovered it in the *Holaster planus* chalk at Enthorpe, Yorks. It has also been found by Dr. Rowe in the *Terebratulina* zone at Reighton, and in the *Holaster planus* zone near Flamborough. In the course of my own very limited collecting from the Yorkshire Chalk I have obtained specimens from both these zones in inland Yorkshire, so it would appear to be not uncommon.

Echinoderms are generally common in the *Holaster planus* zone, but such is not the case in Lincolnshire. The commonest forms are *Holaster planus* and *H. placenta*. *Echinocorys* is also found, but the specimens are too imperfect or too much crushed to show any characteristics of shape. As in Yorkshire, *Micrasters* are very rare. The *Micraster cortestudinarium* from Ulceby is the only example of that species which has been found in Lincolnshire. It is about the usual size, having a length of 48 mm. and a breadth of 52 mm. The most remarkable of the echinids is *Infulaster excentricus*. This fossil is common in the zone of *M. coranguinum*, and also occurs in the higher zones, but its occurrence in the lowest part of the Upper Chalk is quite remarkable. Mr. Rhodes, of the Geological Survey, collected a specimen from the Acthorpe quarry, a mile and a half north-west of Louth. In addition to the example which I found at Limber, I have also obtained a specimen from a quarry near Malton which is either in the *Holaster planus* zone, or just within the zone of *M. cortestudinarium* (probably in the former).

Dr. Kitchin has carefully examined the two specimens, and has compared them with the one from Acthorpe, and he says:—

‘The specimens are very good examples of *Infulaster excentricus* Rose. I find that this is a variable form as regards outline. The elevation of the apex, the degree of dorsal carination, and the slope exhibited by the margin of the anteal sulcus are characters subject to much variation, but I do not

think that your two specimens of *Infulaster* can be specifically separated from one another or from any of our museum examples. The specimen from Acthorpe is less than half the size of either of yours; it is relatively more flattened and less elevated, less strongly carinated, and its anteaal profile shows a greater convexity of outline. But we have a cast of a much larger specimen labelled 'Upper Chalk, Swaffham,' and the differences between this, your Limber specimen, and an extreme form such as your Yorkshire example, are only differences of degree.'

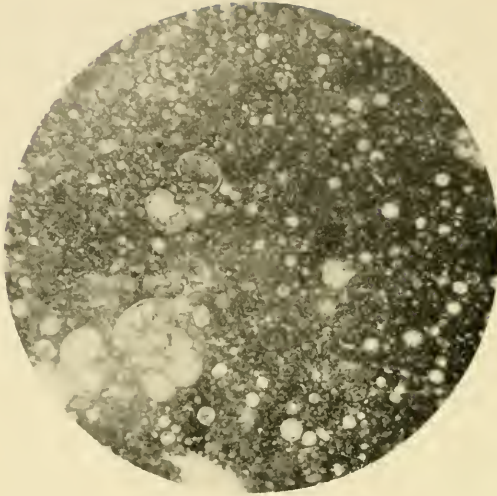
No sponges have yet been found in these beds in Lincolnshire. The only coral found was *Parasmilia centralis*.

The following is, so far as I know, a complete list of the fossils recorded from these beds.

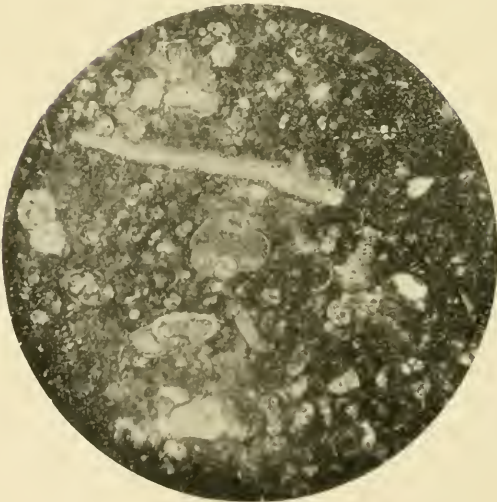
* Fossils obtained by the Geological Survey.	
† „ „	Mr. W. Hill.
‡ „ „	the Louth Naturalists' Society.
|| „ „	myself.
+ <i>Exogyra</i> sp.	<i>Terebratulina carnea</i> Sow.
* <i>Inoceramus bronngiarti</i> Sow.	„ <i>semiglobosa</i> Sow.
* „ <i>cuvieri</i> Sow.	‡ <i>Terebratulina lata</i> Eth.
* „ <i>digitatus</i> Sow.	„ <i>striata</i> Wahl.
* „ sp. (an unnamed species).	<i>Serpula</i> (two species).
<i>Modiola cotta</i> = <i>Septifer lineatus</i> Sow.	<i>Cidaris perornata</i> Forbes.
	„ <i>sceptrifera</i> Mant.
	„ sp.
|| <i>Ostrea normaniana</i> d'Orb.	<i>Cyphosoma</i> sp.
„ <i>vesicularis</i> Lam.	* ? † <i>Echinocorys scutatus</i> Leske.
„ (a small species).	* <i>Galerites globulus</i> Desor.
<i>Plicatula sigillina</i> S. P. Woodw.	<i>Holaster placenta</i> Ag.
<i>Spondylus latus</i> Sow.	† „ <i>planus</i> Mant.
† ‡ <i>Kingena lima</i> Defr.	* <i>Infulaster excentricus</i> Rose.
|| <i>Rhynchonella cuvieri</i> d'Orb.	|| <i>Micraster corboris</i> Forbes.
* „ <i>limbata</i> Schloth.	„ <i>costudinarium</i> Goldf.
„ „ <i>plicatilis</i> , var. <i>octoplicata</i> Sow.	† „ <i>leskei</i> Desm.
† „ „ <i>reelensis</i> Eth.	<i>Parasmilia centralis</i> Mant.
	* <i>Hippothea elegans</i> d'Orb.

In conclusion I wish to express my very sincere thanks to Mr. W. Hill, Mr. A. J. Jukes-Browne, Dr. F. L. Kitchin, and Dr. Rowe (who has enabled me to make several corrections to the list published in the *Geol. Mag.*) for the valuable help which they have so kindly given to me.

I am also indebted to Mr. Hill for the following notes on two thin sections from these beds, and to Mr. A. E. Holt for the micro-photographs in illustration.



No. 1.



No. 2.

Microscopic Sections of Lincolnshire Chalk.

APPENDIX.

NOTES ON THE MICROSCOPIC ASPECT OF THE
UPPER CHALK OF LINCOLNSHIRE.

(PLATE XVIII.)

W. HILL, F.G.S.

**No. 1.—From the quarry three-quarters of a mile
W.S.W. of Fotherby.**

The example of the Chalk of Lincolnshire on this slide will compare with many examples of chalk from the base of the zone of *Micraster cortestudinarium* from the south of England.

Its character is well marked by the large number of 'Spheres' which it contains, and, though these are not packed so closely together as in some specimens of chalk from other localities and horizons, yet give it an aspect which may form a useful help in determining the horizon elsewhere in Lincolnshire or Yorkshire. Besides these 'Spheres,' which at once take the eye when the section is examined under the microscope with a 1-in. objective, there can be recognised foraminifera and a few shelly fragments.

Among the foraminifera *Globigerina* is the most common, together with a minute *Textularian* (probably *Textularia minuta*). There are one or two other forms, but there seems neither a large number nor a great variety of foraminifera in this chalk.

Some of the shell fragments can be identified as belonging to *Inoceramus*, the prismatic arrangement in the shell being well shown, others are too small for identification. There are also three fragments of some Echinoid test, and one small Echinoid spine has been cut through in making the section.

As in many specimens of chalk, the greater part consists of amorphous calcareous matter, probably the debris of calcareous organisms, which has of course surrounded and perhaps helped to preserve those remains which we can still recognise embedded in it. I estimate the amount of this to be about 55 per cent. of the mass, the remainder largely consisting of 'Spheres,' with a few foraminifera and shell fragments 45 per cent.

No. 2.—From the quarry a mile west of Ulceby.

I cannot refer to this specimen as being like the chalk of any particular horizon. It consists very largely of amorphous

calcareous matter, with foraminifera. A few fragments of shell and here and there a thin, thread-like spicule of a sponge can be seen.

The foraminifera, however, exhibit considerable variety in genera, and the chalk would I think be worth washing if soft enough. Amongst those I can recognise are *Globigerina*, which is fairly common. *Textularia* (two or three species), *Cristellaria*, *Nodosaria* (?), and some *Rotuline* forms, besides others. 'Spheres' are present, but most of the single cells seen in this section appear to me to be the primordial cells of *Globigerina* or other foraminifera. The shelly fragments are very small, and give no clue to identification, but there is one large fragment of the test of an Echinoid. I estimate the recognisable ingredients of this chalk to be about 20-25 per cent. of its mass, the rest being amorphous material.



Rare Speeton Clay Fossils. One of the most interesting fossils collected during the visit of the Yorkshire Naturalists' Union to Speeton in June, is a small ammonite of the *Olcostephanus* type which Prof. Kendall found on the weathered clays high up on Black Cliff Ridge.

It evidently belongs to the form of *discofulactus* with few umbilical ribs (19-21) not to that with many (24-30), described and figured as *Olc. (Simberskites) discofulcatus* in the 'Argiles de Speeton'* (p. 146, pl. xi. fig. 15), but which Prof. Pavlow in a later work † has shown to be *Olc. ? phillipsi* Neum. and Uhl. (sp. or subsp.).

Though but 25 mm. across, several of the siphonal ribs exhibit the occasional bifurcations usually seen only in older examples. It has been suggested that the presence of this species here should be recorded as affording additional proof of correspondence between the fauna of the Russian and Speeton Neocomian deposits.

Another find on the same excursion was a small *Crioceras* of the genus *Ancyloceras*, belonging to a species which Prof. von Koenen, to whom specimens had previously been submitted, considers undescribed.—C. G. DANFORD, Reighton.

* 'Argiles de Speeton et Leurs Equivalents.' A. Pavlow et G. W. Lamplugh. Moscou, 1892.

† 'Le Crétacé Inférieur de la Russie et sa faune.' A. Pavlow. P. 78, pl. vi. fig. 1 a, b, c, d; pl. vii. fig. 2 a, b, c, fig. 3 a, b, c.

NOTES ON HARVEST-SPIDERS, WITH PARTICULARS OF THEIR OCCURRENCE IN YORKSHIRE.

(PLATE XIX.)

WM. FALCONER,
Slaiithwaite, near Huddersfield.

INASMUCH as harvest 'spiders' are most in evidence at the time of the ingathering of the crops, they justify the application to them of one part of their trivial name, but they are not, notwithstanding the popular conception of their identity contained in the other part, true spiders. Nevertheless these creatures have an affinity with each other, and are so nearly related, as both to be placed by systematists in the same great class *Arachnida*. Once they were regarded as insects, even by naturalists, but in more modern times they have been removed from amongst the insects, from which they can with ease and certainty be differentiated by the absence of antennæ, the possession of four pairs of legs, the union of the head and chest into one piece (the cephalothorax), and their different life history, which is unmarked by any metamorphoses, the egg producing a juvenile which resembles its parents from its birth, and which without change of form in process of time becomes adult.

Although the harvestman and the spider possess these characteristics of their class, there is considerable dissimilarity between them, and so apparent is this difference to the unaided sight that there is no likelihood, when once the distinction is made, of either of them being mistaken for the other, even by the most careless observer. In the former (Fig. 1) the body is without division, the cephalothorax and the abdomen being fused together; the latter shows definite, if occasionally indistinct, traces of original segmentation, and is without spinners; the eyes, two in number, are placed on an elevation, which is in many species armed with two rows of more or less strong denticulæ. In the latter (Fig. 2) the cephalothorax and the abdomen form separate portions of the body, and are connected by a distinct pedicle; the abdomen shows not the slightest sign of segmentation, and is furnished with spinners; the eyes in the British species are either six or eight, variously grouped.

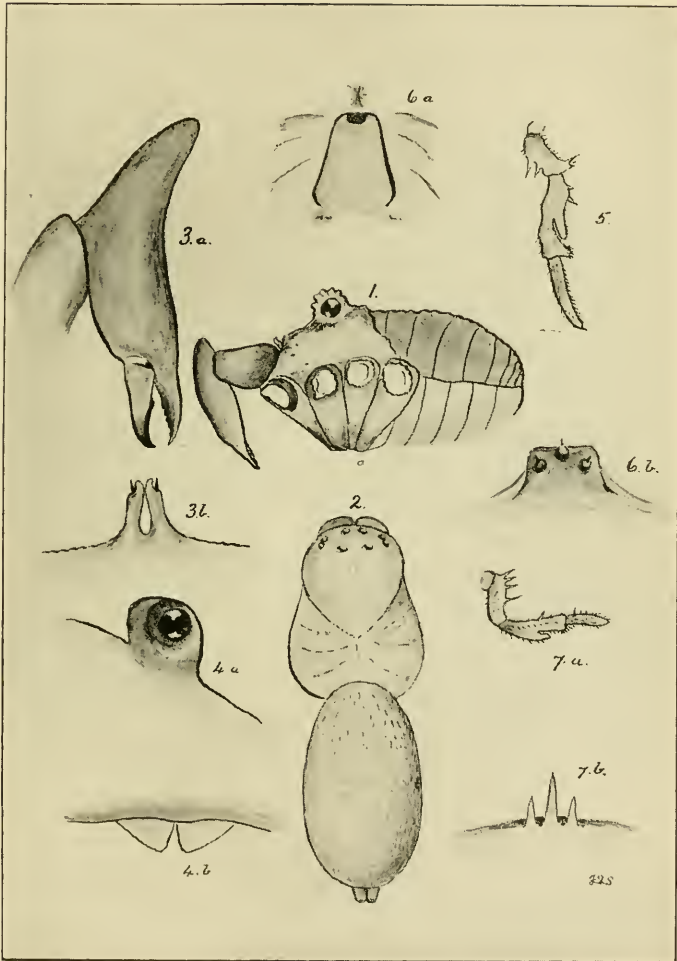
Only a few of the commoner and more active kinds of harvestmen force themselves on our attention in the late summer and autumn, running briskly over the grass and herbage; the others must be diligently searched for during the same seasons (except a few which are adult in spring, and one or two which

may be found throughout the year), in more or less concealment amongst moss, dead leaves, and debris, at the bases and roots of grass and low vegetation, on the foliage and trunks of trees and bushes, in wall crevices, on the inferior surface of projections, and under stones. In these situations they find full scope for the exercise of their carnivorous propensities, feeding on the small creatures (inclusive of the weaker and younger of their own kind) which abound in such places. Being without spinning apparatus of any kind, they cannot weave webs to ensnare their prey, and so ensure an easier and more certain capture; and, as their fangs are not connected with poison-glands, they must, to obtain a meal, overcome their victims by superior strength. One of the larger Phalangiiids has been seen to capture and eat an adult female 'wolf' spider, an animal as large as itself and armed with more deadly weapons in the form of poison-injecting fangs.* On the other hand, there are times when their own lives are in danger, and then they adopt a remarkable expedient (though not one peculiar to them) to baffle their enemies and secure their own safety. Should they be held by one of their long legs, they instantly and of their own volition throw off the limb, which, being endowed with great nervous irritability, begins and continues for a considerable length of time a series of vigorous contortions which bewilder the assailant, fixing its attention and giving the imperilled harvestman an opportunity to hide in the nearest and most convenient retreat. In the use of such a device for self preservation, they are equally gifted with the slow worm, the common lizard, the spider, the crab and the lobster, the reptiles throwing off their tails, the spider its leg, and the crustaceans their claws in similar circumstances. In all these animals the discarded portions are sooner or later replaced. It is, therefore, assumed, but the fact has not been proved,† that a similar renewal takes place in the harvestmen, to whom, however, the deprivation of a leg is apparently no great loss, for they may frequently be seen speeding on their way with any number short of the proper complement down to two (one on each side of the body), while the Rev. J. G. Wood mentions an example which had only one leg left, with which it endeavoured to edge itself along.‡ They are not always the victims of open violence; foes of a more insidious nature and of

* Rev. O. Pickard Cambridge's 'British Phalangidea,' p. 5.

† *Ibid.*

‡ 'New Illustrated Natural History,' p. 751.



Harvest-Spiders, etc.

much smaller size often attack them. One of these assailants, the young six-legged form of a red mite, one of the *Trombididæ*, attaches itself generally to their legs, but occasionally to the upper and lower surfaces of their bodies, selecting those situations which are out of reach of its victims. Being at this stage of its existence a true parasite, its intention, in thus effecting a lodgment on another animal, is manifest. Firmly anchored in this position by peculiar modifications of the mouth parts, it is enabled to suck the juices of its host, and at the same time secure wide dissemination. Eventually it drops to the ground, in which it hides itself, changing in about three weeks into the perfect eight-limbed free imago. Harvestmen, especially when, as often happens, they carry several of these mites at once, are, owing to the bright colour of the latter, rendered much more conspicuous objects than from their sober colouring they would otherwise be. Sometimes too, as has often been observed in England* and in Germany,† the pseudo-scorpion takes advantage of the free-roaming harvestman's long legs as a means of locomotion, holding firmly by its strong pincers. Its motive is much less obvious than that of the mite, and consequently, naturalists who have enquired into the reason for this strange habit, have not all come to the same conclusion. Some think it merely desires a change of quarters, and adopts this plan to attain its end; some that being disturbed in its lair, and being moreover of a very pugnacious and obstinate disposition, it angrily seizes the intruding limb, will not let go, and is, therefore, taking an involuntary ride. Mr. H. Wallis Kew, in an interesting article,‡ concludes that the pseudo-scorpion, in spite of its vastly inferior size, attacks other creatures for food, and must therefore be regarded as an animal of prey; he adduces observations from various sources in support of his view, but admits the subject will bear further investigation. Apparently the harvestman does not (one wonders why?) associate violence with the treacherous attacks of the parasitical mite or predacious pseudo-scorpion, and makes no attempt to clear itself of them by throwing off the infested limb.

The twenty-five species (of which one is doubtful) of British harvestmen are arranged in three families and nine genera, and all belong to the section *Plagiostethi* of the Order *Opiliones* Sund. = *Phalangidea* Cb. While the different species are not

* Rev. W. W. Spicer, 'Science Gossip,' 1867, p. 244.

† Professor Leydig, 'Skizze zu einer Fauna Tubingensis,' 1867.

‡ 'Naturalist,' July, 1901, No. 534, pp. 195-215.

difficult to discriminate when adult, it is otherwise with the sexes, but the male may generally be distinguished from the female by the smaller size and more intense colouring of his body, his longer and more slender legs, and in some kinds by the curious development of his falces.

The subjoined list records fifteen species for the County of York—thirteen of my own collecting, the work of three months—July to September, 1905—and two from other sources. One of the thirteen has been previously taken in Yorkshire, and it is very probable that some of the others, owing to their abundance, have been also, but if so the fact is unknown to me. They have all been verified or named by the Rev. F. Pickard Cambridge, whose 'Monograph of the British Phalangidea,' 1890, is indispensable to students of this small, compact, but very neglected group. From this work the table below for purposes of identification has been compiled, and in them the abbreviations E.E.=eye eminence; C.T.=the cephalothorax; Legs I., II., III., or IV.=the first, second, third or fourth pair of legs respectively; F.S.=the three frontal spines which stand in a line near the front edge of the cephalothorax of the genus *Oligolophus* C. Koch. First refer the specimen to Table A to find the family to which it belongs, next under the family chosen in Table B pick out the genus, and then under the selected genus in Table C determine the species. Finally compare the specimens with a detailed description to eliminate error.

TABLE A—FAMILIES.

1. Transverse folds behind E.E., 2: palpi with terminal claw... ..	<i>Phalangiide.</i>
Transverse folds behind E.E., none: palpi without terminal claw	2
2. Coxæ of legs free: C.T. not prolonged into a hood... ..	<i>Nemastomatidæ.</i>
Coxæ of legs soldered to under-side of body: C.T. prolonged into a hood	<i>Trogulidæ.</i>

TABLE B—GENERA.

I. FAM. PHALANGIDÆ.	
1. Margin of C.T. without lateral pores	<i>Sclerosoma</i> Lucas.
Margin of C.T. with lateral pores	2
2. E.E. without denticulæ	<i>Liobunum</i> C. Koch.
E.E. with denticulæ	3
3. Palpi without or with only small apophyses	4
Palpi with more or less strong apophyses	5

4. Legs I. metatarsi with false articulations
(except *P. saxatile*) *Phalangium* Linn.
Legs I. metatarsi without false articulations *Oligolophus* C. Koch.
5. Both cubital and radial joints of palpi
with apophyses... .. *Platybunus* C. L. Koch.
Cubital joints of palpi only with apophyses *Megabunus* Meade.

II. FAM. NEMASTOMATIDÆ.

- One genus only, see Table A. *Nemastoma* C. Koch.

III. FAM. TROGULIDÆ.

1. Legs I. and II. tarsi of 2 articulations;
Legs III. and IV. tarsi of 3 articulations *Trogulus* Latr.
2. Legs I. and II. tarsi of 3 articulations;
Legs III. and IV. tarsi of 4 articulations *Anelasmacephalus* Sim.

TABLE C—SPECIES.

GEN. SCLEROSOMA.

1. Tibiæ of legs without spines *quadridentatum* Cuvier
2. Tibiæ of legs with strong spines *romanum* L. Koch.

GEN. LIOBUNUM.

1. Eyes rimmed with black; 2 blunt projections
below front edge of C.T. *rotundum* Latr.
2. Eyes rimmed with white; these projections
absent *blackwallii* Meade.

GEN. PHALANGIUM.

1. Two prominent adjacent teeth below
front edge of C.T. *opilio* Linn.
These teeth absent 2
2. Larger; without central abdominal line
of conspicuous white spots *parietinum* C. Koch.
Much smaller, with central abdominal
line of conspicuous white spots *saxatile* C. Koch.
The doubtful species, *P. minutum* Meade, is omitted.

GEN. PLATYBUNUS.

1. Apophysis of cubital joint of palpi=
 $\frac{1}{2}$ length of joint itself *corniger* Herm.
2. Apophysis of cubital joint of palpi=
 $\frac{2}{3}$ length of joint itself *triangularis* Herbst.

GEN. MEGABUNUS.

- One species only, with one long spine near
front edge of C.T. *insignis* Meade.

GEN. OLIGOLOPHUS.

1. F.S. very small 2
F.S. strong 7
2. F.S. equal, wide apart 3
F.S. central one slightly longest, closer
together 5

- | | |
|---|-------------------------------|
| 3. Legs long | 4 |
| Legs short; no spines or denticulæ ... | <i>cinerascens</i> C. Koch. |
| 4. Spines on tibiae of legs I, none or few,
and weak | <i>morio</i> Fabr. |
| Spines on tibiae of legs I, numerous and
strong | <i>alpinus</i> Herbst. |
| 5. F.S. central one a little in advance;
genital plate with circular indentation | <i>agrestis</i> Meade. |
| F.S. in straight line; Genital plate with-
out a circular indentation | 6 |
| 6. Lighter coloured; F.S. tapering ... | <i>tridens</i> C. L. Koch. |
| Dark coloured; F.S. conical | <i>hansenii</i> Kraepel. |
| 7. F.S. unequal; in straight line | 8 |
| F.S. equal | 9 |
| 8. F.S. nearly vertical; central one slightly
longest | <i>palpinalis</i> Herbst. |
| F.S. directed forwards; central one equal
at least twice the lateral ones | <i>meadeii</i> Cb. |
| 9. F.S. directed a little forward; central one
a little in advance | <i>ephippiatus</i> C. L. Koch |
| F.S. directed much forward; in straight
line | <i>spinus</i> Bosc. |
| GEN. NEMASTOMA. | |
| 1. Black; legs short | <i>lugubre</i> O. F. Muller. |
| 2. Legs long and very slender | <i>chrysomelas</i> Herm. |
| GEN. TROGULUS. | |
| One species, see Table B. | <i>tricarinatus</i> Linn. |
| GEN. ANELASMOCEPHALUS. | |
| One species, see Table B. | <i>cambridgii</i> Westw. |

(To be continued.)

EXPLANATION OF PLATE.

Drawings by F. P. SMITH.

- Fig. 1. Outline of body of a harvestman. A. position of genital plate.
 Fig. 2. " " spider.
 Fig. 3a. *Phalangium opilio* Linn.—fals of male.
 Fig. 3b. " " " the two teeth below the front edge of the
cephalothorax.
 Fig. 4a. *Liobunum rotundum* Latr.—eye eminence.
 Fig. 4b. " " " the two projections below the front
edge of the cephalothorax.
 Fig. 5. *Platybunus triangularis* Herbst. —palpus showing the large
apophysis.
 Fig. 6a. *Oligolophus agrestis* Meade—genital plate with circular indentation.
 Fig. 6b. " " " the three frontal spines of the cephalo-
thorax.
 Fig. 7a. *Oligolophus palpinalis* Herbst. —palpus showing the small
apophysis.
 Fig. 7b. " " " the three frontal spines of the
cephalothorax.

THE PINE MARTEN IN LAKE-LAND.

EDWARD T. BALDWIN.

UNTIL lately I was under the impression that the Pine Marten, *Martes sylvestris* (locally known as 'Mart' or 'Sweet-mart'), was approaching extinction in the hill districts of Cumberland, Westmorland, and North Lancashire; but from enquiry recently made on the spot, I find that this is far from being the case, and that the Pine Marten in fair numbers still holds its own in its former mountain fastnesses.

What records I was able to obtain bring the instances of its occurrence given by the late Rev. H. A. McPherson, M.A., in his valuable work on the 'Vertebrate Fauna of Lake-land' (1892), down to a much later date; in fact, in some instances, almost to the present day. As such, they are worthy of notice. Two young 'Marts' were trapped in the third week of May 1906, close to the Bowder Stone in Borrowdale, a locality well known to all tourists in the Lakes. One was got by a man called Jackson, employed (I believe) at the slate quarry there, the other by a man whose name I forget. Jackson, who appears to be a noted 'Mart' catcher, is credited with having trapped no fewer than seven in a single winter, but I believe this occurred some twelve or fourteen years ago. Most of these (if not all) were got at the same place, and were obviously attracted by the number of domestic fowls kept there; in fact the traps seem to have been set close to the fowl run.

Another "Mart" was got, about Christmas 1905, at Watendlath. This is a high upland valley, running parallel with Borrowdale, and lying between the Armboth and Borrowdale fells. The Blencathra Foxhounds (a pack kept mainly in the interest of the sheep farmers for killing hill foxes, as distinguished from the mere sport of hunting, and whose Master is the present Speaker of the House of Commons), when hunting, in May of the present year, the steep rocky side of Borrowdale, opposite the tiny village of Stonethwaite, are said to have put away a 'Mart' which they ran for some distance, but finally lost in the rugged slopes of Glaramara (2560 feet) on the opposite side of the valley.

In the spring of 1905, considerable losses of lambs occurred on the sheep run occupied by a Mr. Richardson, of Seathwaite. Seathwaite is the hamlet of half a dozen houses at the head of Borrowdale, which has the unenviable reputation of possessing

an annual average rainfall of 150 inches. For some time it was thought that a hill fox was the culprit, but after it became plain that the injury to the lambs was all of the same nature, and that a peculiar one, a small piece being in each case bitten out of the back of the neck, it was suspected that a 'Mart' was at work. Accordingly a trap was set by a man named Pepper, the 'Mart' was caught, and the depredations at once ceased.

I was informed by a shepherd that his brother, employed as a gamekeeper by a Mr. Robinson, in Langdale, had during the last four years trapped four or five 'Marts.' These were all the recent records I was able to obtain, but it is only fair to say that enquiries were made in but one place, viz., Borrowdale. As a boy (now, alas, many years ago) I remember hearing that 'Marts' were fairly plentiful in the upper part of Eskdale, and we possessed a magnificent stuffed specimen which had been trapped there by a gamekeeper named Proud. If one attached a long string to him and dragged him gently and noiselessly up to a cat sleeping by the fireside, the result was such as to exceed the wildest expectations of any malicious boy, but the sport had to be curtailed, or broken windows would have marked the maddened exit of the poor cat from the room.

I am told that 'Marts' are very easily trapped, and that a piece of fish is a fatal bait, though a bit of rabbit will do at a pinch. They cannot stand smoke, and when run to ground in rough stones or screes, if a bunch of bracken is set alight and applied to the mouth of the hole, they will bolt immediately. The best kind of dog for hunting them is said to be a cross between the otter and the foxhound.

The Raven (*Corvus corax*) seems still fairly plentiful. I saw no less than four when standing on June 4th of this year on the summit of Stickle Pike (2300 feet), one of the Langdale Pikes. And though not quite so recently, I have heard their familiar croak in the steep precipices of Dale Head, a (comparatively) little-known mountain of the Borrowdale group. The sheep-farmers do not think they molest the healthy lambs, but they give (rather to my surprise) a bad name in this respect to the Carrion Crow, especially during the last year or two. In fact, they were said to be worse than the hill foxes.



The Presidentship of the Yorkshire Naturalists' Union for 1907 has been offered to and accepted by Mr. C. Crossland, F.L.S., of Halifax, joint author of the recently published 'Fungus Flora of Yorkshire.'

XERIS SPECTRUM AT LEEDS: AN ADDITION TO THE BRITISH LIST OF HYMENOPTERA.

W. DENISON ROEBUCK, F.L.S.

WHILE getting together material for the list of Yorkshire Hymenoptera, to be very shortly published in the first volume of the Victoria History of the County, I had some specimens sent me for names by Mr. W. E. L. Wattam, and I am indebted to the Rev. F. D. Morice, of Woking, for identifying one of them, which is *Xeris spectrum* (L.), ♀, one of the family Siricidæ.

Mr. Wattam informs me that it was captured by a friend of his in May 1905, in the workroom of the Yöst Typewriter Co., in Leeds.

Mr. Morice says he does not know whether it has ever been recorded from Britain; that it might no doubt turn up anywhere in imported timber, and that it *may* be indigenous, but he should doubt its being so.

It is always a difficulty to state the real home of these wood-feeding Sirices, and it might be just as well entitled to a place in the British list as in that of other countries from which it is placed on record. Mr. Morice states that W. F. Kirby (Brit. Mus. Cat.) gives only 'Munich, Transbaikal, Algeria' as localities, that Konow localizes it for 'Europa,' André for Germany, and Thomson gives it as a Scandinavian form, occurring sparsely in pine woods.

◆◆◆ COLEOPTERA.

Brosicus cephalotes L. etc. near Doncaster.—My attention was called a short time ago, by Mr. Tonkinson of this town, to the fact that this maritime species was to be found in a sandy lane about two miles east of Doncaster. On visiting the spot I found the insect fairly common. It has also recently been taken by Mr. Tonkinson at Edenthorpe, and by myself at Finningley. It would therefore appear to be widely distributed and well established in the district. Other Geodephaga taken in the same lane as *Brosicus*, are *Cychrus rostratus*, *Carabus nemoralis*, *C. monilis*, *Nebria brevicollis*, *Harpalus ceneus*, *H. tardus*, *H. latus*, *H. ruficornis*, *Pristichus matidus*, *Pt. niger*, *Amaru fulva*, *A. apricaria*, *A. tibialis*, *A. plebia*, *Calathus cisteloides*, *C. flavipes*, *C. melanocephalus*, *Pristonycha terricola*, *Anchomenus dorsalis*, *Trechus minutus*, and *Lebia chlorocephala*.—H. H. CORBETT, Doncaster, June 16th, 1906.

FIELD NOTES.

FLOWERING PLANTS.

***Silene nutans* near Doncaster.**—This beautiful and rare plant is now flowering in profusion on some waste land to the east of Barnby Dun Station, about $4\frac{1}{2}$ miles from Doncaster.—H. H. CORBETT, Doncaster, June 16th, 1906.

***Claytonia perfoliata* at Ainley Wood, Elland.**—There is a moderate quantity of this interesting alien plant at the above locality. It was brought to me for identification by Mr. J. Robertshaw on the 2nd June last.—W. E. L. WATTAM, Newsome.

Variety of *Ranunculus repens* at Shaw Wood, Outlane.—During an investigation of this wood by members of the Lindley Naturalist and Photographic Society on the 2nd June last, my attention was drawn to a variety of *Ranunculus repens*, the flowers having petals from eight to twelve in number. The plants bearing this type of blossom cover a large area of moist ground.—W. E. L. WATTAM, Newsome.

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MAMMALS.

Note on the Mole.—I have ample proof that moles will catch at, and cling to, the feet of birds which have accidentally broken through the crowns of their shallow runs. A strong bird like a full-grown pheasant will, on first being seized, fly off for a short distance with the mole clinging to its foot. Till to-day I have never heard of them attacking a child. I have often picked living moles up, but have never been bitten. Here at Cadney a child was seized by the finger; as he is only between two and three years, he cannot give details. The mole clung to his hand, just as they will to a bird's foot, till it was torn from its hold by his cousin, and as promptly dispatched by Mr. David Richardson, of the Manor House, who was standing by, and told me of the incident.—E. ADRIAN WOODRUFFE-PEACOCK, Cadney, Brigg, May 12th, 1906.

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BIRDS.

Albino Starling and Meadow Pipit at Sedbergh.—We have in our district a white starling and a meadow pipit. The latter has white wings, and white feathers under the body. Both have been bred this year.—W. MORRIS, Sedbergh, June 15th, 1906.

LIST OF PAPERS AND MONOGRAPHS

By Dr. H. CLIFTON SORBY, F.R.S., &c.

(Continued from page 197.)

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ON THE INGLETON CARBONIFEROUS BASEMENT BEDS.

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

IN the Yorkshire Naturalists' Union circular, issued for the Ingleton meeting this year, stress was laid on the necessity for obtaining such data as would enable the horizon of the Carboniferous basement beds in the district to be compared with the complete series of rocks of similar age in the Bristol and South Wales areas. Since Dr. Vaughan published* the results of his investigation of the faunal sequence in the Bristol area, with their zonal divisions in terms of the corals and brachiopods, his classification has been applied in the Mendips † by Mr. Sibley, in South Wales ‡ by Mr. Dixon, at Rush, Co. Dublin § by Dr. Matley, and in East Derbyshire by Mr. Wedd. || Its correctness has, therefore, been well established.

The geological route for the Ingleton meeting was arranged so as to include as many exposures of the basement beds as possible. Fossils were only collected from beds where the relationship to the older rocks could be distinctly made out. In most cases the corals were obtained from within a few feet of the upturned edges of the ancient rock complex, upon the uneven surface of which the Carboniferous rocks were laid down.

Many corals were found as a result of the first day's work, but the writer and Mr. W. Robinson of Sedbergh stayed longer, and were able to obtain further specimens from Norber. Brachiopods were only found as indeterminate fragments during this visit, but the corals were sufficient to enable Dr. Arthur Vaughan to express an opinion that the beds corresponded to the top of the *Syringothyris* zone and the bottom of the *Seminula* zone or C₂ and S₁.

As this was much lower than had been expected, the writer made subsequent visits, again accompanied by Mr. Robinson. The western side of Ingleton Dale and Thornton Dale were worked, and, in addition to numerous corals, a number of better preserved brachiopod fragments, together with a few whole specimens, were found. Most of the brachiopods came from exposures opposite the 'granite' quarry. As it had been reported that *Lithostrotion basaltiforme* occurred in the basement beds at Foxholes,* a careful search was made but without success. Not a single specimen was seen during the whole

* *Q. J. G. S.* 1905, pp. 181-305.

† *Q. J. G. S.* 1906, pp. 324-380.

‡ *Ibid.*, p. 378, and 'Summary of Progress,' 1904, pp. 44-45.

§ *Ibid.*, pp. 275-323.

|| *Ibid.*, p. 379.

of the investigation. The writer however found it in situ at Norber, 125 feet above the conglomerates. The Foxholes record is therefore probably an error.

The new specimens enabled Dr. Vaughan to confirm his previous opinion that the beds corresponded to the C_2 and S_1 horizon. Now this is the point where Dr. Vaughan had, on the grounds of a break in the faunal succession † in the Bristol area, divided the beds into an upper or Kidwellian, and a lower or Clevedonian series. But it also coincides with the assumed unconformity and striking conglomerate noted at Pendine, by Mr. Strahan.‡ It is synchronous with the conglomerate of Rush, Co. Dublin, and is about the horizon of the great outpouring § of lava at Weston. The Ingleton beds are therefore of more than passing interest. They are indications of that final collapse, in Mid Avonian time, of the pre-carboniferous floor. The area we have been discussing had long resisted the gravitational stresses. The immense thickness of the Old Red Sandstone and Carboniferous Limestone series up to the top of the *Syringothyris* zone had been deposited in South Wales and at Bristol before its final submergence took place.

Fortunately there does not appear to be any doubt as to the correctness of the correlation, for as Dr. Vaughan points out, not a single specimen of a form known to occur only in the upper beds of the Carboniferous Limestone series was found in the Ingleton beds. It will be necessary now to examine the sections on Ingleborough, and when the zonal divisions have been made out, to carry them on into the neighbouring dales and determine their relationship to the lithological divisions which have been mapped. This is now being done.

The writer desires to thank Dr. Vaughan for determining the corals and brachiopods collected, and for establishing the correlation. He must also put on record his indebtedness to Mr. W. Robinson, the divisional secretary of the Union, for his valuable assistance in the field and intimate knowledge of the ground.

Note—When introducing a discussion on inter-carboniferous earth movements at the Leeds Meeting of the Yorkshire Geological Society, March 1905, the writer pointed out that volcanic activity was characteristic of regional subsidence, and cited the Weston lava flows, among other examples.

* Harcastle; *Trans. Leeds. Geol. Assoc.*, part 5, p. 26.

† *Q. J. G. S.* 1905, p. 217 and p. 264.

‡ *Q. J. G. S.*, 'Summary of Progress,' 1904, p. 44.

§ *Q. J. G. S.*, vol. lx., p. 147.

YORKSHIRE NATURALISTS AT INGLETON.

MAY 12-14, 1906.

(Continued from page 193.)

GEOLOGICAL NOTES.

By Mr. EDWIN HAWKESWORTH.

EVER since the earliest days of geological study, the district of Ingleton has excited the attention of the students and exponents of the science. As far back as 1802, in that epoch-making book, 'Illustrations of the Huttonian Theory,' Dr. Playfair refers to sections near Ingleton, which showed a bed of 'Limestone,' nearly horizontal, resting upon almost vertical beds of 'primary argillaceous schistus.' Many other pioneers of the science, including such honoured names as W. Smith, A. Sedgwick, and J. Phillips, worked at and wrote of the geology of the district, and many of the most eminent living geologists have devoted considerable attention to it. Nevertheless it still affords a number of problems, pressing for solution.

In its broader aspects, the geology of Ingleton may be said to be fairly simple. On a platform of ancient rocks, highly contorted, and then exposed to enormous denudation, rests a thick mass of Carboniferous deposits, showing the basement of that system up to the Millstone Grit, which caps the higher hills. This mass, covering a large area, was in its turn subjected to great denudation, leaving a series of high hills, very similar in type, some of the deeper valleys between having been cut down into the older rocks.

But, in coming to details, several complicated and difficult points present themselves. The stratigraphy of the Carboniferous rocks is clear, but that of the older rocks is far from being so. According to the Geological Survey, the succession of these is as follows :

Upper Silurian	{	Coniston	{	Tough grits and flags.
		Flags	{	Cleaved mudstone or slate.
			{	Conglomerate.
				Unconformity?
Lower Silurian	{	Coniston Limestone	{	Mudstone or strongly cleaved
		Series.	}	slate. Limestone and shale.
		"Green Slates and Porphyries."	}	Greenish grits and slates.

A considerable patch of these rocks is exposed near Ingleton, running for about two miles north-east of the line of

the North Craven Fault, and several sections are seen in the Dale Beck or Ingleton valley. These appear to belong to the lowest part of the succession, and consist for the most part of beds of slates and grits, varying much in texture. In some instances they are vertical, but generally have a dip of from 50° to 80° in a S.W. direction. In places near the margin of this area, the Coniston Limestone or its supposed equivalent is exposed. These older rocks offer a pressing and abstruse

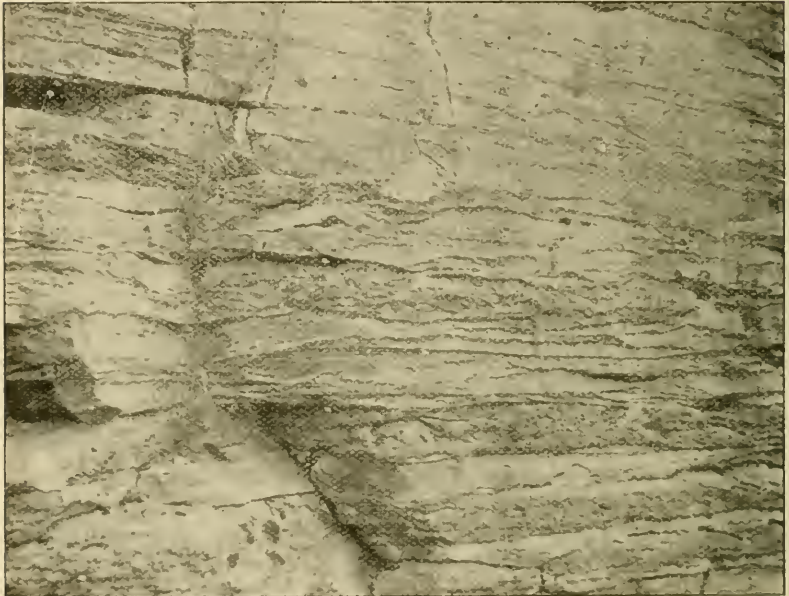


Photo by

[J. J. BURTON.

Section of the lower portion of the Carboniferous basement beds in Ingleborough, showing conglomerate and current bedding.

problem. There are supposed to be about 10,000 feet, in vertical thickness, of these beds ; but it might be found, from a very searching survey, that this is beyond the mark, as, in such highly inclined beds, there may be several repetitions. The question is difficult. The stratigraphy is far from being clear ; the rocks must have undergone great pressure and alteration, which no doubt accounts for the almost total absence of fossils, thus adding greatly to the difficulty of elucidation.

Two large faults, the North and South Craven ones, intersect the southern part of the area, running from N.W. to S.E. These, again, cause complications, though the evidence of them is very clear; in fact, one cannot call to mind any part of our county showing the results of great faults more clearly than this.

The Carboniferous rocks do not present much difficulty in themselves. The lowest beds are well seen in many places, resting almost horizontally upon the edges of the older rocks. In some cases the base is formed by a conglomerate, which in others is absent. Where it is present it is very coarse, gradually getting finer in the ascending section, until, through the stages of lines of pebbles, then traces of quartz grains, it passes up into the Great Scar Limestone, here about 600 feet thick, and often very fossiliferous.

Such are the salient features of the district recommended for the day's work of the Geological Section, and no wonder such a variety of interest attracted a large number of members and associates, geologically inclined, and armed with a fearful and wonderful selection of implements. They were divided into two parties, according to time of arrival, and it was gratifying to see so many of the geological officials of the Union present. They included Messrs. Cosmo Johns, F.G.S., and the writer; president and secretary respectively of the section; Messrs. J. H. Howarth, J.P., F.G.S., and W. Simpson, F.G.S., of the Boulder Committee; Messrs. E. E. Gregory, J. J. Burton, and Thos. Sheppard, F.G.S., representing other committees. The earlier party was under the guidance of the writer, the later one under that of Mr. W. Robinson, both parties following the same route, and joined at the granite quarry.

Jenkin Beck was visited first. Both branches of the Craven Fault cross this. The line of the South one was seen very clearly, bringing down Coal Measures against the Carboniferous Limestone. A bed of sandstone, much shattered, belonging to the former, was seen adjacent to beds of the latter. The line of the North branch was less distinct, but still perceptible, throwing down the Carboniferous Limestone against beds of the Coniston Limestone series. Passing out of the gill, the way was taken over Storrs Common, where some large blocks of Silurian rocks, no doubt ice-borne, were seen resting on the Carboniferous Limestone. The view from here was extensive and most interesting, giving one a splendid idea of the results

of the great faults. A little to the north-west, far below, was Black Burton, on the Ingleton Coalfield, the Coal Measures near having a covering of Permian rocks. On the opposite side of the Ingleton valley, at a much greater elevation than these, could be seen the fine section of Carboniferous Limestone in the Meal Bank quarry, the beds dipping rapidly to the S.W. towards the fault. A little more to the north, rather higher than the limestone, was the Silurian slate quarry.

Getting on to the high road, the line of fault was soon crossed, and the party was on the main exposure of the Lower Silurian Slates and Grits.

Considerable attention was devoted to a quarry at Skirwith. The junction of the Carboniferous and Silurian beds gives rise to a line of powerful springs. Here the water forms a beck which has cut down into the Slates and Grits, which are almost vertical. Resting on these, and forming the floor of the quarry, is a bed of very coarse conglomerate, containing large pebbles, apparently derived from the underlying rocks. Over this is a bed of limestone, then more conglomerate, much finer than the lower one, consisting mainly of small water-worn fragments of slate, cemented together with calcareous matter. Above this the limestone gets gradually more free from derived materials, though for some thickness current-bedded thin lines of small pebbles and grains occur. On one large feathered face of the rock these wavy bands or lines of harder material stood out well, forming a beautiful picture.

Higher up the road, near the waterworks, the limestone was seen resting immediately upon the edges of the Silurian rocks, the conglomerate being absent. Those who saw this section will remember it from the following description:—'As we went along the Askrigg road from Ingleton, about a mile and a half from the latter, an opening appeared in the side of the hill, on the right, about one hundred yards from the road, formed by a large stone which lay horizontally, and was supported by two others standing upright. On going up to the spot we found it was the mouth of a small cave, the stone lying horizontally being part of a limestone bed, and the two upright stones vertical plates of a primary argillaceous schistus. The limestone bed which formed the roof of the cave was nearly horizontal, declining to the south-east; the schistus, nearly vertical, stretching from north-west by west to south-east by east. The schistus, though close in contact with the limestone, seemed to contain nothing calcareous, and did not

effervescence with acids in the slightest degree.' This is an extract from 'Playfair's Illustrations of the Huttonian Theory,' p. 217, 1802, which had not been noticed by the writer previous to the excursion, but now seems worthy of mention. A number of fossils, mostly corals, were obtained from the lower part of the limestone here, which, together with some from Skirwith and from the other sections examined later, will be carefully determined, and it is hoped they will furnish sufficient evidence to co-relate the Basement Carboniferous rocks of this area with those of the South Wales and Bristol areas. Should this be done, the excursion will have answered a very useful purpose.

Still further up the dale, on about the same line, the conglomerate was seen again, containing, in its lower part, very large stones. The surface of the older rocks seems to be uneven, the conglomerate filling the larger hollows.

The 'Granite' Quarry was next visited. Here the two parties joined, and were met by Mr. Tate, the manager, whose willingly rendered local information was greatly appreciated. The quarry showed a magnificent section, and formed the puzzle of the day. The rock has been described variously as grit, conglomerate, granite, porphyry, syenitic granite, and arkose. Some have considered it as igneous, others as detrital, and there appears to be evidence in favour of each. A good argument in favour of the former was a large block of the 'granite' with irregular and angular large pieces of slate included. The late Thos. Tate, in describing a microscopic examination of it,* says 'it consists of fragments of various metamorphic, as well as of eruptive and pyroclastic rocks, slates, chlorite, mica, and quartz schists; pegmatite; quartzose and granitoids; together with ancient rhyolitic lavas, showing banded fluxion and spherulitic structures. Some of the latter hold porphyrytically developed crystals of remarkably clear sanidine, and of quartz enclosing portions of the felsitic ground mass. All these various rock fragments are firmly bound together by a cement of green diabasic paste, with very fresh lath-shaped crystals of plagioclase, and more basic minerals, probably augite and olivine, now converted into secondary products such as chlorite and epidote. The fragments are little water-worn, so cannot have been carried far. Its deposit formed an episode in the prevailing volcanic conditions of the period; consequently we find it sandwiched between beds of

* Trans. Leeds Geol. Assoc., pt. 6.

greenish-grey slate, consisting of a fine felspathic volcanic dust, which is never a constituent of the 'granite' itself, although it is interbedded with it on one or two horizons.' The problem still awaits solution.

Leaving this, the Dale Beck was crossed, the Fox Holes providing the next point of interest. It showed a most instructive section of the Carboniferous Basement Beds containing bands not seen in other sections. It was described as follows by the late C. D. Hardcastle:—*

'Solid limestone, coloured with Silurian mud.'

'Alternate bands of conglomerate and limestone, former becoming finer in upper parts.'

'Coarse conglomerate, 2-3 feet.'

'Limestone with *Lithostrotion basaltiforme*, 4-6 inches.'

'Limestone and calcareous shale, about 3 feet.'

'Clayey shale, about 1 foot.'

'Iron-stained coarse conglomerate, about 2 feet.'

Unconformity.

'Roughly cleaved slates.'

Various fossils were obtained from the limestones here, and at one or two other places lower down the valley where they were exposed.

Although it had been amongst grand scenery all the day, at Beezley's the party paid its sixpences to see *the* 'scenery.' This may savour of vandalism, but there is little cause for complaint, for, were it not that the lessees have made good and safe paths, the glorious scenery of the lower part of this dale would be almost inaccessible. For some distance the walk was over the edges of the slates and grits, and the magnificent gorge and beautiful waterfalls were much admired. Near Ingleton an igneous dyke, variously described as mica-trap, minette, and kersantite was seen crossing the bed of the stream, but the water was rather too deep to admit of a close inspection. A nearer view of the Meal-bank quarry, mentioned in the early part of the paper, with a thin bed of coal in the limestone, completed the day's work. Within such a small area in our county it would be almost impossible to find a *better* exposition of such important geological phenomena.

Mr. Cosmo JONNS, F.G.S., adds:—An examination, as careful as time permitted, of the evidence bearing on the character of the Craven faults in the district visited, went

* Trans. Leeds Geol. Assoc., pt. 5, p. 26.

to strengthen the conclusion that they are normal. There was, as might be expected with faults having a great throw that have moved often, evidence of crushing along the fault lines. The section seen, on crossing over from Jenkin Beck into Chapel-le-dale, on the opposite side of the dale was convincing of this, and admitted of no other conclusion, thus in the neighbourhood of Ingleton, at any rate, the faults are normal ones. This does not negative the possibility that in a long fault line, where the direction varies so much, and where the hade possibly varies too, there might be developed during recurring movements severe local tangential stresses. There was not time available for a prolonged investigation of the structure of the rocks older than Carboniferous, but on the second day, changes of strike and dip were observed that could only be explained by folds along an east and west axis, causing the beds to be repeated. This would not agree with the section given in the 'Survey Memoir,' p. 4, or the statement on p. 5 that 'there must be here exposed a thickness of about 10,000 feet of strata,' but would be in accord with the more recently expressed views of Prof. Hughes. It will probably be found, when the structure of the ground is completely worked out, that we have here a complex of rocks much more ancient than is generally understood.—T.S.

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MOLLUSCS.

Helix nemoralis and *H. arbustorum* in North West Lincolnshire.—While taking a walk on Kettleby Beck bank in Cadney parish, on April 16th, I filled my pocket with broken molluscs from Thrush Stones. On returning home, I found my gathering to be as follows: *H. nemoralis*, *libellula*, 117 specimens, with ordinary banding ranging from 0000 through 12345 to (12345). There was only one variety *roseolubiata* (123) (45). The variety *rubella* was represented by 74 specimens, with exactly the same range of banding. The only interesting shell was (123) × (45). *Helix arbustorum* was fairly well represented by 35 specimens, and the following varieties: three *cincta*, five *flavescens*, and one *fuscescens*. All these shells were obtained by the Thrushes, from the rough grass on the fresh water alluvium of the Beck bank. On the way home, the find of the walk was made, at Pepperdale, Howsham, on the Chalky Boulder Clay, by a Thrush Stone on the roadside, I picked up one specimen of *H. nemoralis*, *libellula*, 12034.—Thomas L. Warner, Cadney, Brigg, April 17th, 1906.

YORKSHIRE NATURALISTS AT FLAMBOROUGH.

JUNE 2-4, 1906.

It can be safely said that the excursion of the Yorkshire Naturalists' Union to Flamborough Headland on Whit week-end was one of the most successful and enjoyable that the Union has had for a long time. Nearly fifty members stayed the week-end, and on the Bank Holiday those present in the different sections numbered over a hundred and fifty. The various branches of the Union's work were exceptionally well



Photo by]

Guillemots.

[R. FORTUNE, F.Z.S.

represented by the officials, in addition to which the members had the advantage of the presence and guidance of several specialists.

Of the three days devoted to the study of the headland, the first was occupied in investigating the southern portion; the second was devoted to examining the northern part, at Speeton and Reighton; whilst the third was occupied by watching the 'climbers' at Bempton, and in working the eastern section of the headland. During the whole of the time the weather was perfect; everyone seemed in the best of humour for work, and in almost all the sections several important discoveries were

Naturalist.

made, as will be seen from the reports following. References are made elsewhere to the action the Union took in reference to the Peregrines at Flamborough, and to the hideous advertisements which have been erected on North Landing. Mr. C. G. Danford also describes on another page some of the more interesting discoveries made at Speeton.

On Saturday evening there was a well-attended meeting at the Society's headquarters, the Station Hotel, under the presidency of Prof. Kendall, at which reports were given of the work accomplished up to that time. A lengthy discussion also took place in reference to the Boulder Committee and its work, which was opened by a paper by Mr. J. H. Howarth. The secretary exhibited and described some new Ammonites, etc., found at Speeton by Mr. C. G. Danford, as well as a large Saurian bone from the same beds.

On Monday a well-attended meeting was held in the open air at Flamborough, at which the Rev. E. M. Cole presided. Reports of work accomplished were given by the officers of the sections, and several new members were elected.

GEOLOGICAL SECTION.—Mr. J. W. STATHER writes:—

The Flamborough excursion from a geological point of view must be written down a great success, for what can a geologist want more than fine sections, fine weather, and congenial companionship?

Saturday morning was spent in examining the chalk quarries in the neighbourhood of Bessingby and Carnaby. The Bessingby quarry is in flintless chalk, and yielded *Actinocamax granulatus*, *Scaphites binodosus*, *Cardiaster ananchytes*, *Rhynchonella* sp., *Ventriculites* sp., and sponges of several species. The Carnaby quarry is unfortunately now very much overgrown with vegetation, but a careful search resulted in the following list:—*Ananchytes oratus* (*Echinocorys vulgaris*), common, *Hamites* sp., *Rhynchonella* sp., *Inoceramus lingua*, *Ammonite* sp., and many sponges. Mr. G. W. Lamplugh and the local observers have long regarded these quarries as representing higher zones in the chalk than even the cliffs at Sewerby. Dr. A. W. Rowe, of Margate, who has recently visited these sections, coincides in this opinion, and regards these pits as high up in the zone of *Actinocamax quadratus*, although it may be as well to note here, for the benefit of those unacquainted with the little anomalies of modern zonal nomenclature, that this fossil has not yet been found in Yorkshire.

Saturday afternoon found the party, largely increased in numbers, examining the coast sections between Bridlington and Danes' Dyke. A long pause was made at the Sewerby buried cliff, which consists of an ancient cliff of chalk buried under glacial beds. From the deposits backed up against the old cliff a large number of mammalian bones have from time to time been obtained. On this occasion, though no fossils were obtained, the various beds were well exposed and their sequence perfectly clear. Much interest was aroused by Prof. Kendall's remarks as to the importance of a correct interpretation of the section and the conditions under which the beds were deposited. The remainder of the afternoon was spent in knocking out sponges and other fossils from the cliffs and scars between Sewerby and Danes' Dyke.

The following day was spent at Speeton. Mr. C. G. Danford led the party, and the shore sections were carefully examined, from the Red chalk under the big cliffs and the Kimeridge clay a mile and a half away. In the cliff at the south end of the section the *Deshayesi* clays were seen, and lower down the compound nodular band was visible on the beach. The coprolite bed (the dividing line between the Kimeridge clay and the Speeton clay) was also exceptionally well exposed. Many beautiful fossils were taken, including a previously unrecorded ammonite, which occurred to Prof. Kendall on the slopes of Middle Cliff.

The Speeton estuarine shell-beds were also examined.

On Monday morning a very large geological party assembled on Bempton Cliffs. The 'climbers' were in great form, and claimed a good deal of attention. The contorted strata in the cliffs at 'Old Dor' were well seen, and created much discussion as to when and how they were brought about. At Thornwick, most picturesque of Bays, a descent was made to the beach, and the hammers were got out. But the tide was high, the chalk hard, and fossils scarce.

VERTEBRATE SECTION. —The Vertebrate Section was officially represented by its president, Mr. T. H. Nelson, M.B.O.U., and two of its secretaries, Messrs. Booth and Fortune, who present this report.

Most of the time was spent upon the cliffs by the members of this section, excepting on the Saturday, when the country and woods near Bessingby were investigated, and also the wooded ravine of Danes' Dyke. Although the weather was delightfully

fine, the high wind which prevailed most of the time prevented the birds showing as much as usual. In all fifty-six species of birds were noted, and the nests of nineteen species containing eggs or young were observed.

Many nests of Blackbirds and Thrushes were found, and it was rather remarkable that they contained eggs only, showing a great regularity in the time for their second broods. Quite half of the Blackbirds' nests seen were built upon the ground, although there were plenty of more normal situations. The increasing tendency of this species to nest upon the ground

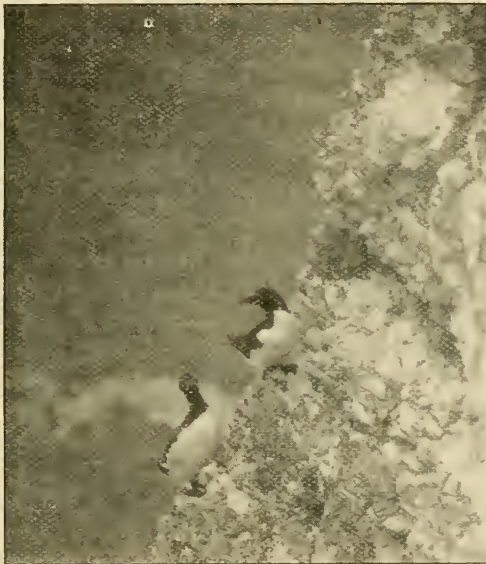


Photo by

Razorbill and Ringed Guillemot.

[R. FORTUNE, F.Z.S.]

has been observed for some time in the West Riding, and it is interesting to note the same habit in the East Riding.

The Wood Warbler was heard in a wood near Bessingby, and we were informed that it was a rather uncommon bird in this district. The Rev. F. H. Woods found an addled and rather remarkable egg of the Pied Wagtail which apparently had two shells, the outer shell being of the normal Pied Wagtail type, whilst the inner shell partook more of the character of the Yellow Wagtail. A Thrush's eggs were seen in one nest which were quite blue, and entirely devoid of the usual spots.

The sight of the numerous colonies of the common Linnet in Danes' Dyke and other suitable localities, was greatly enjoyed by members from other parts of the county, where the ranks of this delightful little bird have been sadly thinned by the rascally bird catcher.

A few scattered pairs of Stonechats were noted, and also a few pairs of Rock Pipits, and the call of the Corn Bunting was heard in almost every field. The comparative scarcity of all species of Titmice was remarked upon, although a good deal of time was spent in rather unsuitable places for seeing them. No Tree Sparrows were observed about their haunts in the cliffs during the period of the excursion, but upon Tuesday and Wednesday, when the wind had abated, they were much in evidence, as were also the Pipits. A Kestrel's nest seen in a wooded ravine contained five very finely marked eggs.

The great treat was observing the sea birds. Looking down from the cliff tops vast multitudes of Guillemots, Razorbills, and Puffins were seen. Four sets of 'climbers' were following their occupation, their methods greatly interesting the members. A discussion as to whether the Guillemots, etc., were as numerous as formerly had to be abandoned owing to the magnitude of the numbers under consideration, but all the climbers complain that they are not getting as many eggs as formerly, more especially are the better marked varieties scarcer. A search was made for the variety known as the Ringed Guillemot, but although only a single bird was identified during the excursion, the president observed several in the course of the following fortnight.

The chief feature of interest was that, after an absence of a quarter of a century, a pair of Peregrine Falcons has taken up its abode in the cliffs again. Owing to the number of people about upon Bank Holiday, the birds were not seen after the early morning, but on the following day the male and female were seen and the position of the eyrie located; a descent was made to the nest on the Wednesday, and it was found to contain three young ones well feathered. It is hoped that these fine falcons may be allowed to remain and nest in security in the cliffs for many years; the fact of their presence adds greatly to the interest of naturalists visiting the locality. The birds are protected by law, and the Wild Birds' Protection Committee of the Union has made arrangements to see the law is carried out, and have promised a reward to the climbers if the birds successfully bring off their young, or in case anyone robbing the

nest or shooting the birds, that they should supply such information as will lead to the prosecution of the offenders.

It was pleasing to see the several colonies of the beautiful Kittiwake nesting on the cliffs. Herring Gulls were also present, not as nesting species, but sailing majestically along with eyes scanning the ledges for unprotected eggs. A few Lesser Black Backed Gulls were also noticed. Several Carrion Crows were seen (including a young one scarcely able to fly), and the inevitable Jackdaw, all on the prowl for eggs. Rock Doves and Stock Doves were also seen, but it was noticeable that at the Bempton portion of the cliffs there were very few doves about, either the above kinds or of the half wild dove-cote pigeon usually seen. The presence of the falcons probably accounts for this scarcity.

Mr. T. H. NELSON adds :—Until the third week of June I had the falcons under observation, and it is highly satisfactory to be able to announce that the young birds fledged about the 21st. On that day, the climber, at my request, went down to the eyre and saw the youngsters flying from point to point of the lower cliffs. They were strong on the wing, and there is every prospect of their safety being ensured.

In MAMMALIA and REPTILIA nothing special was observed, though the examination of some Badger 'earths' on the cliff tops, showing the presence of these interesting animals in the neighbourhood, was a source of considerable pleasure. Mr. Roebuck records the Smooth Newt. At the evening meeting an egg was exhibited by Mr. Nelson (who had it lent by Prof. Newton) of very great interest; it was marked Razorbill, and signed as taken by the celebrated Yorkshire Naturalist, C. Waterton, at Flamborough in 1834. Opinion was against the fact of its being a Razorbill's egg, the general idea being that it was an egg of the Black Guillemot, which it is known formerly nested on the cliffs.

MOLLUSCA.—Mr. J. E. CROWTHER reports :—The Conchological Section was officially represented by Messrs. W. Denison Roebuck, F.L.S., Leeds (president), and J. E. Crowther, Elland (secretary). On the road side between Bempton Station, the cliffs, and Flamborough, Messrs. J. E. and T. Crowther found *Agriolimax agrestis* in great variety, while *Hygromia hispida*, *H. rufescens*, and *Vitriua pellucida* were also fairly plentiful. *Vitrea cellaria*, *V. nitidula*, *Arion ater* var. *albo-lateralis*, *A. faciatus*, *Theba cantiana*, and *Cochlicopa lubrica* were

all found sparingly. *Cepaea hortensis* and its variety *roseolabiata* were found on the cliff at Bempton. A large colony of *Helicogena aspersa* was met with close to Bempton village, and a single *Milax gagates* at the same place. *Helionanes virgata* occurred on the cliffs near Bridlington. In a pond in Danes' Dyke *Aeroloxus lacustris* was fairly abundant on old rush stems. *Radix pereger*, *Spherium corneum*, and *Pisidium* (probably *nitidum*) also occurred but sparingly. *Gyraulus crista* and its variety *laevigata* were very plentiful in the same pond, the variety occurring at the rate of about 5 to 1 of the type.

Near the Lighthouse Messrs. Roebuck and Cash found in a little damp hollow *Agriolimax agrestis*, *Vitriina pellucida*, *Vitrea cellaria*, *Hygromia hispida* (abundant), *Cochlicopa lubrica* (several), *Cepaea nemoralis* var. *libellula* (12) 345 (one), *Vallonia pulchella* (one), *Succinea putris* (abundant), *Arion ater* var. *nigrescens* (one), *Radix pereger* (a few), and *Limnaea truncatula* (one). Mr. Cash also noted near Flamborough village *Theba cantiana*, *Hygromia rufescens*, and *Helicogena aspersa*. The Rev. F. H. Woods found *Vitriina pellucida* (common and fine), *Clausilia bidentata*, *Vitriina alliaria*, *V. nitidula*, *Candidula caperata*, *Theba cantiana*, *Hygromia hispida*, *H. rufescens*, and *Cepaea nemoralis*. Mr. Wood also reported the marine shell *Pholus crispata*. Mr. C. Crossland brought *Arion hortensis* and *Euconulus fulvus* from Danes' Dyke.

In all twenty-eight species of non-marine mollusca and five varieties were noted during the day, comprising five slugs, seventeen land, and six freshwater species.

In Hymenoptera Mr. G. T. Porritt collected at Bempton a couple of Sawflies which, having since been submitted to the Rev. F. D. Morice, turn out to be *Pachynematus apicalis* Htg., ♀ and *Dolerus picipes* Kl., ♀ (which is probably the same as *D. intermedius* of Cameron's monograph), and both of them additions to the Yorkshire list of Hymenoptera which Mr. W. Denison Roebuck is at present writing for the Victoria History of Yorkshire. Mr. W. Pearson took a yee, which Mr. E. Saunders identifies as *Andrena albicans* ♀.

FLOWERING PLANTS. Mr. J. F. ROBINSON writes:—The Saturday rambles took in the Boynton Woods, nearer Bridlington, as well as the cliffs, fields, and plantations of the south-west portion of the headland, up to and including the deep ravine to the ancient British earthwork known as 'Danes' Dyke.' The clayey and gravelly sea-front from Bridlington to a point opposite the village of Sewerby is dominated at

present by much growth of the buck's-horn plantain (*Plantago Coronopus*), whilst in the ravine at the south end of Danes' Dyke a minute investigation yielded all the plants already mentioned in the 'Flora of the East Riding.' Amongst phanerogams blossoming most conspicuously just now are *Viola Riviniana*, Gorse, and the Early Purple Orchis (*O. mascula*), the last being very fine when it was somewhat sheltered by young trees of a very recent plantation. Two or three other orchidaceous plants were found in the fields above, e.g., *Orchis Morio*, *O. ustulata*, and *Listera ovata*. Vegetative signs also were seen of the Grass of Parnassus, *Eupatorium cannabinum*, *Hypericum pulchrum*, etc. In the small round plantations of older Sycamore, Ash, and Scots Pine (the last two very sparsely intermingled), which occur on the glacial drift that covers the chalk near Sewerby, the dominant plant of under-growth was the rose-red campion (*Lychnis dioica*), and it was in greater profusion and luxuriance than one had ever seen it previously.

For the Monday meetings the rendezvous changed to the Bempton or northern side of the chalk plateau, round *via* Thornwick Bays, North Sea Landing, Silex Bay, the Lighthouse, and the village of Flamborough, about which already have blossomed the flowers of romance, as in Blackmore's 'Mary Anerley.' The long lane from Bempton to the cliff edge, where Guillemot is king, is quite typical of East Yorkshire. Bordered by well-cultivated, apparently fertile fields, there was lush growth of Hedge Parsley (*Cherophyllum sylvestre*), white, and red deadnettle, big old hawthorn trees, and again, but more subdued, red campion. Although the arborical vegetation of this part is somewhat stunted and possessed of a covering habit due to winds that frequently sweep the upland, still in considerable numbers trees are conspicuous generally. Most noteworthy was *Pyrus malus*, Wild Apple, probably however not the 'Crab,' but an escape from cultivation, which was in profuse, very white blossom. There were also Birch, Alder (*Alnus glutinosa*), Mountain Ash, Common Ash, etc., mingled with much hawthorn in fragrant blossom. Inland, and more under the cultivator's hand, the fields were in one golden glory of buttercup—*Ranunculus bulbosus*. Nearer the edge of the cliffs, two or three hundred feet above sea-level, vegetation showed several points of its xerophilous character—fleshy, stunted, and closely clapped to the surface of the soil. Mingled together on the very short sward, and varying according as the soil was clay, gravel, or chalk, there were *Viola ericetorum*

(yellow spurred), *Poterium sanguisorba*: four plantains—*Plantago lanceolata*, *P. media*, *P. maritima*, and *P. Coronopus*; two bedstraws—*Galium verum* and *G. saxatile*; together with Thrift (*Armeria*), *Spiraea Filipendula*, and wild Thyme. Dotted here and there in the grass *Ophioglossum vulgatum* was noted. The ordinary scurvy grass, *Cochlearia officinalis*, together with *Matricaria maritima* and a fleshy-leaved form of *Lotus corniculatus* was common on and near the cliff edge. On earthen and turf-made fences near North Sea Landing one tiny grass—*Aira praecox*—was noted for the first time in this locality.

Of watery places, of which there are a few in the shape of small ponds, and even small brooklets in the Flamborough district, there was nothing special to note except the occurrence of *Ranunculus hederaceus*, *Pinguicula vulgaris*, and *Triglochin palustre*, all in flower. A clayey cattle-pond near Flamborough village was white over with the snowy flowers of *Ranunculus floribundus*, whilst the smaller-flowered *R. Drouetti* affected other parts, and *Sium angustifolium* with *Scirpus palustris*, one small beck.

Very exhaustive lists of the flowering plants generally were handed to the writer by Rev. F. H. Wood and Mr. J. J. Marshall, from which a very complete florula of Flamborough Head could be made; and, whilst it would not discover any great rarity, yet it would always be interesting if for nothing else but completing the more thorough botanical survey of an otherwise noted portion of the broad-acred shire.

MOSSES AND HEPATICS.—Mr. J. J. MARSHALL writes:—So far as I can gather we found twenty-two Acrocarpous Mosses, twenty Pleurocarpus Mosses, and six Hepatics.

The soil was too dry to yield a good haul, and the shady banks of Danes' Dyke proved the best collecting ground. The following are the best plants noticed:—*Hymenostomum gymnostomum*, *Seligeria paucifolia*, *S. calcarea*, *Dicrano-Weissia cirrhata*, *Barbula lurida*, *B. brevifolia*, *Orthotrichum pulchellum*, *Amblystegium chrysophyllum*, *Fissidens exiguus*, *F. viridulus*.

T. S.

To be continued.

The Ripon Corporation is holding a great historical festival in July for the purpose of raising funds for the Municipal Museum in connection with the Spa Gardens. Towards this there are already several objects housed in the Town Hall, including a collection of Coleoptera formed some years ago by the Marquis of Ripon.

THE NATURALIST.

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T. SHEPPARD, F.G.S.,
THE MUSEUM, 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.

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NOTES AND COMMENTS.

BRITISH ASSOCIATION AT YORK.

TO-DAY (August 1st) the British Association for the Advancement of Science, commences its meeting at York, the city in which, three quarters of a century ago, this important society was founded. John Phillips, then Curator of the York Museum, was its first secretary. The first meeting was held in the Lecture Theatre of the York Philosophical Society—and this small room accommodated all the members present. To-day, all the largest halls and buildings in the city are necessary for the sections to be properly carried on. For the present meeting the citizens of York have made handsome arrangements. They are hoping that it may be a 'record' meeting. Over three thousand pounds have been subscribed towards the local fund. In view of the fact that last years' meeting was in South Africa, and that this is the seventy-sixth anniversary of the foundation of the Association, there should be every prospect of the meeting being exceptionally well attended. On the other hand, however, the date chosen—August bank holiday week—is surely the one week in the year that the convenience of the members cannot be properly considered. Only those who have been bold enough to *travel* in our county, we cannot say take a *holiday*, in that week, can form any idea of what the effect of several hundred additional visitors to York will be—for the convenience of whom it is usual to charter numerous special trains! We do not know who is responsible for the unusually early date of the meeting this year, but we feel sure that it is exceedingly inconvenient to many.

THE YORK HANDBOOK.

We have been favoured with an advance copy of the 'Handbook to York and District,' which has been prepared for the British Association meeting. It is a substantial volume, is well printed on good paper, is of the proper size, has a most appropriate design on the cover, and has not been spoilt by the insertion of portraits of various local 'worthies'! The volume is edited by Dr. G. A. Auden, who also writes the Preface, etc., and the chapter on Pre-historic Archæology. The local committee has acted wisely in its selection of its editor of the Handbook. Dr. Auden is one of the few—very few—who take an intelligent and practical interest in the antiquities of our county capital. York, with its glorious associations and wealth of historical relics, is, strangely enough, lacking in the type of

antiquary that one would expect to find there. Still, there are some, and the aid of these has been called in, in the preparation of the Handbook. It is, as might be expected, largely devoted to archæology. Messrs. Auden, Platnauer, Hargrove, Willis, Cooper, Benson, Solloway, Skaife, Miss Sellers, and the Revs. Canon Watson and Purey-Cust, describe every aspect of the archæology and antiquities of the city. Naturally, much of the information in these 250 pages is to be found elsewhere, but as a summary it is useful, and will probably be much appreciated by the visitors to York this week, for whom, we must not forget, the book was primarily prepared.

THE NATURAL HISTORY SECTION.

Seeing that three-quarters of the book are occupied in the way referred to, it is hardly to be expected that in the remainder there will be much opportunity of describing to any serious extent the various branches of geology, botany, zoology, etc., of York and district. The result is that many of the chapters under this section of the book are largely devoted to lists of species. These lists, too, as might be anticipated, are for the most part drawn from the various monographs issued by the Yorkshire Naturalists' Union. The chapter on 'Geology' is written by the Rev. W. Johnson, who is to be complimented on his success in keeping his description within seven pages, notwithstanding the fact that 'the geology of York is, in one sense, of the simplest kind!' Dr. W. G. Smith follows with a 'General Survey' of the botanical features of the area, which has the advantage of being exceedingly 'readable,' and can be appreciated by one who may perhaps not know that *Bellis perennis* is the daisy! Under 'Phanerogamic Flora and Vascular cryptogams,' Mr. H. J. Wilkinson gives several pages of lists of plants characteristic of different areas around York. No one could have done this better, and it will be very useful for reference. The Algæ, Fungi, Hepaticæ, Sphagnaceæ, and Musci Veri, are under the name of our contributor, Mr. W. Ingham, and Mr. Oxley Grabham lists the mammals, birds, reptiles, and amphibians; Mr. Riley Fortune gives a very complete account of the fishes; in three pages the Rev. W. C. Hey deals with the Coleoptera, Mr. S. Walker, writes on 'Lepidoptera,' the Rev. T. A. Brode gives a list of the Mollusca, and Mr. J. E. Clarke gives some useful 'Meteorological Notes.' These conclude the volume, there being unfortunately no index.

YORK MAPS.

Accompanying the volume are three very useful maps, one is a reproduction of Skaife's well known archæological map of York (1864). There is a map of the greater part of the county, specially prepared by the Ordnance Survey for the meeting, and a map showing the glacial lakes, moraines, etc., which is to be distributed amongst the members of the geological section. This last is handy; if it is possible to find a fault it would be that the railways are shown just a little too prominently, but as we believe this map is largely due to the efforts of Mr. M. B. Cotsworth, this item is quite excusable!

YORK MUSEUM.

In perusing the various sections of the Handbook above referred to, it is impossible to get away from the fact that the York Philosophical Society and its Museum are duly appreciated for the influence they have had on the scientific activity—or otherwise—of York. The editor is justly proud of the fact that the society 'discovered' John Phillips, and that John Phillips, with Vernon Harcourt and W. Gray, founded the British Association. Were it but possible that Phillips could attend the present meeting of the Association—would he not be surprised—possibly astounded—at the present position and importance of the Association. It has surely grown beyond even Phillips' greatest expectations. But, wouldn't he be even more astounded to find that the Museum he loved so well, and for which he did so much, was little different from the days in which he knew it? True, it may contain some specimens which have been added since his day—labels too, thanks (?) to the constant changes in nomenclature—may bear unfamiliar names, but the buildings, the cases, etc., have they advanced with the times? They have not. This is no fault of the Curators, nor of the few enthusiasts who *do* take an interest in the Museum. It is the fault of those who ought to have been the very first to have kept their unique collections in worthy surroundings—the wealthy citizens of York. We can only express the hope—as we have already done recently in these columns—that the meeting of the British Association may awaken the people of York to their responsibilities, and that a new building may be erected for the better display of the specimens.

MUSEUMS ASSOCIATION AT BRISTOL.

The annual conference of Museum's' Curators (the Museums Association) was held at Bristol from July 2nd-6th. Dr. W. E. Hoyle, of the Manchester Museum, presided. It was exceptionally well attended, and, whether viewed from the excellence and usefulness of the papers read and discussed, the interest attached to the places visited, or the delightful way in which the visitors were entertained, it must be admitted that the meeting was one of the most successful the Association has held. Bristol certainly shows up much better than many northern towns as regards its 'show places.' In addition to the Museum, Art Gallery, and Zoological Gardens in the city, visits were paid to the Stone Circle, etc., at Stanton Drew (described by Prof. Lloyd Morgan), the Cheddar Cliffs and Caves, and the British Lake Village at Glastonbury. The last named was described by its discoverer, Mr. A. Bulleid. Representatives from the following northern museums were present:—Bootle, Bolton, Chester, Carlisle, Hull, Huddersfield, Keighley, Liverpool, Manchester, St. Helens, Sheffield, Stockport, Sunderland, and York. Next year's conference will be at Dundee.

**GEOLOGY.**

The 'Shell-bed' at Speeton.—The so-called Speeton Shell-bed, originally described by Mr. G. W. Lamplugh ('Drifts of Flamborough Headland,' 'Quar. Journ. Geol. Soc.,' Vol. 47, 1891), has recently been exposed on the beach at the foot of the cliffs about 600 yards north of Reighton Gap. From it the characteristic shells were obtained. This gives a total exposure of the bed at beach level of about half a mile.—C. G. DANFORD, Reighton, July 17th, 1906.

—: o :—

MOLLUSCS.

Testacella scutulium at Rastrick.—On May 24th, Mr. A. C. Lane sent me two slugs in a garden at Rastrick, which he said lived on worms; that portion of the garden infested by the slugs being almost denuded of worms. I have submitted one of them to Mr. J. W. Taylor, F.L.S., of Leeds, and he pronounces them to be *Testacella scutulium* Sowerby. This is a new record for the Parish of Halifax. —JOHN E. CROWTHER, Elland, June 11th, 1906.

FOSSIL MOLLUSCAN ZONES IN THE CARBONIFEROUS ROCKS OF THE MIDLANDS.

PART I.

(PLATES XXI., XXII.)

WHEELTON HIND, M.D., B.S., F.R.C.S., F.G.S.

It has long been a reflection on the students of the geology of the Carboniferous Rocks of the North Midlands of England that they had not worked out any life zones in these rocks. Of late years, however, much has been done, and to-day I hope I may say that at least the broad lines of Zonal division of the whole Carboniferous series has been laid down. Following up the idea which led me to show, in a graphic manner, the distribution of the mollusca of the coal measures, in my Monograph on *Carbonicola*, *Naiadites*, and *Anthracomya*, I, in conjunction with my friend Mr. Stobbs, published a Fossil Chart for the North Staffordshire Coal Field. Since that time we have made many observations on the distribution of these shells in other coal fields, and we believe that this succession of fossils is fairly constant in all of them. Two distinct faunas, one characterised by the genera *Carbonicola*, *Anthracomya*, and *Naiadites*, and the other by *Pterinopecten papyroceus* and various small cephalopods, occur in the coal measures, but never intermingle. We regard the species of the former as exact zonal indices, and make use of marine bands occurring in a definite relation between any two of the zones as affording detailed evidence of definite horizons.

That the genera *Carbonicola*, *Anthracomya*, and *Naiadites* denote fresh water, or possibly slightly brackish water conditions, we assume from the eroded conditions of the umbones due to solution of the CaCO_3 of the shell in water charged with CO_2 . This view is strengthened by the negative fact that no known marine species occur with them. Lastly, the *Carbonicola* and *Anthracomya* belong to the *Unionidae*, which have a fresh water habitus now.

In the North Staffordshire coal field we find that in the uppermost beds, 'the Keele series,' no mollusca occur. These beds are probably the equivalent of the Radstock series of the Bristol Coal Field, judging from the plants which are found in them. The shell which is found in the lower part of the Newcastle series of North Staffordshire is very small, and has not a wide vertical range, but it is fairly common in certain calcareous beds in the series. This shell is *Anthracomya calcifera* (*Quar. Jour. Geol. Soc.*, Vol. LV., p. 365, pl. xxv., figs. 14-20), and

is our highest Zone fossil. Below it comes the Zone of *Anthracomya phillipsii*, a most important zone, for it has been found in nearly every English coal field. It characterises 300-400 feet of strata. In the upper part of this Zone a very small shell *Carbonicola vinti* occurs, but at present this species has only been found in the North Staffordshire and Durham Coal Fields. *Anthracomya phillipsii* occurs in the black band ironstones, and its range, as known at present, is from the Top Red Mine ironstone to the Gubbin ironstone. The maximum of *Anthracomya wardi* occurs, 600 feet below in the bed known as the roof of the Winghay or Knowles coal. It is associated with a rare form of *Naiadites*, *N. elongata*.

Anthracomya adamsii and its varieties, and *A. pulchra*, occur in a very narrow bed some 500 feet lower in the New Mine and Burnwood ironstones. *Carbonicola turgida* denotes a well-marked zone, 500 feet lower, and *Carbonicola subconstricta* is often associated with this band some little way below the Moss coal. 500 feet lower is the Zone of *Carbonicola robusta*, but this species goes down to the base of the coal measures. 200 feet lower comes *Anthracomya modiolaris* in the Holly Lane coal. 100 feet lower is the Zone of *Anthracomya williamsoni* and *Carbonicola nucularis* in the roof of the Hard Mine coal. 400 feet below is the Zone of *Carbonicola acuta* or rather of its peculiar variety, *C. acuta* var. *rhomboidalis*, for the latter are a more definite Zonal index than the species itself. 500 feet lower is the well-known band with the marine fauna found in the Hard bed coal — *Gastrioceras listeri*, *Dimorphoceras gilbertsoni*, *Pterinopecten papyraceus*. The marine bands of the North Staffordshire Coal Field are described in a paper by Mr. J. T. Stobbs and myself in *Quar. Jour. Geol. Soc.*, Vol. LXI., pp. 495-547, and I shall do no more here than refer to the position of them with regard to the Zonal species mentioned above. Eleven marine bands are noted in our paper.

The highest is that known as the roof of the Bay or Lady coal, which occurs about 48 feet above the bed with *Anthracomya wardi*. The bed to be mentioned next, which occurs a few feet below the Knowles coal, contains only *Lingula mytiloides* and *Orbiculoidea nitida*, but *Pterinopecten papyraceus* is found in the higher one, and is, as far as we know at present, the latest appearance of this species, which is characteristic of the whole of the Upper Carboniferous below this horizon. It occurs in beds which rest on the uppermost Limestones of Zone D₃ of the Lower Carboniferous. The next marine band, and the one

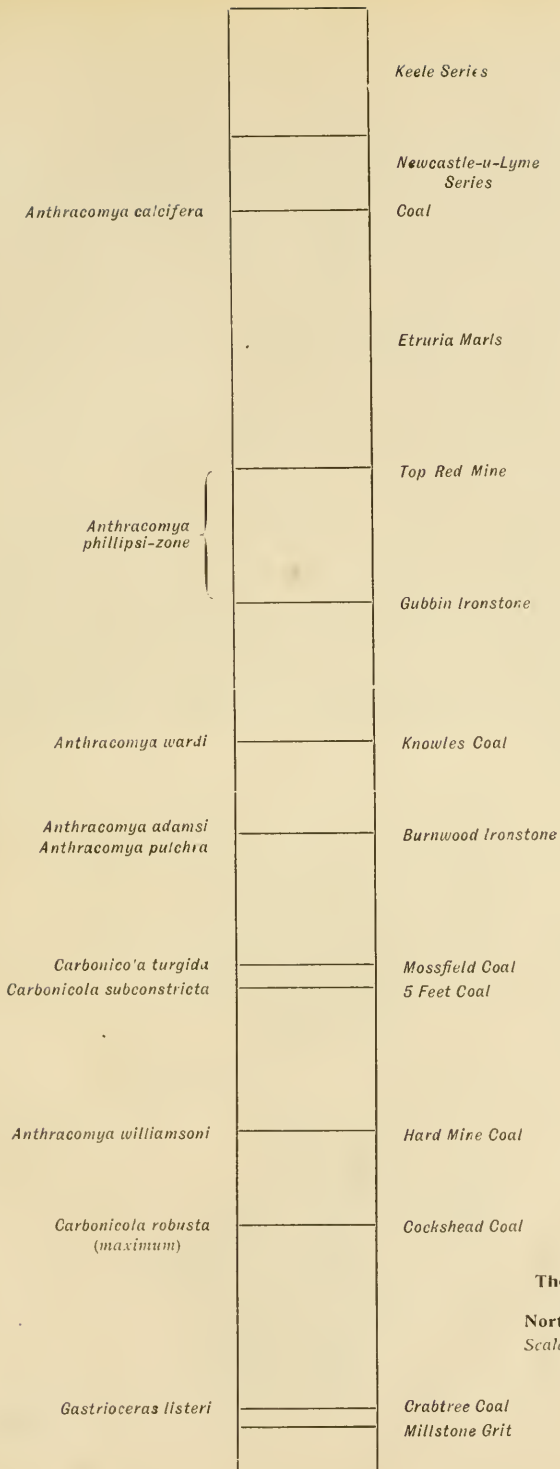


Fig. 1.
The Coal Measure
Sequence in
North Staffordshire.
Scale: 850 ft. to an inch.

most prolific in species, occurs about 40 feet below the Zone of *Anthracomya adamsii* or the Burnwood ironstone. A second marine bed, known as the Florence marine bed, occurs some little distance below this coal. The fifth marine bed occurs above the moss coal or Zone of *Carbonicola turgida*, and the sixth a short distance below that seam. The seventh marine band is found 250 feet below the Zone of *Anthracomya williamsoni* or the Hard mine coal. The eighth bed, the horizon of which is doubtful, need not detain us. Bed No. 9 is in the Cheadle Coal Field, and for the present we will not discuss its equivalent in the main coal field of North Staffordshire. Marine Bed No. 10 occurs between the Winpenny and four feet coals. Marine Bed No. 11 consists of two or three bands with marine fossils, near the Crabtree Coal, which we consider to be the equivalent of the Bullion seam of Lancashire and the Hard bed of Yorkshire.

It is my hope that this brief table of Life Zones, which has been established for one important coal field, may be a guide to workers in other coal fields, and enable fossil charts to be drawn up for each of them. There is no doubt that collectors have studiously neglected the mollusca of the coal measures in the past, but it is to be hoped that the future will tell a very different tale.

DESCRIPTION OF PLATE XXI.

- FIGS.
 1, 2. *Anthracomya modiolaris*, Sow. Sp.
 3, 4. *Naiadites modiolaris*, Sow. Sp.
 5. *Carbonicola turgida*, Brown Sp.
 6. *Naiadites carinata*, Sow. Sp.
 7. *Anthracomya adamsii*, var. *expansa*, Hind.
 8, 9. *Naiadites quadrata*, Sow. Sp.
 10, 11. *Anthracomya dolabrata*, Sow. Sp.
 12. *Naiadites triangularis*, Sow. Sp.
 13. „ *carinata*, Sow. Sp.
 14. „ *elongata*, Hind.
 15, 16. *Anthracomya wardi*, Eth.

DESCRIPTION OF PLATE XXII.

- FIGS.
 1-3. *Carbonicola acuta*, Sow.
 4. „ *aquilina*, Sow. Sp.
 5. *Anthracomya senex*, Sow.
 6, 7. *Carbonicola robusta*, Sow.
 8. *Anthracomya pulchra*, Hind.
 9. *Carbonicola cuneiformis*, Hind.
 10. *Anthracomya phillipsi*, Williamson.
 11, 12. „ *williamsoni* Brown Sp.
 13, 14. *Carbonicola gibbosa*, Hind.
 15. „ *similis*, Brown Sp.
 16, 16a. *Anthracomya minima*, Ludwig, Sp.
 17. „ *pulchra*, Hind.
 18. „ *adamsii*, Sow. Sp.
 19. „ *nucularis*, Hind.



1.



2.



3.

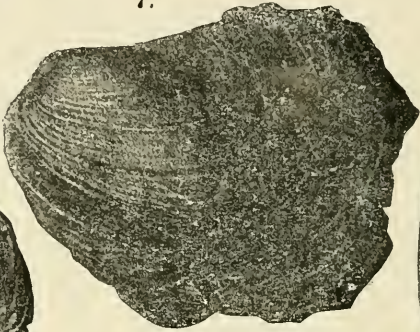


5.



4.

7.



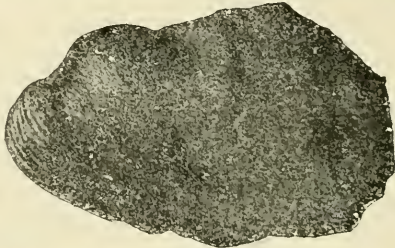
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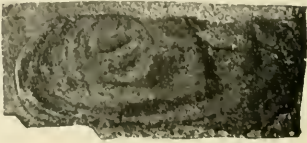
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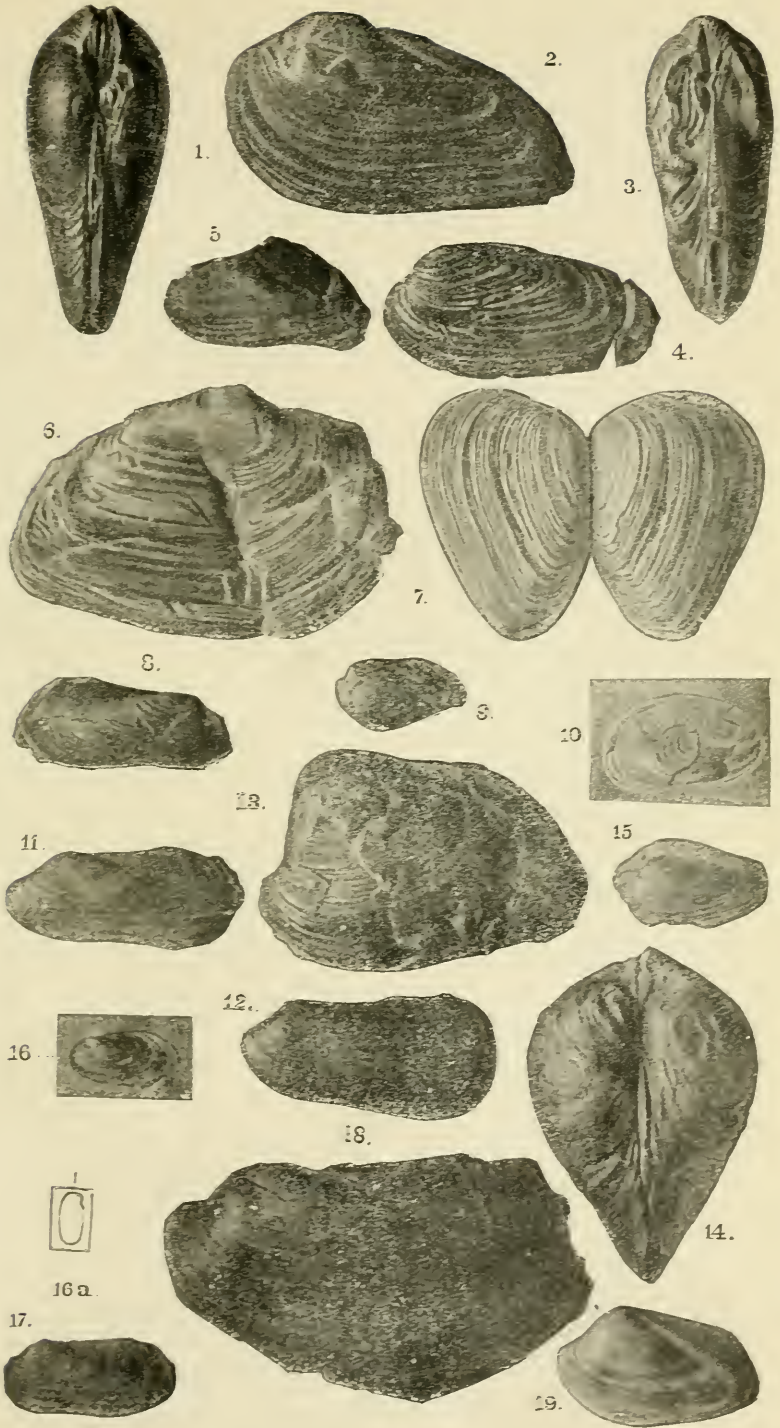
11.



15.



16.



NOTES ON YORKSHIRE BOTANY IN 1727.

HERBERT E. WROOT,
Bradford.

AMONG the valuable stores of unprinted manuscripts in the library of Sir Mathew W. Wilson, Bart., at Eshton Hall, are the following letters written by Dr. Richard Richardson, of Bierley Hall, Bradford, to Samuel Brewer. Both writer and recipient were botanists of distinction. Richardson (born 1663, died 1741) was a man of wealth, and not only liberally patronised less favoured botanists, but was himself an ardent student of plants, and especially of the cryptogamia. He founded at his residence at Bierley the first botanical garden in the north of England, and one of the best, if not the best, of its kind in the country. Dillenius, who was Richardson's intimate friend, distinguished him as one of the two men—the other being James Sherard—who, by repeated botanical investigations through England, had most enlarged the list of its plants, and fixed the habitats of specimens previously unsettled. Linnæus, who was acquainted with Richardson, called a plant after him.

Samuel Brewer (died 1743?), to whom the letters are addressed, was a native of Trowbridge in Wiltshire, but, being unsuccessful in business there, he came north. He was the companion of Dillenius in a tour to the Mendips, and thence to Bristol, passing onward to North Wales and Anglesey in 1726, and he remained in Bangor for some months, sending plants to Dillenius. The letters of Richardson to him were mainly notes of the habitats of rare plants in Wales, written to facilitate Brewer's searches. These have been printed, but the description of the botany of Ingleton has not hitherto been transcribed. As will be seen, Richardson invites Brewer to Yorkshire, and that invitation was accepted. In the autumn of 1727 he took up his residence in Yorkshire, living first at Bingley, and afterwards at Bierley, near Dr. Richardson, who befriended him. He remained at Bierley for some years, and died there.

[From Dr. RICHARD RICHARDSON to SAMUEL BREWER, at Bangor.]

North Bierley, May 26, 1727.

[EXTRACT.]—'I intend to spend a few days in Craven, to fetch from thence some plants which I have lost out of my garden, that my friends in the south desire. Ingleton shall be my farthest stage, which is not much above thirty miles from

hence. There I meet with Heleborine flore rotundo s. Calceolus C.B.P. [*Cypripedium Calceolus*], and Heleborine folijs prælongis angustis acutis Newtoni R.S.M. [*Cephalanthera ensifolia*] Orchis abortiva rufa s. nidus avis [*Neottia Nidus-avis*], and Geranium Batrachoides montanum nostras, R.S.M. [*Geranium sylvaticum*], Orchis sphegoides [*Habenaria bifolia*], and Orchis fucum referens [unidentified]; upon the boggy places of the hill Chamæmorus gerardi [*Rubus chamæmorus*], sedum alpinum trifido folio C.B.P. [*Saxifraga hypnoides*], and sedum palustre tribhirsutum purpureum C.B.P. s. montanum luteum minus nostras, R. Cat. Angl. [*Saxifraga aizoides*]; and upon the rocks on the top of the hill, Sedum Ericoides C.B.P. [*Saxifraga oppositifolia*], and Salix pumilla montana folio rotundo J.B. [*Salix reticulata*, probably a mistake for *S. herbacea*], and several others. At Wharfe, on my return to Settle, Gentiana fugax verna s. præcox R.S.N. Ed. 2d. [*Gentiana verna*], a little above the town and under the rocks Cardamine impatiens, vulgo Sium minus impatiens and Leucoium lunatum vasculo Sublengo interto R.S.M. [*Draba incana*], and in the rocks polygonatum floribus ex singularis pediculis J.B. [*Polygonatum officinale*], and in the way from thence to Settle, Bistorta minor Gerardi [*Polygonum viviparum*] and Thlaspi globulariæ folio J.B. [*Thlaspi alpestre* var. *occitanum*]; betwixt Settle and Malham, Alsine pusilla p[ulch]ro flore folio tenuissimo R.S.M. [? *Alsine verna*], Viola montana grandiflora lutea nostras R.C.H. [*Viola lutea*]. Allium montanum bicorne R.C.H. [*Allium oleraceum* var. *complanatum*] I never could find nigh this place, though Mr. Ray met with it; Trichomanes ramosum J.B. [*Asplenium viride*]; I have sometimes found [word illegible] with the common one, Cetrach s. scopopendria [*ceterach officinarum*] in the rocks nigh Malham Tarne. 'Tis probable the tarne may afford some uncommon water plants; nigh the cove Valeriana Greca [*Polemonium caeruleum*] in abundance, and some roots of Christophoriana Gerardi [*Actea spicata*] amongst the bushes, and Rubus alpina humilis J. B. [*Rubus saxatilis*]; by the waterside viola Trachelij folio [? *Viola hirsuta*]; at Gordil [Gordale], a little way from hence, Heleborine atrorubente flore C.B.P. [*Epipactis atrorubens*] in plenty, Thalictum minus and Hieracium macrocaulon hirsutum folio rotundo R.S.M. [*Hieracium murorum*] and one or two Salix's which I have not often met with, and primula veris flore rubro Ger. [*Primula farinosa*] in all the wet grounds. I have recommended Settle and for a few miles about it as a very productive country for

mosses, though I was never there in winter, which is their proper season, and I doubt not but these mountains produce severall unknown grasses which I believe have not been much sought after as yet. I hope you will pardon this long scroule, perhaps naming the known products of this country may be a temptation to you to pay us a visit, and to make stricker inquirys after such discoveries then has hitherto been don, for which I doubt not there is still roome enough left. You may perhaps meet with some seeds that are not usual. I have now some good plants raised from seed gathered by you and Dr. Dillinenius (*sic*), which he sent me not long agoe.'

Letter from Dr. RICHARDSON to S. BREWER.

North Bierley, June 17, 1727.

[EXTRACT.]—I was last week at Inglebrough in order to bring from thence and in that neighbourhood some plants for my friends in the south which I had lost out of my garden (*viz.*), *Calceolus flore rotundo* [*Cypripedium Calceolus*], *Heleborine folijs prælongis angustis acutis newtoni* [*Cephalanthera ensifolia*], in the place where these two grow I met with either a new *Rubus alpinus humilis* J.B. [*Rubus Saxatilis*] or else a very singulare variety. The leaves are much larger, rounder and smooth, and of a pale green; whether it differ in flower or fruite from the other I know not. I have brought roots of it into my garden. At the foot of Giggleswick Scar I met with a *valeriana* which seems a stranger to me, it was out of flower, it may perhaps be one of those Gerard says grows about Ingleborough Hill. I brought roots of it with me as also of *Chamæmorus* Ger. [*Rubus Chamæmorus*] and *Thlaspi globularia folio* J.B. [*Thlaspi alpestre* var. *occitanum*], and *Alsine pusilla pulchro flore folio tenuissimo* R. Cat. Angl. [*Alsine verna*]; in a place called Gordill, nigh Malham, I found a *Hieracium* or two that I had not seen before, alsoe *Heleborine atrorubente flore* C.B.P. [*Epipactis ovalis*], *Heleborine latifolia montana* C.B.P. [*Epipactis latifolia*], and *Heleborine palustris nostras* Raij [*Epipactis palustris*], *Herba Paris* [*Paris quadrifolia*], *Lilium convallium* [*Convallaria majalis*], *Rubus alpinus humilis* J.B. [*Rubus saxatilis*], *Thalictrum minus* Ger., and several other unusuall plants, also severall rare orchis's. I have brought some roots of *Thalictrum minus* [probably *Thalictrum alpinum*] into my garden, this seems in all its parts much less than the Welsh one which grows plentifully with me.'

From Dr. R. RICHARDSON to S. BREWER.

July 28, 1727.

[EXTRACT.]—‘The last weeke the same person who brought me *Epimedium Anguillariæ* [*Epimedium alpinum*] showed me a plant in Bingley town which I never expected to be a native of England; 'tis common in the streets and upon the dunghills; it was out of flower when he showed it me, but being an old acquaintance I knew it at the first sight, 'tis *Campanula pentagona perfoliata*, Mor. Hist. 2, 457. I am glad you think of visiting Yorkshire.’

From Dr. RICHARDSON to S. BREWER.

Aug. 10, 1727.

[EXTRACT.]—‘*Epimedium Anguillariæ* was found by John Emmott, a gardiner of Bingley, lately in a wood nigh that place. I sent a servant to see it growing in its native place, and to bring some roots of it along with him, which he has accordingly don. The same Gardiner brought me a large branch of a *Bettula foliis platans*, if it is not a rare kind, 'tis a very remarkable variety. The same person also brought me a plant which he gathered about Richmond in this county; it was not in flower; it seems to be an *Aster*. I sent the Consul [Sherard] a specimen of a *Valeriana* I found nigh Giggleswike. He takes it to [be] *Valeriana sepine rotundifolia inodora* of Mr. Ray. This was out of flower when I found it, but if the aromatic smel of the root had not discovered it to be a *Valeriana* I had not known whither to have referred it. It thrives very wel in my garden, the leaves round and undivided, as large as a small Dock.’

Notes of most of these plants were communicated by Richardson to Dillenius for the 3rd edition of Ray's ‘Synopsis,’ published in 1724, and the records appear in Dr. Lees's ‘West Riding Flora.’ But for several of the plants these letters constitute the first record, ante-dating by many years the first records given by Dr. Lees. The plants referred to as found at Bingley are almost certain to have been introduced and planted to deceive Dr. Richardson.

Mr. H. H. Corbett informs us that his note in the ‘Naturalist,’ No. 594, p. 224, recording *Silene nutans* near Doncaster is an error. The plant has been named by Mr. W. Foggitt, of Thirsk, as *Silene dichotoma* Ehrb., a south European casual.



Yorkshire Naturalists at Flamborough.

YORKSHIRE NATURALISTS AT FLAMBOROUGH.

(PLATE XX.)

(Continued from page 248.)

FUNGI.—Mr. C. CROSSLAND, F.L.S., reports :—Several of the members, including Messrs. Jones, York; Philip, Hult; Jackson, Goole; Woods, Bainton; Cheesman, Selby; and Booth, Halifax, interested themselves in the mycology of the respective areas they visited, and handed on the specimens they collected to the secretary of the Mycological Section. Among them was *Stropharia coronilla*, a new East Riding record, and five or six others, once only previously recorded for this division of the county. St. George's Mushroom—*Tricholoma gambosum*—turned up in pastures at Bessingby, Speeton, Bempton, and Flamborough, as it did at Filey on the excursion held about the same date, 1903 ('Naturalist,' July, 1903, its first record for East Riding). *Entoloma ameides* is not at all of common occurrence, its only other Yorkshire records are Arncliffe, 1894, and Hornsea Mere side, 1903 (Yorks. Fungus Flora). It will be noted in the following list that all four Myxomycetes were gathered in Danes' Dyke; *Trichia affinis* is a remarkably fine species, and not very common. One scarcely expected to see 'Jews'-ear' fungus brought in, but so it was, being spotted on a living elder bush in a ravine near Speeton by one of our oldest active Yorkshire mycologists. A full list of the species collected is given below in the hope that it may prove useful at some future date to students interested in distribution problems.

Locality, and host or habitat, are given in all cases. For D.D. read Danes' Dyke.

BASIDIOMYCETES.

Tricholoma gambosum, in pastures.
Bessingby; Speeton; Bempton;
Flamboro'.

Entoloma ameides, in pasture. Bessingby.

Hypholoma fascicularis, on dead stump. D. D.

Stropharia coronilla, in pasture. Bessingby.

Psathyrella gracilis, in pasture.

Marasmius orcaedes, in rings in pastures, several places.

Polyporus squamosus, on dying ash tree. D. D.

Hirneola auricula-judæ, on living elder tree. In a wooded ravine near Speeton.

UREDINACEÆ.

Uromyces poæ, *Æcidium* stage, on pilewort. D. D.

Puccinia galii, *Æcidium* stage, on crosswort, near the cliffs, Bempton.

Puccinia violæ, *Æcidium* stage, on viola. D. D.

Puccinia pimpinella, *Æcidium* stage, on cow parsnip. D. D.

Puccinia poarum, Spermogonium and Æcidium stage, on coltsfoot. D. D.

Phragmidium subcorticatum, Æcidium stage, on wild rose in several places.

PYRENOMYCETES.

Xylaria hypoxylon, on dead wood. D. D.

Rhytisma acerinum, mature on dead sycamore-leaves. D. D.

DISCOMYCETES.

Sphaerospora trechispora, on moist soil among moss. D. D.

Dasyscypha nivea, on dead woods. D. D.

Mollisia atrata, on dead herbaceous stems. D. D.

MYXOMYCETES.

Lycogala epidendron, on rotting wood. D. D.

Trichia affinis, on strip of cast bark. D. D.

Didymium squamulosum, on dead herbaceous remains. D. D.

Tilmadoche nutans, on rotten wood. D. D.

MICROSCOPIC ALGÆ.—Mr. R. H. Philip reports:—The pond in Boynton Woods yielded the following species of Diatomaceae:—

Cymatopleura elliptica Breb.

„ *Solea* Breb.

Cymbella cuspidata var. *naviculi-formis* Auers.

Epithemia turgida Ehr.

Fragilaria undata W. Sm.

Navicula ambigua Ehr., and forma *craticula* (rare).

„ *Anglica*, Ralfs.

„ *elliptica* Kutz.

Navicula oblonga Kutz.

„ *radiosa* Kutz.

Pinnularia viridis Ehr.

Stauroneis anceps Ehr.

„ *acula* W. Sm.

„ *Legumen* Ehr.

„ *Pheniceron* Ehr.

„ *Smithii* Grun.

Surirella biseriata Breb.

„ *robusta* Breb.

This gathering was chiefly remarkable for the number both of species and individuals of the genus *Stauroneis*.

Ponds at Speeton were interesting from the great number of Desmids found in them, though there were comparatively few species. The most abundant were *Closterium Venns* Kutz. and *Cosmarium crenatum* Ralfs.; also present were *Closterium lanceolatum* Kutz. and *C. Ehrenberghii* Men.

A small stream falling into Little Thornwick Bay contained some very interesting Diatoms, among which may be noted the following:—

Amphora ovalis Kutz., and vars. *affinis* and *gracilis*.

Campylodiscus Hibernicus Ehr. (fine and abundant).

Coscinodiscus radiatus Ehr.

Cymbella cistula Hempr.

„ *cymbiformis* Breb.

„ *gastroides* Kutz.

Gomphonema intricatum Kutz.

Melosira nummuloides Ag.

Navicula amphibia Bory.

Navicula limosa Kutz., and var. *gibberula*.

Nitzschia dubia W. Sm.

„ *linearis* W. Sm.

„ *signoidea* W. Sm.

Pleurosigma Spencerii W. Sm.

Surirella ovalis Breb., and var. *minuta*.

„ *spiralis* Kutz.

Synedra alba Ehr., var. *longissima*.

Vanheurckia vulgaris V. H.

Coscinodiscus radiatus, a marine species, was found very plentifully in the lower part of the gulley, but still considerably above high-water mark. It would seem it must have been thrown up by the foam of the waves, and falling into this little stream made itself at home and flourished there. The only other distinctively marine species found in this locality was *Melosira nummuloïdes*, and this only in very small quantity.

The photograph of some of the members, taken at Flamborough, is reproduced by the permission of the photographer, Mr. J. Duncum, of Beverley.

T. S.

COLEOPTERA.

Anchomenus viduus (Panz) at Hatfield.—On the 21st June I took a specimen of the type of this species at Hatfield Moor. As it would appear that only the variety *moestus* (Duft) is recorded for Yorkshire, I thought it worth reporting.—H. V. CORBETT, Doncaster.

—: o :—

BOTANY.

Hypochæris glabra Linn., in Lincolnshire.—This species has been diligently sought for by Messrs. Lees, Fowler, Fisher, and by Miss Stow and myself. In 1902 Mr. H. C. Hawley finally met with it, and this season has sent me beautiful typical specimens. He took it first in an arable field (peas) on Old River Gravel between Tumby and Coningsby. It is a first record for Lincolnshire.—E. ADRIAN WOODRUFFE-PEACOCK, Cadney, Brigg, July 10th, 1906.

—: o :—

GEOLOGY.

Fish Remains in the Speeton Clay—During the Yorkshire Naturalists' Union excursion at Whitsuntide, I found, at Speeton, a number of fossil scales, some spines, etc. of fish. Being unable to find any published information upon these, they were submitted to Dr. A. Smith Woodward, F.R.S., of the British Museum (Natural History), who informs me they chiefly belong to the genus *Leptolepis*, but are too incomplete for a specific name. Two of the specimens are typical dentary bones of that genus. These are now in the Hull Museum.—T. HAWKESWORTH, July 1st, 1906.

LINCOLNSHIRE MITES.

EPICRIUS.

C. F. GEORGE, M.R.C.S.

THIS genus of mites belongs to Koch's Family of 'Thiermilben' = 'Gamasides.' He describes eight genera of this family in his *Ubersicht*, published in 1837: *Epicrius* was not one of them,

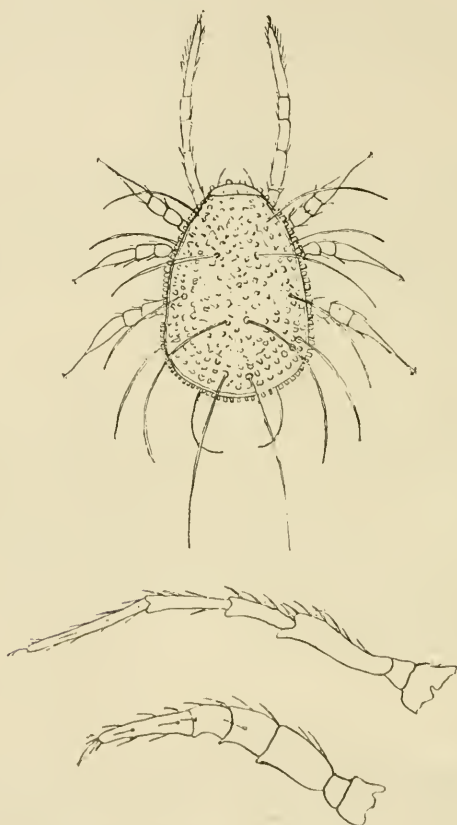


Fig. 1.—*Epicrius mollis*. Kramer.

the genus had not then been formed. The type species was first described and figured by Kramer in 1876 (under the name of *Gamasus mollis*) in the 'Archiv für Naturgeschichte,' and the genus *Epicrius* was founded afterwards by Canestrini and Fanzago. Haller also figures a species which he calls *Epicrius canestrenii*. None of these papers have yet been seen by me,

situated as I am, far from any good natural history library. Berlese gives large coloured figures of *E. mollis* and *E. geometricus*, (these I have seen at the British Museum, on one of the rare visits I have been able to make to its Reading Room); Professor Berlese has also kindly examined my mounted specimens, and confirmed this diagnosis.

Fig. 1.—*Epicrius mollis*. Kramer.

I first found this mite in moss, in January 1878; it is rather small, but like the rest of the Gamasi it is very active; it has no visible eyes, the front legs are long and slender, and used chiefly as feelers, and not for progression; the skin is highly chitinized, and dotted over with angular papillæ, well seen at the extreme edge of the body; there are also four rows of very long curved hairs, which extend considerably beyond the body, these hairs must render the creature's skin very sensitive. In colour it is of a beautiful transparent yellow, the papillæ or tubercles a dark orange, one specimen was considerably darker in its general colour, being of a sort of chocolate or cinnamon colour, rather translucent, no doubt, like many other mites, the colour is much influenced by the nature of the food recently ingested; Mr. Soar's beautiful drawing gives a good idea of this extraordinary-looking creature; he has also figured the first and second pair of legs, and gives the measurement of the body as 0.40 mm. long and 0.26 mm. broad. It makes a fine object for the microscope when well mounted, and once seen, can never be mistaken for any other *Acarus*. Mr. A. D. Michael found it in tolerable abundance in Cornwall a good many years ago, and he exhibited it at some of the local societies. Professor Sig Thor of Christiana has also met with it, and a specimen was sent to Mr. Soar, taken in the neighbourhood of Edinburgh about three years ago, so that probably it is not very rare, and may be found if carefully looked for; I believe it has not been before figured in this country, and this is probably its first record for Lincolnshire.

Fig. 2.—*Epicrius geometricus*. Canestrini and Fanzago.

This is another very beautiful mite of the same family, but considerably larger than *E. mollis*. I found it in 1879; a glance at Mr. Soar's drawing will at once show the great difference in appearance between this mite and the one just described; the peculiar arrangement of the papillæ, by which the dorsum is divided into irregular spaces, like divisions on a map, is well shown on the figure, from which the hairs have been removed;

from the centre of the principal spaces, arises one of the long and strong curved hairs; these are not quite so long in proportion as those on *E. mollis*, the colour of the mite is a deeper orange, and altogether it is a very striking creature, and has been well figured in Berlese's great work 'Acari Myriapoda Scorpioni Italia, &c.'

Fig. 3.—*Epicrius canestrinii*. Haller.

This is another extremely handsome species of this family. I have not had the pleasure of finding it, and so have not seen

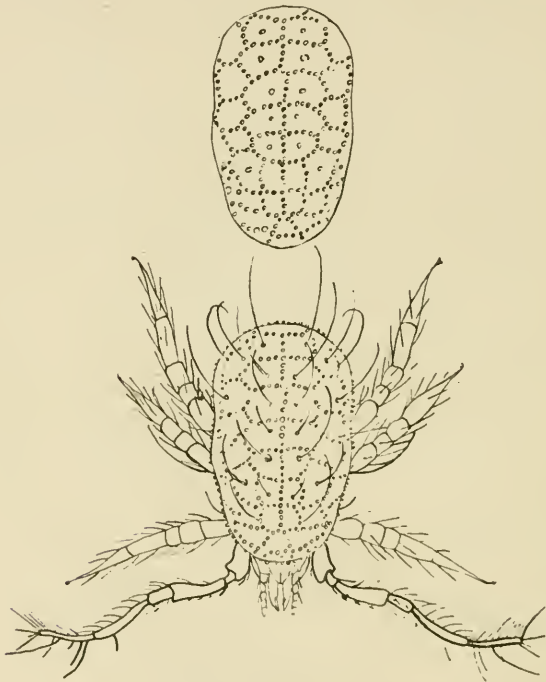


Fig. 2.—*Epicrius geometricus*. Canestrini and Fanzago.

it alive. The drawing was made by Mr. Soar, from a fine mount kindly given to me by Mr. Michael, who found it in Cornwall. In this mite it will be seen that there are somewhat similar spaces on the dorsum, as in *E. geometricus*, though differing in size and pattern, and bordered by ridges, instead of the distinctly separate papillæ; the mite also seems to be much lighter in colour than the other two, but this may be due to preservative solution, or mounting media, &c. I should very much like to

meet with it alive. This however is hardly likely at my time of life. However it is quite possible that it may occur in Lincolnshire, and so I hope some reader of 'The Naturalist' will be fortunate enough to find it. There may also be other species

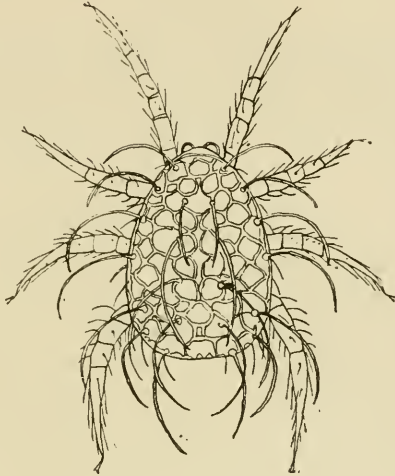


Fig. 3.—*Epicrius canistrinii*. Haller.

yet to be discovered and described, but these three are all I know of at present; here therefore is a fine field for work, 'verbum sap.'

I desire to express my thanks to Professors Berlese of Florence and Sig Thor of Christiana, and Messrs. A. D. Michael, F.L.S., and C. D. Soar, F.R.M.S., for kind assistance in this and other microscopic work.

Since writing the above notes, I have seen a treatise on the Acarina by Nathan Banks, published at Washington in 1904; on page 57 he observes that 'of *Iphiopsis* and *Epicrius* no species have been found in this country' (*i.e.* America).

LEPIDOPTERA.

***Selenia Lunaria* at Denby Dale.**—A single specimen of this moth was captured by me at Netherend, near Denby Dale, on the 16th June last. Mr. G. T. Porritt kindly identified it for me, and states that it is a local moth generally, and in this district a great rarity.—W. E. L. WATTAM, Newsome.

GLACIAL PHENOMENA IN THE NEIGHBOURHOOD OF GUISBROUGH.

FRANK ELGEE,
Middlesborough.

IN view of the forthcoming meeting of the Yorkshire Naturalists' Union at Guisbrough in August, it may be of interest to give a few notes on the Glacial Geology of the Guisbrough Valley, more especially as some of the phenomena have not hitherto been described.

Professor P. F. Kendall in his great paper, 'A System of Glacier Lakes in the Cleveland Hills,' has shown that a glacier from the Cheviots swept down upon the Cleveland area, and in his opinion it coincided with a period of maximum glaciation from Scarth Nick to the Wykeham Moraine.* Consequently it would impinge directly upon the great Jurassic escarpment bounding the Guisbrough Valley to the south. At Bold Venture, at 800 feet, occur gravel mounds with Cheviot Porphyrites indicating a glacier lake overflow down Sleddale.† Erratics are even to be found on Newton Moor at a height of 1000 feet.

When the ice began to retreat, a small lake was held up in High Bonsdale, the overflow falling westward at 675 feet.‡ As the ice melted backwards a great overflow out of the Boosbeck Valley into the Guisbrough Valley was initiated, forming the Slapewath Gorge (600-425).

Professor Kendall§ thinks that, as no channels exist along the western slopes of the hills in alignment with Slapewath, Airy Hill, above Skelton, acted as a barrier to the ice, and that a sinuous lake extended along the hill sides. However this may be, at the foot of Bonsdale Hill is a great bank of drift (Grove Hill) 400 feet high, with a fine *westerly* channel in front of it, cutting at its exit near Lowcross House, the 325 foot contour. I do not think that this valley was in alignment with the Slapewath overflow. It simply seems to have been produced at a later stage of retreat when the waters in the Bonsdale Valley escaped round the end of the hill. The channel is of a type not uncommon along the steep slopes of the Jurassic

* *Quarterly Journal Geological Society*, Vol. 58, p. 565.

† *Op. cit.* p. 519.

‡ Kendall, *Op. cit.* p. 519.

§ 'Proceedings Yorkshire Geological Society,' 1903, p. 44.

escarpment, viz., a large mound of drift on the iceward side, and with an abrupt rocky scarp (generally of the Sandy Series of the Middle Lias) on the other. Similar extra-morainic channels I have noted at Great Ayton, Ingleby, Carlton, and Swainby.

The whole of the vale of Guisbrough is covered with drift, which must be of great thickness. An old sand pit on Windy Hill, just north of Lowcross House, yielded Lower Lias Fossils, Cheviot Porphyrites, Botryoidal Magnesian Limestone, a small piece of Shap Granite, and a broken valve of *Cyprina islandica*, all (except the Shap Granite) indicating an ice flow from the north.

On entering Cleveland the Cheviot Glacier must have abutted directly on Eston Nab and practically surmounted it. 'Among the areas comparatively free from drift, we may notice the tops and steep northern faces of Eston and Upleatham Hills. With the exception of the small point at Eston Nab, occasional pebbles of foreign rocks show that a thin coat of drift once existed here.'* Some striking overflows formed during the retreat of the ice *on the Eston Outlier* prove conclusively that the ice overswept the whole hill which in pre-glacial times must have stood 1000 feet above the plain! The outlier is divided into two branches by Moordale Beck, of which the southern one, running from Osborne Rush to Park House, has been trenched by overflows from the pent up waters of Moordale.

As the ice melted from the Guisbrough Valley its edge reached in time the summit of the spur just mentioned. The water flowing from its melting front initiated two channels. The westerly one is near Normanby Intake Plantation, and perhaps leads from the head of Moordale. Its intake level is 625 feet, but it cuts through the 650 feet contour, a fact which would seem to indicate that it originated in the way described.

The second is the grand gorge of Scugdale Slack, certainly as fine a piece of glacial erosion as can be found in Cleveland. It contains little or no stream, and the intake level is 523 feet, cutting clean through the hill where it is about 50 feet deep. It rapidly becomes deeper and steeper until where it emerges into the Guisbrough Valley it is about 200 feet deep. From its outflow a wide flat-floored trench *in the drift* can be seen

* Barrow, 'Survey Memoir,' p. 66.

sweeping down the valley to the westward between Grove Hill and Windy Hill. I have traced it as far as Lowcross House. It is about 25 feet deep near the Chaloner Pit Railway.

In strict alignment with Scugdale Slack is a dry valley to the south of Moordale Beck. It commences near Upsal Pit and flows past Barnaby Moor Farm. The erosion began at 575 feet, continuing to 525 feet. The ice has here evidently caused the impounded waters of Moordale Beck to travel along its margin and out by Scugdale Slack. Upon the final retreat the beck resumed its old course, leaving the channel high and dry.

After Scugdale Slack was abandoned the waters from Upper Moordale flowed along the ice front eastwards. The present course of the stream beyond Crow Well is very anomalous, recalling on a small scale that of the Esk at Crunkley Gill. Here a mass of drift, 500 feet high, blocks up the small valley. On the southern side of this barrier flows Moordale Beck in a very narrow channel. The most curious point, however, is that to the *north* of the drift hill is a channel, now dry, falling eastwards at a lower level than the top of the present gorge! I take this to mean that the northerly channel was formed first, then the ice re-advanced a little, and compelled the beck to flow at another and higher level. This continued for so long that on the retreat of the ice any flow down the northerly channel was impossible. A simpler explanation may be found in the irregular deposition of the drift with an ice barrier standing on the mound until the critical level had been passed, but it leaves unexplained the northerly channel with its fall to the *eastward*. Both explanations, however, demand an ice barrier.

In *Man* for May, 1906, the Hon. John Abercromby figures and describes a Neolithic 'Pintadera' (?) from Derbyshire. This is of red deer horn, one end of which is rounded and polished, the other being cut into a diamond pattern. It was found in association with three pieces of red ochre. The author considers that the horn object 'may have been a portable stamp or pintadera, with a hole for suspension, and intended for imprinting a pattern on the human body.' The specimen is in the Bateman Collection, now in the Sheffield Museum.

The following is a list of the donations to the Public Museum at Bootle last year:—Print of the Great Seal of George I., Nest and Eggs of Blackbird, Thristle, House Sparrow, and Robin; Model of Catamaran; Casts of Typical Footprints (Trias); Bow and Arrows from Borneo; a large Turtle Shell [given by an Alderman!]; an Eagle; South American Birds; specimens of Plumbago and Soapstone; a Gold Fish; Cannel Coal; a Tiger Moth; Seahorses from Venice; a Musk Beetle; Nests of Blackbird, Bullfinch, Hedge Sparrow, and Thristle; Hedgehog; Otter's Head; Water Vole; Mineral specimens; a Pheasant; Sketches of the Salmon; and a Venomous Spider and young Alligator (in spirits).

YORKSHIRE NATURALISTS AT FEWSTON.

JUNE 30, 1906.

THE hundred and ninety-fifth meeting of the Yorkshire Naturalists' Union was held at Harrogate, for Fewston and the Washburn Valley, on Saturday, June 30th. The day proved all too short for the investigation of such a charming district. There were about sixty members, who drove by brakes, and had the advantage of the guidance of the divisional secretary, Mr. R. Fortune, Mr. S. Margerison, who described what was being done on afforestation by the Leeds Corporation, and Mr. W. Storey, who has charge of the reservoir, etc.



Photo by]

Island in Swinsty Reservoir.

[R. FORTUNE, F.Z.S.

The party travelled via Stainburn Moor and Little Almais Cliff to Swinsty, where, by the courtesy of Captain Wakefield, Swinsty Hall was examined and the old oak wainscotting much admired. Mr. W. Denison Roebuck occupied the chair at the evening meeting, when reports on the work accomplished were given by the officers of the sections. Fifteen societies were represented. A vote of thanks to the land owners and leaders was proposed by Prof. T. W. Edmondson, of New York University, whom the members were pleased to see amongst them again.

For the GEOLOGICAL SECTION Mr. E. HAWKESWORTH reports that the circular did not promise many attractions, but the few geologists who attended found much to interest them.

The district is composed of rocks belonging to the Millstone Grit Series. In the route traversed, sections were rare, but the beds were seen to be much disturbed and folded, being on the line of the anticlinal fold running from near Skipton to Harrogate. Most attention was paid to a good section of the 'Shell Bed' exposed in the north-easterly bank of the Fewston reservoir. This is a bed of hard calcareous grit, cherty in places, probably of estuarine origin. It forms a constant horizon over a considerable area, and, owing to its hardness, is used largely as roadstone. As its name implies, it is very fossiliferous, but the fossils are mostly internal casts of such shells as *Productus*, *Orthis*, and *Spirifer*. Large slabs were seen covered with these. Fragments of encrinurites are common, and a single specimen of *Rhabdomeson*, a polyzoan, was noted. In the same bed, at Hampsthwaite, a few miles to the north-east, these are plentiful. The shell bed was seen to be cut off by a roughly north and south fault, and thrown against a bed of flaggy sandstone.

VERTEBRATE SECTION.—Mr. R. FORTUNE writes:—The Vertebrate Section was unusually well represented at this meeting, officially, by its three secretaries, Messrs. Booth, White, and Fortune.

Unfortunately the limited time at our disposal did not permit of much serious work being done.

It was interesting to note how the lowering of the water in the Fewston reservoir had left several nests of the Little Grebe stranded, and of course deserted. A new nest of this bird with one fresh egg was seen. The singing of the Cuckoo was noted, it being rather late in the season to hear the song. Whinchats were very numerous, as a rule busy feeding their young. Three pairs of the Yellow Wagtail were seen, their plumage being not nearly so bright as a month or so ago. Snipe were particularly abundant, and it was interesting to note the occurrence of the Lesser Whitethroat. Altogether sixty-one species of birds were noted, many of them with young. A Linnet's nest, containing five eggs, was one of the very few seen with eggs.

Of the rarities noted in the circular as nesting in the locality, no traces were seen. This was a great disappointment to the members, as it would have been a great treat to have seen them in their nesting haunts. A visit paid to the ground a few days after the excursion revealed a pair of Tufted Ducks upon

Swinsty reservoir, causing one to wonder if these birds had not been mistaken for Golden Eyes, an error easily made.

The mammals noted only numbered six species. We heard that the Badger was not uncommon, but we met with no traces of it in the district covered. We were informed that in the large banquetting hall in Swinsty Hall, small bats were to be seen flying about every evening, probably the Pipistrelle. One Reptile, two Amphibians, and one Fish completed the total of our records. No doubt, with more time at our disposal, some interesting records might be made, as the district is particularly suitable for bird life.

LIST OF SPECIES NOTED.

Mammalia.

Hare.	Stoat.	Water Vole.
Rabbit.	Field Vole.	Hedgehog.

Aves.

Kestrel.	Yellow Wagtail.	Skylark.
Missle Thrush.	Meadow Pipit.	Swift.
Song Thrush.	Tree Pipit.	Green Woodpecker.
Blackbird.	Spotted Flycatcher.	Cuckoo.
Ring Ouzel.	Swallow.	Heron.
Wheatear.	Martin.	Mallard.
Whinchat.	Sand Marten.	Ring Dove.
Redstart.	Creeper.	Stock Dove.
Robin.	Greenfinch.	Pheasant.
Whitethroat.	Sparrow.	Partridge.
Lesser Whitethroat.	Chaffinch.	Grouse.
Garden Warbler.	Linnet.	Corn Crake.
Chiff Chaff.	Bullfinch.	Waterhen.
Willow Warbler.	Yellow Bunting.	Coot.
Wood Warbler.	Reed Bunting.	Lapwing.
Sedge Warbler.	Starling.	Snipe.
Hedge Accentor.	Magpie.	Sandpiper.
Great Tit.	Jackdaw.	Redshank.
Blue Tit.	Crow.	Curlew.
Wren.	Rook.	Little Grebe.
Pied Wagtail.		

Other species were reported, but require confirmation.

Reptilia.—Common Lizard. *Amphibians.*—Frog, Toad.

Pisces.—Trout.

The CONCHOLOGICAL SECTION was represented by Mr. John W. Taylor and the president, Mr. W. Denison Roebuck. The results of the day's working round the margins of the Swinsty Reservoir were not very brilliant, only seven molluscan species being noted. The district is geologically unfavourable,

and the day being fine, with wind, the ground was too dry. Of water shells, *Limnæa peregrina* was common in a water trough, and at the lower end of Fewston Reservoir, where also was found a broken shell of what is most likely *L. auricularia*, a species which has before been found there. Only one slug was seen, *Agriolimax agrestis*, and four species of land shells, *Vitriina pellucida*, *Helix hispida*, *Patula rotundata*, and *Hyalinia ulliaria*, the last-named being additional to the lists given in the circular.

Mr. J. H. Ashworth kindly forwards the following list of Diptera taken at Fewston, which it is as well to put on record, as the changes in connection with the Waterworks and the afforestation may affect the fauna to some extent. Most of the specimens have been examined by Mr. Percy Grimshaw, of Edinburgh.

OTLEY TO BLUBBERHOUSES.

<i>Microchrysa flavicornis</i> Mg.	<i>Eristalis arbustorum</i> L.
<i>Chrysopilus auratus</i> F.	<i>Syritta pipiens</i> L.
<i>Rhamphomyia sulcata</i> Flin.	<i>Morellia curvipes</i> Meq. (?)
<i>Empis</i> sp.	<i>Calliphora erythrocephala</i> Mg.
„ <i>livida</i> L.	<i>Lucilia sericata</i> Mg.
<i>Hilara</i> (? <i>chorica</i> Flin.)	<i>Polietes lardaria</i> F.
<i>Tachydromia</i> sp.	<i>Hylemyia nigrimana</i> Mg.
<i>Dolichopus unguulatus</i> L.	<i>Limnophora</i> sp.
<i>Chilosia</i> sp.	<i>Scatophaga stercoraria</i> L.
<i>Melanostoma mellinum</i> L.	<i>Sepsis</i> sp.
<i>Syrphus ribesii</i> L.	<i>Opomyza germinationis</i> L.
<i>Eristalis tenax</i> L.	(?) <i>Piophilila</i> .

NORWOOD TO THE WHARFE BELOW LEATHLEY.

<i>Pachyrrhina guestfalica</i> Westh.	<i>Sericomyia lappona</i> (Kex Gill, by Cat Crags Plantation).
<i>Platychirus peltatus</i> Mg.	
„ <i>scutatus</i> Mg.	<i>Mydca impuncta</i> Flin.
<i>Psila fimentaria</i>	

For the ENTOMOLOGICAL SECTION Mr. A. WHITAKER reports that very little work was done. *E. janira*, *C. pamphilus*, and *L. icarus* were abundant, and *V. atalanta* was noted. Ova of *S. populi* and *D. vinula* were observed on the small poplars by the reservoir.

A beetle was handed to Mr. Roebuck on the excursion, and submitted to Mr. E. G. Bayford, who writes:—

'This is a specimen of *Ancistronycha abdominalis* F., a very interesting and uncommon species, for which we possess very few recorded localities in Yorkshire. An incident of this kind serves to emphasise the desirability of members assisting each

other in the different branches of natural history which they are investigating.'

FUNGI.—Mr. C. CROSSLAND reports that Mr. Roebuck forwarded to him *Ombrophila clavus* on a decaying herbaceous stem from the Fewston Excursion.—T. S.

PUBLICATIONS ON YORKSHIRE GEOLOGY.

THE **Proceedings of the Yorkshire Geological Society** Vol. XV. Pt. 3, does not impress one as previous parts have done. It is somewhat thin and watery. Perhaps one is



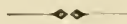
Section in Boulder Clay at Balby, near Doncaster.

prejudiced against this publication from the fact that the editors persistently misdate it. This number, for instance, did not appear in 1905 at all, but rather somewhere about May 1906. Nothing is gained by such deception, and endless trouble is caused in after years to those who have to set the matter

* One of the many illustrations appearing in the Yorkshire Geological Society's Publication—reproduced by permission.

right. The British Association has had a committee working on general delinquencies of editors for years, and I recommend to their notice the Yorkshire Geological Society. Another thing that strikes the editorial mind is the extreme reduction of the maps in Mr. Carter's papers. By all means let the maps be reduced so as to fall in to as small a space as is consistent with expense and utility, but letter the original drawings sufficiently boldly that when reduced one has not to use a microscope. Mention may be made of the singular custom of publishing the proceedings of the Council in a general publication, the details regarding illustrations printed on p. 489 are surely better fitted for the Minute-Book of the Council than for the public eye.

The **Transactions of the Hull Geological Society**, Vol. VI., Pt. 1, impress one more favourably. Here is commendable brevity and restraint in all the papers, doubtless forced upon the editor by that excellent master, want of funds, but evidently editorial. The result is that one reads such papers right through, and does not cast them aside with impatience at the mass of detail, often quite unnecessary to print. It would have been better if the Belemnites described in Mr. Danford's paper had not been figured upside down (perhaps the Editor had Phillips' 'Yorkshire' in mind), and if the sections of those fossils could have been given on the same plates. Certain ugly misprints occur, *e.g.* 'cordierite-geisses' on p. 25; 'Rhetic' on p. 80; and a bad slip in the second paragraph on p. 88. The Bibliographical matter is invaluable and will always be of value; the addition of an asterisk to those works in local libraries is an excellent idea, and such information invariably leads to presentations and therefore less imperfection in local history. The reproductions by photographic processes of views and other objects can now be done so economically and well, that smaller societies can almost compete with larger ones in their wealth of illustration. Publications on Yorkshire Geology are not behindhand in this respect.—C. D. S.



REVIEWS AND BOOK NOTICES.

A Preliminary List of Durham Diptera, with Analytical Tables. By the Rev. W. J. Wingate. With Seven Plates. [8vo., papers, pp. vi. + 416 + 7 plates and explanatory leaves].

This forms the second volume of a new series of the *Trans-*

actions of the Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne, and worthily sustains the reputation of these publications.

The title of this book is somewhat misleading, in two ways. In the first place, it is hardly a 'preliminary' list, inasmuch as it is the third list of the two-winged flies of the county, which the author has himself published. No doubt it is by inadvertence that no reference of any kind is made in the volume now before us to the two previous lists. The first of these was a full and elaborate one, with localities of the Durham Diptera, which was published in this journal three years ago (See the 'Naturalist' July 1903, pp. 269-288), and the second was published last year in the 'Victoria History of the County of Durham.'

In the second place, the title errs on the side of modesty, for this is not so much a list of Diptera of a county, as a series of analytical tables by which to diagnose almost the whole Dipterous fauna of the British Isles, the exceptions being duly noted in the introductory remarks, and reasons assigned.

English dipterists (or dipterologists) have so little literature in their own tongue available for the determination of their captures, that they cannot but feel grateful in the highest degree to Mr. Wingate for furnishing them with a work so well calculated in its plan to help the young dipterologist to make out his captures. The dichotomic or tabular method adopted here is a very useful one, as drawing attention to the diagnostic points, and likely to assist the beginner in making out, at any rate, the well-marked and more distinctly characterised species. The actual value of any such tables is not to be gauged by a reviewer, and can only be judged after prolonged use in the actual determination of the species.

There are seven plates, giving diagrammatic representations of details of external anatomy in various genera. We are allowed to reproduce plate 1, what the author calls a 'Fly-Chart,' figuring an imaginary or generalised type of fly, on which the various morphological features are fully indicated, and fully explained in the introductory chapters. This chart ought to be very useful, and its use ought to tend to accuracy and precision in dipterological investigation.

The tables give the diagnoses of 2526 species, some being forms not yet known as British, but quite likely to occur, and localities, or statements of distribution in Durham, are cited for the 626 species which the author has found in the district. The work is fully indexed, and one of the indexes is of the Durham

species, thus giving at a glance a conspectus of the county fauna.

It is a pleasure to note that the author has placed his collection of the Flies of Durham in the Newcastle Museum, and we hope that no class-lecturing to school children is permitted in the Museum, for nothing can be more destructive to insect collections than the orderly measured tramp of well-drilled scholars by reason of the vibration of the structure thereby produced.

The author and the Natural History Society are to be congratulated most warmly on the production of this most useful volume.—R.

Lincolnshire Naturalists' Union Transactions. Edited by **Arthur Smith, F.L.S., F.E.S.** Printed by Wiggen Bros., Louth. 8vo., 74 pages.

We have to congratulate our Lincolnshire friends on the publication of this the second part of their Transactions, and upon the excellent and varied nature of its contents.

A list of officers and of members is followed by a statement of objects and rules, a balance sheet, and a *résumé* (brief but interesting) of the Field meetings held during the twelve years' existence of the Union, and giving fuller details of the meetings of later date.

A portrait and short notice of the Union's first President, the late John Cordeaux, recalls vividly to mind the beloved personality of an enthusiastic field-observer.

The next paper, on 'The Stoat and its Ways,' a delightful piece of Nature-study, by the Rev. E. Adrian Woodruffe Peacock, F.L.S., forms the presidential address for the year 1905.

An excellent detailed list of the 'Non-Marine Mollusca of Lincolnshire,' by Mr. C. S. Carter, of Louth, embodies the work of no fewer than twenty-three enthusiastic workers at the rich and varied mollusca fauna of Lincolnshire, and includes 109 out of the 144 possible species—a good proportion—as well as 133 varieties and three monstrosities.

The part concludes with an admirable piece of field-geology, illustrated by a plate and process blocks, in which the worthy Editor of the *Naturalist* (Mr. T. Sheppard, F.G.S.) describes the structure of his birthplace, in 'Notes on the Geology of South Ferriby.'

The part is neatly printed at Louth, but ought to have been properly sewn by the binder. It is 'stabbed' through with wire, a double fault, which the publishers of scientific publications should avoid like the devil does holy water.

We note also the (no doubt inadvertent) absence of reference to the fact that this is the second part of the L.N.U. Transactions, the first having been published in 1895, under the Editorship of Mr. Walter F. Baker, F.E.S., of Gainsborough, the founder and first secretary, which contains papers on Lincolnshire Geology by Mr. F. M. Burton, on Cryptogams by Mr. M. B. Slater, and on the Life History of *Hydrobius fuscipes* by the Editor, besides presidential addresses by Mr. John Cordeaux and Mr. F. M. Burton, the first two presidents, and an exhortation on 'Work for Lincolnshire Naturalists' by Prof. L. C. Miall, besides a Secretary's report and a report of the Museum Committee.

May we hope that the Union will be able to publish a similar instalment annually, and would suggest that future parts be paged continuously with previous parts, instead of independently.—R.

The Butterflies of the British Isles. By Richard South, F.E.S. 'Wayside and Woodland Series.' Published by Frederick Warne & Co., London and New York. 6/-

One's first thought, on seeing the title of this work, is to doubt whether there is room for another book on British Butterflies even to get a foothold among our literature on the subject; but one does not spend many minutes in its pages to be convinced that not only will it obtain a foothold, but will at once allocate for itself a comfortable position. The book is different from its contemporaries, and the difference is distinctly to its advantage. It aims at being a pocket companion to the beginner student of our Rhopalocera, and it will prove to be what it professes. Handy in size, neat in appearance, it attracts at once, and the contents do not belie its outside attractive impression. Small and compact, as a field pocket companion must necessarily be, it is illustrated by no fewer than 750 figures on 127 plates, of which figures 450 are coloured, most being direct photographic reproductions from typical specimens by the three-colour process, and the effect is wonderfully good, for, although a figure here and there is a little bit 'off,' such is almost inevitable in a process the printing of which can scarcely yet have surmounted every difficulty in its application.

Part I. of the book gives a clear Life Cycle of the Butterfly from the egg to the imago, followed by chapters on Collecting and Setting. Part II., by far the greater portion of the work, is devoted to the descriptions and histories, with localities, etc., of the various species, the plates not only giving very accurate coloured illustrations of all the British species and many varieties, but accompanied in nearly all cases by black and white plates representing the eggs, larvæ, chrysalids, and food plants.

The volume is well printed in clear type, and altogether is just such a book as we should have revelled in when we began collecting butterflies long years ago.—G.T.P.

NORTHERN NEWS.

The Hornsea Urban Council is endeavouring to borrow £12,500 for the purpose of defending the coast in front of the town.

The members of the London Geological Association held their 'long excursion' to the Yorkshire Coast (northern section) from July 23rd to 28th.

Copies of the photograph of the group of Yorkshire Naturalists taken at Flamborough (reproduced on a small scale on Plate XX.) can be obtained from Mr. Joseph Duncum, photographer, Beverley, price one shilling each.

We have tried one of the lantern slide cabinets made by Messrs. Flatters and Garnett, of Manchester, and can thoroughly recommend them. To those who use lantern slides these cabinets are invaluable, and are astonishingly cheap.

On August 24th, the birthday of William Wilberforce, Hull opens a new museum—Wilberforce House—the birthplace of the great emancipator. The museum will be illustrative of the history of Hull, and will contain relics of Wilberforce. Particulars of suitable exhibits will be gladly received by the Curator.

In the *Annals and Magazine of Natural History* for June, 1906, Messrs. C. Davies Sherborn and B. B. Woodward have a note 'On the date of publication of the Natural History Portions of the "Encyclopédie Méthodique,"' based on sets of that publication recently found in Philadelphia, U.S.A., and at Hull!

Messrs. A. Brown & Sons, Hull, have just issued an attractive penny Guide to Hull, one of the well-known 'Borough' Guides. It contains 48 pages, and contains a map and twelve views from recent photographs. It is edited by Mr. T. Sheppard, who, in an Introduction, describes the changes that have recently taken place in the city.

At the recent meeting of the Yorkshire Naturalists' Union at Flamborough, a lady was asked if she had seen the contortions of Old Dor. Thinking the query referred to one of the 'climbers,' she replied, 'Oh, yes, is he going down again!' Another of the members had heard Filey Brig described as the end of Cleveland Dyke—running out to sea!

Mr. W. Booth, of Howsham, Lincolnshire, writes us that in his garden, which is of chalky boulder clay, under the shade of a beech, three grasses grow, *Bromus sterilis*, *Poa trivialis*, and *Agrostis palustris*. They have all been attacked, and more or less destroyed, by a fungus, which Mr. H. C. Hawley, of Tunby Lawn, Boston, says is *Ærysiphe graminis*.

Mr. Elliot Stock has issued a cheap edition of Johnson and Wright's 'Neolithic Man in North-East Surrey,' which was reviewed in these columns for May 1904, p. 155. The present work is in an attractive cover, and the contents are, to all intents and purposes, the same as those of the previous volume. Those who did not purchase the first volume on account of the price, should not hesitate to take the recent issue.

In the report of the Fishery Officer to the meeting of the North-Eastern Sea Fishers Committee at Scarborough recently, it is recorded that a marked crab liberated at Runswick on September 2nd, 1905, was captured in Cove Bay, Berwickshire, on the 28th of May. The crab has travelled northward 120 miles in 268 days. This was the greatest distance from the place of deposit at which any of the marked crabs had been captured.

We understand that a committee of the Moss Exchange Club is preparing a Census Catalogue recording the distribution of Mosses in the British Isles, and would be glad to hear from any Bryologists who can render assistance. Communications should be addressed to Professor T. Barker, Woodlea, Lightwood, Buxton. Help to improve the lately published Census Hepatic Catalogue will be welcomed by W. Ingham, 52, Haxby Road, York.

THE NATURALIST.

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

EDITED BY

T. SHEPPARD, F.G.S.,

THE MUSEUM, 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.,

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

WILLIAM WEST, F.L.S.

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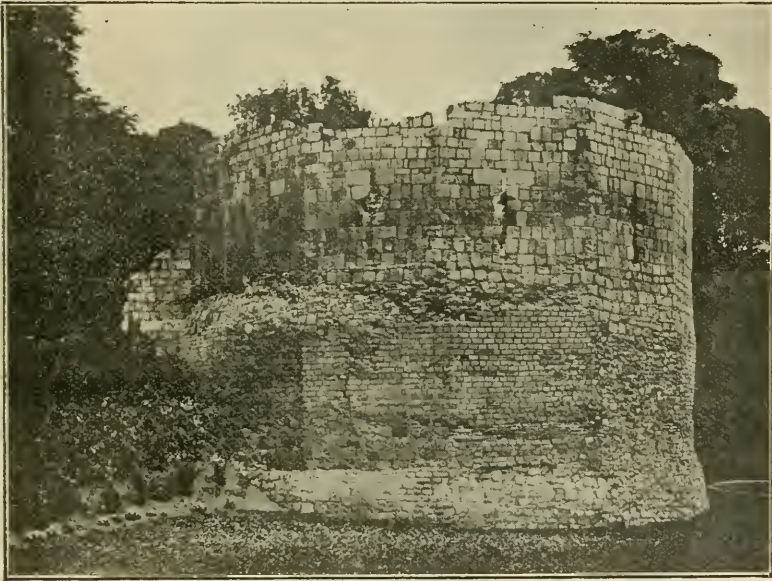
SOME PRESIDENTS OF SECTIONS.

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NOTES AND COMMENTS.

THE YORK MEETING.

THE long anticipated York meeting of the British Association has been held, and the walls and railings of our county capital have lost their covering of posters and placards directing the way to the reception room, refreshment room, and sections A B C D E F G H I K and L. It must be admitted that York did its best, and with the kind help of the Clerk of the Weather, the week will be a memorable one in the minds of all those who were able to be present. One missed many friends and workers



Multangular Tower, York.

who would have been there had the date been later (and after all, the great attraction to most of those who regularly attend, is the opportunity the Association gives of meeting and chatting with ones colleagues and fellow-workers), but notwithstanding this, almost everything had been done to make the visitors happy. Quite distinct from the part it has played in the history of the Association, surely York is an ideal place for a gathering such as the one just held. The picturesque old city with its famous cathedral, its walls and bars, and earthworks, the Roman remains, the numerous ancient buildings—intact or in

ruins—the river, and even the museum and its beautiful grounds, all lend themselves admirably to the purpose. In the matter of hospitality, also, much had been done; in fact, almost every possible want had been well catered for. Perhaps the main exception was the ‘British Association Refreshment Room’ which most of the members went to, once. In one other way, though perhaps not a very serious matter, was there ground for complaint, and that was the very poor arrangements made for enabling the visitors to purchase books etc., relating to the geology, natural history, archæology, etc., of the county. In fact obstacles were purposely put in the way of the proper exhibition of such works!

STATISTICS.

The number of members attending the York meeting this year was 1973, as compared with 2557 at the former visit to York in 1881. In South Africa last year 2130 members attended the meeting, and the year previous, at Cambridge, the number was 2789. The figure for this year is therefore exceedingly disappointing. The Lord Mayor of York, in various speeches before the meeting, expressed the hope that the present would be a record gathering; and in view of the fact that last year’s meeting was in South Africa, where so many were unable to attend, and also having regard to the circumstance that this was the Anniversary meeting at York, after the foundation at that city of the Association three-quarters of a century ago, there was every reason to hope that the present meeting would be exceptionally well attended. At any rate, all believed that the number recorded in 1881 would be reached. But it was not to be. We can only assume that the cause is the inconveniently early date of the York meeting this year, as was pointed out in our August issue.

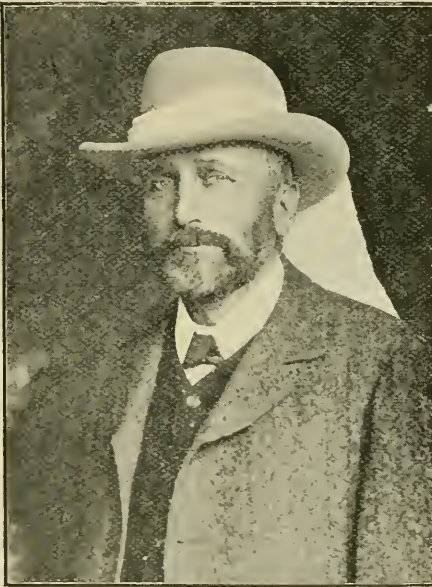
ENTERTAINMENTS.

There can be no doubt that York did its best to make those who did attend get the greatest advantage therefrom. Numerous and various garden parties and other functions occupied the attention of the by no means small proportion of the visitors who make a point at these meetings of having a sort of scientific picnic, and care little for the ‘solid’ work. This is perhaps as well, as those who attended for the purpose of serious study were thus saved the inconvenience that arises from a great crowd of people who know little and care less about what is going on.

At the president's address, for instance, which is still *the* function at the British Association meeting, what proportion of all the gaily arrayed audience was really interested in or appreciated the proceedings? Yet the address was in every way what such an address should be!

DR. TEMPEST ANDERSON.

Whilst it is admitted that the various York officials carried out their numerous and onerous duties to the satisfaction of all concerned, there can be no question that at least one York



Dr. Tempest Anderson.

scientist made almost superhuman efforts in the interests of the Association and its objects. We refer to Dr. Tempest Anderson. In his capacity as Chairman of the Executive Committee, and as President of the York Philosophical Society, and in other ways, he was able to do much, and did; notwithstanding the fact that he 'felt like "Poo-bah" in the opera!' And there are many who would have had Dr. Anderson in a much more prominent position even than he was, had they had their way. But it was not to be. His Friday evening discourse on "Volcanoes," as might be expected, was well received. Perhaps the effort which appealed to the greatest number of members,

however, was his invitation to 'all votaries of the simple life to a plain cup of tea every afternoon during the meeting' in the Museum grounds. This was most enjoyable, and was quite a feature of the York meeting.

THE RED LIONS.

The members of 'Ye Red Lion Club' had a dinner ('bones') at York, after an interval of six years! This interval probably



accounted for the extraordinary 'roaring' indulged in by both 'lions' and 'cubs' alike. We are able to reproduce the front page of the 'bones' card, which explains itself.

EXCURSIONS.

The arrangements made by the Excursion Committee were somewhat peculiar, and it is perhaps not surprising to find that the leaders and organisers of the excursions were complaining of the smallness of the number of members who took part in them, as a contrast to previous meetings, when one often found that all who applied could not be taken on the outings. In recent years, at any rate, it has been the practice to present to each member a number of neatly printed pamphlets showing the nature of the places to be visited, with particulars of cost, time, etc. These were often in a cloth cover, and were useful for reference for all time. Not so at York, where one had first to pay for a

ticket for an excursion, and then show it in order to get the pamphlet for *that excursion only*. Thus the stranger had no means of choosing the excursion that would repay him the best. Most of the members therefore neither went on any of the excursions nor got any of the hand-books.

FUTURE MEETINGS.

The next meeting of the Association will be held at Leicester, and, notwithstanding the experience gained by the early date at York, July 31st has been selected for the date of the commencement of the 1907 meeting. In 1908 the Association visits Dublin, and in the following year an invitation from Winnipeg has been accepted.

THE ADVANCEMENT OF SCIENCE.

The York Meeting may be said to have commenced on Wednesday evening, August 1st, when the presidential address was delivered by Professor E. Ray Lankester, M.A., LL.D., D.Sc., F.R.S., F.L.S., Director of the Natural History Departments of the British Museum. The first part of this address was devoted to an admirable survey of the advances made in scientific research during the preceding quarter of a century. At the previous York Meeting, 25 years ago, Lord Avebury—then Sir John Lubbock—reviewed the progress in science during the previous fifty years. In the two addresses, therefore, we have an useful resumé of the scientific achievements of the last three quarters of a century, during which the British Association for the Advancement of Science has been in existence. In the second part of his address Professor Ray Lankester dealt with “The Advancement of Science as Measured by the Support given to it by Public Funds, and the Respect Accorded to Scientific Work by the British Government and the Community at large.”

In this he pointed out that whilst he had been able to indicate the satisfactory and, indeed, the wonderful progress of science since the Association last met in York, so far as the making of new knowledge was concerned, he was sorry to say that there was by no means a corresponding ‘advancement’ of science in that signification of the word which implies the increase of the influence of science in the life of the community, the increase of the support given to it, and of the desire to aid in its progress, to discover and then to encourage and reward

those who are specially fitted to increase scientific knowledge, and to bring it to bear so as to promote the welfare of the community. He was speaking on a privileged occasion to a body of men who were met together for the Advancement of Science, and claimed the right to say without offence to the representatives of institutions which he criticised, what was in his mind.

PUBLIC OFFICIALS.

‘It is, unfortunately, true that the successive political administrators of the affairs of this country, as well as the permanent officials, are altogether unaware to-day, as they were twenty-five years ago, of the vital importance of that knowledge which we call science, and of the urgent need for making use of it in a variety of public affairs. Whole departments of Government in which scientific knowledge is the one thing needful are carried on by ministers, permanent secretaries, assistant secretaries, and clerks who are wholly ignorant of science, and naturally enough dislike it since it cannot be used by them, and is in many instances the condemnation of their official employment. Such officials are, of course, not to be blamed, but rather the general indifference of the public to the unreasonable way in which its interests are neglected.

‘A difficult feature in treating of this subject is that when one mentions the fact that ministers of State and the officials of the public service are not acquainted with science, and do not even profess to understand its results or their importance, one’s statement of this very obvious and notorious fact is apt to be regarded as a personal offence. It is difficult to see wherein the offence lies, for no one seeks to blame these officials for a condition of things which is traditional and frankly admitted.

AND THEIR EDUCATION.

‘This is really a very serious matter for the British Association for the Advancement of Science to consider and deal with. We represent a line of activity, a group of professions which are in our opinion of vital importance to the well-being of the nation. We know that those interests which we value so highly are not merely ignored and neglected, but are actually treated as of no account or as non-existent by the old-established class of politicians and administrators. It is not too much to say that there is a natural fear and dislike of scientific knowledge on the part of a large proportion of the persons who are devoid

of it, and who would cease to hold, or never have held, the positions of authority or emolument which they now occupy, were scientific knowledge of the matters with which they undertake to deal required of them. This is a thorny subject, and one in which, however much one may endeavour to speak in general terms, it is difficult to avoid causing personal annoyance. Yet it seems to me one which, believing as I do that it is of most urgent importance, it is my duty as your President to press upon the attention of the members of the British Association. Probably an inquiry into and discussion of the neglect of science and the questionable treatment of scientific men by the administrative departments of Government, would be more appropriate to a committee appointed by the Council of the Association for this purpose than to the Presidential Address.

‘At the same time, I think the present occasion is one on which attention should be drawn in general terms to the fact that science is not gaining ‘advancement’ in public and official consideration and support. The reason is, I think, to be found in the defective education, both at school and university, of our governing class, as well as in a racial dislike among all classes to the establishment and support by public funds of posts which the average man may not expect to succeed by popular clamour or class privilege in gaining for himself—posts which must be held by men of special training and mental gifts. Whatever the reason for the neglect, the only remedy which we can possibly apply is that of improved education for the upper classes, and the continued effort to spread a knowledge of the results of science and a love for it amongst all members of the community. If members of the British Association took this matter seriously to heart they might do a great deal by insisting that their sons, and their daughters too, should have reasonable instruction in science both at school and college. They could, by their own initiative and example, do a good deal to put an end to the trifling with classical literature and the absorption in athletics which is considered by too many schoolmasters as that which the British parent desires as the education of his children.

OLD AND NEW LECTURE SOCIETIES.

‘It is a fact which many of us who have observed it regret very keenly, that there is to-day a less widespread interest than formerly in natural history and general science, outside the

strictly professional arena of the school and university. The field naturalists among the squires and the country parsons seem now-a-days not to be so numerous and active in their delightful pursuits as formerly, and the Mechanics' Institutes and Lecture Societies of the days of Lord Brougham have given place, to a very large extent, to musical performances, bioscopes, and other entertainments, more diverting, but not really more capable of giving pleasure than those in which science was popularised. No doubt the organisation and professional character of scientific work are to a large extent the cause of this falling-off in its attraction for amateurs. But perhaps that decadence is also due in some measure to the increased general demand for a kind of manufactured gaiety, readily sent out in these days of easy transport from the great centres of fashionable amusement to the provinces and rural districts.'

PROFESSOR RAY LANKESTER'S REQUESTED RESIGNATION.

After the preceding remarks it seems somewhat fateful that at the very moment when Professor Lankester was preparing to discharge the duties of the President of the British Association, the Press announced that he had been called upon to resign his position as Director of the Natural History Museum, on the ground that the age limit of 60 was reached. As Professor Lankester points out in a letter to the *Times*, the decree of the Trustees simply amounts to this—they propose to remove him from a post of which the salary is £1200 a year and to leave him unemployed, and without possibility of appropriate employment, at the age of 60 on a pension of £300 a year. His predecessor, Sir William Flower, was continued in office until 68 years of age, and Sir Ricland Owen, his predecessor, was 80 when he retired.

CONFERENCE OF DELEGATES.

Two meetings of the Delegates from corresponding societies attending the British Association were held, the Chairman being Sir E. Brabrook. At the first Dr. H. R. Mill gave an address on 'Meteorological Observations by Local Scientific Societies.' He urged that there is not a sufficient number of meteorological observations made. 'You can all do something,' he said, 'to improve the official weather predictions in this country. There is probably no body in the British Isles more subject to criticism than the Meteorological Office, which produces the daily forecast

in the newspapers. There is no journalist, however young, who has not flung a gibe at the "Clerk of the Weather," and there is no crank who has not at one time or another intimated that he knows how to predict the weather a great deal better than people who are paid to do it. There is no cure for the journalist but experience, and no cure for the meteorological faddist but the study of meteorological facts, and the meteorological faddist always refrains from that study. But you can create an instructed public opinion which will be able to give intelligent criticism to the predictions that are given out, and once the Meteorological Office feels that the predictions are subject to intelligent criticism it will be a stimulus that will help the heads of the Office, who are doing the best they can, to do still better, and will result, I am confident, in a very great improvement.'

METEOROLOGICAL OBSERVATIONS.

Dr. Mill would like to see in every town of importance in the British Isles—'and in every town that thinks itself important'—a meteorological station kept up under the watchful care of a scientific society, which would not allow a record to be modified to boom the place as a health resort, and which would not show a temperature always above the average and the rainfall below it, as he had sometimes suspected—but whose record of sunshine would never exceed the number of hours the sun is above the horizon. Such a society, he suggested, should forward observations to one of the central authorities specially devoted to the study of meteorology.

Urging the need of additional observations in regard to sunshine, Dr. Mill remarked that we knew deplorably little about the sunshine of this country. There were very few places where we could tell with approximate exactitude what the sunshine of a place was. One result of more observations would be that we should find that this country is far sunnier than we supposed. It was desirable to put sunshine recorders in a few hundred places where they do not now exist. More observations of rainfall were also needed. There are more than four thousand observers of rainfall in the British Isles, but still, thinks Dr. Mill, there are not enough. There are not a quarter enough rain gauges in the East and North Ridings of Yorkshire, though the West Riding, and particularly the western part of it, is well represented.

PHOTOGRAPHIC SURVEY.

The principal business before the second meeting was the consideration of a paper by Mr. W. Jerome Harrison, F.G.S., on 'The Desirability of Promoting County Photographic Surveys.' In dealing with this important subject, Mr. Harrison referred to the origin of the movement in 1889, when at a meeting in Birmingham of the representatives of numerous local photographic, scientific, and literary societies a paper was read, entitled, 'Notes upon a Proposed Photographic Survey of Warwickshire.' This paper was the amplification of the ideas which had been urged in a previous note upon the work of the local photographic society read before the Birmingham Photographic Society in 1885. The ambition was to link together photographers of the entire civilised world by the extension of the survey idea. The paper continued to sketch the progress of the survey work in Britain and to deal with three objects of the work, which are to benefit the individual photographer, the scientific and photographic societies, and the nation. In an appendix Mr. Harrison gave details of the movement, and suggested that the British Association seemed to be specially well fitted to carry on the work.

It was ultimately agreed to recommend that a committee be appointed next year to promote photographic survey work in the British Isles. The names suggested for this Committee were—Rev. J. O. Bevan, Rev. Ashington Bullen, John Brown, William Croke, Mr. W. Jerome Harrison, and Thomas Sheppard.

CORRESPONDING SOCIETIES.

IN the report of the Corresponding Societies Committee it was stated that with the view of carrying into effect the new regulation whereby many of the smaller local Societies which exist in this country for the encouragement of the study of science may, under certain circumstances, become Associated Societies, a circular was drawn up and addressed in the early part of the year to a number of such Societies. It was found with satisfaction that some of these Societies had undertaken and published original scientific work, and were consequently entitled to Affiliation. Amongst those recommended, from the character of their published work, to be placed on the list of Affiliated Societies are the Liverpool Biological Society and the Vale of Derwent Naturalists' Field Club.

It was also recommended that the following be placed on the list of Associated Societies :—

Bakewell Naturalists' Club.	Liverpool Microscopical Society.
Barrow Naturalists' Field Club and Literary and Scientific Association.	Liverpool Science Students' Association.
Bradford Natural History and Microscopical Society.	Newcastle-upon-Tyne Literary and Philosophical Society.
Grimsby and District Antiquarian and Naturalists' Society.	Preston Scientific Society.
Lancashire and Cheshire Entomological Society.	Southport Society of Natural Science.
	Warrington Field Club.

MR. W. EAGLE CLARKE.

The President of the Yorkshire Naturalists' Union, Mr. W. Eagle Clarke, F.R.S.E., F.L.S., has been appointed Keeper of the Natural History Collections of the Royal Scottish Museum, Edinburgh, in place of Dr. R. H. Traquair, F.R.S., who has had the appointment since 1873. Mr. Eagle Clarke, first as assistant, and afterwards as assistant keeper, has been an officer in the Natural History Department of this museum for the past eighteen years. Mr. Clarke is a native of Leeds, and was at one time editor of the 'Naturalist.' All northern naturalists will join with us in congratulating Mr. Clarke on his recent appointment, and in the hope that he may be successful in his new sphere.

—◆—
GEOLOGY.

***Oxyrhina mantelli* in the Lincolnshire Chalk.**—I have recently obtained a fish tooth from the large Barton Chalk Quarry on the south Humber shore. It occurred towards the base of the Middle Chalk, about three feet above the *Belemnitella plena* zone. Dr. A. Smith Woodward, F.R.S., kindly identifies it as *Oxyrhina mantelli*, which does not appear to have been previously recorded in the Middle Chalk of Lincolnshire or Yorkshire. The specimen can be seen in the geological gallery at the Hull Museum.—H. C. DRAKE, Hull, August 1st, 1906.

—: o :—

FLOWERING PLANTS.

***Coronilla Varia* at Elland.**—During the ramble of the Lindley Naturalist and Photographic Society to Tag Lock, Elland, on the 14th July last, this pretty alien vetch was found growing on a waste heap near the Lock by Mr. J. Ackroyd.—W. E. L. WATTAM, Newsome.

ZOOLOGY AT THE BRITISH ASSOCIATION.

OXLEY GRABHAM, M.A., M.B.O.U.,
Local Secretary of Section D.

THE Zoological Section was, on the whole, well attended throughout the meeting, from the President's Address to the reading of the last paper. Many subjects of varied scientific interest were discussed. The chief objects of interest with regard to northern county items were (1) the excellent paper read by Mr. G. T. Porritt, F.L.S., on 'Melanism in Lepidoptera,' his observations in this connection having been largely carried on in his own immediate neighbourhood of Huddersfield; (2) The unique series of lantern slides of Yorkshire Birds and Mammals, made from photographs mostly taken by Mr. Oxley Grabham, M.A., M.B.O.U.; and (3) the paper by Dr. E. J. Allen on the Relations of Scientific Marine Investigations to Practical Fishery Problems. A most interesting discussion on this matter took place, in which not only men of science, but those connected with the fishery business took part. The whole matter, as it stands, is very unsatisfactory. In spite of all that has been said about the inexhaustive supply of fish in the North Sea, there is no doubt that the time will come when this supply will be very greatly diminished; indeed, as was shown by statistics, it is diminishing now. When we consider the hundreds of thousands of pounds invested in the fishery business, the number of men employed in the same, and the value of fish as a food supply, it is high time that the State took more interest than it does in promoting the study of the question as to how to best keep up that supply. As was pointed out by one of the speakers, in most other branches of science every emolument is open to the expert, but in the matter of fish, as soon as anyone took up that study he seemed to lose cast amongst his brethren; no encouragement was given to him. And Prof. Cunningham advised any of his hearers who were thinking of taking up that study to have nothing whatever to do with the matter, if they wished to get on in life. There is surely something very wrong about this, for the fishery question is one of national importance. But again, as was pointed out, the practical fisherman looks with contempt upon many of the proceedings of the man of science, as indeed, unfortunately, at times he is justified in doing, and *vice versa*. It is very very rarely that one comes across any one who is thoroughly conversant not only with the scientific and theoretical

side of the question, but also with the practical side as well, and unfortunately there is no school of learning where the two are taught and combined. Students who can name every part of a fish's anatomy have been known to be unable to distinguish between a plaice and a sole.

As a result of the York meeting, over a thousand pounds have been voted for scientific purposes. These are as under :—

	£	s.	d.
Section A.—Mathematical and Physical Science	170	7	6
Section B.—Chemistry	70	0	0
Section C.—Geology	113	2	0
Section D.—Zoology	196	16	6
Section E.—Geography	60	0	0
Section F.—Economic Science and Statistics ...	25	0	0
Section H.—Anthropology	169	0	9
Section I.—Physiology	125	0	0
Section K.—Botany	97	5	7
Section L.—Educational Science	15	0	0
Corresponding Societies' Committee	20	0	0
Grand Total	£1061	14	4

The Presidents of Sections at the York Meeting of the British Association were :—

- A. Mathematical and Physical Section : Principal E. H. Griffiths, Sc.D., F.R.S.
- B. Chemical Section : Prof. Wyndham Dunstan, M.A., LL.D., F.R.S., F.C.S.
- C. Geological Section : G. W. Lamplugh, F.R.S.
- D. Zoological Section : J. J. Lister, M.A., F.R.S.
- E. Geographical Section : The Rt. Hon. Sir George Taubman Goldie, K.C.M.G., LL.D., F.R.S.
- F. Economic Science and Statistics Section : A. L. Bowley, M.A.
- G. Engineering Section : J. A. Ewing, LL.D., F.R.S., M.Inst.C.E.
- H. Anthropological Section : E. Sydney Hartland, F.S.A.
- I. Physiological Section : Prof. Francis Gotch, M.A., D.Sc., F.R.S.
- K. Botanical Section : F. W. Oliver, M.A., D.Sc., F.R.S.
- L. Educational Science Section : Prof. M. E. Sadler, M.A., LL.D.

The Correspondent to the *Yorkshire Post* was apparently particularly pleased with Dr. S. Hartland's address to the Anthropological Section, and with his 'delicious' humour. 'Take, for instance, his illustration of the "fluidity of the savage concept of personality," which gave him the opportunity of adding that he and they might "quite easily be transformed into something more than metaphorical representatives of the British Ass." This is the first time that noble animal has been mentioned, so far as the present meeting is concerned. It recalled the famous Edinburgh gathering at which Sheriff Nicolson broke into song to the tune of "The British Grenadiers," and sent the noble army of Professors into fits of laughter. One of the verses of his ditty ran thus :—

'We've read in ancient story
How a great Chaldean swell
Came down from all his glory
With horned beasts to dwell ;
If you would know how it happened so
That a King should feed on grass,
In Section D, Department B,
Inquire of the British Ass. !'

ANTHROPOLOGY AT THE BRITISH ASSOCIATION.

ALTHOUGH the meetings of the Anthropological Section produced nothing of startling or extraordinary interest, the general high level and value of the communications serve to make the meeting at York a memorable one. The president, Mr. E. Sidney Hartland, F.S.A., has long been recognised as a master of his subject, and his address upon the Origin of Magic and its relation to Religion was freely spoken of as one of the most striking presidential addresses ever delivered to this section. Dealing with the problems of savage religions and savage philosophy, he traced the growth of religious practice from animism to the concept of personality indued with inherent qualities capable of influencing its surroundings. Magic is essentially an application of this idea of the potentiality for good or evil possessed by personality, and spells and incantations are often indistinguishable from prayer and shade into one another by the finest gradations, while the slavery of man to custom has deep down below the surface an element of religion in it.

Ethnological problems were treated by Prof. A. C. Haddon, F.R.S. (Ethnology of S. Africa), and Mr. Dornan (The Bushmen of Basutoland), while other contributions dealt with the inhabitants of Ba-Yaka and Sungei-Ujong. Classical archæology was exceptionally well represented. Mr. D. G. Hogarth described the remarkable results of his excavation of the primitive Artemisia of Ephesus, undertaken under the auspices of the British Museum, the discoveries in which were described by Mr. R. C. Bosanquet as hardly yielding in importance to Schliemann's excavations on the site of Troy. Mr. Bosanquet himself showed the remarkably successful results of his excavations in Sparta, which had resulted in the discovery of the sanctuary of Artemis Orthia. Dr. D. Ashby detailed the result of recent explorations in the Roman Forum, and also upon the site of Venta Silurum (Caerwent). The chief archæological interest, however, was centred in the lecture by Prof. W. Flinders Petrie upon the work of the British School of Archæology in Egypt and the discovery of the site of a fortress of the Hyksos, or Shepherd Kings, who held Egypt from about 2400 to 1600 B.C. This great earth bank, 20 miles north of Cairo, which in all probability represents the Hyksos Camp of Avaris, had originally a great outward slope of white stucco 60 or 70 feet in length, with a long sloping entrance ascending over the bank which appears to have been subsequently encased in front with a wall of limestone blocks some 45 feet high.

Prof. Petrie also described the site of the store city Raamses built by the Israelites, and the discovery of the town and temple built by the high priest Onias, who fled from Jerusalem to Egypt from the persecution of Antiochus Epiphanes about 150 B.C.

British archæology was, however, by no means neglected. Miss Layard gave the results of her past year's work upon the Palæolithic site at Ipswich, and in an Anglo-Saxon cemetery near the same place, and showed an extremely interesting series of exhibits. Mr. T. Sheppard also contributed papers and exhibits dealing with Anglo-Saxon and Roman finds near South Cave* and South Ferriby respectively. Dr. G. A. Auden exhibited a splendid collection of pigmy flints from North Lincolnshire and Yorkshire belonging to Rev. G. Scott Gatty, and also a series of crania from York, and from the excavations conducted by Dr. Thurman in Lamel Hill in 1847. This exhibition, together with a paper by Mr. J. Mortimer dealing with measurements of bones from his museum, served as a prelude to a most useful discussion upon the physical characters of the early races of Britain, in which Dr. Wright, Dr. Shrubshall, and Prof. Ridgway took part. Other valuable papers were contributed by Miss Pesel upon the evolution of design in Greek and Turkish embroidery; by Prof. Ridgway, of Cambridge, upon the origin of the fiddle and guitar; and by Mr. J. L. Myers upon early human types in the Ægean. Mention should also be made of the reports of the several committees which have done such useful work in connection with the Anthropological Section. The committee for the exploration of the Lake Village at Glastonbury presented a report of continued useful work, which is now nearing completion. The printed report of the committee for anthropometric investigation gives an illustration of the male human adult prepared by Prof. D. Cunningham (chairman) to mark the points between which dimensions are to be measured, together with provisional schedules and instructions for psychological observations. The report of the committee for the investigation of the age of stone circles, under the chairmanship of Mr. C. H. Read, gave the results of excavations at the Stripples Stones, E. Cornwall, which tend to prove that this circle, like that at Arbor Low (Derbyshire), previously examined by the committee, belonged to a period not earlier than the *late* neolithic time or later than the *early* Bronze Age.

* Printed *in extenso* in the *Antiquary* for September.

In conclusion, mention should be made of the nomination of a new committee, with Prof. W. Ridgway as chairman, to take in hand the important work of registration and classification of the megalithic remains of Great Britain, a work which is of paramount importance in view of the general supineness of the British public and of successive Governments, and the resulting neglect of a class of monuments in which the British Isles have been peculiarly rich, but which are in many places rapidly disappearing. Dr. G. A. Auden, York, is secretary to this committee, and it is to be hoped that members of the various Archæological Societies will give the committee their hearty co-operation and support, and forward any material which may be of service in the work of registration.



R. Scharff

HINDERED by the difficulty Mr. Taylor is experiencing in obtaining autographs and portraits of prominent conchologists, the 'Monograph of the Land and Freshwater Mollusca of the British Isles' is making slow progress. An appeal for help in the matter appears in part 12 of the Monograph, which is just issued. It contains a further instalment of the second volume, which gives minute details of distribution of the different species. As in previous issues the part is illustrated by portraits of workers, and views of favourite localities. *Arion*

intermedius 'is here associated with Dr. R. F. Scharff, M.R.I.A., of Dublin, its recent discoverer in this country, and the first in Britain to make known its really distinctive characters and wide distribution.' We feel sure our readers will be glad to have the opportunity of seeing the portrait of Dr. Scharff, who is a native of Leeds.

BOTANY AT THE BRITISH ASSOCIATION.

THE botanists had a busy time at York, and thanks to the excellent arrangements of the local members, not an idle moment was spent. Prof. F. W. Oliver, of University College, London, was president of the section, and chose as the subject of his address 'The Seed, a Chapter in Evolution.' The subject was a natural and suitable one, from a palæobotanist who has recently done so much to raise the question of the seed and its significance in comparative morphology to such a position of interest. The second portion dealt with 'Botany in England,' but more especially modern botany, which is the product of the last twenty-five years. He made a significant reference to our large Herbaria, 'the effort involved in their construction and upkeep being altogether disproportionate to any service to which they are put.' With some this may be merely a matter of opinion, but no one will quarrel with his remark that these institutions might and ought to become centres for the teaching of systematic botany of the best type, for it is remarkable that in no botany school in England is systematic botany taught as it should be. The address is as full of interest as it is stimulating, and should be read by all botanists. We were glad to see Mr. J. G. Baker rise to move a vote of thanks, for who could have been more suitable than this veteran Yorkshire botanist.

The address was followed by several interesting papers. Mr. Seward read two papers for Prof. Pearson on 'South African Cycads.' Mr. Hugh Richardson dealt with the 'Vegetation of Teneriffe,' and Miss Sanders 'The Metabolism concurrent with Heat-production in some Aroids.' The morning's work concluded with several reports of committees, that on 'Botanical Photographs' was illustrated by a number of prints, including some of Irish plants by Mr. A. Welch, and others of Alpine plants by Mr. Ballance. Many of these were excellent, and showed exactly what ought to be done in this direction. Mr. F. J. Lewis in the report on 'Peat Moss Deposits' records that the chief point of interest up to the present time is the discovery of a well-marked Arctic Plant bed lying at the base of the peat. A silty clay occurs in some places on the banks of and partly under the river Tees at about 2000 feet, crowded with well-preserved leaves of *Salix reticulata* and *S. Arbuscula*. The stems, and frequently the leaves, of these plants are abundant at the base of the peat over the

whole of the district. In the afternoon Dr. T. W. Woodhead opened with an account of 'Ecological Work in Switzerland.' Everyone was surprised at the extent and range of the work carried on there, and an opportunity was given to the members of examining much of this in the large collection of literature, maps, photographs, etc., exhibited in illustration of the paper. In strong contrast to similar work in England, these studies are greatly encouraged by government grants, and by the departments of Agriculture and Forestry.

Mr. C. E. Moss dealt with 'Succession of Plant Formations in Britain.' He described the plant formations of sand dunes, muddy salt marshes, lowland and upland peat moors, and primitive woodland. He concluded that plant associations are determined much more by edaphic than by climatic factors. Of the edaphic factors the occurrence of humus and humous acids is one which is highly important and deserving more attention. An open association is usually dominated by one plant, and the number of other species is small. An intermediate association either consists of a number of smaller vegetation units (plant societies), as in the case of the dune marsh association, or is dominated by several plants, each of which possesses the same plant form as in the case of the reed swamp. The number of species in an intermediate plant association is often very large. A closed association is again dominated by one plant, and the number of species in the association is small. The ground is not fully occupied by plants in an open association, whereas in a closed association plants cover all the available ground. Intermediate associations pass gradually into each other, but the extremes are easy to differentiate. Prof. T. Johnson gave an account of 'Corn Smuts and their Propagation,' and Mr. W. Wilson referred to 'Acclimatised Plants' in Scotland.

Friday was given up to the Palæobotanists, and they had much of interest to tell us. Dr. Scott was to deal with 'Some aspects of the present position of Palæozoic Botany,' but he found his subject too big and his time too small, so he wisely confined his remarks to the interesting topic of Pteridosperms, and he was able to reassure us that true ferns really did exist during the coal period, in spite of the fact that so many so-called ferns had recently been shown to be seed plants. Calcareous nodules and coal balls found in coal seams proved hard nuts to crack. Prof. Weiss, Dr. Stopes, and Messrs. Watson, Lomax, and Bolton all tried their hand with varying success. Dr. Stopes

pointed out that they were undoubtedly concretions largely composed of Ca CO_3 , varying in size, and often surrounded by coal. As a rule the plants in two neighbouring balls are disconnected fragments, but in some cases the same plant continues in two nodules. This suggests that the concretions containing the plant tissues were formed in the place in which we now find them. She supported the view advanced by Binney that the constant association with the roof nodules containing marine shells suggests that the infiltration of sea-water and carbonate was necessary for the formation of true 'coal balls.' Mr. Lomax made the not very probable suggestion that coal balls were water worn, and had been carried to their present position by strong currents of water. He admitted at the outset that Dr. Stopes had taken the wind out of his sails. However formed, a study of their contents has helped forward palæobotany at a rapid rate during recent years. There is obviously much valuable work waiting to be done around our own doors.

Saturday was a busy morning. Mr. Gallagher opened with an account of the 'Root Anatomy of the Cupuliferæ and of the Meliaceæ.' He found two distinct types of rootlets in our native Cupuliferæ. (a) Rootlets free from fungus, these possessing a root cap, root hairs, definite hypoderm, and cortex of upwards of twenty concentric layers are present; these are clearly not roots of extension and fixation alone, they are also absorptive, as shown by the well-developed root hairs. (b) Rootlets bearing an exotrophic mycorrhiza, in these root cap, root hairs, and hypoderm are absent; there are not half a dozen concentric layers in the cortex, and the rootlets are much shorter than in (a). Culture of the mycorrhiza on various media were made, but no fructification could be obtained. Dr. Blakeslee gave an account of 'Zygosporer Germinations in the Mucorineæ,' illustrated by many interesting cultures. All were glad to see Prof. E. C. Jeffrey, whose anatomical work has won general admiration. He is now studying the anatomy of Mesozoic plants, and gave some results of his work on the 'Structure and wound reactions of the genus *Brachyphyllum*,' Prof. Weiss described a 'Stigmaria of unusual type,' found in a nodule from the Halifax hard bed of the lower coal measures. It differs from most specimens of stigmaria in the considerable amount of primary wood which was centripetal in its development. Prof. Bottomley had been carrying out experiments on the 'Cross-innoculation of Leguminosæ and other root-nodule bearing plants,' and showed that, provided the specific organism

which produces the nodule is first grown for two weeks upon a nitrogen-free medium, cross-innoculation is possible between the organism found in root nodules of the Mimosæ, Alder, *Elæagnus*, and various *Papilionaceæ*.

In a second paper on 'Nitrifying Bacteria in the Velamen of certain Orchids,' he demonstrated the presence of both nitrite and nitrate bacteria in the velamen cells. Dr. Ellis considered the 'Taxonomic value of Cilia in Bacteriology,' and showed that many non-conciliated forms could, under favourable conditions, be made to develop cilia, and that the distinction between bacterium and bacillus is non-existent. He states that motility, either potential or actual is a characteristic of all the forms of the three divisions—*Coccaceæ*, *Bacteriaceæ*, and *Spirillaceæ*.

On Monday, Botanists and Zoologists combined in a discussion of Fertilisation Problems, introduced by Dr. V. H. Blackman. Several foreign visitors from the conference on Hybridisation attended, and contributed to the discussion, including Profs. Johansen and Ostfeldt. Prof. Hickson pointed out that in spite of much excellent work, some of the most generally accepted conclusions of cytologists, *e.g.* definite number of chromosomes for a given species, and chromosomes as carriers of hereditary characters rested on very unsatisfactory foundations.

Tuesday morning was devoted to problems suggested by the study of Seedlings, and very able papers were read by Messrs. T. G. Hill, A. G. Tansley, A. W. Hill, and Miss Thomas. In the discussion that followed the ladies figured largely, and on disputed points seemed to have the best of the argument. They are certainly excellent speakers, many of the men being painfully deficient in comparison. Thanks to Prof. Tansley, the meetings ran smoothly throughout, and were so arranged that the mornings were generally given up to papers and discussions, leaving the afternoons free for excursions and other functions. Dr. Burt and Mr. W. Ingham made excellent guides, and conducted large parties to localities of botanical interest. Askham Bog was visited on August 3rd. The following day Castle Howard was the place selected. On Monday afternoon, after a short but interesting semi-popular lecture by Prof. Yapp on 'Some Impressions of South African Vegetation,' and the results of observations on 'Periodicity in Algæ,' by Miss Rich, which showed that some valuable work was going on in the ecological study of pond vegetation, the

members repaired to the laboratory and grounds of the British Botanical Association and Messrs. Backhouse's nurseries. Afternoon tea was served, the members were photographed, and much interest was shown in the valuable collection of plants. On August 7th an excursion was made to Skipwith Common. Here a hepatic new to Yorkshire was discovered by a lady member. This proved to be *Riccia crystallina*, and associated with it was *Botrydium granulosum*. The botanical dinner at Davy Hall was largely attended, and the interest enhanced by the presence of several foreign guests. They made excellent speeches, which furnished another proof, if one were needed, of the freemasonry of science. The meetings were also taken advantage of by the Central Committee for the survey and study of British vegetation, which met and discussed various questions relating to survey work; and on Wednesday, under the leadership of Mr. C. E. Moss, the members spent four days in studying the vegetation of the North Derbyshire Moors.



MOSSES.

Schistostega osmundacea Mohr. in Derbyshire.—I recently found a fine growth of this beautiful moss in a small heading made in a gritstone quarry, situated about 850 feet above sea-level and about one mile west of Wirksworth. Last Sunday evening (July 29th) I happened to visit the place about an hour before sunset, and the time was ideal for showing off the so-called luminous but really rather refractive properties of the moss. The rays of the evening sun shone directly into the heading, making one side of it a sheet of pale metallic green, one of my companions compared it to the peculiar metallic green that we see on the breast of some Humming Birds. This curious effect appears to reside not in the fronds of the moss but in the protonema, as looking closely into the hole the dark fronds could be seen standing out against the glittering green covering of the rock surface. When taken out into full daylight the glittering appearance is quite lost and we see only the moss fronds and a dull green alga-like growth covering the sandstone. *Schistostega osmundacea* grows in several localities in Derbyshire, all of them upon the Millstone grit, in crevices in the rock and often in rabbit burrows, but it has not previously been recorded from the immediate neighbourhood of Wirksworth.—T. GIBBS, Wirksworth, July 31st, 1906.

MELANISM IN LEPIDOPTERA.*

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

MELANISM, as applied to lepidoptera, is an increase or substitution of black on the wings or body, or on both, at the expense of some other colour. The phenomenon has increased with extraordinary rapidity in South-west Yorkshire and parts of Lancashire, and also occurs in a lesser degree in many other parts of the United Kingdom. In some species the changes have been sudden, *i.e.*, not a gradual progression from pale to black, for instance the cases of *Amphydasis betularia*, *Odontopera bidentata*, etc. But in most cases the change has been gradual, though rapid. Over thirty species are melanic in Yorkshire, the great majority of which have apparently become so during the collecting experience of many present-day lepidopterists. In addition, there are also at the present time a considerable number of other species, of which specimens so much darker than the typical forms are so frequently taken, as to indicate that they too are being influenced towards the same end. The species in which Melanism was first noticed was *Amphydasis betularia*, and for many years it seemed to be the only representative. But about twenty-five years ago Melanism was noticed in several others, and since then additions to the species have constantly been made. He detailed the progression of the Melanism in *Pligalia pilosaria*, *Tephrosia biundularia*, *Hybernia proge mmaria*, *Diurna sagella*, *Boarmia repandata*, *Arctia mendica*, *Polia chi*, *Odontopera bidentata*, *Larentia multistrigaria*, *Venusia cambricaria*, *Agrotis agathina*, *Acronycta menyanthidis*, and others. These have all apparently become black, or largely black, in recent years, and many of them in some districts promised at no distant date to altogether oust the old ordinary pale forms. One melanic form, the variety *varleyata* of *Abraxas grossulariata*, has *not* increased in numbers. Known more than forty years ago, it is to-day as rare as it was then, although its hereditary tendency is so strong that a brood raised this year from a pair of moths from wild larvæ were all of the extreme form, not a single example showing any tendency to revert to the pale ordinary form or to any other

* Abstract of paper read to Section D (Zoology) of the Meeting of the British Association, York. The paper itself will be printed in *extenso* in the Report of the British Association.

than *varleyata*. In other species, in captivity, and the parents selected for the purpose, it has usually taken three generations to produce an almost completely melanic race, but even then there has generally been a very small percentage of the pale forms. The usually accepted theory of the reason for Melanism is that it is a protection against birds and other enemies of the moths, that the pale forms being so much more conspicuous on the darkened (by soot, moisture, etc.) tree trunks, the birds pick them off, and the dark specimens being less conspicuous are more likely to escape detection, and so survive in proportionately greater numbers to perpetuate still darker forms. That Melanism in many cases is apparently, and very probably protective, is not denied, but we have as yet little proof from what enemies such protection is needed. He did not believe that birds feed to any extent on the larger moths, and the nightjar which does, only takes them on the wing at night when colour similarity with tree trunks would be useless. The same applies to bats and other enemies, and indeed there seems to be no evidence of any enemies which systematically search tree trunks for large species like *Amphydasis betularia*, *Boarmia repandata*, *Pligulia pilosaria*, *Tephrosia biundularia*, and others. Moreover, many Melanic species, such as *Larentia multistrigaria*, the Melanism in which has become very rapidly developed for no apparent reason, do not affect tree trunks at all. This species hides in the daytime among grass and other green herbage on the exposed hillside meadows in which it flies, and where the herbage is so thick that an assimilation of colour to the soil underneath would seem of little use. The theory that smoke and humidity, together with natural selection and heredity, in the manufacturing districts of Yorkshire and Lancashire has caused Melanism, although likely in many instances, the exceptions are so numerous that unless it is conceded that other and altogether different influences were the causes in these exceptions the theory cannot stand.*

* This paper was illustrated by a large number of specimens of Melanic species from Mr. Porritt's cabinet, supplemented by specimens from the cabinet of Mr. Samuel Walker, of York. In the discussion which followed Prof. Poulton, F.R.S., Dr. Dixey, F.R.S., the Rev. C. F. Thornewill, M.A., and Mr. Doncaster took prominent parts, Prof. Poulton pointing out that it was not necessary that the melanic form of *Abraxas grossulariata* should increase because it happened to be exempt from ordinary enemies, for neither birds nor mammals would touch it in any stage.

ON BRITISH DRIFTS AND THE INTERGLACIAL PROBLEM.

(EXTRACTS FROM THE ADDRESS TO THE GEOLOGICAL SECTION,
BRITISH ASSOCIATION, YORK.)

G. W. LAMPLUGH, F.R.S.,
President of the Section.

IF a personal reminiscence be pardonable, let me first recall that twenty-five years ago, at a meeting of this Section in this same room, I ventured, while still a youth, to contribute my mite towards the right understanding of the Yorkshire drifts. The occasion will always remain memorable to me, for it was my first introduction to a scientific audience, and the encouraging words spoken by Ramsay from this chair impressed themselves upon me and gave me confidence to persevere in the path of investigation.

Finding myself again in these surroundings, it seems fitting that with fuller experience and less diffidence I should resume the subject by bringing before you some further results of my study of the drifts. But it is with just a sigh that I recollect how on the former occasion I was able to reach a definite conclusion on a simple problem from direct observation, and had confidence that all problems might be solved by the same method; whereas now I find confronting me an intractable mass of facts and opinions, of my own and other people, terribly entangled, out of which it seems to grow ever more difficult to extract the true interpretation.

That the glacial deposits possess some quality peculiarly stimulating to the imagination will, I am sure, be recognised by everyone who has acquaintance with glacialists or with glacial literature. The diversity and strongly localised characters of these deposits, together with their aspect of superficial simplicity, offer boundless opportunity to the ingenious interpreter; and therefore it is not surprising that along with the rapid accumulation of facts relating to bygone glaciation there should have arisen much divergent opinion on questions of interpretation. Nor need we regret this result, since these differences of opinion have again and again afforded the stimulus for research that would not otherwise have been undertaken.

THE INTERGLACIAL PROBLEM.

One of the most important points on which there has been, and still is, wide difference of opinion among glacial geologists,

both in this country and abroad, is with regard to the value of the evidence for interglacial periods ; and it will be my aim, in bringing before you some general conclusions regarding the drifts, to concentrate attention principally upon this evidence.

To keep the discussion within practicable limits I must perforce assume the former extension of ice-fields over the glaciated areas ; for although I know that there are still dissentients from this fundamental proposition, the cumulative evidence in its favour has been so frequently recapitulated that it would not be justifiable for me to detain you by repeating the arguments.

It is now, I think, agreed by all who accept this proposition that the ice-sheets of the Glacial Period, though of vast extent, had their northern as well as their southern limits ; the original idea, that they represented the outer portion of a polar ice-cap, having been disproved by more extended researches in the more northerly part of our hemisphere. Moreover, it has been found that these ice-sheets had their origin in the coalescence of masses which spread outward from separate areas of accumulation, acting more or less independently, so that the individual sheets did not all attain their farthest bounds at the same time. But this recognition of independent centres of glaciation has given sharper prominence to the question whether the glacial deposits are to be regarded as the product of a single epoch of glaciation, or whether they represent successive epochs of this kind, separated by intervals during which the great ice-sheets temporarily vanished.

As opinion stands at present, probably most geologists lean to the idea that the glaciation was interrupted by at least one interglacial epoch, during which the climate of any particular latitude became not less warm, and perhaps warmer, than it now is. This is the interglacial hypothesis in its simplest form. But it has been frequently pointed out that the criteria depended upon in the recognition of warm interglacial conditions cannot be all assigned to the same horizon, since they recur at different positions in the drift series. Hence it has been claimed that two, three, four, or even five interglacial epochs, with a corresponding number of separate epochs of glaciation, may be recognised in the glacial sequence. In respect to the number, relative importance, and correlation of these epochs or stages in different countries, or in different parts of the same country, there has been, however, no pretence to agreement among the upholders of the Interglacial idea.

In opposition to these views of every degree, a smaller number of glacialists have urged that there is no proof of even a single absolute interruption of the glacial conditions from the beginning to the end of the period; and that the evidence indicates only one great glaciation, during which there were wide oscillations of the margins of the ice-sheets in different places, due probably to more or less local circumstances.

This radical difference of interpretation respecting the constitution of the Glacial Period assumes the greater consequence in that it bears directly upon many questions other than those which are strictly geological. Thus, the antecedents and distribution of our present fauna and flora, and the time and conditions of that momentous event, the appearance of man in Northern Europe, are deeply involved in the issue.

Moreover, until we can tell whether it is one or several periods of glaciation that we require, how can we approach the other sciences for aid in our search for the cause of the Ice Age? It is, indeed, essential that, before seeking counsel's opinion of this kind, the geologist should have all his evidence at command and well-marshalled, so that he can say such and such are the facts, and this the order of them. Otherwise he may receive not the desired interpretation, but advice as to what he ought to have found and instructions to go and find it. And that such instructions may be detrimental rather than helpful to our progress is, I think, shown by the history of the Interglacial hypothesis. In this matter the glacial geologists, having some evidence for the alternate extension and recession of ancient glaciers, fell readily under the influence of the fascinating theory brought forward by James Croll to explain the Great Ice Age, whose interpretation, however, reached far beyond the facts that were placed before him.

I need hardly remind you that, according to Croll, a sufficient explanation of the Glacial Period could be found in certain astronomical conditions, which were shown by his calculations to have recurred at definite intervals, and were supposed to have produced repeated alternations of cold and warm climate at the opposite hemispheres during the course of the period. It is not my purpose to discuss this or any other theory regarding the cause of the Great Ice Age, but only to direct your attention to the influence of Croll's views upon the work of observation. If the theory could have been sustained, it would have given into the hands of the geologist a first instalment of that absolute measure of geological time which he so

ardently desires ; and with this allurements it is no wonder that the theory was welcomed and hopefully put to the test. Foremost among its exponents was Professor James Geikie ; and we must all recognise that its main importance to the field-geologist arose from his powerful support and masterly arrangement of the evidence favourable to the hypothesis.

It is not surprising that, amid the complicated mass of facts confronting us in the glacial deposits and among the voluminous literature wherein these facts are more or less skilfully enwrapped, there should have been found some material to support the idea of a recurrent succession of glacial and interglacial stages. But the glamour of the astronomical hypothesis has waned, and it is recognised that there are flaws in the physical aspect of the theory and in its geological application that render it untrustworthy. I think, therefore, that the time has come when we should reconsider the matter in critical mood, uninfluenced by the early glow of the theory, after the wise example of that ancient people who debated all matters of import in two opposite frames of mind.

On the present occasion it would be impossible adequately to discuss the whole subject, and I propose to deal principally with my own experience in attempting to apply the Interglacial hypothesis to my field-work. I hope also to be able briefly to review the evidence from other parts of our islands in the light of this experience.

And here I may remind you of the important part which this Section of the British Association has taken in the study of the subject by organising Committees of Research, provided with funds for carrying out excavation and other necessary work. During the twenty-five years since we last met at York I find that, including the work in certain bone-caves, there have been fourteen such committees, and in many cases their operations have extended over several years, so that over thirty separate reports have been published in the Annual Reports of the Association. The precise information embodied in these reports is of high scientific value, and I am sure that these results are very creditable to the Section.

[After stating the 'Classification of the Drifts,' proposed by Prof. J. Geikie on the basis of the Interglacial hypothesis, Mr. Lamplugh dealt with the literature relating to the Interglacial problem in other countries, from which it would appear that there is elsewhere the same diversity of opinion as to the unity or otherwise of the glacial epoch that obtains in this country].

THE INTERGLACIAL PROBLEM IN THE BRITISH ISLANDS.

Let us now consider the application of the Interglacial hypothesis to our own land.

The task of following up the evolution of Prof. Geikie's scheme through its varied phases, though instructive, is very confusing—one might even say irritating—by reason of the continual changes of correlation which its author has suggested in sorting out the British drift deposits into this orderly sequence. Our East Coast boulder-clays, for example, were at one time held to cover four glacial epochs, and their associated gravels to mark three mild interglacial epochs; and all except the first glaciation were supposed to be represented in the boulder-clays of Lancashire and Cheshire. Then, somewhat vaguely, it was allowed that perhaps there were only three separate glaciations on the east coast, with a minor episode of recession of the ice-margin; and the Lancashire and Cheshire boulder-clays were correlated with the two later of these glacial epochs. But subsequently we are reduced in the eastern district to two epochs of glaciation, with one mild interval, of which the equivalents are all recognised also in the north-west of England.

While these and other similar changes may show a laudable desire of their author to keep pace with the growth of definite information, I cannot help feeling that they also show the premature character of the whole scheme, and a flexibility in it that justifies suspicion. Moreover, in spite of these frequent changes in the correlation and this local lopping off of glacial and interglacial episodes, we find, with surprise, that the number of separate epochs in the classification has not diminished, but has actually increased, by regrowth in fresh places. This, again, may betoken the inherent vitality of the scheme, in which case it will gain strength from every readjustment; but it must certainly also denote the weakness of its original basis.

[Mr. Lamplugh then proceeds to discuss the 'First Glacial' and 'First Interglacial' Epochs of the proposed classification, which are supposed to be represented in East Anglia, but not in Yorkshire. He next turns to the Yorkshire Drifts].

EAST YORKSHIRE DRIFTS.

The long cliff-sections between the Humber and the Tees constitute one of the best exposures of lowland drifts in Britain, or even in Europe. They fortunately include some deposits which reveal the conditions prevailing in the neighbouring

part of the North Sea basin just before the great glaciation ; and they therefore enable us without interruption to continue the history begun in East Anglia.

The old cliff of chalk and the marine beach at its foot which lie buried at Sewerby, on the southern side of Flamborough Head, under sheets of boulder-clay and gravel, prove to us that at the very beginning of glacial times the North Sea still held possession of its basin, and with a surprisingly slight difference from its present level. A few far-transported stones in the old beach denote that ice-floes sometimes drifted southward into Holderness Bay ; while the bones of animals in the shingle, and in the blown sand which overlies it, prove that among the denizens of the neighbouring land were the elephant (*E. antiquus*), rhinoceros (*R. leptorhinus*), hippopotamus (*H. amphibius*), and bison. This fauna is frequently considered to be proof of mild conditions of climate ; but from the mode of its occurrence in this and other places, I can find no reason to doubt that these animals inhabited the country, perhaps as seasonal migrants, until the time that it was actually covered by the encroaching ice-sheets.

And here I may note my opinion, that throughout the discussion of our glacial deposits too much weight has been allowed to the deductions regarding climate based upon scanty indications afforded by the ancient fauna and flora. We know little regarding the range of adaptability possessed by the forms in the past, and can judge only from their present habitat, which is generally governed by many other factors besides climate ; moreover, it is granted that species already established when subjected to gradual change, will persist for long under circumstances that would have effectively barred their introduction. In the Upper Zambesi Valley last year I was more impressed with the cold of the nights than with the heat of the days ; and even at that latitude the sturdy hippopotamus in his nocturnal raids must experience a temperature occasionally descending below freezing-point.

It took us long to break away from the established conviction that the fossil elephant and rhinoceros could not have existed in a cold climate ; and the same conviction still lingers with respect to their companion, the hippopotamus. But the far-travelled stones in the Sewerby beach and in the beaches of the same age in the south of Ireland are evidence that the British seas were already cold enough to carry ice-floes while these large mammals still tenanted the land.

The next event indicated by the Sewerby section is a slight elevation of the land. Then the traces of an increasingly rigorous climate become conspicuous, for the sand-dunes which had been banked against the old cliff are covered by chalky rubble containing a few land shells; and this material, like the corresponding 'head' which covers the ancient beaches of the south of Ireland and the south-west of England, appears to represent the frost-splintered rock washed down from the rock slopes during the season of thaw.

According to my reading of the evidence, it was during this time that the bed of the North Sea was gradually filled by a great ice-lobe that spread southward and outward along the basin, slowly but irresistibly churning up and dragging forward the old sea-floor as part of its ground-moraine. When it impinged upon the rising ground of eastern Britain the progress of this sheet was arrested and part of its burden left in the form of the lowest boulder-clay—the 'Basement Clay' of Yorkshire and the 'Cromer Till' of Norfolk. In Yorkshire this boulder-clay frequently includes huge transported masses of Secondary strata, which still maintain their identity, in some cases even to their bedding planes; and along with these we sometimes find patches of the material of the old sea-floor which have similarly escaped destruction. More frequently the pre-existing deposits from which the boulder-clay has been derived have been thoroughly kneaded together, and fragments of Pleistocene shells are then scattered through its mass, along with fossils derived from the Secondary and older rocks.

In adopting the hypothesis that the Basement boulder-clay represents the ground-moraine of an ice-sheet we may consider briefly the probable conditions under which this 'East British ice-lobe' was accumulated. Whether the elevation subsequent to the stage represented by the infra-glacial beaches was sufficient to drain off the shallow seas around our islands is uncertain, but it must, at any rate, have restricted their area and rendered them still shallower; and it is unlikely that there was then any southward connection of the North Sea with the English Channel. The climate by this time had become such that permanent snow-caps could accumulate in the northern parts of our country at elevations not much above present sea-level. Indeed, I am inclined to think that the climate may have been actually colder at this time than during any of the later phases of the Glacial Period, and that the stage of maximum

glaciation lagged considerably behind the stage of minimum temperature. Under these conditions, with the snowfall on the uplands always slowly drawing away in ice-streams to the basins, and there accumulating, it is inevitable that the enclosed basins would eventually become ice-covered, any open water within them being in time obliterated, either directly by the encroaching glaciers, or indirectly by the packing of bergs and floes, until the basins themselves possessed a surface upon which the snowfall could accumulate. Thus the basins became great reservoirs of ice, in which the supplies from the surrounding uplands received important augmentation by direct accretion of snowfall;—reservoirs, moreover, containing a substance sufficiently rigid not to require retaining walls; so that, in time, the surface of the ice within the basins rose higher than many parts of the rim. The general movement of the mass within its reservoir then became dependent mainly upon its own configuration, and only secondarily upon the shape of the solid ground.

These conditions in the North Sea basin had their parallel in the basin of the Irish Sea, in which the 'West British ice-lobe' was developed; and on the low interior plain of Ireland, where the similar though smaller 'Ivernian' sheet held possession.

Now, the crux of the Interglacial problem, so far as the British Islands are concerned, lies in the question whether these huge reservoirs, after their first filling, were completely emptied during the supposed interglacial epoch of warmth named by Professor Geikie the 'Helvetian,' and were afterwards refilled for the later 'Polandian' glaciation, in which, on the evidence of the upper boulder-clays, it is generally agreed that ice-sheets from the basins again closed in upon the land. It is this one interglacial or 'middle glacial' epoch only that most of the British supporters of the hypothesis have demanded, and have attempted to establish in the East Yorkshire sections.

For my own part, although I have sought long and carefully for evidence of this great interglacial episode in the Yorkshire drifts, and at first with the belief that such evidence must surely be somewhere forthcoming, my search has not only failed to bring to light any adequate proof of its reality, but has yielded many facts which I cannot explain otherwise than by recognising that the ice-lobe continued to occupy the basin of the North Sea during the deposition of the beds claimed as interglacial, though its margin had for a time shrunk considerably within its earlier limits.

The 'Purple' Boulder-Clays and Stratified Drifts.—The drifts overlying the Basement Clay in East Yorkshire consist of a complex and very variable series, in which bands of boulder-clay predominate in some places and lenticular sheets of well-stratified materials in others. In the cliff-sections of the Holderness plain certain bands of boulder-clay, known as the Upper and Lower Purple Clays, are persistent for many miles; but when the series approaches the rising ground of the Wolds the individuality of the beds is lost, and they are often replaced entirely by irregular mounds of sand and gravel.

I began work on these sections with the then-prevalent idea that every separate band of boulder-clay above the Basement Clay might indicate a separate glacial epoch, and that warm interglacial epochs might be represented by the partings of sand and gravel between these boulder-clays; and the object of one of my early papers was to show that more of these divisions were present than had found place in the scheme of classification then in vogue. But after struggling for a time under an ever-increasing load of epochs I was compelled, in tracing the separate bands northwards, to recognise, as my friend Mr. J. R. Dakyns had previously recognised, that the whole series underwent protean changes, the boulder-clays sometimes splitting into numerous shreds amid thick sheets of sand and gravel, at other times merging into a single mass to the exclusion of all stratified material, and not rarely presenting a passage from uncomprising 'till' to stratified gravel, sand and clay. Hence I was driven to conclude that stratified and unstratified drift must often have been forming simultaneously at places very little distance apart; and on finding, also, that the whole of the deposits between the Basement Clay and the Upper or 'Hessle' Clay were not only knit together in this fashion, but were similarly interwoven with the top and bottom of these boulder-clays, I had finally to abandon the Interglacial hypothesis altogether so far as the coast-sections were concerned. I mention this experience in order to show that my present scepticism respecting the Helvetian Interglacial Epoch is based, not upon any preconceived objection to the idea, but upon the failure of the hypothesis when I have put it to the test in this and other districts; and I find also that my experience in this particular runs parallel with that of many other investigators of the so-called 'middle glacial' deposits of England.

Marine Detritus in Glacial Gravels.—From certain characters of the moundy gravels on Flamborough Head and in

Holderness, such as their rudely linear arrangement, their indifference to the contours, and their relation to the middle or Purple boulder-clays, it appears most probable that they represent the material deposited along the margin of the ice-sheet by the surface-waters flowing from it and from the adjacent land. From the occurrence of more or less fragmentary marine shells in them, the gravels were, however, originally supposed to be of marine origin, and this view is still upheld by some geologists. It is the same question in which so many of the so-called 'middle glacial' sands and gravels of the British Islands are involved, and upon which there has been so much discussion. If it be permissible for me to reiterate the well-known argument by which the presence of marine shells in gravels of glacial origin is explained, it may be outlined as follows.

Since the basins around our islands are known to have been occupied by the sea at the beginning of the Glacial Period, and since these basins were afterwards filled by ice-lobes, which, as we have seen, moved outward in many places upon the land, dragging with them much of the material of the old sea-floor, it is inevitable that a certain amount of marine detritus will occur in the deposits formed by the ice or derived from its melting. Just as we find shells, and sometimes even transported masses of marine deposits, intact in the Basement Clay, so we find marine relics likewise, though unusually more scattered and less perfect, in the gravels derived from the same ice-sheet. This deduction is consistent with our knowledge of existing glaciers and ice-sheets; thus, Sir Archibald Geikie has recorded the presence of sea-shells in the moraine of a Norwegian glacier;* Professors E. J. Garwood and J. W. Gregory have found an excellent illustration of the same phenomenon in one of the Spitzbergen glaciers; † and Professor R. D. Salisbury, in describing the characteristic upturning of the layers of ice at the end of one of the glacial lobes which descends into a shallow bay in North Greenland, gives the following instructive note on the conditions which he observed: 'Here the upturning of the layers brought up *shells from the bottom of the bay*, and left them in marginal belts where the upturned layers outcropped. These shells were mingled with

* *Geological Sketches at Home and Abroad* (London, 1882), pp. 145-6.

† 'Contributions to the Glacial Geology of Spitzbergen.' *Quart. Journ. Geol. Soc.*, vol. liv. (1898), p. 210.

other sorts of débris. In one case their quantity could have been measured by some such unit as the wagon-load.*

In our islands, as Professor P. F. Kendall has clearly shown in discussing the drifts of Western England,† it is only where the ice-lobes have passed over portions of the pre-existing sea-floors that we find marine remains in the drift deposits; while in other places, at the same or lower elevations, where there is proof that the ice-flow was from the land, such remains are invariably absent.

The occurrence of these shells in a few places at high elevations, all explicable by consideration of the geographical circumstances, gave rise to the idea of a great mid-glacial submergence, and upon this idea the hypothesis of a mild interglacial epoch has mainly hinged. In Professor Geikie's latest scheme this supposed submergence is, indeed, reduced to moderate limits, but it is still the essential factor in the argument.

The same idea of a moderate degree of submergence, accompanied by temperate conditions of climate has been applied by Mr. Clement Reid ‡ to the shelly gravels of Holderness. Mr. Reid has also proposed to include the buried cliff-beds of Sewerby in the same interglacial stage; but as the gravels rise to nearly 100 feet above the level of the old beach in northern Holderness, and are separated from it by the Basement boulder-clay, I am sure that this correlation cannot be sustained.

These Holderness gravels are supposed to be absent from the coast sections, and it is suggested that they may lie below sea-level in this quarter; but this is not very probable, as they are found at an elevation of 50 feet within a few miles of the coast in southern Holderness, and the Basement boulder-clay rises well above sea-level in the cliffs at Dimlington. It is true that the gravels of the coast sections afford no support to the idea of a mild interglacial submergence, and are evidently of similar origin with the rest of the glacial deposits, but I can see no other reason against their correlation with the gravels of the neighbouring interior. Except in two or three limited tracts, the shells in the Holderness gravels are as fragmentary, and nearly as scanty, as in the moundy gravels of Flamborough

* 'Glacial Geology of New Jersey.' *Rep. Geol. Survey of New Jersey*, vol. v. (1902), p. 81. (The quoted italics are in the original.)

† In the late Professor H. Carvill Lewis's *Glacial Geology of Great Britain and Ireland* (London, 1894), Appendix A, pp. 425-431.

‡ 'The Geology of Holderness.' *Mem. Geol. Survey* (1885).

Head, which from their character and position cannot be of marine origin. Even at the exceptional places referred to, where the fossils are more plentiful, there is a mixture of forms, including an abundance of the freshwater shell *Corbicula fluminalis*, which seems to denote their derivation from pre-existing local deposits; and in the new section at Burstwick, described by Mr. T. Sheppard,* these shelly gravels revealed the same close association with the boulder-clay that is so frequently displayed in the glacial gravels of the coast sections.

The Kirmington Section.—There is, however, one case known to me in the east of England, and only one, in which an undoubtedly contemporaneous fauna occurs in beds intercalated with the boulder-clay series.† At Kirmington, in North Lincolnshire, a brickyard is worked in a deposit of estuarine clay lying in the middle of a broad shallow valley which cuts across the Chalk Wolds about eight miles south of the Humber. Recent investigation by a Research Committee of the Association, in which I took an active share, has shown, somewhat unexpectedly, that the surface of the chalk at this place descends to present sea-level, and that the estuarine warp is underlain by over 60 feet of drift, consisting of sand and chalky gravel, with two thick bands of tough clay containing far-travelled stones.‡ The boring in which these beds were proved was insufficient to show precisely whether the stony clays possessed the distinguishing features of true till, but there can be no doubt as to their glacial character, since we know of no deposits of this kind in the east of England except those of glacial age. At the base of the estuarine warp, at 65 feet above Ordnance datum, we found a thin seam of silt and peat containing a few freshwater shells and plant remains, which, like the very scanty fauna of the overlying warp, give no precise indication of climatal conditions, though suggesting that the climate was cooler than at present. The estuarine bed is overlain by a coarse gravel of rolled flints, and in one part of the section this gravel is covered by 3 or 4 feet of red clay with far-travelled stones, resembling

* ‘On another Section in the so-called Interglacial Gravels of Holderness.’ *Proc. Yorks. Geol. and Polytech. Soc.*, vol. xiii. (1895), pp. 1-14.

† The freshwater deposit which I found some years ago at Bridlington, and at first thought to be probably intercalated with the boulder-clay, proved on fuller exposure to lie above the boulder-clay, with which it had become entangled by later disturbance. See *Geol. Mag.*, dec. ii., vol. vi. (1879), p. 393; and *Proc. Yorks. Geol. and Polytech. Soc.*, vol. vii. (1881), p. 389.

‡ *Rep. British Assoc.* for 1904, pp. 272-4.

the Upper boulder-clay or Hessle Clay of Holderness. The character and fauna of the warp show that it must have been laid down between tide-marks, and we therefore gain an exact measure of the sea-level at the time of its accumulation, and also, I think, of the highest limit of marine submergence in this part of England during any stage of the Glacial Period.

The position of the deposit, at the fringe of the great sheet of drift which covers the lowland east of the Wolds and on the edge of an area west of the Wolds which appears to have escaped glaciation, sustains me in the opinion that it was accumulated during that temporary recession of the East British ice-lobe of which we have other evidence. Its proposed correlation with the Holderness gravels seems hardly tenable in the light of the fuller information which we now possess regarding the section. That the East-British ice-lobe, during one of its phases, had the sea at its margin, has always appeared to me to be probable,* and, I think, supplies an adequate explanation of the facts.

Under this interpretation the complex drifts between the Basement Clay and the Hessle Clay are regarded as the marginal products of the ice-lobe which filled the North Sea Basin during a stage when its western border began to lose ground by rapid wasting. By this recession a broad hollow was left between the hills and the ice-sheet, and into this hollow were swept the abundant washings from the glacier on the one side and from the bare land on the other, thus forming the irregular mounds and broad fans of stratified material which run parallel with the receding ice-border. The sea at this time encircled the southern end of the ice-lobe, but its waters were restricted, in the area under consideration, to narrow estuarine inlets between the ice and the land.

The Upper Boulder Clay.—Concurrently with this shrinkage of the East British ice-lobe there appears to have been a steady increase in the ice-caps which covered the broader upland tracks of the northern English counties. But all the evidence tends to show that the tongues descending eastward from these caps, from the time of the Basement Clay onward to the close of the glaciation, were persistently prevented from passing freely outward by the presence of the main lobe in the North Sea Basin. Upon the shrinkage of the main lobe they were deflected

* 'Drifts of Flamborough Head.' *Quart. Journ. Geol. Soc.*, vol. xlvii. (1891), p. 421.

southward along the hollow between it and the hilly land, which, in time, they filled again to a somewhat higher level than before, the inoculation of the upper and lower Purple boulder-clays with the stratified drifts marking the gradual stages in this process. The magnificent cliff-sections of the Yorkshire coast north of Flamborough reveal the continuous character of this glaciation, and there is no room anywhere to wedge an interglacial period into these sections. South of Flamborough, the interval between the withdrawal of the one mass and the advance of the other was longer, because the passage of the new invader to the eastward of the Oolitic hills was only gradually effected; and consequently it is in the interior of the Holderness recess that we find the greatest development of the stratified drifts. To imagine, with the interglacialists, that the North Sea Basin was emptied of its ice-sheet, and was then filled again just far enough to influence the flow of the local ice, without extraneous re-invasion of our coast, seems to me an unwarranted sacrifice of the evidence to the idea.

(To be continued.)



It is gratifying to find that a recent issue of 'Progressing Advertising and Outdoor Publicity' cordially agrees with the recent action of Yorkshire Naturalists in regard to the advertisements on Flamborough Head. The paper quotes in full the letter written to the press by the Hon. Secretary of the Yorkshire Union, and adds: 'The members of the Yorkshire Naturalists' Union are naturally indignant at the action of certain firms in turning the rugged cliffs of Flamborough Head into advertising stations. It will be remembered that when an American firm "collared" the White Cliffs of Old England at Dover to advertise a breakfast food, such an outcry was raised that the bold, bad advertiser was compelled to remove the ad. We hope that the result will be the same at Flamborough. *The legitimate bill-poster is as averse to despoiling scenery as anyone.*'

According to the *Yorkshire Post* of August 7th, the scientific resurrectionists had a field-day in Section H, where the anthropologists gathered in great force to hear Miss Nina Layard and Mr. T. Sheppard describe the contents of pre-historic graves that have been opened in Ipswich and in South Cave. The family vaults of these Anglo-Saxons have been ruthlessly rifled of brooches, bracelets, buckles, and pins of great interest and, in some cases, of singular beauty. Happily, the period is too far distant to provoke the retaliation of outraged descendants. The Hull curator was mightily proud of having discovered a number of vases which the ubiquitous Canon Greenwell and Mr. J. R. Mortimer had missed. An exhibition of Roman and other remains found in North Lincolnshire whetted the curiosity of several well-known archæologists. Such a find is extraordinary at this time of day, and Mr. Sheppard quietly informed his audience that he did not think it 'necessary' to state the precise locality. He was commended by Professor W. Ridgeway for his wholesale reticence, 'especially,' he slyly added, 'with Sir John Evans on the platform.' As the revelation was not made, a stampede of enthusiastic archæologists was avoided.

LEAD MINING IN YORKSHIRE.*

JAMES BACKHOUSE.

THE general subject of lead mining in the North of England has been somewhat exhaustively dealt with, both mineralogically and geologically, by various writers, but hitherto the historical side of the question for any given county has not been systematically treated.

In 1863 the late Mr. Thomas Sopwith, F.R.S., read an admirable paper before the British Association on the local manufacture of lead, copper, zinc, antimony, etc. Tracing, as he did, the general history of the mining of those metals in the various districts, especially of the North of England, it was obviously impossible to particularise on any one metal, but as a general epitome the article was absolutely reliable.

In 1848 a paper was read before the Yorkshire Philosophical Society, and published in their Transactions, entitled 'Thoughts on Ancient Metallurgy and Mining in Brigantia and other parts of Britain,' which gives an excellent summary of our knowledge of early mining in the country, but does not attempt to define any special area or set of mines. More recently Mr. Stephen Eddy has written upon the 'Lead Mining Districts of Yorkshire,' mostly from a geological standpoint, but where statistics are given they are of much value.

For many years Yorkshire held a most important place as a lead-producing district, and it is probable that during the palmy days of the industry at least 3000 persons were employed, directly or indirectly, in lead mining in the county. To-day there are probably not more than 25 all told!

It is clearly proved that lead has been mined for many centuries in Yorkshire, not only in Roman, but in Brigantean times. Pigs of lead can be shown, found in Yorkshire, bearing the Roman impress. In the 'baile,' or 'bole-hills,' and in one or two drifts and shafts, we probably have evidence of Brigantean working; some of it possibly dating back earlier than the Roman invasion.

In many districts tradition points to Roman mining, but evidence is not forthcoming to show whether these conquerors

* Epitome of a paper read to Section F of the Meeting of the British Association, York.

actually mined it themselves or whether they begged, borrowed, or stole it from the subjugated tribes.

From those times, however, through what we may call the early documentary period, lead was mined more or less systematically in Yorkshire, often in large quantities, and there can be no doubt also to large profit.

But we have to deal especially with the lead mining of the nineteenth century, and to consider briefly to what extent the industry has been carried on in recent times.

The actual area in which lead has been mined in Yorkshire may be taken as about one-sixth of the entire county, and is situated in the North and West Ridings, in the mountainous regions towards the head waters of rivers—the Tees (where it divides Yorks. from Durham and Westmorland), the Yorks. Lune, the Swale and its great tributary Arkle Beck, the Ure, the Nidd, the Wharfe, the Aire, and the Ribble. Taking these districts *seriatim*, commencing in the north, we find that the Tees area contained some thirteen or fourteen distinct mines, none worked since about 1870. Lunedale had about half a dozen, one of which, that known as Lunehead, was extensive, and has been reopened recently. For the next two areas—those of Arkengarthdale and Swaledale—it is impossible at the moment to register any definite number, but they may be said to have run into the hundreds at one time or another.

Two especially, Hurst Mine in Arkengarthdale, and that at Old Gang, in Swaledale, were notorious for centuries, and the output from them was enormous.

From the latter mine it is said that at one time, about the middle of the nineteenth century, some 3000 tons per annum were produced. At Hurst the Romans are said to have had a penal settlement, and lead was probably mined there, not only by them, but who shall say how long before? Now Hurst is grim and desolate like the 'Deserted Village,' though the hills still cover thousands of tons of rich ore, which twentieth-century enterprise may yet acquire. Old Gang, in Swaledale, is still kept going, but is gradually becoming worked out, though there can be little doubt that many other veins in its proximity may be worked to profit at to-day's selling price if facilities for carriage were provided.

In Wensleydale, over the ridge southward, we find at least forty distinct mines, and some of these were very remunerative, notably that of Keld Heads, near Wensley. Flooding of the

mine at a time when the market price was very low was the cause of closure.

This mine, along with several others, was closed down during the last decade of the century. Continuing southward, in Nidderdale about thirty separate mines have been wrought, those on Greenhow Hill being once among the oldest and most productive in the North of England; Cockhill Level (Greenhow) branched into many miles of levels, from which a great weight of lead was taken; yet the supply is by no means exhausted, for the Bradford Corporation, when recently making their pipe track across Greenhow Moor, cut a very large vein of ore. Mr. Joseph Craddock, J.P., of Stockton-on-Tees, still works at Lolly Scar and Blayshaw Gill Mines in this area.

Wharfedale contributed enormously in the middle of last century from some twelve or fifteen mines, of which Grassington Moor Mine was by far the most important. They were closed some thirty years ago.

Of Airedale but little need be written, for, with the exception of the great Cononley Mine, there were only a few lesser trials.

In the last area, that of Ribblesdale, three mines were worked, namely, at Rimington (Skelhorn), and three in the Bolland district near Slaidburn.

Skelhorn Mine was worked centuries ago, and was rich in silver, like many of the Yorkshire Mines.

So far as can be ascertained, there are possibilities for future enterprise in nearly all the areas mentioned, but Prospectors will do well to observe the causes which led to the close of the various workings before. Briefly they are as follows:—

(a) The continued low price of lead, largely influenced by Spanish importation.

(b) The system of the remuneration of the miners themselves having been changed from the 'bing system' to the 'fathom system.'

(c) The spirit of mine speculation in the worst sense of the term, whereby the mines were bought up and floated for the sake of immediate gains from their flotation.

(d) The fact that landlords in many districts purposely put difficulties in the way of miners on account of the value of their lands for grouse-rearing, and because of the pollution of their rivers owing to the lead-washing.

THE ORIGIN OF THE BRITISH TRIAS.*

Professor T. G. BONNEY, ScD., LL.D., F.R.S.

THE three sub-divisions of the Bunter, whether east or west of the Pennine Range, apparently unite to the south of it, and thin out as they approach the southern parts of Warwickshire, Staffordshire, and Leicestershire. Their equivalents are fairly well developed in Devonshire, but apparently thin out in a similar wedge-like manner towards the north and north-east, not reaching the Bristol Channel. The upper and lower members in the northern area are sandstones, generally red, often conspicuously current-bedded, but without pebbles, the grains being frequently wind-worn. The pebble-bed between them reaches a thickness of 1000 feet near Liverpool—where, however, sand dominates over pebbles—is about 300 feet thick in Central Staffordshire, and rather overlaps the Lower Bunter sand. The writer describes the lithological characters of the pebbles, and discusses the reasons for and against deriving them either from a southern or south-western source, like those in the Devon area, or from any region, either exposed or buried, in their more immediate neighbourhood, maintaining a northern origin to be more probable. The Keuper group, both sandstones and marls, extends without interruption (except for the sea) from Devonshire to Yorkshire on the one hand, and to Antrim on the other.

The author considers the Bunter to be fluvial rather than lacustrine deposits, chiefly formed by large rivers. Two of these flowed from a mountain region, of which Scotland and the extreme north of Ireland are fragments, and a third from a similar region to the south-west of Britain. Deposits comparable with the Bunter, and especially the pebble-bed, may be found on the border of the Alps, and those rivers probably traversed (at any rate early and late in the Bunter epoch) arid lowlands, from which, if not absorbed, they may have escaped by some channel now buried under south-eastern England. The Keuper sandstones, as he shows, indicate the setting in of inland sea-conditions, the Red Marls being generally regarded as deposited in a great salt lake. These, like the clays of the Jurassic system were probably derived from the mountain ranges which had previously supplied sand and pebbles.

In fact, the physical and climatal conditions of the Trias—

* Abstract of a paper read to Section C of the Meeting of the British Association, York.

and the same perhaps may also be said of the Permian—were probably to some extent comparable with those existing in certain of the more central parts of Asia, such as Persia or Turkestan.

A RECENTLY DISCOVERED SKELETON IN SCOSKA CAVE, LITTONDALE.*

HAROLD BRODRICK, M.A., and C. A. HILL, M.B., B.A.

SCOSKA CAVE is situated about a mile beyond the village of Arncliffe and at a height of 230 feet above the river Skirfare. The opening of the cave is about 7 feet high and 15 feet wide. At a distance of 250 feet from the entrance the cave branches, the right branch being more than 400 yards in length. The left branch (which contains a small stream) is entered by creeping under a ledge 18 inches high; the roof soon rises to a height of 4 feet, and continues at this level for 400 feet; at this point the roof lowers, and a few yards beyond many bones in a good state of preservation have been found. All the bones belong to one person, and were for the most part almost entirely buried in stalagmite; they were scattered along the floor of the cave over a distance of about 20 feet. The skull is that of a female Celt, being of the brachycephalic type. All the teeth are present, with the exception of the two back molars, which evidently fell out subsequently to death. The teeth show signs of considerable attrition, being worn flat with the loss of the enamel in the molars; this has evidently been caused by eating corn ground between gritstones, the grit being left in the flour. Just above the right mastoid process is a small, irregularly shaped hole, which has penetrated the inner table of the skull and has evidently been the cause of death. The blow would not prove instantly fatal, so that the woman had probably crawled up the cave to die, the position in which the bones were found precluding the idea of burial. Detailed measurements of the skull, &c., were given.†

* A paper read to Section H of the Meeting of the British Association, York.

† With regard to this 'find,' it should be pointed out that whilst it is within the bounds of possibility that this skeleton is that of a female Celt, there is no proof of its age, and it seems even probable that the skeleton is of much more recent date than the authors consider. The measurements of the skull, given when the paper was read, are no criterion, and in the absence of any associated relics, our best archæologists would hesitate to date the remains.—ED.

FAULTS AS A PREDISPOSING CAUSE FOR THE EXISTENCE OF POT-HOLES ON INGLEBOROUGH.*

HAROLD BRODRICK, M.A.

INGLEBOROUGH HILL consists of a large plateau of Carboniferous limestone about 500 feet in thickness and capped by a cone of Yoredale rocks with a summit of Millstone Grit. On this plateau there are a large number of pot-holes or vertical shafts in the limestone: there are upwards of thirty of these at present known to exist, and it is probable that there are many more still covered with the deposit of glacial drift. Within the last few years many facts have come to light which prove that many, if not all, of the deeper pot-holes owe their existence to faults. Rift Pot, a pot-hole on the south-east side of the hill, was recently explored and found to extend to a depth of over 300 feet: the first portion consists of a vertical shaft 114 feet deep, the lower portion of which consists of a chamber 130 feet long and 25 feet broad; from the south end of this the pot descends for a distance of about 200 feet with a series of platforms of jambed stones wedged between the walls of a vertical fissure, finally ending in a short passage which, at the end, is waterlogged. The pot-hole at the surface takes the form of a fissure 60 feet long and from one to seven feet wide. At the northern end of this fissure, within a few feet of the moor level, the east wall is slickensided, and in the main chamber at the foot of the first shaft, the east wall is also slickensided over an area 50 feet in length and at least 20 feet in height. At the surface the slickensides occur along successive master joints, while those in the main chamber occur along another master joint at a horizontal distance of about 15 feet. These slickensides are horizontal, showing that the fault was one of horizontal displacement, and as a careful examination shows that the beds of limestone on either side of the upper part of the pot correspond, it is clear that no vertical movement accompanied the faulting. The slickensides near the surface are coated with clear crystals of calcite which, when removed, leave the slickensides clearly marked.

Only one fault is marked on the maps of the Geological Survey: this is a fault which runs from near Horton to God's

* A paper read to Section C of the Meeting of the British Association, York.

Bridge, in Chapel-le-Dale. Along the line of this fault are several pot-holes, all of which have their longer axes in the direction of the fault. Sulber Pot, which is about 59 feet deep, and Nick Pot, which receives an inflowing stream, and has recently been explored to a depth of about 80 feet, exhibit no direct evidences of faulting; but Mere Gill, on the other hand, does. Mere Gill consists of a fissure about 80 yards long, which is bridged in three places by rock. As a rule this fissure is filled with water to within 30 feet of the surface; in times of normal rainfall the water escapes through a tunnel below the water level which leads in a southerly direction (away from the valley); it then makes two vertical descents of 80 feet each and turns northwards to emerge in the valley near God's Bridge in the direct line of the fault. On the limestone, which is usually covered by the stream falling into the pot, are crystals of calcite. These are very much water-worn, but clearly indicate the existence of a fault.

Gaping Gill consists of a vertical shaft, 365 feet deep, into which the waters of Fell Beck fall. At a depth of about 190 feet is a ledge some 12 feet wide: at this point a fault is very clearly to be seen; the fault has a downthrow of six feet to the south. The shape of practically all the pot-holes is a further indication that they have been formed as a result of faults: they are all much longer than they are wide and thin out at each end into a narrow crack. It is also a noticeable fact that they occur in groups and in such positions that it would have been impossible for a stream to form more than one out of several.



It is a matter of congratulation to the Yorkshire Naturalists to find that the only 'natural history' paper recommended by the British Association to be printed in *extenso* in its report, is that by Mr. G. T. Porritt, F.L.S., F.E.S., entitled 'Melanism in Lepidoptera,' of which we give a lengthy notice in another column.

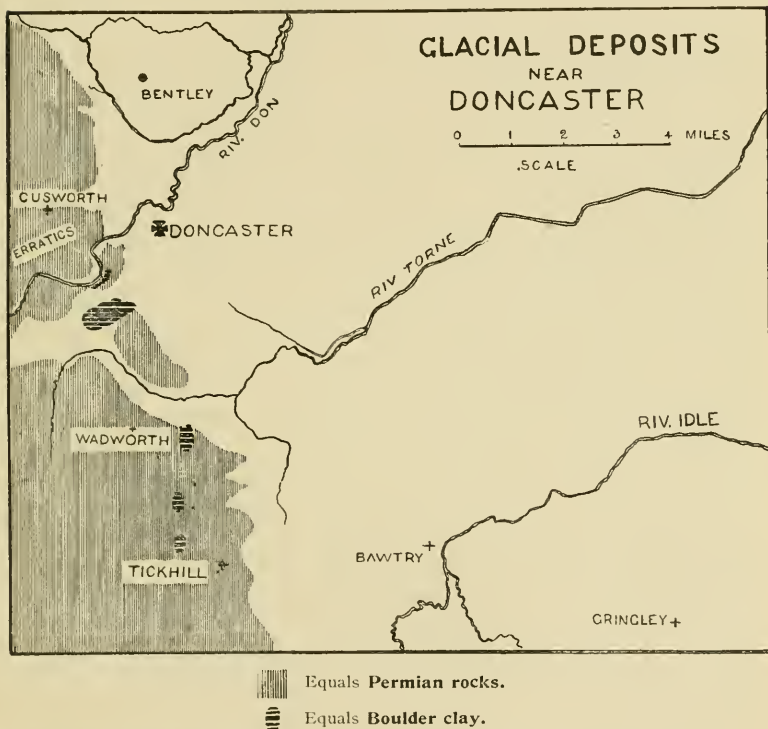
Eleven 'gravel catchers' were recently found at the Hull Police Court for removing gravel and sand from the beach at Hornsea. In the evidence it was stated that the gravel 'produced 2d. per ton, and it had been estimated that some landowners had made as much as £1000 a year out of it.' Strangely enough, if the men had gone a little further north, to Atwick, they could have taken as much gravel as they liked without let or hindrance.

There has been deposited at Barnard Castle a draft Scheme for enlarging the powers of the trustees of the Bowes Museum, by enabling them to purchase objects of artistic, scientific, antiquarian, or local interest. The scheme has been formulated by the Charity Commissioners, and has been formally approved by the Urban District Council. No objection has been entered against the proposals contained in the draft, and it is announced that one of the first purchases under the extended powers, will be the valuable collection of preserved birds and animals left by the late Mr. Robert Carter, taxidermist, of Barnard Castle.

RECENT EXPOSURES OF GLACIAL DRIFT AT DONCASTER AND TICKHILL.*

H. CULPIN AND G. GRACE, B.Sc.

THE Doncaster district has long been noted for a remarkable deposit of stiff boulder-clay which covers about 125 acres south of the river Don, one-and-a-half miles south-west of Doncaster. Two miles to the north-west, near Cusworth Park, on the north side of the Don, numerous Lake District and Carboniferous



erratics are scattered on the surface of the fields, but there is no exposure of clay. The distribution of the Balby clay and the Cusworth erratics is roughly fan-shaped, the Don gorge forming the handle of the fan.

In the sinking of the Bentley pit, two miles north of Doncaster, boulder-clay has recently been passed through at a depth of 55 to 75 feet below O.D. This clay lies on Bunter

* Paper read to Section C at a Meeting of the British Association, York.

sand, and is covered by 80 feet of alluvial clays, sands, and gravels. The boulders contained in it are principally of Permian Limestone. There are a few Carboniferous grits and ganisters, and some finely scratched Carboniferous close-grained, and also encrinital, limestones. Several specimens have been found of Coal Measure shale with *Anthracomya Phillipsi*. Shales with this characteristic Upper Coal Measure fossil are also found in the Balby clay. The beds from which these shales may have been derived are not known to occur in Yorkshire further north than the Don valley. The presence of this fossil in the Balby and Bentley clays lends support to Mr. W. Lower Carter's suggestion that ice passed west of the Permian escarpment, and then entered the lower levels by way of the Don gorge.

In a distance of two miles between Wadworth and Tickhill, the South Yorkshire Joint Railway is making four cuttings through boulder clay. The most southern of these is at All Hallows Hill, which is near Tickhill, and a little over six miles south of Doncaster. Where the base of the clay is seen it rests on Upper Permian or Triassic sands and marls. In the intersecting valleys the fossiliferous top beds of the Upper Permian Limestone reach the surface. In its deepest part the clay is more than 20 feet thick, the base not being exposed. In the first three cuttings it is not as tough as at Balby, but at All Hallows Hill it is so stiff that the railway contractor is using explosives for the purpose of excavating it. The boulders are mainly of Permian Limestone, and range up to 12 cubic feet in size. There are Carboniferous limestones up to two feet cube, some of them being highly fossiliferous. In addition to encrinital blocks there are large pieces containing *Productus Cora*, *P. scabriculo-costatus*, *P. longispinus*, and *Aviculopecten*. There are also Carboniferous grits and ganisters, and a few Lake District boulders. The stones are sub-angular, and are well scratched. No traces of the Coal Measure shell beds, such as are seen at Balby and Bentley, have been found in these deposits.

Like the Balby clay the Wadworth and Tickhill deposits are closely packed on the low western rim of the southern extension of the Vale of York. The positions they occupy on the gentle slopes of the hills have shielded them from denudation, and it is more than probable that they are the relics of a widely extended moraine. The plain which lies below them to the east stretches beyond the Trent, and except where broken by the low escarpments of the Bunter and the Keuper, is for the most part below the 25 feet contour. It is bounded on the south by the range

of hills running from Tickhill through Bawtry to the Trent near Gainsboro'; and on this range a similar assemblage of Permian and Carboniferous boulders is found at Gringley-on-the-Hill, which is ten miles east of Tickhill, and, like Tickhill, about forty miles south of York.

COAST-EROSION.*

CLEMENT REID, F.R.S.

THE erosion of our coast must be studied in conjunction with the deposition of the material eroded. When examined in this way we find in England that it has not been a continuous process, varying when short periods are studied, but averaging the same from century to century. Instead of this regular process, the rapid accumulation in certain places teaches us that coast-erosion, as we now see it, began at a definite date, before which conditions were entirely different. If this were not so, the area of the new lands, accumulations of shingle, and of sand-dunes would be much greater. It does not seem practicable to obtain exact measures, but the rates of accumulation of various recent deposits, and of the silting-up of our harbours, suggest that the cliff-erosion only began 3000 or 4000 years ago, or about the date when our harbours were already in use and Stonehenge was being raised.

In order to understand the nature of the changes that are now going on, it is necessary to look back to the Neolithic period to see what the country was then like, otherwise the existing irregularities of our coast-line will be quite unintelligible. It is not needful to go back further, but we must picture the country as it looked when the sea stood 60 feet lower.

A close study of the buried land surfaces, or 'submerged forests,' found in the alluvium of all our estuaries at various levels down to about 50 feet below the present sea level, shows that oak trees flourished on the lowest of these ancient soils. This proves that the sea then stood so far below its present level that the highest tides could not reach the roots of the trees. These old land-surfaces seem all to be of Neolithic date. During this period the seaward end of all our valleys was deepened till the channel reached about 60 feet below its present

* Abstract of a paper read to Section E of the Meeting of the British Association, York.

level. The south and east coasts of England were utterly unlike what we now see. Instead of bold cliffs there was a wide coastal plain, like that which still extends for many miles west of Brighton, separating the rising Downs from the coast. This plain extended out approximately to the existing 10-fathom line.

About 4000 years ago there set in a fairly rapid but intermittent subsidence of the land, or rise of the sea. This subsidence flooded a great part of the coastal plain, brought the waves within striking distance of the rising land behind, and submerged the lower part of all our valleys.

The process seems to have been more rapid and jerky than any change which has been recorded of late years, for the deposits in all our big estuaries tell the same tale. We find rapidly deposited marine silt alternating with thin beds of peat or soils with trees. But the vegetation is usually nothing but brushwood or quick-growing trees, and the peat also is of rapid growth. Only at the very bottom of these deposits, far below the present sea-level, are oaks of more than 100 years to be seen.

The rise of the sea-level may have been completed about 3500 years ago. Whatever may be its exact date, the completion of the rise is the starting-point of our present inquiry. Only then commenced the coast-erosion which we now see; only then did our existing shingle-beaches and sand-dunes begin to form.

At first erosion was rapid, for the sea was merely eating into loose talus or into cliffs of little height; and protective banks of shingle and sand take time to accumulate. As the land is cut into, the cliff becomes higher and shingle-beaches and sand-dunes form, all tending to make the width of the strip destroyed annually less and less.

Of the land thus destroyed, part is washed into deep water and lost, but much of the coarser material is rolled into shingle-beaches, or forms sand-banks and dunes. These form our best protection against further inroads. If the coast-erosion is stopped, shingle-beach and sand-bank will themselves wear out and disappear, and valuable lowlands behind may be spoilt by the sea.

Another compensation for the loss on the coast will be found in the great gain of alluvial land in the sheltered estuaries; but against this must be set the rapid silting-up of our harbours, even of those into which no streams flow.

Before we take for granted the desirability of attempting to stop the erosion of our coasts (except near towns) we must strike a balance between loss and gain. If the loss exceeds the gain there will still remain the question, Shall we obtain any sufficient compensation for the enormous cost of any works put up to protect agricultural land?

Some curious problems are suggested by this inquiry. Many may think them of no practical importance, but to the geographer and geologist they are of great interest. If what is said above is correct, and since civilised man has lived in Britain there has been a rapid change of sea-level followed by a long rest—what are the prospects of a similar period of rapid change again setting in? A new rise or fall to the extent of a few feet would have most disastrous effects on all our coasts and harbours, and would also seriously affect our inland drainage until things were adjusted to the new conditions.

Quarterly Record of Additions, No. xvi.; Hull Whaling Relics, and Arctic or Historical Records of 250 years; Catalogue of Antique Silver on Exhibition. Being Hull Museum Publications, Nos. 30, 31, and 32.

These publications worthily maintain the high standard set by their predecessors, and will prove of permanent value altogether apart from the objects of interest of which they treat. The catalogue of antique silver, lent for exhibition, appropriately printed on superior paper, contains very full particulars of a most interesting and very valuable collection. Although the information given of the several articles is far from meagre, there are some that do not altogether satisfy our curiosity. In particular, the vicissitudes of a fine sixteenth century chalice and paten would make interesting reading could they be traced in all their fulness. Although locally valuable, in that many of the articles are of Hull manufacture, the antiquary, the artist, and the collector alike will view these exhibits with delight. Almost the same may be said for the other two publications in which Messrs. Sheppard and Suddaby have figured and described a large collection of relics and records connected with the Hull whaling industry. Although the museum already possessed many articles illustrating this industry, the recent gift by Lord Nuaburnholme of a most extensive collection of these objects has increased the collection to such an extent, both in quantity and value, as to make the exhibit all but complete, and merit an entire room for its disposal. It is difficult to speak in terms sufficiently high to express one's gratitude for the manner in which the accumulated matter has been arranged and presented to the public. We could almost wish that an edition of these two numbers had been printed on the same superior paper as the catalogue first referred to. We feel sure there are many who will appreciate the permanent value and significance of the many records and statistics they contain, and would be only too pleased to pay the enhanced price which such an edition would involve. Work of this kind is rarely done twice, and we throw out the suggestion while its accomplishment is possible.*—E. G. B.

* The information contained in the two pamphlets referred to is being incorporated in 'A History of the Hull Whaling Industry' by the same authors. This will be on 'superior paper,' and, as the reviewer anticipates, will be more than a penny.—ED.

NOTES ON THE SPEETON AMMONITES.*

C. G. DANFORD.

A RESIDENCE of several years in the neighbourhood of Speeton has enabled the author to collect many fossils from the clays and shales underlying the Chalk. With regard to the *Ammonitida*, his results confirm the general succession given by Pavlow and Lamplugh, and add some further information.

The lowest portion of the Kimeridge clay which the author has been able to examine in exposures on the shore contains numbers of ill-preserved ammonites of the square-backed *Hoplites* group; while the higher part contains forms of a different type, belonging to the round-backed *Perisphinctes* and allied genera.

In the lower part of the zone of *Belemnites lateralis* ammonites are extremely rare, and the author has no fresh information to offer; but in the upper part they become plentiful. The very globose forms of *Olcostephanus* (*Olc. gravesiformis*, *keserlingi*, etc.) occur mainly in the bed D 3 of Mr. Lamplugh's classification, but are usually in bad preservation. The overlying bed, D 2, is perhaps the most interesting of the whole series; at its base both the *Olcostephani* and the *Hoplites* are very numerous, the former being often in the condition of imperfect phosphatic casts. Above this band the round-backed ammonites entirely disappear, though *Belemnites lateralis* continue to be fairly abundant up to D 1.

It therefore appears that the southern *Hoplites* obtained full possession of the area earlier than their associated southern *belemnites* of the *jaculum* type, although rare examples of these *belemnites* occur in the clays below D 2.

The lower part of the zone of *Belemnites jaculum*, besides yielding many *Hoplites*, contains occasional ammonites pertaining to the genera *Holcodiscus* and *Astieria* (of the *Olcostephani*), and also to other genera. The higher beds are occupied by *Olcostephani* of the genus *Simbirskites*, but these beds have of late years been so poorly exposed that no further information can be given regarding the distribution of these forms.

In the zone of *Belemnites brunsvicensis* ammonites only occur at the extreme base, where there are a few examples of one of the *Simbirskites*, and in its uppermost beds, where the genus *Hoplites*, represented by *H. deshavesi*, reappears associated with

* A paper read to Section C of the Meeting of the British Association, York.

forms of the genus *Oppelia*, the whole of the intervening deposits being apparently devoid of these fossils.

In the beds with *Belemnites ewaldi*, which may prove to be a distinct zone between the *brunsvicensis* and *minus* zones, no ammonites have as yet been detected, but in the *minus* zone *H. interruptus*, Brug., has been found.

The *Criocerata* have been found to exist in most, if not all, the deposits from the uppermost part of the *Belemnites lateralis* zone to the top of the *Belemnites brunsvicensis* zone, and are especially numerous about the middle of the *Belemnites jaculum* zone. They are, however, difficult to determine, being both fragmentary and ill-preserved.

The following is a list of the specimens obtained:—

* <i>Crioceras duvali</i> d'Orb	C mid. to lower D 2?	<i>Crioceras fissicostatum</i> ?	Roem. B top.
„ <i>semicinctum</i>	Roem. C mid. to lower.	* <i>Hamites intermedius</i>	Phill. C mid. to lower.
* „ <i>puzosianum</i>	C mid.	* <i>Ancyloceras</i> —	sp. B top.
„ <i>rarocinctum</i> v. Koen.	C.	* „ —	sp. B top.
* „ <i>matheroni</i>	Pavl? C upper.	* <i>Toxoceras royeri</i> d'Orb	B top.
„ <i>strombecki</i> v. Koen.	B lower.	* ? <i>Scaphites constrictus</i>	d'Orb B. top.

THE LIMESTONE KNOLLS OF CRAVEN. †

A. WILMORE.

THE Craven Lowlands district, between the great faults on the north-east and the grit hills of the Pendle Range on the south, is characterised by a well-known series of limestone knolls which have been the subject of much discussion. Having worked in the district for some years, I venture to make the following suggestions:—

The words 'knoll' and 'reef-knoll' seem to be differently understood by different workers. It seems to me desirable to drop the term 'reef-knoll.' This term was applied by Mr. Tiddeman to certain extreme members of a series: there is every possible gradation between these and ordinary rounded knolls to which the term would never be applied. Further, the hills so named by Mr. Tiddeman have not all originated in the same way.

* Determined by Dr. A. von Koenen.

† A paper read to Section C of the Meeting of the British Association, York.

The following types of knolls may be recognised :—

- (a) Those in the grey or bluish-white limestone. Some of these are well-bedded and very fossiliferous ; some are obscurely bedded ; some are not *apparently* very fossiliferous.
- (b) Those in the dark limestones with numerous shales ; these knolls are lower and more rounded.
- (c) Scar-knolls ; truncated folds weathered into semi-rounded and more or less detached masses. These vary from small crags through large peninsular masses to long scar-like ridges. These may be in the white or dark limestones. Sometimes a scar-knoll has been detached from the main mass of limestone by weathering.

There are gradations of every degree connecting these types.

Examples of all these types of knolls occur on one well-defined horizon. They may all be seen striking parallel with the Pendleside shales containing *Posidonomya becheri*, *Posidoniella lævis*, *Aviculopecten papyraceus*, and immediately succeeded by these shales. The succession may be seen at Cracoe and Thorpe, Stockdale, Newsholme, Broughton and Thornton, Downham, Slaidburn.

The knolls are most conspicuous on the margins of the district. They are seen close to the faults at Threshfield, Malham, Attermire, Stockdale, and Bell Busk. Against the grit ridges on the southern side they are well developed at Thorpe and Cracoe, Broughton and Thornton, and near Downham.

It is noteworthy that knoll-like masses are seen *north* of the Grassington branch of the Craven faults, at Craven moor, and near Dibble's Bridge. Here the massive white limestones come up with a much greater dip than is usual north of the faults.

The whole district is much folded. There are well-defined folds with N. E.-S. W. axes intersected by less conspicuous folds parallel to the main Pennine axis. The interference of these fold-systems seems to have directly produced some of the knolls. Folding is seen everywhere, in both the dark and the white limestones ; though the well-bedded dark limestones naturally show it best. Minor faults are common, and some of the knolls appear to be due in part of faulting.

The more massive knolls of white limestone appear to be due to irregular aggregations of submarine débris. Folding has ridged up these massive limestones, and weathering has intensified the difference between these and the commoner knolls of the district. The smaller knolls are due to folding and subsequent weathering.

LIFE-ZONES IN THE BRITISH CARBONIFEROUS ROCKS.*

Dr. WHEELTON HIND, F.G.S.

MR. COSMO JOHNS, at my suggestion, kindly examined the coral fauna of the Basement conglomerate in the neighbourhood of Ingleborough. The beds contain several corals and more rarely brachiopods. The fossils have been submitted to Dr. Vaughan, who suggests the horizon to be the base of the Seminula zone and upper part of the Syringothyris zone that is somewhere about the horizon of the *Michilinia megastoma* beds of Rush. This correlation is of great interest, because it is estimated that the whole of the Limestone Series in the neighbourhood of Ingleborough, including the Yoredales, is only 1500 feet, and the Dibunophyllum fauna as found in rocks is probably here considerably more than 1200 feet thick. An interesting problem presents itself as to what happened in this area between Lower Seminula and Lower Dibunophyllum times. I hope that some work on which I am engaged in the Carboniferous succession of the Isle of Man may throw some light on this question. In Derby Haven *Michilinia megastoma* occurs in abundance in limestone which succeed the Basement conglomerate, and this may give a clue. I should not be surprised if these beds eventually turn out to be in the Dibunophyllum zone.

Important work has to be done in the north to work out the exact zone of each Basement bed. For example, in the neighbourhood of Shap and Askham, bordering the Lake District, the lowest limestones contain a well marked Dibunophyllum fauna, pointing to the existence of land in the Lake District in Upper Carboniferous Limestone times. Nowhere that I know at present has a fauna below D_1 been obtained in the Pennine area south of Northumberland. The corals of the Lower Limestone Series of the West of Scotland are undoubtedly of Upper Dibunophyllum age, and the exact results of this fact have to be worked out.

* Abstract from interim Report of the Committee, consisting of Dr. J. E. Marr (Chairman), Dr. Wheelton Hind (Secretary), Dr. F. A. Bather, Mr. G. C. Crick, Dr. A. H. Foord, Mr. H. Fox, Professor E. J. Garwood, Dr. G. J. Hinde, Professor P. F. Kendall, Mr. R. Kidston, Mr. G. W. Lamplugh, Professor G. A. Lebour, Mr. B. N. Peach, Mr. A. Strahan, Dr. A. Vaughan, and Dr. H. Woodward, presented to Section C of the Meeting of the British Association, York.

The result of Mr. Tait's collecting last year in Northumberland is expressed in a table which is printed in the report.

The object of his research was to endeavour to ascertain the fauna which characterises the horizon of the Fell Top Limestone, which may be regarded as the top of the Carboniferous Limestone Series in that area. The thin limestone is succeeded by the Millstone grits of that district.

The general results show that the fauna has a *Dibunophyllum* facies, but that he did not get any of the corals which in the Midlands we now recognise as zone indices of the top beds—*Cyathaxonia* and *Amplexi-zaphrentis*.

The Great Limestone of Durham and Northumberland contains many specimens of *Dibunophyllum* and *Lonsdaleia floriformis*, and we therefore correlate it with the Upper *Dibunophyllum* zone of Bristol. The beds collected from are some 400 feet higher in the series. Westgarth Foster estimates the Great Limestone to be 408 feet below the Fell Top Limestone.

It may serve a useful purpose to summarise the results arrived at since the Committee commenced work some years ago.

At first, work was chiefly done on the series of black shales and limestone, to which Mr. J. A. Howe and I gave the name of Pendleside Series. Year by year collecting in various districts has demonstrated our thesis that these beds had a definite fauna which distinguished them from the Yoredale Series of Wensleydale. We had obtained this fauna between two very different degrees of latitude in the Midlands; that is, the fauna has never been obtained north of the latitude of Settle, or south of the latitude of Leicester. The fauna is found to characterise beds which succeed the upper *Dibunophyllum* zones of the Carboniferous Limestone as far west as Co. Clare and Co. Limerick, Loughshinny, Co. Dublin, the Isle of Man; it also occurs E. at Visé, Clavier near Dinant, and near Mons, in Belgium.

Zones can be distinguished in the series according to the following table:—

Zone of <i>Gastrioceras listeri</i>	...	(Lower Coal Measures.		
		(Millstone grit.		
Zone of <i>Glyphioceras bilingue</i>	...			
Zone of <i>Glyphioceras spirale</i>	...	) <i>Glyphioceras diadema</i> .	
Zone of <i>Glyphioceras reticulatum</i>	...			
Cythaxonia beds	(Zone of <i>Posidonomya becheri</i>	...	Nomismoceras rotiforme.
		Zone of <i>Prolecanites compressus</i>	...	D ₃ .

The whole of the Upper Carboniferous Series, comprising the Pendleton Series, Millstone Grit, and Coal Measures, might

be termed the zone of *Pterinopecten papyraceus*. This fossil appears in the lowest beds, with *Posidonomya becheri*, and marks the faunal change.

I have also shown that the Pendleside Series is represented at Bishopston in Glamorganshire, and that the Lower Culm of Devon belongs to the *Posidonomya becheri* beds and *Prolecanites compressus* beds.

More work is required to be done in the Millstone Grit Series, and I have in hand certain details which require working out; but further research must be done before they can be published. Attention is being given to the Coal Measure lamellibranchs in the Yorkshire and Lancashire coalfields. At present details appear to demonstrate the value of the lines that have been laid down for the North Staffordshire coalfields by Mr. J. T. Stobbs and myself.

With regard to the Lower Carboniferous Series, the whole of the south-western area of the Lower Carboniferous Series has been zoned by the corals, supported by certain mutations in the species of brachiopods, by Dr. A. Vaughan and Mr. J. F. Sibly.

The same zones are, to some extent, and with local differences as to detail, demonstrated (*vide antea*) to occur in N. Wales, and most important is the fact that none of the series below the top of the Upper *Seminula* beds are present there.

It is more than probable that in the Derbyshire-Staffordshire area the same condition of things prevails, at any rate in the west, but probably the Carboniferous Sea deepened somewhat to the east. At present, however, I have never obtained any fossils which point to a lower horizon than the lower *Dibunophyllum* beds in that area.

The uppermost beds of the Lower Carboniferous Series in Staffordshire and Derbyshire are characterised by *Cyathaxonia*, *Amplexi-zaphrentis*, *Beaumontia*, *Michilinia tenuisepta*, and *Cladochonus bacillaris*. In the upper part of this zone *Prolecanites compressus* occurs.

Below this horizon are the rich fossil deposits of Park Hill, Castleton, Narrowdale, and Wetton and Thorpe Cloud, which therefore belong to the Upper *Dibunophyllum* or *Lonsdaleia* sub-zone, but on the west side of the Pennine uplift *Lonsdaleia* is itself a very rare fossil.

In the Craven and Bolland districts of Yorkshire the same sequence obtains. The lithological structure of the rocks and

the rich fossil beds of Cracoe, Settle, and Clitheroe being exactly like those of the Derbyshire area and on the same horizon. They are overlaid by *Cyathaxonia* beds, and these in turn are succeeded by *Posidonomya becheri* beds.

In Yorkshire, however, the base of the series is seen in the neighbourhood of Ingleborough. In the Basement conglomerate area Mr. Cosmo Johns has collected a series of corals, which Dr. A. Vaughan refers to a lower horizon than I should have expected to find there.

Dr. Vaughan thinks the fossils denote the basement beds to be on a horizon at the base of the Lower Seminula beds or Upper Syringothyris zones. If this is so, some interesting details must be worked out.

The whole Carboniferous Series under Ingleborough is estimated to be 1500 feet, and 1000 feet at least of this is characterised by Giganteid Producti and a fauna which I take to be of *Dibunophyllum* age. The question to be worked out is to account for the small thickness of the whole of the Seminula beds here, which are about 1000 feet at Bristol; and in connection with this point it is to be noted that the limestones which rest on the Basement beds west of the Lake District, the Askam and Knipe Scar Limestone, contain a definite *Dibunophyllum* fauna, and even farther north the Lower Limestone Series of Scotland apparently belong to the *Lonsdaleia* sub-zone.



COAL-BALLS FOUND IN COAL SEAMS.*

Miss M. C. STOPES, D.Sc., Ph.D.

OWING to the variety of concretions and nodules found in the Coal Measures, and the many local names for them, it seems wise to describe those distinct concretions in the actual seam, containing plant structures and now well known to botanists, as 'coal-balls;' and the concretions in the roof above them containing goniatites and a few plants, as 'roof' or 'goniatite-nodules.' For long it has been generally accepted by those who work among the Lower Coal Measures that the true coal-balls are to be found only in one geological horizon—viz., the 'Bullion' or 'Upper Foot' Mine. In the course of our work, however, Mr. Watson and I have satisfied ourselves that (granted the correctness of H. M. Survey of the district, which

* Abstract of paper read to Section K of the Meeting of the British Association, York.

in this case seems beyond doubt) a seam containing typical coal-balls associated with goniatite nodules, which we have unearthed, lies some distance below the well-known Ganister bed, while the true Bullion seam lies above it. The pit at Hough Hill, which has supplied so much material, seems also to belong to this lower horizon. Further, I have evidence of very similar, if not identical, structures in the Middle Coal Measures. This shows that the factors needed for the formation of these structures have combined more than once during the deposition of the Coal Measures as a whole. The coal-balls are undoubtedly concretions, largely composed of CaCO_3 , though varying much locally, as detailed analysis shows. They are of various sizes, and often completely surrounded by coal. As a rule, the plants in two neighbouring balls are disconnected fragments, but in some cases the same plant continues in two nodules. This suggests that the concretions containing the plant tissues were formed in the place in which they are now found (except for slight subsequent shifting, due to earth movements). Though this is opposed to Mr. Lomax's view, it seems to be supported by the discovery at Shore of a single calcareous mass, in the form of a number of nodules cemented together by carbonates, all rich in preserved plant remains, the whole enormous mass weighing two tons, and locally replacing the coal in the seam. While further in support of the *in situ* theory, a coal-ball found in the floor of the seam contains practically nothing but stigmarian rootlets. The constant association with the roof nodules containing marine shells suggests that the infiltration of sea-water and carbonate was necessary for the formation of the true 'coal-balls,' a view suggested by Binney, against which we have as yet discovered nothing directly militating, though we cannot give conclusive facts in its favour. Experiments have been undertaken which have conclusively shewn that sea-water and peat form a splendidly preservative medium for *plants*, though allowing animal tissues to decay. A careful survey of the mine at Shore reveals the extremely local occurrence of the coal-balls; in twenty yards a 'pocket' may be worked through. The evidence which could be collected under the difficult conditions of underground work went against rather than in support of the view that they had been brought by streams at the time of the deposition of the coal. Most of this work was done in collaboration with Mr. James Lomax and Mr. D. M. S. Watson, though our views do not coincide in all cases.

THE ARTESIAN BORING FOR THE SUPPLY OF THE CITY OF LINCOLN FROM THE NEW RED SANDSTONE.*

Professor EDWARD HULL, LL.D., F.R.S.

Down to the present time since the year 1847—when the water-works were commenced by a public company—Lincoln has depended for its supply of water upon surface streams, impounded into reservoirs and subjected to a filtering process, the quantity dealt with amounting to about 331 millions of gallons a year, with a rainfall of about 25 inches. Needless to say, a supply from such sources was found to be unsatisfactory on the grounds both of quality and quantity. In 1885 Dr. Harrison was requested to report on the former of these subjects, and he produced elaborate analyses, the general result being that, as some of the sources were liable to pollution, the water was unfit for domestic purposes.

Owing to the rapid growth of the city the conditions became more unfavourable, and it was determined by the Corporation to ascertain whether some better source of supply might not be available. With this object the late Mr. De Rance, F.G.S., was instructed by the Corporation to report 'on the probability of obtaining a pure and sufficient supply of water for the city.' Accordingly he presented a report, dated September 15, 1891, containing the results of a prolonged and careful study of the geological conditions, and stating his opinion that a boring of large diameter to a depth of from 1250 to 1500 feet at Torksey or Collingham, would yield at least a million of gallons per day of the purest water, also suggesting supplies from the Oolite limestone formation.

This report does not appear to have been immediately acted upon; and nothing was done until the year 1898, when I received instructions to report on 'the probability of obtaining water by boring near the present pumping station, and if so, at what depth, and at what expense.' After a preliminary survey, I recommended a well and boring to be carried down into the New Red sandstone, which I estimated would be reached at a depth of about 1400 feet, from which I anticipated a supply of about a million gallons per day, and that the water would rise in the boring and well up to, or nearly to, the surface of the ground by hydrostatic pressure. It will be observed that

* A paper read to Section C of the Meeting of the British Association, York.

my conclusions went to verify those of Mr. De Rance, both being founded on well-recognised geological data, and they have now been abundantly borne out by actual experiment.

Not until the year 1901, however, was a contract signed with Messrs. C. Chapman & Son, of Salford, for carrying out this, the deepest water boring in the United Kingdom. Nor was it till Sunday, June 10, 1906, that the success of the undertaking was demonstrated, when, on reaching the top beds of the New Red sandstone, at a depth of 1561 feet 6 inches, the water burst in with great force, and (to adopt the words of the newspaper reporter) 'the roaring sound of rushing waters, far below was distinctly heard at the surface, and was likened by one of the workmen to the rush of the ægir on the Trent when the tides are at their highest.' From this time the water steadily rose in the bore and well 1502 feet in total depth, at the rate of 12 feet per hour, until it ultimately reached the surface and overflowed, which event took place on the Wednesday morning following the inburst of the water.

The following are the formations passed through:—

	Feet
Lower Lias clay	641
Rhætic beds	52
Red marl and sandstone (Keuper)... ..	868
Total	1561

Below the above is the New Red sandstone and conglomerate, which reaches the surface in a broad tableland of an average of 300 to 400 feet above the sea-level to the north of Nottingham, and constitutes the source of supply for that town and a large district ranging into Yorkshire. At its nearest border it is about 20 miles from Lincoln, and spreads westward to its margin at Worksop—for a distance of 5 or 6 miles—receiving and absorbing (probably) two-thirds of the rainfall over its area. Owing to its extreme porosity, its absolute continuity in the direction of the dip of the beds (there being no faults between), and the constantly increasing hydrostatic pressure of the water in the direction of Lincoln, we have all the conditions for a successful artesian water supply. The success of this undertaking has produced amongst the inhabitants of that important city a feeling of the greatest relief and satisfaction, which finds expression in the local paper in the words: 'Sunday, the 10th June, 1906, will be a day to be recorded in the annals of Lincoln.'

THE PLAIN OF MARINE DENUDATION BENEATH THE DRIFT OF HOLDERNESS.*

Prof. P. F. KENDALL, F.G.S., and W. H. CROFTS.

THE Plain of Holderness is covered entirely with glacial deposits, no solid rock being visible throughout the whole area. Numerous borings have shown that a floor of chalk extends under the area sloping in a general way towards the existing coast. Mr. G. W. Lamplugh, some years ago, discovered that the chalk cliffs between Flamborough and Sewerby, near Bridlington, ran in behind a drift-covered area, and that this line of cliffs consisted of two parts. The visible part was of modern date, while the ancient wave and wind-worn cliff was prolonged inland. At the base of this ancient cliff he discovered a shingle beach, resting upon a floor of chalk and covered in succession by wind-blown sands, chalk wash, and over all a glacial boulder clay. One of the authors of this paper (Mr. Crofts) subsequently discovered the counterpart of this succession in an extension at Hessle Station on the North Eastern Railway. An examination of the details obtained by well-boring in Holderness and its margin, disclosed the fact that these two points could be connected by a continuous line of cliffs passing nearly on the line taken by the North Eastern Railway, and passing through Beverley. Details of a large number of borings between this cliff line and the sea shewed that the slope was a very gradual one, a slope of only 90 feet being contained in a distance of 12 miles up to Hornsea. Near Beverley and Hull the floor showed considerable irregularities and the pre-glacial course of the Humber was clearly indicated by a great trumpet-shaped depression extending from the present Humber gap out in a due easterly direction. The relations of the land level indicated by these data with those deducible from borings in the Vale of York, were discussed and showed that a wide valley excavated in rock extended far below sea-level through a large area, at York being 50 feet below the level of the sea. The data are altogether inadequate in the determination of the relative age of these two land levels, but the higher level, indicated by the deep Vale of York, was probably antecedent to the lower land level, of which the chalk plain in Holderness and the cliffs which bound it were indications.

* Abstract of Paper read to Section C at a Meeting of the British Association, York.

THE FOSSILIFEROUS DRIFT DEPOSITS AT KIR- MINGTON, LINCOLNSHIRE, AND AT VARIOUS LOCALITIES IN THE EAST RIDING OF YORK- SHIRE.*

J. W. STATHER, F.G.S.

The Speeton Shell-bed.—As mentioned in last year's report, this fossiliferous estuarine sand was first described by Professor Phillips in his 'Geology of Yorkshire,' and later by Mr. G. W. Lamplugh in the *Geological Magazine* for 1881. As the bed is almost always obscured by slips, so that its relations to the drift are open to question, it was decided to examine its position by excavations.

Since the presentation of the last report several excavations have been made in the neighbourhood of the exposures seen by Professor Phillips and Mr. Lamplugh, and your Committee reports that, though the results obtained are corroborative of the accounts given by the observers above named, they also include certain new points of interest.

The largest excavation was made in the ridge between Middle Cliff and New Closes Cliff at Speeton, and at this place beds were exposed as follows —

		Feet	Inches
Estuarine Shell- bed.	(a) Boulder clay (lower part only excavated) ...	45	0
	(b) Fine chalky gravel	1	6
	(c) Yellowish sandy silt with shells	6	2
	(d) Black Silt	4	0
	(e) Black silt with sandy streaks and a little gravel	2	0
	(f) Fine gravel, chiefly of chalk	4	0
	(g) Speeton clay (base of <i>Bel. jaculum</i> zone 1½' and 'Compound nodular band' ½' forming the upper portion of the sloping cliff of Secondary clays 84 feet above beach level).		

It will be seen from the above section that the shell-bed is here 17 feet 8 inches thick and its base is about 86 feet above the present beach.

The gravel (f) rests on the *Bel. jaculum* clays, but contains some material washed from the lower beds of the Speeton clay, such as fragments of *Bel. lateralis* etc.

* Report of the Committee, consisting of Mr. G. W. Lamplugh (Chairman), Mr. J. W. Stather (Secretary), Dr. Tempest Anderson, Professor J. W. Carr, Rev. W. Lower Carter, Mr. A. R. Dwerryhouse, Mr. F. W. Harmer, Mr. J. H. Howarth, Rev. W. Johnson, Professor P. F. Kendall, Mr. H. B. Muff, Mr. E. T. Newton, Mr. Clement Reid, and Mr. Thomas Sheppard. Presented to Section C of the Meeting of the British Association, York.

The excavation showed that the beds do not rest on a flat surface of Speeton clay, but that their surface dips into the cliff at an angle of 25 degrees, and that the bedding of the shelly deposit itself also dips into the cliff at about the same angle.

Shells occur throughout the silty beds, but are most plentiful in bed *c*. When excavating the shells seen were *Cardium edule*, *Tellina balthica*, *Scrobicularia piperata*, and *Hydrobia*. A quantity of the shelly material was collected for washing, on which the Committee will report later.

Search was made for the shell-bed at the same level both north and south of the main excavation. Southward no trace was observable, but northwards the beds were traced 50 yards along the slopes of New Closes Cliff.

At the foot of the cliff, about 500 yards northward of the site of the excavations, similar shelly silts were laid bare during favourable conditions of the foreshore early this year. In this exposure the beds attained a thickness of 4 to 5 feet, and were traceable for at least 100 yards. The silts rested on Kimeridge clay, and were overlain by glacial drifts which at this locality are extremely thick.

At the north end of this section the following particulars were noted :—

	Feet	Inches
Boulder clay with intercalated stratified sand and gravel, not less than	120	0
Fine chalky gravel	2	0
Silt with shells	3	0
Kimeridge clay	4	0

The thanks of the Committee are due to the Right Hon. the Earl of Londesborough, for permission to investigate the shell-bed at Speeton, and to Mr. C. G. Danford, of Reighton, for help in many ways.

LEPIDOPTERA.

Rare Lepidoptera in Wharfedale.—In June last I took a specimen of *Melanippe unangulata* at rest on a tree trunk in Bolton Woods, and my son Rosse took *Miana expolita* in Grass Wood in July, and another specimen on Bank Holiday the 6th inst. in Grass Wood. I took *Stilbia anomala* (one specimen). We also took *Scoparia conspicualis* and *Hypolepia sequella*, the latter we found by no means uncommon on tree trunks.—E. P. BUTTERFIELD, Wilsden, August 13th, 1906.

THE OCCURRENCE, DISTRIBUTION, AND MODE OF FORMATION OF THE CALCAREOUS NODULES FOUND IN COAL SEAMS OF THE LOWER COAL MEASURES.*

Prof. F. E. WEISS.

THE petrified remains of coal-measure plants which, through the investigations of Binney and Williamson, of Scott, Seward, and Oliver, have so largely increased our knowledge of the past history of the vegetable kingdom, were chiefly contained in calcareous concretions (the so-called 'bullions') found in certain seams of the Lancashire and Yorkshire coalfields. As first described by Binney, they were to be found in three seams in Lancashire: in the 'Upper Foot' or 'Bullion' Mine, in the Ganister coal, and in a very narrow seam of a lower horizon. Some confusion, however, exists with regard to the two former seams, owing to their union to form the 'Mountain Four Foot' seam, and there seems considerable doubt as to the occurrence of coal-balls in the Ganister coal. Indeed, it would seem now generally accepted that true coal nodules occur only in one single horizon.† The nodules or bullions occurring in this Upper Foot seam (correlated by Bolton with the 'Hard Bed' seam of Halifax) vary from an inch to a foot in diameter. They are concretions, consisting mainly of carbonates of lime (45 to 70 per cent.) and of magnesia (10 to 20 per cent.), with small quantities of oxide and sulphides of iron. Sometimes they are so numerous as to render the coal utterly useless, and they may be found to occur over a space of several acres. They contain a tangled mass of plant remains, often in a state of excellent preservation. Shells are not found in these nodules, but are very common in similar nodules found in the roof of the seam. According to Binney, the occurrence of nodules in the coal is always associated with that of fossil shells in the roof, and the nodules may therefore probably be formed by calcareous salts in solution in water, which became aggregated round certain centres in the submerged peaty mass of vegetable matter. A similar mode of formation has been suggested for the calcareous nodules (Dolomitknollen) which occur in certain seams of the Westphalian coalfield, where marine shells are found in the shaly roof of the seam. Stur has also noticed the same in the case

* Abstract of paper read to Section K of the Meeting of the British Association, York.

† See Lomax, 'Annals of Botany,' 1902.

of calcareous concretions (Sphærosideriten) in certain Austrian coal seams. These are accompanied by roof nodules (Thon-Sphærosideriten) containing the remains of marine shells. On the other hand, Mr. James Lomax has pointed out that when the calcareous nodules are very numerous, and often welded together into a single mass, neighbouring nodules do not show continuity of plant structure; which fact he suggests points to the possibility of the nodules having been carried into their present position after petrification. To settle definitely which is the mode of formation, it would seem important:—(1) To obtain as much evidence as possible from a wide geographical area, and from different horizons, of the occurrence of these calcareous concretions in coal-seams, and to note whether they are in all cases associated with a shale roof containing remains of marine animals. (2) To examine carefully the tissues in closely-packed nodules, with a view to discovering any possible continuity of structure, so as to determine whether the nodules have been formed *in situ* or not.

A STIGMARIA OF UNUSUAL TYPE.*

Prof. F. E. WEISS.

THIS has been found in one of the nodules from the Halifax hard bed of the lower coal measures. It differed from most specimens of Stigmara in the considerable amount of primary wood which was centripetal in its development. This gave to the plant at first sight the appearance of a Lepidodendron stem. The stigmarian nature, however, could be recognised by the absence of any hard cortex, and by the characteristic periderm, to which were attached the remains of rootlet cushions.

—◆◆—

A new Natural History Museum has been acquired by Salford.

Dr. W. H. Perkin, F.R.S., who half a century ago discovered the first aniline dye, has been knighted.

At the York meeting no report was presented by the 'Erratic Blocks of the British Isles' Committee. This committee, which has presented most valuable reports for a great number of years, has surely not finished its labours.

The Geological Association of London has issued 'The Geology of the Yorkshire Coast between Redcar and Robin Hood's Bay,' by R. J. Herries, at one shilling. Some of the blocks used are beginning to look very 'ancient.'

For the loan of the block of Dr. Anderson, on page 283, we are indebted to Messrs. G. J. Smith & Co., Liverpool, the publishers of the 'Official Illustrated Souvenir' of the York Meeting, and for that of the Multangular Tower, on page 281, to the York Museum.

* Abstract of paper read to Section K of the Meeting of the British Association, York.

THE NATURALIST.

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

EDITED BY

T. SHEPPARD, F.G.S.,

THE MUSEUM, 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.,
Prof. P. F. KENDALL, M.Sc., F.G.S.,
T. H. NELSON, M.B.O.U.,

GEO. T. PORRITT, F.L.S., F.E.S.,
JOHN W. TAYLOR,
WILLIAM WEST, F.L.S.

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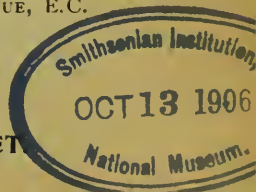
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NOTES AND COMMENTS.

THE FORMATION OF FILEY.

A WRITER in a Yorkshire magazine recently favours his readers with a further example of his journalistic ability. Under the head of 'Antiquities of Filey,' he first quotes 'Mr. Geikie' as under: 'There can be no dispute as regards the abundance of upheavals, subsidences, and dislocations which the crust of the earth has undergone; but that all our valleys and ravines are not mere cracks would seem to be put beyond dispute by the fact that for one valley which happens to run along the line of dislocation, there are fifty or a hundred, I dare say, which do not.' Having read this extract from Geikie, we are told 'The conclusion, therefore, to which *an attentive examination* of the Yorkshire coast line points us is this, that although the rocks have suffered much from subterranean commotion, it is not to that cause that their present external forms are chiefly to be placed. Our frowning, our awe-inspiring mountains and hills are there, not because of upheavals from the valleys, but because their environment in part has been cut away by moving water, frost, and ice.' The author then pities the man who can pass Filey on a ship during the night 'without feeling stirred in all the powers of a grateful heart by the majesty and subdued beauty of such a scene.' *We* pity his readers!

ANOTHER OPINION OF FILEY.

We doubt also if the blower of Filey's trumpet will quite agree with the following description, which appears in No. 4 of the *Museum Gazette*: 'The sands, as in most half-enclosed bays, are extensive and flat. They are firm, and have no mud. As they have no rocks, there is scarcely any seaweed, and very few pebbles. Shells also are very scarce. Excepting for bathers, riders, bicyclists, and children with spades, it is not possible to imagine sands more unattractive than those of Filey Bay. If you walk towards Flamborough Head you must, if you wish to sit down, take your campstool with you, for there is not a bit of rock or a sand hillock. High tides come up to the base of the cliff, and the latter is clay. It is glacial clay, but it contains scarcely any stones, and consequently yields nothing for the shore. This glacial clay cliff extends in this direction much further than most would like to walk. Where it ends chalk and strata begin.'

THE LETHER COLLECTION.

The Hull Municipal Museum has recently purchased the extensive geological collection formed by the late George Lether, of Scarborough. Mr. Lether was well-known as an enthusiastic collector, and probably knew more of the good collecting localities of the Scarborough neighbourhood than any other geologist. On several occasions he acted as leader for societies visiting the district, and the Scarborough Museum is indebted to him for a number of valuable specimens. For many years, however, he had been making a collection of the smaller species to be found in the fossiliferous deposits which are so well represented around Scarborough. The Kelloways Rock, Calcareous Grit, Coral Rag, Cornbrash, the Millepore Limestone and Scarborough Limestone were thoroughly known to him, and from these various strata he obtained the unrivalled collection now at Hull. It is particularly strong in the smaller gasteropods, but in addition contains a very fine series of sea-urchins, terebratulæ, ammonites, corals, etc.

The great value and charm of the Lether Collection, however, lies in the extraordinarily successful manner in which its former owner was able to free the fossils from their matrix. In some instances several weeks were occupied in the preparation of a single specimen. It will thus be seen that the collection now acquired is one of exceptional value, and is a welcome addition to the geological collection in the Hull Museum. Several of Mr. Lether's specimens have been figured and described by Messrs. Hudleston, Tomes, and other specialists.

A NEW MAGAZINE.

Under the title of *Haslemere Museum Gazette* (monthly, 6d.), has been issued what is termed 'A Journal of Objective Education.' In the introductory note we learn that 'we shall be frankly fragmentary, here a little and there a little.' Certainly this object has been carried out in the part before us, even to the second-hand book catalogue at the end of the Journal. In an article on 'Schedule of Pre-historic Times in Britain,' we were somewhat surprised to learn that 'there is convincing evidence that as long as a quarter of a million years ago (250,000) there were men in England who were accustomed to the use of tools.' The same article gives a table showing what has happened in Britain from 220,000 years ago (gradual cessation of the ice ages) to 10,000 years ago (*present and future times*)!! Following these is a note on the fish hunger of



The Lomax Exhibition at York.

vegetarians, the human head, advantages of visualisation ('to visualise is to see the actual thing by the aid of the mind's eye'); there is a Gilbert White page, though why so called we fail to see, and a page of 'questions for answers.'

No. 2 of the same journal keeps up the reputation of its predecessor, and contains notes on famous women at the National Portrait Gallery; the brain in relation to intellect (in which the names of persons with remarkably broad heads, heads both tall and broad, remarkably tall heads, and remarkably long faces are given); notes on out-growths and appendages, snails and snakes, skulls, etc. From a note on the egg market in England, we learn that most of the new laid eggs consumed in Haslemere come from Italy, and this at all periods of the year! A list of the second-hand books on sale at the Museum concludes this part.

Since the above was perused, Parts 3 and 4 are to hand. The word 'Haslemere' has been dropped, and the name of Jonathan Hutchinson, F.R.C.S., F.R.S., etc., appears on the cover. These two parts are a great improvement on their fore-runners, and are largely devoted to sea-side topics, being illustrated by several plates from 'Prof. Johnston's work.'

THE LOMAX COLLECTION.

We are able to give our readers on Plate XXV. an illustration of the exhibit by Mr. J. Lomax of Bolton, at the British Association Meeting at York. It consisted of a really wonderful collection of fossil plant-remains from the Yorkshire and Lancashire coalfields. In addition to the nodules was a number of beautifully cut transparent sections which showed the details of the plant structures in a remarkable manner. The exhibit also proved an attractive item at the conversazione in the exhibition building.

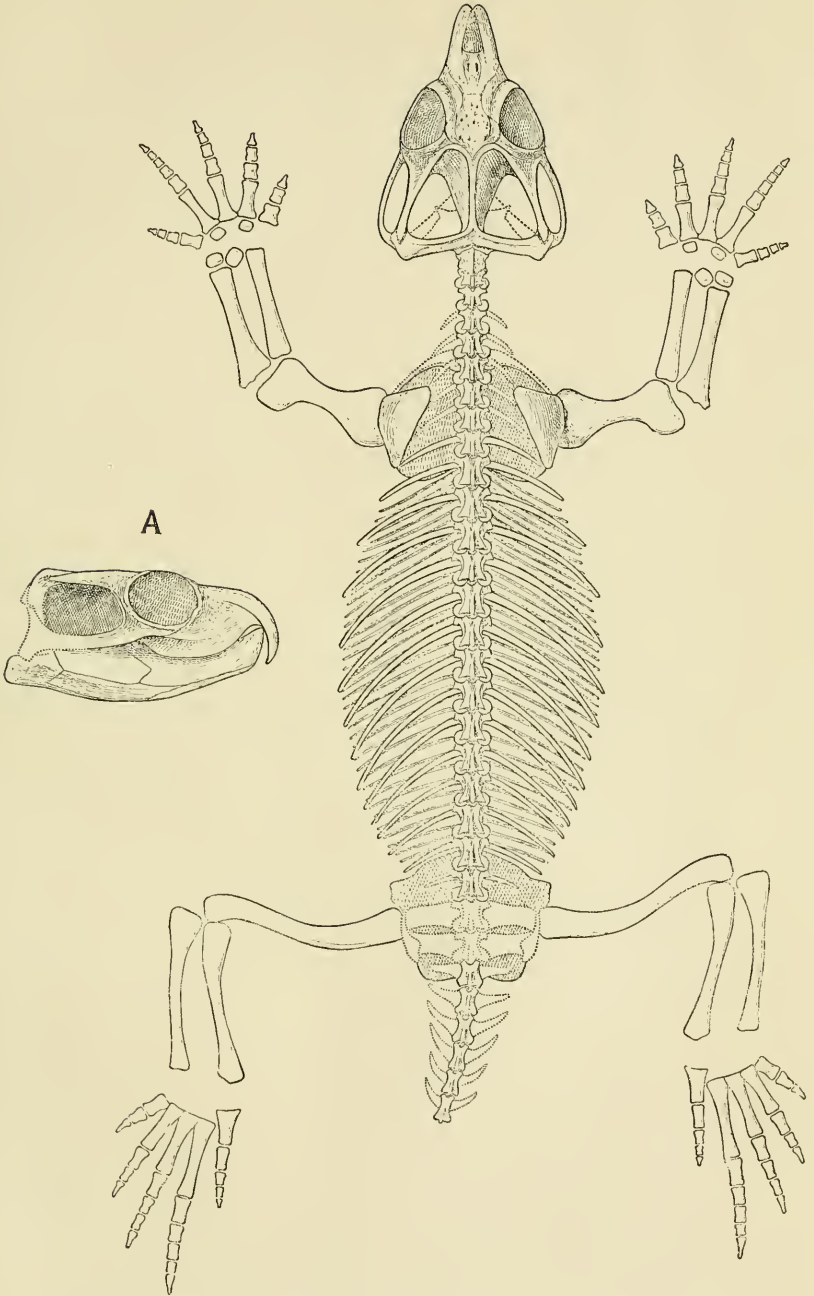
A TRIASSIC REPTILE.

The Report of the Committee for the Investigation of the Fauna of the British Trias, presented at the York Meeting of the British Association, contains a valuable essay on a reconstructed skeleton of *Rhynchosaurus*, by Dr. A. Smith Woodward, F.R.S. This is illustrated by a plate, showing for the first time the probable appearance of a complete skeleton of this species. By the courtesy of the Committee we are able to reproduce this (Plate XXVI.). Remains of *Rhynchosaurus* had previously been described by both Owen and Huxley. The bones described by Owen, in the Shrewsbury Museum,

have been lent to the British Museum for examination and comparison with other specimens. Dr. Woodward confirms the observations of previous writers as to the resemblance and difference between this Triassic reptile and the existing *Sphenodon*. It is more specialised in many respects than its surviving representative. It is also fairly certain that *Rhynchosaurus* was more amphibious than *Sphenodon*.

THE INGLETON PEREGRINES.

Referring to our Comment on page 203 of the July 'Naturalist,' the Secretary of the Yorkshire Naturalists' Union communicated with the authorities, and eventually the case was tried. Perhaps the following note, written by the natural history editor of the *Yorkshire Weekly Post*, will explain the present position of the matter:—"The Chairman of the Ingleton Parish Council, who is also a farmer and "honorary assistant gamekeeper" to the owner of the land at Ingleborough, has been prosecuted before the Ingleton Bench of Magistrates for "attempting to shoot falcons on May 15," and, as the Scotch verdict has it, the charge was found "not proven." There are only three points in this case worth drawing attention to. The alleged offence took place on May 15, the prosecution on August 8, and it was frankly admitted that the authorities had been goaded into action by the press comments, more particularly the *Lancaster Observer*, in which the gross outrage of the law was first published. The usual defence was set up that the reporter had not given an accurate report of what defendant told him, and this was supplemented by the very unusual explanation that the defendant did not fire at the birds, but at a rock in order to get rid of his last cartridge! This is interesting as revealing the survival of a custom of the ancient muzzle-loading, pre-cartridge days. A careful gunner (who has to pay for his own cartridges) usually draws his last one and preserves it for some other occasion; gamekeepers ("honorary" or otherwise) appear to "do things differently" in the Ingleton neighbourhood, otherwise their Worships might have acted differently. The opinion of a witness (in this case a paid gamekeeper) on the absurdity of the Wild Birds' Protection Act is also valuable, but not novel—among persons of his stamp. A hint from his employer might enlighten him on the humble duty of obeying the law, at least until we have gamekeepers' law as our guide. The practical value of this case lies in the authorities being at last "goaded" into action by the Press.'



Reconstruction of *Rhynchosaurus articeps* (Owen). A = Side View of Skull.

Fig. 1.



Fig. 2.



Fig. 3.

Fig. 4.

Habitats of Bats.

THE FLIGHT OF BATS.

(PLATE XXVII.)

ARTHUR WHITAKER,
Worsbrough Bridge.

I AM frequently asked by some friend if I can say to what species a particular bat should be referred which has been observed flying at dusk. Although it is a difficult matter to be perfectly certain about the identity of a bat under these circumstances, nevertheless, after a good many years spent in studying these creatures, I can now often feel pretty confident as to species of bats which I see on the wing.

As the characteristics of flight and haunt which enable one to recognise some species even in the twilight, are not difficult to point out, it struck me that a short article on this subject might not be without interest to readers of the 'Naturalist,' and might enable them to get a better idea as to what species of bats occur in their own immediate neighbourhood.

The Noctule (*Pterygister noctula*) is not difficult to recognise. In the first place it is the largest Yorkshire species, the wings having an expanse of from thirteen to fifteen inches. The wings are long, narrow, and pointed; the flight strong, rapid, and sustained. This bat is undoubtedly the most powerful on the wing of any British species.

It makes its appearance very early in the evening, usually fifteen or twenty minutes earlier than any other species. It occasionally comes out even before sunset, but more often appears ten or fifteen minutes afterwards. In July and August it will often be noticed that the appearance of these bats on the wing almost exactly coincides with the disappearance of the swifts for the evening. Our attention is almost invariably first attracted to it by its piercing, sibilant, and somewhat ventriloquial note, high overhead. High though it flies, it is not difficult to see, for it commences its flight almost before it can be called dusk, and when there is still plenty of light by which to discern it. The Noctule is the highest flying of our bats, and it is nothing unusual for it to be seen wheeling about at an altitude of two or even three hundred feet.

If it be carefully watched for a short time, two peculiarities of its flight cannot fail to strike the observer.

Firstly, a habit it has when flying in a straight line, of doing

so by means of very powerful and deliberate strokes of the wing, letting each stroke carry it a considerable distance, as a swimmer does in the water. This imparts to the flight a combined appearance of power and jerkiness.

Even more noticeable than this, however, is its habit of taking sudden headlong, oblique plunges downwards through the air, for a distance of anything from four or five to twenty or thirty feet. During these dives the wings are held almost fully extended, and flatly out from the body. The bat descends edgeways, so to speak, that is, in the position offering least resistance to the atmosphere. The dives are not vertical descents, but are made at an angle of about sixty degrees, and their object is to secure some insect which the bat has seen. Immediately after thus plunging at an insect and securing it, the bat reascends to its previous altitude, seeming to prefer to swoop *down* at its prey, like a hawk. Should it miss the insect at its first attempt, it will sweep round in an ascending curve until it has again attained a greater height before making a second attempt. I was once fortunate enough to see a Noctule thus attacking a Poplar Hawk Moth which, owing to its large size, was plainly visible to me during the whole of the encounter, and I watched the bat repeat this manœuvre four times before it actually secured the moth. On another occasion I plainly saw one thus catch a dor beetle which had just risen from the grass near my feet. It is seldom that one can actually see the insect the bat is swooping at, however, though the snap of its teeth may often be heard. The Noctule is easily deceived, and a pebble about the size of an ordinary marble thrown in the air will usually be seen and dived at by a Noctule if there is one near. The bat generally finds out its mistake when it has got within a foot or so of the pebble, but will still often follow it nearly to the ground; I have only once got one actually to catch a pebble. This was done within a few feet of my face, and the bat evidently 'pouched' the pebble (*i.e.* thrust it into the skin which stretches between the hind legs, and which forms a kind of bag or pouch when the animal bends its legs forward), for it carried it some twenty feet before dropping it into the reservoir on the edge of which I was standing.

To watch a Noctule dive at a pebble in this manner gives one a good idea of the tremendous speed it can attain when sweeping through the air. For one of these bats, when at a distance of thirty or perhaps forty feet, will often catch sight of

a pebble which has commenced to fall, and will dash after it at such a speed as to overtake it, not merely before it reaches the ground, but actually before it has fallen many feet.

I make use of an ordinary fisherman's landing-net, made of macrama thread of about half-inch mesh, fitted to a handle of bamboo cane about eight feet long, to catch bats when they are flying. The Noctule flies at such a terrific speed when swooping, that one I recently netted not only broke and absolutely splintered the wing bone between the shoulder and elbow, but so stunned itself that it was unconscious for some time. The combined force of its own velocity and the speed of my stroke caused it to hit the meshes of the net with such violence as almost to knock it out of my hand. It really felt like catching a heavy stone in the net.

The Noctule drinks when flying by dipping in the water. It will sometimes fly at quite a low altitude over water, especially late in the evening. It comes abroad occasionally on nights which are quite windy, and may then be seen at its usual elevation beating slowly up against the wind for a distance and then sweeping quickly back, and repeating the process. It appears to face the wind when looking out for food on such occasions. Gentle rain does not deter it from flying, nor smart showers of short duration, but it does not seem to come out on really wet nights. It appears on the wing first about the middle of April, and flies on favourable nights from then until the latter part of September. In late autumn it occasionally flies in the daytime.

Almost all writers are in error on one point; they state that the Noctule flies during the evening twilight, and then retires to its hiding-place until the following evening. This is not the case. On the 20th of July, 1906, I stationed myself under a beech tree in Stainbrough Park, wherein was a hole some fourteen feet up inhabited by a small colony of these creatures (see Plate XXVII., fig. 3).

After considerable squeaking and shuffling in the hole, they commenced to emerge at 8-45, and by 9-3 fifteen Noctules had taken their characteristic 'header' from the hole, risen at once to a considerable height, and flown away. I ascended to the hole and found it untenanted, but still quite hot from the heat of the little creatures' bodies.

The first Noctule returned to the vicinity of the tree about 10 o'clock, but they did not seem to enter the hole at once upon their return, but wheeled around the tree, flying quite low and

passing within a foot or two of my face, and repeatedly flying up to the hole and away again without actually entering. By 10-50, however, no bats were to be seen flying about, and about 11-30, ascending to the hole, I put in my hand and could feel them inside. They seemed to drop off to sleep at once, as even my touching them did not call forth a squeak, and they were perfectly quiet through the night. Dawn commenced about 2-30, and by 3 o'clock it was getting so light that I began to think there was going to be no morning flight of the Noctules, which were still perfectly quiet. In this I was mistaken. At 3-15 I was surprised to see a Noctule drop quietly from the hole, followed at intervals by seven others. The thing that struck me as most peculiar about this morning exodus of the bats was that it took place in absolute silence, very unlike the noisy, squeaky exit in the evening. By 3-45 it was almost broad daylight, and a cold morning for July, with a ground haze. The swallows and swifts were flying about, and the sun just rising before the Noctules came home again to roost. I could not see them feeding anywhere previous to their return to the home tree, but they would suddenly appear with a rush of wings quite magnificent, swing round the tree ten or fifteen times in grand style, then pitch head first on the entrance or side of the hole, and run quickly in, not to be seen or heard again for the time. At 4 o'clock I ascended to the hole and removed the occupants, two of which escaped me; the six I secured were all males. It should be remarked that of the fifteen bats which left their hole at dusk the previous evening, only eight returned after the vespertal flight, seven having for some reason gone elsewhere, instead of coming back to the same hole. This is strange, as the colony had only taken up its quarters in that particular hole two days previously.

This crepuscular flight probably indicates that the Noctule feeds mainly by sight, though suggesting also that the beetles and other insects upon which it feeds also do not fly except in the morning and evening twilight.

To sum up, the Noctule may be recognised when flying by its large size, narrow pointed wings, early appearance in the evening, high altitude, powerful dashing flight, sudden aerial dives, and loud piercing call, regularly and deliberately repeated.

The only Yorkshire bat which can possibly be confounded with the Noctule when flying is Leisler's Bat (*Pterygister leisleri*). This species is rare however in our county, having only been recorded from the vicinity of Leeds, Mexbrough, and

Barnsley. Mr. Armitage and I have handled four specimens only as yet, all taken in Stainbrough district.*

I have seen this bat on the wing a few times, but it could never be distinguished with absolute certainty from the Noctule when both were flying together. It flies a little more slowly than the Noctule, and in a slightly more fluttering and less powerful style, is a trifle smaller, and frequents the vicinity of trees more, not flying *amongst* them, but up and down some open place in their immediate vicinity, and usually at about the altitude of the tree tops.

(To be continued.)

In the Yearbook and Calendar of the Essex Field Club for 1906 and 1907, are some excellent Illustrations of the Essex Museum of Natural History and the Epping Forest Museum, and a portrait of Prof. L. Meldola, F.R.S., forms the frontispiece.

Mr. John Murray has issued an admirable quarterly review, '**Science Progress**' (5/-), which it is hoped may continue. Part I. is before us, and contains twelve articles on various subjects, amongst which the following are selected haphazard:—'Chloroform, a Poison,' by Dr. B. J. Collingwood; 'Physical Geography as an Educational Subject,' by Dr. J. E. Marr; 'The Solvent Action of Roots upon the Soil Particles,' by A. E. Hall; 'Some Notable Instances of the Distribution of Injurious Insects by Artificial Means,' by F. V. Theobald. Some of the articles are illustrated. Being printed on stout paper, the review has a substantial appearance. The editors are Dr. N. H. Alcock and Mr. W. G. Freeman.

The Birds of the British Islands. By Charles Stonham, C.M.G., F.R.C.S., F.Z.S., with illustrations by L. M. Medland. Part I. London, E. Grant Richards. 1906.

The preliminary flourish of trumpets which heralded the appearance of the first part of this book doubtless induced many to expect great things; something fresh and original in the treatment of the well-worn subject of British Birds; new facts based on careful first-hand observation. And it is possible that those who have no knowledge of the subject may take this first instalment as representing all that has been claimed for it, ridiculous though these claims have been. Those, however, who have at least a working acquaintance with this theme, will not be surprised to find that the author, hitherto unknown as an ornithologist, has vastly overestimated the importance of his proposed undertaking, which is at most but a compilation, and bad at that. It is long since, indeed, that we have come across a book which affected so much and performed so little. In the paucity of its information it is pitiful; as a work of reference it is useless; while as to its illustrations, they are contemptible. Apparently drawn from very badly stuffed specimens, they offend the eye from an artistic point of view, while their shortcomings in the matter of accuracy as to the plumage have rarely been outnumbered. It causes us no astonishment to find that the author should feel able to eulogise these caricatures, when we turn to the text to discover him to be so little of a zoologist, that he is unable to detect the absurdity of such statements as that the food of the Wheatear, for example, 'consists of insects, worms, gnats, and flies!' Throughout this part, indeed, he constantly speaks of 'flies and insects.' To be brief, we fail to find any sort of justification for the publication of this book, which has not even the merit of cheapness to recommend it.—W. P. PYCRAFT.

* Since writing the above I have taken six more specimens of *P. leisleri* at Monk Bretton, a place distant some four miles from Stainbro'.

THE ORIGIN OF THE CLEVELAND IRONSTONE.*

Dr. H. CLIFTON SORBY, F.R.S., F.G.S., etc.

IN July 1856, I made a short communication to the Geological and Polytechnic Society of the West Riding of Yorkshire on this subject, which was printed in the Proceedings of that Society at the time. As, however, the publication in which it appeared has been long out of print, and is now rarely met with, and as the opinions therein expressed have not in any way been modified, it may be an advantage to repeat what was then stated, at the same time adding a note giving results of subsequent observations.

The investigation of the circumstances that have given rise to the various rocks that are met with, constitutes a branch of Geology of considerable interest. It has too frequently been supposed that stratified rocks were accumulated in a form far more like what they are now, than is warranted by a more careful enquiry; and this has, in many cases, led to the conclusion that the conditions under which they were found, were unlike those occurring at the present period; whereas they may, perhaps, have been exactly the same, and the difference in the aspect of the rocks brought about by a subsequent change of the same nature as must also now take place in many localities. The case before us is an example of this. The Cleveland Hill ironstone, now so extensively worked at Eston, near Middlesborough, is composed, to a very great extent, of carbonate of iron, and yet it can scarcely be supposed that such a deposit could be formed in any modern sea; because, owing to the strong affinity of the protoxide for oxygen, it would be accumulated as the peroxide. Besides this, I am not aware that there is any sea in which any great amount, even of this, is now deposited, except with a very considerable quantity of other substances mixed with it; its chief source being the decomposition of such silicates as the augite and hornblende of various traps and hornblendic schists, which, in some cases, would yield a clay containing one-third of its weight of this oxide.

If the stone be carefully examined, it may be seen that it contains more or less entire portions of shells. In some cases these are still of their original composition, and consist of

* Read at the Guisborough Meeting of the Yorkshire Naturalists' Union.

carbonate of lime, but in others they are changed to carbonate of iron ; the difference being apparently due, in some instances at least, to the kind of shell. The microscopical investigation of a thin transparent section of the stone shows far more clearly that the minute fragments of shell have been similarly altered ; the replacing carbonate of iron extending, as yellowish obtuse rhombic crystals, from the outside to a variable distance inwards, often leaving the centre in its original condition, as clear colourless carbonate of lime, though in many instances the whole is changed. The oolitic grains likewise, have such peculiarities as indicate that they were altered after deposition.

In order to illustrate this fact of the replacement of carbonate of lime by carbonate of iron, I subjoin an analysis of a shell from the inferior oolite of Robin Hood's Bay, the composition of which, as dried at the ordinary temperature, I found to be :—

Carbonate of protoxide of iron	...	...	...	...	78.0
" lime	...	...	...	...	5.2
" magnesia	...	...	...	...	3.1
Peroxide of iron	...	...	...	...	10.9
Water	...	...	...	...	2.1
Carbonaceous matter	...	...	...	...	0.1
Quartz substances	...	..	...	..	0.6
					100.0

Originally, such a shell would be composed almost entirely of carbonate of lime, with only a small quantity of other mineral substances, and no iron ; but, as will be seen, it is now almost entirely carbonate of iron, with some hydrous peroxide, no doubt due to the action of the atmosphere. The peculiarities in microscopical structure, already described, prove that the same change has occurred in the case of a large proportion of the constituents of the Cleveland Hill ironstone ; and, according to the view I propose to explain its general constitution, all that is assumed is that it did also in a similar manner affect the more finely grained particles, which do not, and could not present such facts as actually prove it to have been so, and yet would be more perfectly exposed to such a process of alteration. The general appearance of the stone agrees remarkably well with this supposition ; for, when examined with the microscope, it is seen to be extremely like many limestones in all such particulars as are compatible with the subsequent alteration, being oolite, with small fragments of shells and patches of finer granular matter, as is the case in many oolitic limestones.

I will not enter into a detailed description of its chemical composition, for that has been so ably treated of by others. I would especially refer to the excellent analysis published on the Iron Ores of Great Britain, part 1 of the Memoirs of the Geological Survey. On comparing together the amounts of the various constituents there given, it may be seen that the rock consists chiefly of the carbonate and some of the silicate and phosphate of the protoxide of iron, along with a much smaller quantity of the carbonate of lime and magnesia, and some alumina and peroxide of iron. Independent, then, of the silica and alumina resulting from the clay so commonly found in limestones, and the phosphate of iron, the general composition is very similar to that of the altered shell already described; so that, as far as the chemical composition is concerned, the same circumstances that *must* have altered the shell, *may* have changed an ordinary limestone into such a rock, in the manner indicated by the microscopical structure to have really been the case.

The silicate and phosphate of iron, to which the rock owes its green colour, have been most probably formed by the same process, from the decomposition of the phosphate of lime, so often found in limestones, and the silicate of alumina of the clay for phosphate of iron is produced by the action of bicarbonate of iron on phosphate of lime, and many facts indicate that the silicate of iron could be thus derived, either by the direct replacement of the alumina of the clay by the protoxide of iron, or by the decomposition of silicate of lime. This does occur in some limestones, and may have been formed from ordinary clay, by the action of the sulphate or hydrate of lime, which are met with in the recent limestones or coral reefs.

The general conclusion that I therefore draw from these facts is, that, at first, the Cleveland Hill ironstone was a kind of oolitic limestone, interstratified with ordinary clays containing a large amount of the oxides of iron, and also organic matter, which, by their mutual re-action, gave rise to a solution of bicarbonate of iron—that this solution percolated through the limestone, and, removing a large part of the carbonate of lime by solution, left in its place carbonate of iron; and not that the rock was formed as a simple deposit at the bottom of the sea.

P.S., May, 1906. It may be well here to say that it seems to me that the amount of iron oxide in the associated non-calcareous beds would in all probability be quite adequate to supply that now found in the ironstone.

Since writing my original papers I devoted much attention

to the production of artificial pseudomorphs, especially including those in which carbonate of lime is replaced by carbonate of iron. Crystals of calcite or portions of Iceland spar were sealed up in tubes with a neutral solution of iron protochloride and heated to various temperatures. Kept for a few weeks in the boiler of a high pressure steam engine, at a temperature somewhat under 300° F. replacement was somewhat rapid, and pseudomorphs were formed as hard as any similar natural product. Kept much longer in a boiler at a temperature varying up to 212° F. the replacement was slower, and the pseudomorphs much more tender. I sealed up a piece of Iceland spar in a glass tube so full of the chloride that there was a mere trace of air left, and after keeping for a few years the replacement was so small that I came to the conclusion that it did not take place at the ordinary temperature, but on re-examining after thirty-six years, though the amount of replacement was small, there could be no doubt about its having occurred. This shows the importance of such long-continued experiments, and proves that the changes met with in the Cleveland ironstone may have taken place at the ordinary temperature of the rocks.

On making a microscopical section of one of the pseudomorphs, it was seen to have the same sort of structure as that seen in the partially changed shells in the ironstone.



A paper on Yorkshire Lake Dwellings by Mr. T. Shepard appears in 'Yorkshire Notes and Queries' (Vol. 3, No. 4).

The Geologists' Association has received a grant of £50 from the Royal Society towards the cost of publishing Dr. Rowe's papers on the Chalk of England.

'A Revised Key to Hepatics of the British Isles,' by Symers M. Macvicar, has been issued by V. T. Sumfield, Station Street, Eastbourne, for 9d. This should be useful to students of the Liverworts.

The report and proceedings of the Manchester Field Naturalists' and Archæologists' Society for 1905, recently issued, is an improvement upon previous reports, but still leaves much to be desired. Advertisements for millinery, furniture, etc., should not adorn its pages.

In *The Entomologist* (volume 39, No. 515) Mr. Richard South has some 'Notes on some forms of *Aplecta nebulosa* in Britain.' These are illustrated by a fine plate showing the extensive colour range of variation to which the species is subject in Britain. Most of the examples figured are from Delamere Forest, Cheshire.

As his presidential address to the Museums' Association, Dr. W. E. Hoyle, of the Manchester Museum, took for his subject 'The Education of a Curator.' This address is printed in a recent issue of the *Museums' Journal*, from which we learn that amongst many accomplishments a curator 'should be an unscrupulous and shameless beggar!' Dr. Hoyle's address has been reprinted as 'Notes from the Manchester Museum' No. 21" (publication 60), price sixpence.

ARCTIC BIRDS WITH BROWN OR BLACK UNDERPARTS.

S. L. MOSLEY, F.E.S.

SEVERAL Arctic shore birds undergo a remarkable change from white in winter to hazel-nut brown or black in summer. This change is mostly on the under-parts. I have been conducting some experiments with a view to ascertaining the reason for these remarkable changes.

The following species have the under-parts pure white in winter and nut-shell or chestnut-brown in summer:—Black-tailed Godwit, Bar-tailed Godwit, Knot, Brown Snipe, Curlew Sandpiper, Grey- and Red-necked Phalaropes.

The following have the under-parts black in summer:—Grey Plover, Golden Plover, and Dunlin. All these, except the two last, are arctic birds; and they are alpine, which, climatically, is the same thing.

The well known facts concerning the colours of clothing materials as regulating the loss of heat, suggested the idea that in these regions of excessive cold every advantage which secures an extra degree of heat during incubation will be taken advantage of by Nature and propagated, and that the coloured under-parts might conduct the heat from the sitting bird to the eggs better than white.

The mercury bulb of a thermometer was surrounded with several thicknesses of cotton cloth and firmly grasped in the palm of the hand. Care was taken that each cloth was of a similar thickness and texture.

White,	1st minute	mercury rose	$8\frac{1}{2}^{\circ}$,	2nd minute	$1\frac{1}{2}^{\circ}$	more.
Red,	„	„	$9\frac{1}{2}^{\circ}$,	„	2°	„
Black,	„	„	$10\frac{1}{2}^{\circ}$,	„	$2\frac{1}{2}^{\circ}$	„

The bulb was then wrapped in cloths, as before, and held against an 8-candle electric lamp, with the following results:—

White,	1st minute	mercury rose	$10\frac{1}{2}^{\circ}$,	2nd minute	11°	more.
Red,	„	„	$11\frac{1}{2}^{\circ}$,	„	10°	„
Black,	„	„	$14\frac{1}{2}^{\circ}$,	„	12°	„

It will thus be seen that the red shows a distinct advantage over the white, and the black over the red in the transmission

of heat. The coloration is confined mainly to the under-parts ; if it extended to the upper-parts in the same degree it would render the bird too conspicuous. The males and females change alike, and in most cases both take part in incubation.

[A point worthy of note in this connection is that these colour changes coincide with those internal physiological changes which precede the maturation of the sex cells, and these in turn with changes both in kind and quantity of food supply as between winter, spring, and summer. It would be interesting to follow up the enquiry in order to determine to what extent these are coincident or determining factors.—EDS.]

FLOWERING PLANTS.

Botany.—While rambling the Cragg Valley on July 15th, with Mr. Carter, Schoolmaster, we discovered *Thalictrum flavum* L., and as there is but one record of this plant in the Calder Valley, Flora of Halifax and Lee's Flora of West Yorkshire, it is one that is worthy of notice.—ARTHUR BINNS, Sowerby, September 18th, 1906.

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BIRDS.

Albino Carrion Crow (?) in Wharfedale.—On August 10th I saw a large white bird on the slope of Burnsall Fell, which I should have taken to have been an albino Rook. In conversation, however, with the local gamekeeper (a very intelligent man), he informed me that there was a perfectly white Carrion Crow about, and that it was a bird of the year, one of a nest of four, the other three young birds being in normal plumage. He had endeavoured to shoot it, but on the only occasion that it had been within gunshot he did not happen to have his gun with him.

I am reporting this occurrence for two reasons. Firstly, because if it should be an albino *Corvus corone*, it is of extreme rarity, in fact I have never heard of one before, although single specimens of reddish-fawn, brindled-grey, and brown and buff have been recorded. Secondly, because this conspicuous bird will probably sooner or later fall a victim to the gun, and it will be interesting to note whether it will remain in Wharfedale, or in what part of the country it will be shot.—H. B. BOOTH, Spring Royd, Shipley, August 20th, 1906.

P.S.—This bird has not been seen in Burnsall for a month now.—H. B. B., September 18th, 1906.

ON BRITISH DRIFTS AND THE INTERGLACIAL PROBLEM.

(EXTRACTS FROM THE ADDRESS TO THE GEOLOGICAL SECTION,
BRITISH ASSOCIATION, YORK.)

G. W. LAMPLUGH, F.R.S.,
President of the Section.

(Continued from page 317.)

Local Shrinkage in the Ice-sheets.—There are many indications, especially in the Midland Counties and along the southern margin of the glaciated region, that the several lobes and tongues of ice of the Glacial Period in Britain did not all attain their maximum development at the same time, but that while some were creeping forward, others were shrinking back. To a certain extent this result may have been brought about simply by changes in the currents as the ice-sheets overwhelmed their erstwhile confining rims of bare land and opened up fresh avenues of discharge.

It appears to me, however, that the prime factor lay in the displacement of the areas of greatest precipitation during the course of the Glacial Period.* As the plateaus of ice rose higher in the path of the moisture-laden air-currents they must have gained increased effectiveness as condensers, thereby not only augmenting the snowfall in one quarter, but also diminishing the precipitation in the region to leeward. Hence I imagine that there would be a persistent tendency for the great ice-sheets of Western Europe to thicken and spread more rapidly toward the west than toward the east, until finally the eastern portions were shrunken for want of sustenance, while the westerly lobes were still waxing thicker and stronger. The recent researches of Mr. F. W. Harmer into the probable meteorological conditions of the Glacial Period † are full of suggestion in their bearing upon the changes which must have been brought about by the expansion of the ice-sheets. The subject is one of peculiar difficulty, but I believe that the solution of many of the problems connected with the Glacial Period are to be found along the lines of Mr. Harmer's investigations.

* *Glacialists' Mag.*, vol. i. No. 11 (1894), p. 231; and *Mem. Geol. Survey*, 'Isle of Man' (1903), p. 395.

† 'The Influence of Winds upon Climate during the Pleistocene Epoch.' *Quart. Journ. Geol. Soc.*, vol. lvii. (1901), pp. 405-476.

In considering this factor it is also especially interesting to find that Captain R. F. Scott is of opinion that the great shrinkage in the Antarctic land ice, of which he obtained such convincing evidence during the recent expedition, is due to the present excessive coldness, and consequent dryness, of the climate; and he assigns the former extension of the southern ice-sheets to a period of warmer and moister conditions.* It would have been easy, had time permitted, to bring together numerous illustrations from Polar lands to show how strongly localised in many places are the conditions of existing glaciations; and such conditions must have been still more effective at lower latitudes. Hence we can readily imagine that, during the Glacial Period, differential growth and shrinkage might be brought about concurrently in areas not very wide apart, by local circumstances.

Waning Ice-sheets.—So far as the eastern side of England is concerned, I think that the epoch of maximum glaciation was reached, not when the East British lobe pressed farther westward, but when the Pennine and North British ice advanced southward along its receding flank; and this stage is, I presume, equivalent to the 'Polandian Glacial Epoch' of Professor Geikie's classification. It was at this time that the ice lapped highest around the slopes of the Jurassic and Cretaceous uplands of Yorkshire, causing that radical diversion of the surface-drainage which produced the remarkable effects first made known to us by the brilliant researches of Professor P. F. Kendall in Cleveland, † and since traced by him and his fellow-workers at intervals wherever the margins of the ice-sheets have abutted against the slope of the land.

Farther southward this ice, augmented by the snowfall on its own broad surface, appears to have spread over the lower ground far beyond the bounds of the former invasion, covering most of East Anglia and the East Midland counties with a moving ice-cap, beneath which the Chalky boulder-clay was accumulated. The Upper boulder-clay of Yorkshire I consider to be the product of the same ice-sheet at its waning.

This final waning of the British ice-sheets, as I have elsewhere attempted to show, ‡ must have been accompanied by

* 'Results of the National Antarctic Expedition.' *Geograph. Journ.*, vol. xxv. (1905), p. 306.

† 'A System of Glacier-Lakes in the Cleveland Hills.' *Quart. Journ. Geol. Soc.*, vol. lviii (1902), pp. 471-571.

‡ 'The Geology of the Isle of Man.' *Mem. Geol. Survey* (1904), pp. 395-7.

conditions very different from the waxing stages. It appears from the evidence that the great ice-plateaus still lingered in their basins even after the amelioration of the climate had progressed so far that no permanent snow could remain on hills that rose considerably above their level. Deprived of reinforcement, and wasting ever more rapidly as their surfaces were brought lower, the lobes must in all their embayments have passed into that condition of 'dead ice' with which the explorers of Polar regions have made us familiar. The 'englacial' load of detritus which the ice was powerless farther to transport was gradually dropped to the ground, and often modified and spread by gravitational movement in the saturated mass.* The peculiar features of the upper part of the lowland drifts were thus explained many years ago by the late J. G. Goodchild in his luminous description of the glacial deposits in the Vale of Eden,† and his conclusions have been supported by the researches of Dr. N. O. Holst in Southern Greenland, where there was found to be the same difference between the unoxidised ground-moraine and the overlying oxidised material of 'englacial' origin as between the lower and upper boulder-clays in areas of ancient glaciation.‡ In adopting this explanation we must recognise that the uppermost boulder-clay of an extensive area was not formed at exactly the same time in every part, but was accumulated progressively as a marginal residue during the emergence of the land from its icy cloak.

Late Glacial and Post-Glacial Deposits.—Of the glacial and interglacial epochs of Professor Geikie's scheme later than the 'Polandian' it is admitted that no indication has been found in Yorkshire. There seems, on the contrary, to be evidence of steady amelioration in the climate, as the glacial deposits opposite the mouths of the Wold valleys are overlain, first by great deltas of chalky gravel, denoting torrential floods, probably from the seasonal melting of heavy snows; and then, in the hollows of these gravels, or of the boulder-clay itself, we

* The flow of loose material at the surface when saturated by water has been recently studied by J. G. Anderson (Upsala), who cites many remarkable illustrations of the phenomenon, and proposes to apply to it the term 'solifluction.' *Journ. Geol.*, vol. xiv. (1906), pp. 91-112.

† 'Ice Work in Edenside.' *Trans. Cumberland Assoc.*, No. 12 (1886-7), pp. 111-167.

‡ 'Dr. N. O. Holst's Studies in Glacial Geology,' by Dr. J. Lindahl, *American Naturalist*, Aug. 1888, pp. 705-712. It should be noted, however, that Professor R. D. Salisbury did not find this difference apparent in the moraines of North Greenland Glaciers. See *Journ. Geol.*, vol. iv. (1896), pp. 806-7.

find freshwater marl and peat that were deposited in the many lakelets and marshes that dotted the Holderness plain ; and in the lower layers of certain of these freshwater deposits the leaves of the arctic birch (*Betula nana*) have been detected, † indicating a climate colder than at present.

In East Yorkshire, then, we appear to have a continuous record of the events from the beginning to the end of the Glacial Period ; and yet, if I read the sections aright, we can find no place into which a single mild interglacial epoch can be intercalated.

Let us now more briefly consider certain glaciated areas within the influence of the ' West British ' ice-lobe which I have personally investigated.

DRIFTS OF THE ISLE OF MAN.—From its isolated position in the midst of the Irish Sea, the Isle of Man constitutes an excellent gauge or glaciometer, on which is recorded the course of events within the basin occupied by the West British ice-lobe. In carrying out the geological survey of this island I made a close examination of its glacial deposits in every part, and have stated the results rather fully in a recently published memoir.

We find here, as in Yorkshire, that prior to the glaciation there was a sea-margin at approximately its present level, and where the coast is composed of ' solid ' rocks, in approximately its present position. In this sea, marine deposits indicative of cold conditions were accumulated, and were afterwards displaced and mingled with the boulder-clay of an ice-sheet that gradually filled the basin and swept southward, or south-south-eastward, over the very summit of the island. At its maximum the surface of this ice-sheet stood more than 2000 feet higher than present sea-level. The difference between the altitude attained by this ice and that of the East British lobe in the same latitude is especially noteworthy. In Yorkshire the eastern ice did not reach much above 800 feet on the flanks of the Cleveland Hills, declining to 500 feet or under off Flamborough Head. The higher land which surrounds the Irish Sea Basin may be in part responsible for this difference, but I think that it must have been mainly due to the heavier precipitation in the west.

Then followed a declining stage in the glaciation, during

* By Dr. A. G. Nathorst, at Bridlington ; and by C. Reid, at Holmpton. ' Geology of Holderness,' pp. 78 and 85.

which the ice-sheet shrank away from the hills, which were never again covered. Owing to local circumstances that are readily recognisable, the recession of its margin was relatively accelerated in the northern part of the island, so that a broad hollow was formed there between the hills and the ice-border; and in this hollow a mass of stratified drift was deposited. From its terraced aspect and the occurrence of scattered shells, I thought at first that this deposit might be of marine origin; but examination in detail convinced me, as it had previously convinced Professor P. F. Kendall,* that the phenomena could only be explained by regarding the stratified material as marginal 'overwash' from the ice-front. As in Yorkshire, the association of the boulder-clays with the stratified drift is in most places so intimate that again the evidence for the continuous presence of the ice-sheet in the surrounding basin seems irrefragable.

Following closely upon this local deposition of stratified drift, there appears to have been a limited re-advance of the ice, which brought about the accumulation of an upper boulder-clay on parts of the low ground. But, unlike the Upper Clay of Yorkshire, this bed lies well within the limits of the lower clays, both in extent and elevation; and it seems to denote only a slight augmentation of the persisting ice-sheet, which was thus enabled to close in again upon the lower flanks of the hills.

The end of the glacial invasion was marked by similar conditions to those found in Holderness. Great fans of flood-gravel were spread out around the mouths of the upland glens; and the hollows in the drift-plain were occupied by lakelets, now mostly obliterated by an infilling of marly and peaty sediments. Among the plants found in a bed near the base of one of these hollows is a northern willow (*Salix herbacea*), along with the remains of a minute arctic freshwater crustacean (*Lepidurus glacialis*); and similar remains were also found in a peaty layer interbedded with the flood-gravels.

Here, then, is another area in which the drifts are fully developed and magnificently exposed in cliff sections, but still yield no proof of the supposed interglacial epochs or of the marine submergence.

[Mr. Lamplugh next shows that analogous results were obtained from four separate areas in Ireland which he had personally investigated; and he then proceeds to discuss the

* 'On the Glacial Geology of the Isle of Man.' *Yn Lioar Manninagh*, vol. i. pt. 12, pp. 397-438.

drifts of other areas in England and Scotland, where beds of supposed Interglacial age have been described. His concluding summary is as follows]—

SUMMARY.

My subject has proved unwieldy ; and in merely sketching its outlines I am uneasily aware that I have overstepped the usual bounds of an Address. My conclusions—if the term be applicable to results mainly negative—are as follows :—

1. In the present state of opinion regarding the glacial sequence and its interpretation in North Europe, it is premature to attempt the arrangement of the British drifts on this basis.

2. No proof of mild interglacial epochs, or even of one such epoch, was discovered during the examination of certain typically glaciated districts in England, Ireland, and the Isle of Man ; and the drifts in these areas yielded evidence that from the onset of the land ice to its final disappearance there was a period of continuous glaciation, during which the former sea-basins were never emptied of their ice-sheets.

3. The 'middle glacial' sands and gravels of our islands afford no proof of mild interglacial conditions or of submergence. In most cases, if not in all, they represent the fluvio-glacial material derived from the ice-sheets.

4. The British evidence for the Interglacial hypothesis, though requiring further consideration in some districts, is nowhere satisfactory. Most of the fossiliferous beds regarded as interglacial contain a fauna and flora compatible with cold conditions of climate ; and in the exceptional cases where a warmer climate is indicated, the relation of the deposits to the boulder-clays is open to question.

5. The British Pliocene and Pleistocene deposits appear to indicate a progressive change from temperate to sub-arctic conditions, which culminated in the production of great ice-sheets, and then slowly recovered.

6. During the long period of glaciation the margins of the ice-lobes underwent extensive oscillations, but there is evidence that the different lobes reached their culmination at different times, and not simultaneously. The alternate waxing and waning of the individual ice-sheets may have been due to meteorological causes of local, and not of general influence.

Let me add, in closing, that it would have been a more gratifying task if, instead of probing into these outstanding uncertainties, I had chosen to deal only with the many and

great advances that have been made during the last twenty-five years in the domain of British glacial geology. With these advances we have, indeed, reason to be well satisfied. But the necessity for further knowledge is insistent; and it is useless to set about the solution of our intricate problem until we have all the factors at command. Even then—'Grant we have mastered learning's crabbed text, Still there's the comment'—and, as I have tried to show, the comment may raise more difficulties than the text itself.



Dr. A. C. Haddon, F.R.S., has just written a clever work, 'Magic and Fetishism.' It is a useful introduction to the subject, and is published by Messrs. Constable & Co., at one shilling.

Referring to our note on p. 200 in reference to the status of *Thyamis curta* as a British insect, Mr. E. G. Elliman writes to the *Entomologist's Monthly Magazine* still claiming the insect as British.

Under the heading 'My Country Diary,' in a recent issue of *The Animal World*, a F.R.H.S., M.B.O.U., etc., and author of many volumes, tells the old story of the 'graminivorous' student who threatened to eat Cuvier. The story is prefaced by the words: 'What I really wanted to tell was a good story in connection with Cuvier, who, I believe, was a French Naturalist.'!

In a paper on the Fauna of the Trimmingham Chalk, by R. M. Brydone (*Geological Magazine* for July), several new species of Polyzoa are described. In connection with these the author perpetuates the memory of his various friends and fellow workers. Amongst the specific names added to scientific literature in this paper are *Griffithi*, *Trimminghamensis*, *Britannica*, *Mundesleiensis*, *Canui*, *Rowei*, *Sheborni*, *Dibleyi*, *Jukes-Browni*, *Batheri*, *Woodsi*, *Pergensi*, and *Gregoryi*!

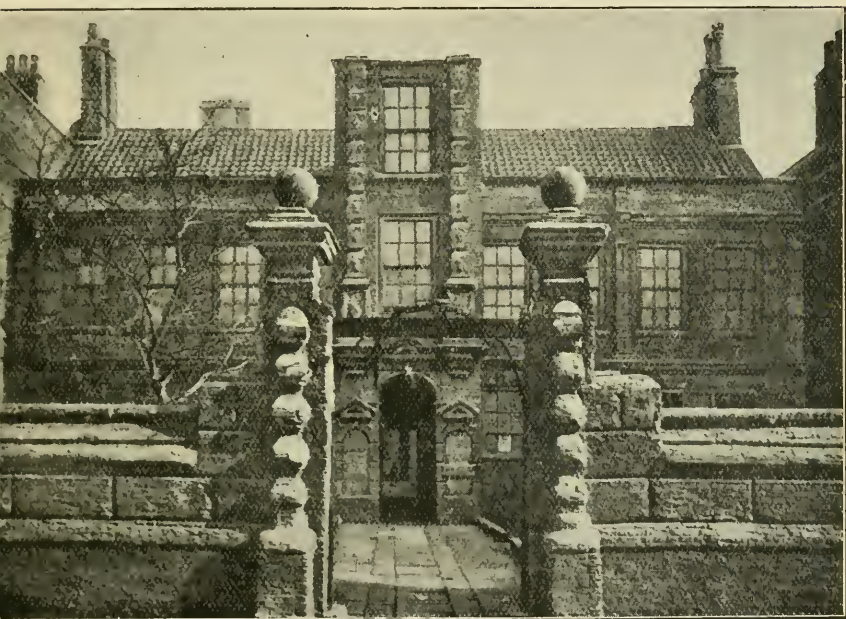
The recent number of the *Entomologist's Monthly Magazine* contains the following items of interest to northern naturalists: 'A new British Arctiid' from Carnforth; 'A new species of *Phora* (*P. papillata*) and four others new to the British list,' from Durham; an Ant (*Formicoxenus nitidulus*, Nyl) new to Northumberland and Durham; in a paper on 'Additions and Corrections to the British list of Hymenoptera,' *Pompilus approximatus* is recorded for E. Cumberland; *Epurea angustula*, Er., is recorded for the Northumberland and Durham district; *Carpophilus sexpustulatus* F., restored to the British list (on the evidence of specimens near Doncaster).

A writer on 'East Coast Holiday Notes' in the *Yorkshire Post* says that 'Nature study is another form of recreation—and a very wholesome one—which is becoming common on the coast. Botany is a favourite study, and nearly as popular as geology. Any day you will find parties of fossil hunters searching the cliffs about Flamborough, Hornsea, or Whitby. The knowing ones return to their favourite kitchen middens annually for specimens of Roman pottery; the philosophers of the Geological Societies tramp many a mile to find fresh exposures of the earth's crust; and experts are continually investigating the Scandinavian Boulders that are strewn about our beach. Philistines often ask what manner of men those are in their private work-a-day lives, and they generally set them down as amiable enthusiasts. At a British Association conversazione at York, a young lady was heard to say that "Pa was an excellent geologist—for a gentleman," and now comes the horrible thought that geology and gentlemen may after all have little in common'!

HULL'S NEW MUSEUM.

ON August 24th, the anniversary of the birth of William Wilberforce, the Earl of Liverpool opened Wilberforce House at Hull as a public museum and memorial.

Wilberforce House is an Elizabethan building in red brick, and is situated in High Street, at one time Hull's principal thoroughfare. Built by Sir John Lister at the close of the 16th century, it has played an important part in the history of the town. Charles I. was entertained there, and in 1759 William Wilberforce, who became Member of Parliament for



Wilberforce House.

Hull, and later for the county of York, and did so much in connection with the abolition of slavery, was born there. In Georgian times the building was considerably altered and enlarged; consequently, from an architectural point of view, it represents two distinct periods. In recent years it was let off as offices, and considerably mutilated. Some time ago Councillor J. Brown, the Chairman of the Museums Committee, took an interest in the house, and eventually was the means of its being secured for the city and transformed into a museum devoted

to the exhibition of relics of Wilberforce, and of objects illustrating the history of Hull from earliest times. Only part of the building has as yet been opened to the public. Every possible care has been taken to have it restored in the proper sense of that much abused word. Several coats of paint have been removed from the oak panelling, modern partitions and other additions have been taken away, the result being that in its present condition the house as nearly represents what it was in Wilberforce's time as possible.

The Curator, Mr. Sheppard, has been exceedingly fortunate in gathering together so goodly a number of suitable objects for exhibition. The small room in which Wilberforce was born contains nearly fifty portrait engravings, as well as a beautiful oil painting by Richmond. Another room is devoted to autograph letters of various Hull worthies; letters, bills, election cards, etc., of Wilberforce, and views of old Hull. Another contains a collection of Hull seals, coins, tokens, medals, keys, and various other antiquities relating to the city. A number of valuable documents, including a volume of letters of Hull's 'incorruptible patriot,' Andrew Marvel, have been removed from the Town Hall. Perhaps the most interesting room is that containing a collection of implements, paintings, engravings, etc., relating to the old Hull whaling industry. This series is an exceptionally complete one, principally through the generosity of Lord Nunburnholme, who recently presented a number of harpoons, harpoon-guns, flensers, blubber-knives, spades, etc. (see Plate XXVIII.).

At the opening ceremony was a very representative gathering, and an admirable address was given by the Earl of Liverpool. Other speakers were the Earl of Carrington, Sir Alfred Gelder, Sir James Reckitt, Mrs. Arnold Reckitt (*née* Wilberforce), Mr. W. B. Wilberforce, Alderman Hall, Alderman Cohen, and Councillor J. Brown. Several members of the Wilberforce family were also present.

Admission is Free on Week-days and Bank Holidays. The Committee will welcome any gifts of articles and literature relating to the slave trade and the Great Emancipator, such as at all times can be reported to the Curator or Chairman of the Committee.

The *Eastern Morning News* devoted two pages to an account of the opening ceremony, with illustrations, together with special articles bearing on the subject, and these have been reprinted in pamphlet form as Hull Museum Publication No. 34.



A Corner of the 'Whaling' Room.



View in one of the Oak Panelled Rooms.

Wilberforce Museum, Hull.

YORKSHIRE NATURALISTS AT ASKERN.

JULY 12, 1906.

THE hundred and ninety-sixth meeting of the Yorkshire Naturalists' Union was held at Askern on Thursday, July 12th, and certainly the suitability of choosing a Thursday for an excursion in this district was proved by the fact that over eighty members and associates, including representatives from sixteen societies, were present. As usual, the weather was most favourable, the routes traversed by the various sections were through a charming country, the arrangements made by the divisional secretary were all that could be desired, and in every way the excursion was pleasant and profitable. The geologists, as is nowadays their wont, found that the geology of the district was by no means 'worked out,' many important problems still require solution, and the sections visited near Askern are not at all so easy of explanation as they apparently were, say twenty years ago. The botanists, entomologists, and others, after numerous visits, still find a charm in following their pursuits, and are able to add new facts to our knowledge of the fauna and flora of the area. Details of these were given at the well attended meeting in the garden in front of the Spa Hydro at Askern. Mr. W. Denison Roebuck presided at this, and details of the reports presented are given hereafter. At this meeting the Union was further strengthened by the affiliation of the Doncaster Grammar School Natural History Society, this making a total of forty-one societies now affiliated.

GEOLOGICAL SECTION.—Mr. H. CULPIN writes :—The principal object of interest to the Geological Section was the large gravel and sand pit on the south-west slope of Askern Mount. A great thickness of coarse magnesian limestone gravel, ranging from large sub-angular blocks to well-rounded small pebbles, with lenticular patches of sand, rests on beds of sand. The gravels are probably of Glacial age, but they have not travelled far. The sand is Triassic in appearance, and suggests a pre-Triassic valley similar to the one south-west of Doncaster. The gravels overlook a valley to the south.

At Burghwallis, $1\frac{1}{2}$ miles south-west by west of the Askern pit, is a deposit of well-rounded magnesian limestone pebbles plentifully intersprinkled with sand. This deposit lies on the upper magnesian limestone, and also overlooks a valley to the south.

At Campsall, $1\frac{1}{4}$ miles north-west by west of the Askern pit, and in Campsmount Park, a quarter mile further to the north-

west, are two gravel and sand pits. The Campsall pit shows a bed of yellow sand, above which is a red sand strongly suggestive of Trias. The whole is topped with magnesian limestone gravel containing sub-angular blocks. In Campsall Park there are 8 feet of well-rounded magnesian limestone pebbles resting on 2 feet of a greyish white sand, below which is a foot of 'head,' and then the solid upper magnesian rock. Here the sand is evidently of the same age as the pebbles.

About a mile further to the north-west, or $2\frac{1}{2}$ miles from the Askern pit, is the Sheep Cote Upper Limestone Quarry, on the south side of the Went Valley. On the slope immediately west of this quarry is a magnesian limestone gravel pit, with some sand intermingled with the pebbles. The gravel forms a tongue, and is bordered on its western edge by a deserted over-flow channel of the crescentic or 'in-and-out' type. Half-a-mile to the west, at Westfield Farm, is another gravel pit of well-rounded limestone with sand. It lies on the lower magnesian limestone just below the 100 feet contour, or at about the same level as the Sheep Cote gravel.

On the north bank of the Went, near Kirk Smeaton Station, $2\frac{3}{4}$ miles north-west of the Askern pit, is a large gravel pit, consisting almost entirely of magnesian limestone similar to that at Askern. This gravel also lies to the west of solid upper magnesian limestone rock, and is on a slope overlooking the Went Valley to the south. A few Carboniferous grit pebbles were noted in this pit.

In the course of the afternoon a careful, but fruitless, search for fossils was made in the upper limestone at Town's Quarry, Lane Ends, Norton. Many fossiliferous blocks were noticed in the gravels.

A considerable amount of attention was paid to the Askern Mount. This is a ridge of upper magnesian limestone with easterly dips of 12° to 15° . It is evidently an anticline, the western side of which has been denuded, leaving an escarpment below which the sand and gravels have been subsequently deposited.

ORNITHOLOGY.—Mr. A. WHITAKER writes:—A full list of species of birds seen was not made. The most interesting of those which were noted were the Hawfinch and Grasshopper Warbler. Mention may also be made of the Common Snipe, Reed Bunting, Waterhen with young, Ring Dove and nest containing two eggs, and Sedge Warbler. The latter bird was particularly abundant.

For the CONCHOLOGICAL SECTION the report was given by Mr. John W. Taylor. The work of the day had been done by himself, Mr. W. Denison Roebuck, F.L.S. (president of the section), and Mr. W. H. Hutton, all of the Leeds Conchological Club, and Mr. J. W. Hart of Doncaster, and some specimens were brought by Mr. E. G. Bayford and Mr. H. H. Corbett. The district is to some extent classic land, for many of the Yorkshire Conchologists have at one time or another visited Askern. Most of the day's collecting was done in Campsall Park, the ditches intersecting it and the large pool yielding *Limnæa peregra*, *L. auricularia* in its characteristic young stage, *Physa fontinalis*, *Planorbis albus*, *Pl. vortex*, *Pl. complanatus*, *Pl. carinatus*, *Bythinia tentaculata*, *B. leachii*, *Valvata piscinalis* var. *acuminata* (the best find of the day), *Succinea putris*, *Anodonta cygnea* var. *arenaria*, *Unio tumidus*, *Sphaerium corneum*, *Pisidium fontinale*, and *P. obtusale*. Of land shells the only ones seen in Campsall Park were *Patula rotundata* and *Vallonia pulchella*, and of slugs—it being so very dry—only *Agriolimax agrestis*, an *Arion ater*, and tracks on beech trunks referable to *Limax arborum*. Round the pool at Askern *Helix aspersa* and *H. cantiana* were abundant, and Mr. Bayford brought *H. caperata* var. *bizonulalis* (fine), and *Cochlicopa lubrica* from Kirk Smeaton.

Later in the day the mole hills in the low-lying fields were searched, and the following species collected of sub-fossil shells: *Limnæa palustris* (fine and large), *L. peregra*, *L. truncatula*, *Planorbis corneus*, *Pl. complanatus*, *Pl. spirorbis*, *Pl. vortex*, *Bythinia tentaculata*, *Valvata cristata*, *Sphaerium corneum*, *Succinea putris*, *Helix nemoralis*, *H. hispida*, *Vallonia pulchella*, *Hyalinia crystallina*, and *Cochlicopa lubrica*.

The total enumeration sums up to thirty-three species in all, of which eight were found in the sub-fossil state only, seventeen in the living state only, and eight in both. The best find of the day was the fine example of the var. *acuminata* of *Valvata piscinalis*.

For the ENTOMOLOGICAL SECTION (Lepidoptera) Mr. A. WHITAKER reports:—A number of common Butterflies and Moths was noted, *E. ianira* being greatly in evidence, and specimens of *Hyperanthus* being also noticed. The most interesting 'find' was a specimen of *D. furcula*, which was beaten from an alder tree in the bog (raising for an instant wild hopes that it might prove to be *bicuspis*!). The specimen was a female, and has laid some thirty ova since its capture.

A few Hymenoptera were collected by Mr. Corbett, and have been submitted to Mr. Claude Morley, who identifies the Ichneumons as ♂ *Ichneumon confusorius* Gr. and ♀ *Glyphicnemis suffolciensis* Morl., the last-named not having hitherto been put on record for the British Isles.

Mr. E. G. BAYFORD writes :—The Coleopterists were well represented. Kirk Smeaton, Campsall Park, and Askern were visited. The following is a list of the species met with :—

<i>Leistus ferrugineus</i> L.	<i>Stenus nitidiusculus</i> Steph.
<i>Elaphrus riparius</i> L.	† <i>Platystethus arenarius</i> Fourc.
<i>Stomis pumicatus</i> Panz.	<i>Oxytelus rugosus</i> F.
<i>Pterostichus madidus</i> F.	„ <i>tetracarinatus</i> Block.
„ <i>vernalis</i> Panz.	<i>Homalium excavatum</i> Steph.
<i>Amara apricaria</i> Payk.	† <i>Proteinus ovalis</i> Steph.
<i>Calathus cisteloïdes</i> Panz.	† <i>Bythinus puncticollis</i> Denny.
„ <i>melanocephalus</i> L.	<i>Adalia bipunctata</i> L.
<i>Tuphrius nivalis</i> Panz.	<i>Coccinella 10-punctata</i> L.
<i>Trechus minutus</i> F.	„ <i>7-punctata</i> L.
<i>Patrobis excavatus</i> Payk.	<i>Halyzia 22-punctata</i> L.
<i>Haliphus ruficollis</i> De G.	<i>Coccidula rufa</i> Herbst.
„ <i>lineatocollis</i> Marsh.	* <i>Dacne humeralis</i> F.
<i>Ceclambus versicolor</i> Schalt.	<i>Brachypterus urticae</i> F.
„ <i>inequalis</i> F.	† <i>Cercus rufilabris</i> Lat.
<i>Deronectes 12-pustulatus</i> F.	<i>Ephurae deleta</i> Er.
<i>Hydrophorus pictus</i> F.	<i>Meligethes æneus</i> F.
„ <i>palustris</i> L.	„ <i>picipes</i> Sturm.
„ <i>pubescens</i> Gyll.	<i>Lathridius lardarius</i> De G.
<i>Agabus nebulosus</i> Först.	<i>Coninomus nodifer</i> West.
<i>Ilybius fuliginosus</i> F.	<i>Enicmus transversus</i> Ol.
<i>Gyrinus natator</i> Scop.	<i>Byturus sambuci</i> Scop.
<i>Anacæna globulus</i> Payk.	<i>Antherophagus nigricornis</i> F.
† <i>Laccobius bipunctatus</i> F.	<i>Ephistemus gyrioides</i> Marsh.
<i>Limnebius truncatellus</i> Thunb.	<i>Mycetophagus 4-pustulatus</i> L.
<i>Helophorus æneipennis</i> Thoms.	<i>Adrastus limbatus</i> F.
* „ <i>affinis</i> Marsh.	<i>Agriotes obscurus</i> L.
„ <i>brevipalpis</i> Bedel.	<i>Microcara livida</i> F.
<i>Cercyon melanocephalus</i> L.	<i>Cyphon coarctatus</i> Payk.
<i>Autalia impressa</i> Ol.	„ <i>variabilis</i> Thunb.
* <i>Gyrophæna manca</i> Er.	„ <i>pallidulus</i> Boh.
<i>Hygronoma dimidiata</i> Grav.	† <i>Scirtes hemisphæricus</i> L.
<i>Hypocyrtus longicornis</i> Payk.	<i>Telephorus lividus</i> L.
<i>Tachyporus obtusus</i> L.	„ <i>bicolor</i> F.
„ <i>chrysolinus</i> L.	„ <i>hæmorrhoidalis</i> F.
<i>Tachinus marginellus</i> F.	„ <i>flavilabris</i> , Fall.
<i>Ocytus olens</i> Müll.	<i>Rhugonycha fulva</i> Scop.
<i>Stilicus rufipes</i> Germ.	„ <i>limbata</i> Thoms.

† Indicates species not previously recorded from the West Riding.

* Indicates species not previously recorded from Yorkshire.

<i>Malthinus punctatus</i> Fourc.	<i>Anaspis maculata</i> Fourc.
<i>Malthodes minimus</i> L.	<i>Trachyphæus aristatus</i> Gyll.
† <i>Dasytes ærosus</i> Kies.	<i>Polydrusus cervinus</i> L.
<i>Chrysomela polita</i> L.	<i>Phyllobius oblongus</i> L.
<i>Phædon cochleariæ</i> F.	„ <i>pyri</i> L.
<i>Batophila rubi</i> Payk.	„ <i>viridiærís</i> Laich.
<i>Sphæroderma cardui</i> Gyll.	<i>Mecinus pyraæter</i> Herbst.
<i>Crepidodera ferruginea</i> Scop.	<i>Cionus scrophulariæ</i> L.
† <i>Lagriá hirta</i> L.	<i>Cæliodes f-maculatus</i> L.
† <i>Anaspis geoffroyi</i> Müll.	<i>Hylesinus fraxini</i> Panz.
„ <i>ruficollis</i> F.	

FLOWERING PLANTS.—Mr. C. WATERFALL writes :—The excursion to Askern was very enjoyable from a botanical point of view. The botanists visited Askern Bog, and secured :—

<i>Cladium jamaicense</i> syn. <i>mariscus</i> .	„ <i>incarnata</i> .
<i>Enanthe Lachenalii</i>	<i>Juncus obtusifolius</i> .
„ <i>fistulosa</i> .	<i>Anagallis tenella</i> .
<i>Lastrea Thelypteris</i> .	<i>Thalictrum flavum</i> .
<i>Carex pulicaris</i> .	<i>Samolus Valerandi</i> .
„ <i>distans</i> .	<i>Hippuris vulgaris</i> .
„ <i>stricta</i> .	<i>Potamogeton obtusifolius</i> .
„ <i>acuta</i> .	<i>Scirpus Tabernæmontani</i> .
„ <i>riparia</i> .	<i>Galium palustre</i> .
„ <i>ampullacea</i> .	„ <i>uliginosum</i> .
„ <i>rostrata</i> .	<i>Triglochin palustre</i> .
„ <i>disticha</i> .	<i>Epilobium parviflorum</i> .
<i>Festuca pratensis</i> .	<i>Sium erectum</i> .
<i>Rumex hydrolopathum</i> .	<i>Senecio aquaticus</i> .
<i>Orchis latifolia</i> .	<i>Pedicularis palustris</i> .
„ <i>maculata</i> .	<i>Equisetum palustre</i> .

Leaving the bog we skirted a field and followed the side of a stream, where we got *Potamogeton polygonifolius*. On the banks of a drain at the other side of this field *Festuca pratensis*, *Glyceriu plicata*, and *Carex vulpina* were collected. On the roadside *Rumex nemorosus* and *Bryonia alba*, then into a magnesian limestone quarry, where *Calamintha arvensis*, *Myosotis arvensis*, and *Arabis hirsuta* were gathered. Outside the quarry we came upon a dry hilly field, where *Helianthemum Chamæcistus*, *Pimpinella Saxifragu* var. *dissectu*, *Ballota nigra*, and *Campanula glomerata* were collected, and further on where we joined the road *Bromus erectus* was secured. In a craggy thicket a little to the east of Askern, past the Church, we got *Reseda luteola* and *Carex muricata*. In a damp quarry just opposite the entrance to the

† Indicates species not previously recorded from the West Riding.

Askern Bog, *Ligustrum vulgare* was got. Out of Askern pool *Chara hispida* and *Hippuris vulgaris*. Other members of the section secured *Ranunculus circinatus*, *Geranium pyrenaicum*, *Geranium molle*, and *Daucus Carota*.

MOSSES.—Mr. C. CROSSLAND writes:—Not expecting Fungi to be much in evidence, Mr. J. W. H. Johnson and myself turned our attention to mosses. A few we were uncertain about have been submitted to Mr. Ingham. They are arranged according to habitat.

C. = Campsall. A.B. = Askern Bog, known locally as Rushy Moor.

Orthotrichum affine.

Tortula muralis.

Pleuropus sericeus.

All on walls. C.

Bryum pallens.

Mnium hornum.

Plag. Borrerianum.

Plag. denticulatum.

On moist banks in a wood. C.

Hyp. cupressiforme.

Ambly. serpens.

On tree stump. C.

Hyl. squarrosus.

Among grass, lake side. C.

Physcomitrium pyriforme.

Funaria hygrometrica.

On muddy peat, drain side, in company. A.B.

Fontinalis antipyretica.

Floating in drain. A.B.

Eurh. prælongum.

Mnium undulatum.

Hyp. riparium.

Hyp. stellatum.

Hyp. aduncum var. *intermedium*
forma *penna*.

Hyp. intermedium Lindl.

Hyp. cuspidatum.

All in wettish places. A.B.

FUNGI.—Mr. CROSSLAND reports:—Though Fungi were rather scarce, the results may be considered fairly satisfactory. Mr. Waterfall found the *Æcidium* stage of the plant parasite *Uromyces junci* on *Pulicaria dysenterica* in Askern Bog, which constitutes the first Yorkshire record for the *Æcidium* condition; its *Teleuto* stage, which occurs on *Juncus*, has been recorded but once (Church Fenton, 'Lees' Flora,' p. 718). The smut *Ustilago olivacea* on *Carex riparia* was also found in the bog by the same diligent investigator; there is only one previous Yorkshire record for this (Humber Bank on same host, 'Yorkshire Fungus Flora,' p. 206, R. H. Philip). The rust *Puccinia suaveolens* was common on *Carduus arvensis*. Fine specimens of the very common *Polyporus squamosus* were seen on old beech trunks in Campsall Park. *Panus torulosus* and *Fomes igniarius* on stumps in plantation. *Bolbitius titubans* and *Psathyrella gracilis* were gathered in the bog, the former among decaying rushes.

REVIEWS AND BOOK NOTICES.

British Non-Marine Mollusca. By E. W. Swanton. 134 pages. Charles Mosley, Lockwood. Price 2/6.

In this compilation Mr. Swanton gives a detailed and somewhat technical description of the various species of non-marine mollusca to be found in the British Islands, 'including fossil forms which occur in the Post-Pliocene deposits, excepting the Forest-Bed series.' It is unfortunate that two or three qualities of paper have been used for printing this small volume, as its appearance is not thereby improved.

A Pocket Book of British Birds. By E. F. M. Elms, 150 pages. West, Newman, & Co. 2/6.

This book is 'intended solely for the purpose of reference in the field, and has been very carefully compiled by the combined aid of well-known ornithological works, coupled with practical observations and notes made by the author from time to time in various parts of the British Isles. The book is of small size, and should be carried in the pocket, where it would always be handy.' The compiler appears to have done his work carefully, and gives his information concisely, under heads of plumage, language, habits, food, nest, site, materials, eggs, etc.

The Natural History of Selborne. By the Rev. Gilbert White. 266 pages. Re-arranged and classified under subjects by Charles Mosley. Elliot Stock. Price 6/- net.

The number of editions through which Gilbert White's Selborne has passed speaks well for the popularity of that work, as well as for the interest taken in natural history generally. By the various editors who have supervised the issuing of the work it has generally been thought desirable to copy White's letters as nearly in their original form as possible. Mr. Mosley, however, strikes out a new line, and in the present volume he has endeavoured, for the benefit of the student, to make extracts from White's letters and arrange them under headings according to species. In this way all the particulars respecting owls, doves, newts, etc., are brought together; and if it is likely that the student should wish to read all the references to any species included in White's Selbourne, then Mr. Mosley's volume is useful. One cannot, however, but feel that whilst the volume may be useful as an index, it has lost much of the charm of the hundred or so earlier editions where the letters remain intact. Mr. Mosley appears to have done his work conscientiously, and in whatever the form all naturalists must welcome this further monument to Gilbert White.

NORTHERN NEWS.

The University of Durham has conferred the honorary degree of D.Sc. upon Prof. G. A. Labour.

Mr. T. Midgley has been appointed Curator of the Museum, and borough Meteorologist for Bolton, in place of his father, Mr. W. W. Midgley, who has resigned.

Mr. M. B. Slater has reprinted 'An account of the Mosses and Hepatics of the North Riding of Yorkshire,' from Baker's 'North Yorkshire,' recently issued by the Yorkshire Naturalists' Union.

An obituary notice of the late Prof. J. F. Blake, well known for his work on the Yorkshire Lias and on Yorkshire Geology generally, appears in the September *Geological Magazine*. A list of his papers, etc., is also given.

Mr. T. Sheppard, who has been the Hon. Secretary of the Hull Scientific and Field Naturalists' Club for thirteen years, has been elected to the office of President of the Club.

The trustees of the late A. A. Palma have agreed to purchase the picturesque estate known as Hubbard's Hills, near Louth, Lincs., with the object of offering it to the town.

Mr. G. Henrickson, Inspector of Mines, Christiania, favours us with a pamphlet entitled 'Sundry Geological Problems' (18 pp.), in which he deals with the origin of certain iron ore deposits.

The Chester Society of Natural Science is 'strong' on Meteorology, judging from the thirty-fourth annual report just to hand. An exceptionally large list of additions to the library is also printed.

We have received Parts 1 and 2 of *Northern Notes and Queries*, a quarterly journal devoted to the antiquities of Northumberland, Cumberland, Westmorland, and Durham, edited by H. R. Leighton, price 1/6.

The Official Information Department of the Manx Government has issued an attractive Hand-book to the Island, beautifully illustrated, which should be in the hands of all those thinking of visiting the Isle of Man.

A paper of practical interest to northern archaeologists on 'The Chronology of Pre-historic Glass Beads and Associated Ceramic Types in Britain,' by the Hon. J. Abercromby appears in the *Journal of the Anthropological Association*, Vol. 35.

We have received a recent report of the Louth Antiquarian and Naturalists' Society, which contains a brief summary of the work of the society during the year. The more important finds are also recorded. The statement of accounts shows a small balance in hand.

A list of papers, maps, etc., relating to the erosion of the Holderness coast and the changes in the Humber estuary, by Mr. T. Sheppard, F.G.S., compiled at the request of the Royal Geographical Society, has been reprinted from the *Transactions of the Hull Geological Society*.

Dr. A. Smith Woodward's presidential address to the Geological Association on 'The Study of Fossil Fishes' has been printed *in extenso* in the Society's Proceedings. It contains some of the most striking illustrations of the evolution of fishes that we have seen for some time.

On the title page of Vol. XIV. of 'Nature Study and the Naturalists' Journal' (formerly the 'Naturalists' Journal') which was issued with the number for December last, was a quotation from a paper by Mr. T. Sheppard on the advantages of the study of Natural History. The magazine has not appeared since !!

From the report of the Manchester Museum, Owen's College, for the year 1905-6, it is gratifying to learn that financially the museum has had a much better year. Amongst many interesting additions is a valuable collection of over 5000 stone implements, formed by Mr. R. D. Darbishire during the last forty years, and presented by him to the institution.

Part 3 of the 'Manchester Field Club' has been received, and contains an account of the work of the society from 1902 to December 1903. The part is excellently printed on good paper; and, whilst many of the articles do not bear upon the Manchester district in any way, there are several which have a distinct local value. The society has a very substantial balance in the bank.

The presidential address of Mr. John Gerrard to the Manchester Geological and Mining Society appears in the *Transactions of that Society*, Vol. 20, Part 11. In the same *Journal* Prof. W. Boyd Dawkins describes 'a section of glacial deposits met with in the construction of the new dock at Salford. In this he mentions a boulder of coal-measure sandstone weighing about 45 tons, which is said to be by far the largest boulder yet found in Lancashire in the glacial drift.'

THE NATURALIST.

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NATURAL HISTORY FOR THE NORTH OF ENGLAND.

EDITED BY

T. SHEPPARD, F.G.S.,

THE MUSEUM, 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.,
Prof. P. F. KENDALL, M.Sc., F.G.S.,
T. H. NELSON, M.B.O.U.,

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JOHN W. TAYLOR,
WILLIAM WEST, F.L.S.

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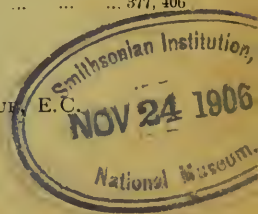
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NOTES AND COMMENTS.

THE LADIES' SLIPPER ORCHID.

Readers will be interested in seeing a photograph of an exceptionally fine flower of one of the great rarities of the Yorkshire Flora. It is of an example of the Ladies' Slipper Orchid (*Cypripedium calceolus*) taken in a remote station in



Cypripedium calceolus.

Upper Wharfedale. The plant has been observed in three localities in Yorkshire during the past summer, one being in Wensleydale, north-west Yorkshire. Happily in this station the plant is watched over with loving care, and the bloom gathered every year to ensure the complete safety of the plant in one of its very few remaining habitats in the north of England.

It seems a pity that such extraordinary precautions should have to be taken to protect our floral treasures against the rapacity of plant collectors, for we can hardly call them botanists, with the result of making it impossible for real nature lovers to have the opportunity of seeing them in all their glory in their natural surroundings. We have also received a photograph of a further specimen from Mr. J. F. Pickard. The photograph reproduced herewith, for which we are indebted to the proprietors of the *Strand Magazine*, professes to be the first photograph ever taken of the Ladies' Slipper in its native haunts.

NATURE PICTURES.

Messrs. Gowan & Grey have issued a series of small nature books, which contain some of the finest reproductions of photographs that we have seen for some time. Five of these have been received, namely, 'Wild Birds at Home' (two), 'Wild Flowers at Home' (two), and 'Butterflies and Moths at Home.' Whilst those dealing with birds contain by far the most striking photographs, all the series contain many of exceptional interest.

THE YORK PHILOSOPHICAL SOCIETY.

The annual report of the Yorkshire Philosophical Society for 'M.C.M.V.' is much smaller than usual. Beyond the Meteorological Tables, it contains nothing except the purely official reports on the society's work. Mr. Oxley Grabham, the Curator, has presented his valuable collection of British Mammals (200 specimens) to the museum, and Dr. Tempest Anderson has provided the cabinets in which the collection is housed. Amongst the honorary members elected during the year we notice the names of Sir Benjamin Baker, Mr. J. J. H. Teall, Dr. Vaughan Cornish, Mr. G. W. Lamplugh, Mr. Romilly Allen, and the Marquis of Ripon.

'SCARBOROUGH: A GUIDE AND SOUVENIR.'*

In connection with a recent conference of the National Union of Teachers at Scarborough, an admirable souvenir was prepared under the editorship of Mr. D. W. Bevan, of the Scarborough Naturalists' Society. It contains chapters on 'Scarborough for the Geologist,' 'Scarborough for the Botanist,' 'The Birds of Scarborough,' etc., and there are numerous illustrations from photographs, maps, etc.

* 188 pages. T. Nelson & Sons, Edinburgh.

THE FLIGHT OF BATS.

ARTHUR WHITAKER,
Worsbrough Bridge.

(Continued from page 353.)

The Pipistrelle Bat (*Pipistrellus pipistrellus*) usually appears about thirty to forty minutes after sunset. It is probably our commonest Yorkshire bat. Its flight is unsteady, erratic, and fluttering, its size small, the wing expanse being usually under eight inches. It flies generally at a low altitude, seven to twelve or fifteen feet, and usually selects a short beat up and down, which it keeps, fluttering with great persistency. This beat varies in length from a dozen yards, merely the length of a barn side or the hedge of a small garden, to several hundred yards, the round of a large plantation or small wood. One thing can almost always be relied on however, and is remarked on by J. G. Millais ('Mammals of Great Britain and Ireland'), 'If the bat is observed to pass a particular spot, it may be expected there again in a few seconds' or a few minutes' time' (according to the length of its round or beat). If struck at when flying, with stick, umbrella, or other implement, as its low flight often tempts people to do, it surprises its assailant by wheeling round several times, often within a few feet of him. I find this species the easiest to net of any, and I have obtained very many scores of individuals at different times, either in my ordinary gauze butterfly net, or still more effective fisherman's landing-net. In early spring and late autumn this bat not infrequently flies during the daytime, especially when a succession of cold nights prevent any insects from stirring, while at the same time the days are so warm as to arouse the bats from their proper winter torpor and thus make them feel the need of food, and at length drive them forth in the sunshine to prey upon the few insects which the noonday warmth has also induced to fly. When flying in the daytime, I have most commonly seen it flitting high up about the tree tops.

The Pipistrelle flies regularly on favourable nights from March to the end of November, and even during the remaining months an exceptionally mild evening will not infrequently tempt it out, so that it may occasionally be seen on the wing even during December, January, or February.

It is almost ubiquitous, and most catholic in its choice of a hunting-ground. I have seen it in the most secluded glades of

the New Forest, flying in the shelter of the cliffs on the sea-coast, fluttering up and down the outbuildings of some isolated farm high on our Yorkshire hills, skimming between the high hedges of a country lane, or hunting for its living over the open fields. Over the smallest pond it may be seen flying, or skirting the edge of large reservoirs or lakes, flying busily backwards and forwards up and down the village street, or making a home near some dirty little reservoir or garden even in the middle of a town or city.

Sometimes Pipistrelles will fly so close to an observer, especially when they happen to be passing under some tree beneath which he is stationed, that he can easily hear the soft rippling noise of their wings, and actually feel the cool draught from their fluttering on his face. At such times the soft, chattering noise which this bat produces in addition to its usual chittering and somewhat querulous sounding squeak, may be most plainly heard.

The flight of the Pipistrelle is longer than that of the Noctule, for although it makes its appearance some twenty minutes later, it certainly almost always continues flying for forty or fifty minutes after the Noctules have retired. I do not think it flies all night, but it certainly reappears again at dawn, and I have netted specimens at 3 a.m. A keeper in the New Forest, whose house roof is inhabited by a large colony of bats of this species, tells me that at dawn they may always be seen fluttering about and twittering around the bedroom windows.

As the Noctule may be confounded with Leisler's Bat, so the Pipistrelle may easily be confounded with the Whiskered Bat when flying. I must confess that after careful observation I can never feel certain which species I am watching. The Whiskered Bat (*Myotis mystacinus*) is not nearly so common as the Pipistrelle, but is still far from rare. It comes out about the same time in the evening—perhaps a trifle later—and continues its flight a little longer into the night than that species. It flies at about the same altitude, but is slightly more direct and less fluttering in its style of flight, and it is certainly much more partial to the vicinity of water, to which it seems to repair at once on its emergence, and over or near which it flies. I have netted many specimens at various times, but all have been taken as I stood near the margin of some pond, reservoir, pool or stream.

The evening flight of Daubenton's Bat (*Myotis daubentoni*) is almost unmistakable, and it cannot well be confounded with

any other species. It is quite aquatic in its habits, and where it occurs, must be looked for fifty minutes to an hour after sunset, frequenting canals, large ponds, reservoirs, and still stretches of river, or water generally.

It flies with a slow, straight, and tremulous sort of flight up and down over the surface of the water, seldom rising above a few inches from it, and ever and anon actually dipping lightly, and causing a little ring of widening circles marking the point where it touched. These dips are so frequent that they appear to be made for the purpose of picking insects from the surface of the water rather than for that of drinking. When dipping, the wings of the bat are raised motionless over the bat, at a V angle. When several of these bats are frequenting a sheet or stretch of water, they seem usually to keep fairly close together in a small party. On a long stretch of water they will travel for a considerable distance before retracing their flight, and thus they often pass one place going in a certain direction, and do not return, coming the opposite way, for many minutes. They can only be seen clearly where the light of the sky is reflected in the water, and it frequently happens that the shadow or reflection in the water is more conspicuous by far than the bat itself. They are practically invisible when flying where the water reflects trees, etc. I have netted this bat as it approached near to the side of the water to prove positively that it was Daubenton's bat which flew in this manner. When knocked into the water accidentally with the net, it will lie still on the surface for a second or two, and then jump out with a clean spring and fly away. This is a very quiet bat, seldom making any audible noise when flying, and there is something particularly eerie in its manner of wandering slowly and silently over the still surface of the water.

Nothing could very well be more misleading than the opening remarks on the habits of the Long-eared Bat (*Plecotus auritus*) made by Mr. Lydekker in his 'Handbook to the British Mammalia,' where he refers to this species as 'essentially a bat of the open country, and not resorting to the neighbourhood of trees and plantations.' It would be difficult to write anything more contradictory to my experience or the experience of most people who have observed this interesting and common little bat.

It is fond of trees, and feeds principally among their branches, and in the day time may often be found resting in crannies of their trunks, or behind pieces of sprung bark in the

middle of large woods. A disused tramway tunnel in the Stainbrough Woods finds an asylum for many bats of this species during both summer and winter (see Plate XXVII., figs. 1 and 2). The thatch of a woodman's shelter, in another large wood I visit, harbours others, and the rocky holes of some old quarries surrounded by woodland form another retreat where I have seen these bats. I have never taken this species away from the immediate vicinity of trees. The best time to view this bat on the wing is the early part of April, before the foliage has become so thick as to make it difficult to see. On a mild, still evening in April one must go into the woods, and there, as soon as it is dusk, these bats will easily be seen threading in and out among the twigs and branches of some tree, frequently hovering whilst they pick off some insect which is settled on a twig, and sometimes alighting on a twig themselves for a short time. A willow tree in flower, either in the middle or on the outskirts of a wood, on a suitable night, is a great attraction, for the Long-eared Bats delight to feed on the *Taniocampas* and other moths which frequent the blossoms. Round a small willow tree in a clearing in New Park Spring Wood near Cudworth, on the evening of April 13th, 1904, I saw four Long-eared Bats flying at once. The bush was scarcely the height of my head, and I was examining it with a lantern, but even this did not deter the Long-eared Bats from hovering cheekily, and taking the moths off the catkins within a foot or two of my lantern. It is the only bat I have observed to take insects which were settled, and I believe that a great part of its food is so obtained, an idea which receives strong confirmation from the fact that this species so readily learns to pick up its own food in captivity, whilst other species (which are accustomed to take their food on the wing) must be fed by hand, for even when half starving and confined in a small cage with plenty of food all around them they will stare anxiously up, waiting for it to drop from the clouds.

In summer, the Long-eared Bat may sometimes be seen crossing quickly from one tree to another, but more often only brief glimpses of it can be obtained as it winds and twists in and out among the branches of some large tree, with a delicate fluttering flight which carries it untouched through the most intricate and seemingly impossible arboreal passages. The long ears are directed forwards during flight, and very occasionally a distinct view of them may be had for a second or two, if a silhouette of the bat be caught against the sky.

Sometimes, especially in autumn, the Long-eared Bat will descend near to the ground and pay a surreptitious visit to some flower bed, up and down which it will thread its way for a time, repeatedly hovering in front of the flowers to pick off some unlucky insect. I shall not forget the first occasion when I saw one thus engaged on a flower border in Barnsley Park. I could see a large, light-coloured form hover for an instant in front of some flower, and as it was during the month of September, I concluded it was a *Convolvulus Hawk Moth* (*S. Convolvuli*), and stalked it for some time before I discovered my mistake. I have heard of cats catching them when they were flying in this manner.

I believe this bat flies all night. I have had a bat flying about me at one o'clock in the morning which I think was this species, but one cannot of course be sure when it is quite dark.

Strange to say, although Natterer's Bat (*Myotis nattereri*) is not uncommon here, and occurs all over the district, I have never yet been able to identify it when flying at dusk, with certainty, though I frequently find them in the daytime in their hiding-places. The flight is not very rapid and rather straight, and it is stated to fly at an elevation of from six to thirty feet, to be partial to the vicinity of water, and to make its appearance early in the evening.

I am not very familiar with the Horseshoe Bats in a natural state, but have often released captive specimens indoors. If the Noctule be described as the strongest flying bat, the Greater Horseshoe (*Rhinolophus ferrum-equinum*) must undoubtedly have the credit for being the most graceful. Owing to its broad wings, it appears actually larger than the Noctule when on the wing, and the beauty of its slow flight is greatly enhanced by the long skimming sails it frequently takes on expanded and motionless wings.

Then its congener, the Lesser Horseshoe (*Rhinolophus hipposiderus*), is undoubtedly possessed of greater aerial agility than any other British species. I have netted six of the seven species of bats occurring in Barnsley district, in fair contest in the open air, but I have tried in vain for over half-an-hour to net two Lesser Horseshoe Bats which I had released in a small room, and under such circumstances I venture to say that anyone would be astonished at the extraordinary agility displayed by these little creatures.

When referring to the altitude or duration of a bat's flight, I have been careful to qualify my remarks by the use of such

adverbs as 'usually' or 'generally,' for of course no hard and fast rules can be laid down. 'Usually' the swift is a high-flying bird, yet they may occasionally, very occasionally, be seen almost skimming the ground or water, and the same thing applies to bats. The Noctule, for instance, on rare occasions may be seen flying quite low. If exceptional atmospheric conditions make the insects it feeds upon alter their level, the bats, of course, will not go hungry, but will promptly follow their food. The changes in the height or duration of a bat's flight are probably induced both by the varying nature of the food supply at different times and in different places, as well as the barometrical influences affecting that food supply on different evenings.

On Plate XXVII. are four photographs showing some favourite haunts of bats, kindly photographed for me by my friend Mr. Wakefield, whose camera has added so largely to the interest and value of most of my observations on bats.

Figs. 1 and 2 show exterior and interior views of an old disused tramway tunnel in Broom Royd Wood, a favourite retreat for bats, and one from which my friend Mr. Armitage and I have taken many scores of specimens at various times, including Long-eared, Natterer's, Whiskered, Pipistrelle, and Daubenton's Bats. In the photographs reproduced, my friend may be seen searching for bats by the somewhat feeble illumination of a candle tied to the end of a walking stick.

Figs. 3 and 4 on the Plate show two beech trees on the Stainbrough estate, in which we discovered colonies of Noctule Bats. Fig. 4 shows a very fine old beech with the centre limb torn away; in a hole in the decayed wood at this rift we found a colony of twenty-seven Noctules on April 10th, 1898.

Fig. 3 shows another beech tree in which is a hole where a party of Noctules appear to take up their abode every summer. The strength of the colony varies in different seasons from as many as two dozen to as few as eight. The hole is only a small one, and in the view given its entrance is almost filled by my hand. On the foot of the ladder stands Mr. W. Broadhead, the chief woodman of the Stainbrough estate, to whose kindness I have been indebted for very many specimens at various times.



The Rev. W. Lower Carter, M.A., of Hopton, Mirfield, has accepted an appointment in Birkenhead. He has consequently resigned the position of Hon. Secretary of the Yorkshire Geological Society, which he has filled so well for many years. Mr. J. H. Howarth of Halifax, reigns in his stead.

GEOLOGY AT THE BRITISH ASSOCIATION.

J. LOMAS, F.G.S.

YORKSHIRE presents so many interesting problems in Glacial and Post-glacial Geology, that it is not to be wondered at that so many papers dealing with this phase of the earth's history were forthcoming in the Geological section.

The president, himself a Yorkshireman, devoted his address to a discussion of the inter-glacial problem, and, so far as Britain is concerned, he pronounced it 'not proven.' Prof. Kendall, following with a well-illustrated paper on 'The geology of the district round York,' first gave a clear and adequate account of the general structure of the county, and then discoursed on the glacial features of the Vale of York, and the wonderful series of glacier lakes and overflows he has described from the Cleveland district and the hills behind Scarborough. Yorkshire drift was again the theme in papers by Messrs. Culpin and Grace on recent exposures of glacial drift at Doncaster and Tickhill, by Mr. W. H. Crofts and Prof. Kendall on the plain of marine denudation beneath the drift of Holderness, by Mr. T. Sheppard on a Hornsea post-glacial section, and a report on the Kirmington drift was presented by Mr. J. W. Stather.

Other papers dealing with general drift problems were contributed by Messrs. Harmer, Oldham, and Cotsworth.

The problems of the Palæozoic Glaciations of Australia and South Africa were dealt with by Prof. Gregory, and it rarely happens that such a subject can be discussed by so many authorities, who know these distant deposits, as were gathered together at York. Prof. Edgeworth David spoke for Australia, Messrs. R. D. Oldham and T. H. Holland for India, the president and others for S. Africa.

Yorkshire Stratigraphy was not specially dealt with, except in so far as parts of the county were included in the numerous papers dealing with the Carboniferous Limestone. Much excellent work has been done in this formation during the last few years, and at last it is claimed that a definite zonal succession can be established. An interesting discussion took place on the origin of the Trias. It was shown that from top to bottom the beds show signs of being laid down under desert conditions, and parallels were suggested between these deposits and those now forming in S. Africa, Egypt, India, Australia, and other places.

The older Palæozoics were discussed by Prof. W. S. Reynolds and Mr. Fearnside in two very suggestive papers.

Palæontology, usually not very prominent in B.A. meetings, was very much to the fore. Mr. Seward and Mr. Danford respectively described the Jurassic Flora of Yorkshire and the Speeton Ammonites. Dr. H. Woodward exhibited and described a wonderful series of Arthropods from the Coal Measures, found by an enthusiastic band of workers in the neighbourhood of Rochdale.

Dr. A. S. Woodward reported on the structure and affinities of *Rhynchosaurus* after a careful examination of all the available specimens; and Mr. H. C. Beaseley followed up the careful work he has done in connection with Triassic footprints, by a description of the great finds which have recently been made in Storeton in Cheshire.

Among the Petrographical and Mineralogical papers great interest was shown in a remarkable specimen of Sodalite from India. It has a bright carmine colour when freshly broken, but changes to grey or white almost immediately on exposure to light. The most remarkable feature of this mineral is that the carmine colour is restored on keeping it in the dark for some time. Mr. Holland, who exhibited the specimens, could suggest no explanation of this phenomenon, which so far as is known is unique.

Prof. Edgeworth David announced the discovery of diamonds in their original matrix. It is strange that only two or three undoubted examples have been found, and we are still in some doubt as to the exact conditions under which the gem has been formed in the natural state.

Prof. Milne gave a most interesting account of the recent world-shaking Earthquakes, and it really seems at last as though some means would shortly be forthcoming whereby we shall be able to predict the occurrence of earthquakes and assign them to some common cause.

The papers presented to Section C were so numerous that it was impossible to deal with them adequately, and several of our prominent members were lent to other sections where geological subjects were under discussion. Thus in Section A the condition of the earth's interior was under consideration. Section E borrowed Mr. Clement Reid, Mr. Whitaker, Prof. Kendall, and others to speak on Coast Erosion. Fossil plants have for some years past formed one of the most exciting topics for discussion in Section K.

The fact is that geology has made such rapid strides during the last few years, and has so many points in contact with other branches of science, that devolution has become essential, and we welcome all the aid which Physics, Geography, Zoology, and Botany can give.



Derby: its Rise and Progress. By A. W. Davison. Bemrose and Sons, 1906. 342 pages, 5/-.

In this little book the author describes in a pleasant way the history of Derby from the earliest times. Chapter I. deals with the time 'Before the Conquest,' and Chapters VII. and VIII. with Town Annals (1833-1905) and Dates of local events. There is also an Appendix and a good Index. There are descriptions and illustrations of old Derby, the latter are quite surprising to anyone who has only been able to pay a hasty visit to Derby and examined it without proper guidance. Much space is devoted to 'The Newspaper Period.' Boswell, in 1777, wrote, 'I felt a pleasure in walking about Derby. There is an immediate sensation of novelty, and one speculates on the way in which life is passed in it.' Mr. Davison's book is just what Boswell would want, were he alive to-day. The printers and publishers have not done their share of the work quite so well as they are in the habit of doing.

The Care of Ancient Monuments. By G. Baldwin Brown, M.A. Cambridge University Press. 260 pages, price 7/6 net.

The sub-title, 'An account of the legislative and other measures adopted in other European countries for protecting ancient monuments and objects and scenes of natural beauty, and for preserving the aspect of historical cities,' defines the scope of the work. All who know Professor Baldwin Brown, and the keen interest he has always taken in the preservation and conservatism of anything and everything having an artistic, historical, archaeological or natural value, will welcome the present volume, in which his views are tersely put. The word 'monument' is used in its broadest sense. Professor Brown would like to see a Royal Commission appointed on the lines of the Historical Manuscripts Commission, but with the power extending over the wide field of ancient monuments in general. Such Commission should have in view in the first instance, Inventorization, after which should come measures of protection. Its work would also form a basis for a new and extended Monument Act on the lines of those recently passed, or still under discussion, on the Continent. Professor Baldwin Brown also gives a verdict strongly in favour of local antiquities, etc., being preserved in the districts in which they are found. 'The local museum acts favourably, by way of stimulus and construction, upon those persons in a district who are of an antiquarian turn of mind. . . . The activity of local societies should by all means be encouraged, and the district museum focusses the society's work, and often gives it a local habitation.' Not the least valuable part of the work is the summary given of the methods adopted in various foreign countries for the preservation of their historical monuments. Special attention should be drawn to the completeness of the survey of foreign legislation and arrangements. In connection with this *official* documents are largely used, instead of second-hand accounts, such as those obtained through diplomatic channels, which are often untrustworthy. In almost every instance it is evident that other countries take a far keener interest in their monuments than we do in ours. And in some countries the governments maintain the right within their jurisdiction of the first offer of collections of art or antiquarian treasures of any description. When will English people tire of seeing their valuable collections purchased and taken away by foreigners?

NOTES ON HARVEST-SPIDERS.

WM. FALCONER,

(Continued from page 220).

LIST OF YORKSHIRE PHALANGIDEA.

Localities—A. near Huddersfield: B. near Leeds: C. near Scarborough.

Liobunum rotundum Latr. Figs. 4a, 4b.

Both sexes.

A. Slaithwaite: Armitage Bridge.

C. Scarborough Mere: North Bay: Raincliff: Ringing-keld Bog, Cloughton: Hayburn Wyke.

One of the most abundant species and the one which most readily dispenses with its legs; seen in autumn running over the grass and herbage, or stationary under coping stones and in crannies of walls; often in masses on the under surfaces of projecting rocks, beams, &c.

Phalangium opilio Linn. Figs. 1, 3a, 3b.

Both sexes.

C. Scarborough Mere: North Bay: Cloughton: Hayburn Wyke.

Another very abundant species amongst grass and vegetation. One of the joints of the palps of the male develops a strong, pointed, slightly curved horn, which is very variable in size and strength, the variability being dependant on the age of the individual as well as on the season.*

Phalangium parietinum De Geer.

Both sexes.

A. Slaithwaite, six examples.

B. Gipton Wood, one example.

This harvestman affects a different habitat from the last. All the examples here recorded were taken either when wandering across a paved yard or in rooms of houses.

Phalangium saxatile C. L. Koch.

C. Scarborough, North Bay.

On the coast, at roots of grass. Both sexes in plenty.

Platybunus corniger Herm.

A. Huddersfield.

Taken by Mr. Charles Mosley and sent to Rev. O. Pickard Cambridge, from whom I have this record.

* O. P. Cambridge's 'British Phalangidea,' p. 17.

Platybunus triangularis Herbst. Fig. 5.

B. Roundhay Park: Wothersome.

From amongst dead leaves. Mr. Cambridge in a letter to the writer states: 'It is doubtful whether *P. triangularis* Herbst. is more than the immature winter form of *P. corniger* Herm.'

Megabunus insignis Meade.

Taken by Mr. Meade in Yorkshire, and noted in 'British Phalangidea,' p. 26, without definite locality.

Oligolophus morio Fabr.

Both sexes.

A. Slaithwaite: Pole Moor: Drop Clough: Standedge: Wessenden Valley: Butternab Wood: Crosland Moor: Armitage Bridge.

B. Roundhay Park: Wothersome.

C. Scarborough Mere: North Bay: Carnelian Bay: Raincliff: Cloughton: Hayburn Wyke.

This and the next species are most abundant, and found in all the varied situations which harvestmen affect.

Oligolophus agrestis Meade. Figs. 6a, 6b.

Both sexes.

A. Slaithwaite: Pole Moor: Drop Clough: Standedge: Meltham: Lindley Moor: Crosland Moor: Butternab Wood: Armitage Bridge.

B. Adel: Compton Bank Top: Dalton Lane: Wothersome.

C. Scarborough Mere: Raincliff: Cloughton: Hayburn Wyke.

Oligolophus hansenii Kraepl.

A. Butternab Wood: several from amongst dead leaves.

B. Scarborough, N. Bay.

First discovered to be British by Mr. W. Evans in Scotland, 1900, and afterwards found by Prof. Carr in Nottinghamshire.

Oligolophus palpinalis Herbst. Figs. 7a, 7b.

A. Bottoms Wood, Slaithwaite: Armitage Bridge.

A few in each place from amongst dead leaves and moss. One of the uncommon Phalangiids.

Oligolophus ephippiatus C. L. Koch.

C. Scarborough, North Bay: Hayburn Wyke.

Several examples from roots of grass.

[*Oligolophus spinosus* Bosc.*

C. Scalby Mill Valley, one example.

The rarest species in the present list. In 'British Phalangidea,' p. 40, it is stated that this phalangiid 'appears to be restricted to chalk or limestone districts,' but the Scalby Beck, in the valley of which the solitary specimen here recorded was taken, runs over Oolitic sandstones.]

Nemastoma lugubre O. F. Muller.

A. Bottoms Wood, Slaithwaite : Drop Clough : Wessenden Valley : Butternab Wood : Meltham.

B. Roundhay Park : Stubbing Moor : Adel : Knaresborough : Malham.

C. Scarborough Mere : Raincliff : Cloughton : Hayburn Wyke.

Common, sluggish in its movements, in various habitats on the ground, and obtainable throughout the year. It is easily distinguished from all the other harvestmen by its black colour, and the two large, distinct, whitish or yellowish spots on the posterior portion of the cephalothorax. In the male, an obtuse extension of the first joint of the falx projects over the second joint.

Nemastoma chrysomelas Herm.

A. Bottoms Wood, Slaithwaite, two examples : Armitage Bridge, one example.

Noted in 'British Phalangidea,' p. 44, as having been found near Bradford by Mr. Meade. In the male the first two joints of the falx are prolonged at the ends contiguous to each other.

—◆◆—
We regret to record the death of Mr. George Irving, of Corbridge-on-Tyne. Mr. Irving was an enthusiastic antiquary, and took a keen interest in arboriculture.

Mr. G. T. Porritt favours us with a copy of his paper on 'Melanism in Yorkshire Lepidoptera,' printed *in extenso* by the British Association. A notice of the paper appeared in our September issue.

The Annual Meeting of the Yorkshire Naturalists' Union will be held at York on Saturday, December 15th. Mr. W. Eagle Clarke, F.R.S.E., of the Royal Scottish Museum, will deliver his presidential address, entitled, 'Antarctic Bird-Life.' This will be illustrated by a fine series of lantern slides from photographs taken during the National and Scottish Expeditions. Further details can be obtained from the Hon. Secretary, the Museum, Hull.

* *Oligolophus spinosus* Bosc. This is an error, and the name must be expunged from the list. The mistake, however, is not due to the writer, who, in the first instance, correctly named the specimen in question *O. ephippia-lus* C.L.K., but altered it in deference to the opinions of the Rev. O. Pickard Cambridge. Some doubt being still felt as to the accuracy of his determination, it was again submitted to him, with the result that the original naming was reverted to.

YORKSHIRE NATURALISTS AT GUISBOROUGH.

At the August meeting at Loftus in Cleveland, last year, some discussion took place as to the source of the iron in the Cleveland ironstone, and it was suggested that one of the meetings in 1906 should be held within the ironstone area, and further consideration given to this subject. Guisborough was accordingly fixed as the centre for this year's August meeting, and a good number of the members of the Union arrived on the 17th, augmented by a large contingent from the Cleveland Naturalists' Field Club on the 18th. Certain routes had been mapped out by the local Divisional Secretary which would have given good ground for all the sections to pursue their investigations, but unfortunately, owing to the refusal of the respective owners of the Chaloner Estate and the Hutton Estate to permit the members to pass on their property, the proposed arrangements were necessarily abandoned, and some of the sections were unable to work advantageously. It is regrettable that a plea of disturbance of game, off the breeding season, should be set up to prevent an important scientific association like the Yorkshire Naturalists' Union pursuing its investigations, and it is sincerely to be hoped that the almost universal welcome and assistance which has been so freely given for so many years to the Union by the landowners all over the county may continue, and that the present case may remain eminently exceptional.

Under the leadership of the Divisional Hon. Secretary, Mr. J. J. Burton, and Mr. F. Allison, for the geologists; Mr. Baker Hudson and Mr. T. A. Lofthouse for other sections, the route up Bulman's Banks was taken past the first alum works in England, where a brief halt was made, and the history of the starting of the industry by smuggling some of the Pope's workmen into this country was given. By a footpath Highcliffe was reached, and the magnificent view gave sufficient excuse for a rest after the stiff climb. Here at a height of about 1000 feet gravel deposits were observed, and some of the Glacial phenomena so well described by Professor Kendall and others were noticed. On the way between Highcliffe and Roseberry Topping a halt was called, and Mr. Allison produced a number of beautifully prepared sections of the strata of the whole ironstone field, made by his father, the late Mr. Thomas Allison, from records of boreholes and shafts sunk in the district. The sections were explained by Mr. Allison, and enabled the members to obtain, in a very graphic manner, a complete knowledge of the

whole strata of the district. Some time was spent on the shoulders of the conical hill of Roseberry examining an outcrop of the main ironstone seam, which had been exposed, and here the characteristic fossils of the *A. spinatus* zone were abundant. The top of the hill is 1057 feet above sea-level, and the cap consists of a block of Oolite. From this point there is a widely extended view down the Vale of York, and far over the River Tees into the county of Durham. From here it was pointed out how the hard backbone of the great Cleveland Dyke had caused uneven weathering, resulting in a long ridge having been left marking the line of the dyke. The Gribdale whinstone quarries in the dyke were next visited, under the guidance of Mr. Naughton and the foreman of the quarries. These quarries are in reality underground workings of the dyke, and gave the members an excellent opportunity of observing the point of contact between the whinstone and the sandstone through which the dyke had forced its way. On one of the following days some of the geologists were kindly taken by Mr. Charlton, the manager, and his son, over Slapeworth Mines, where a further knowledge of some of the problems to be discussed was obtained.

Another abandoned old alum shale quarry was also visited. Some of the members visited Kildale Woods on the 20th, and particulars of their visit are contributed by the leaders.

The business meeting was held at the Buck Hotel, Guisborough, under the presidency of Mr. Charles Crossland, F.L.S., when the reports of the various sections were given, and these will be found elsewhere.

Afterwards a meeting was held under the presidency of Mr. J. J. Burton, when a paper, illustrated by maps and diagrams, was given by Mr. Cosmo Johns, F.G.S., on 'Jurassic Ironstone Deposits of Great Britain.'

A paper contributed by Dr. H. C. Sorby, F.L.S., was also read on the 'Origin of the Cleveland Ironstone,' and has since appeared in this journal.

As the two papers were on different phases of the same subject, they were taken together in the discussion which followed, and which was taken up with much interest by a considerable number of those present.

A paper by Mr. M. B. Cotsworth on 'The Continuous Glacial Period' was also read, but owing to the late hour the discussion was postponed, and subsequently resumed, when some of the ingenious and occasionally startling theories of the

author were criticised. At the close of a most interesting meeting votes of thanks were accorded to the writers of the papers, to Miss Staveley and Captain Turton for permission to visit their estates, to the owners of Gribdale Quarries and Slapeworth Mines, and to all who had contributed to the success of the meeting.

Mr. J. J. BURTON writes :—Guisborough rests on the Middle Lias, and is on the level of the drift-covered plain, but starting from the Railway Station the rise to the Cleveland Moorland is rapid, and part of the Middle Lias zones and the whole series of the Upper Lias zones are passed over until the Lower Oolite is reached, topping almost all the neighbouring hills. Owing to restrictions imposed upon the members, only a few exposures of cliff sections could be examined, but it was seen that the inland strata were identical with the coast sections examined at Loftus last year, although the thickness of the seam differed from the coast exposures. Perhaps the best sections were found in the old disused alum shale quarries (*A. communis* zone), which at different periods of the excursions were carefully examined, and were found to contain great numbers of the characteristic fossils. On the shoulders of Roseberry Topping two outcrops of the main seam of ironstone in the *A. spinatus* zone were noticed, and the top of this hill was found to consist of a mass of the Lower Oolite. The hill is an outlier of conical shape, especially towards the north and west, and is interesting not only from the fact that it offers a splendid point of view from which a vast extent of hill and dale can be seen, but because it exhibits on its steep faces the physical differences of alternating hard sandstones and soft shales when exposed to weather influences. The contour gives a regular succession of gentle slopes and terraces, with abrupt margins and steep declivities. Below the Oolite the Dogger is found all round the district, but here it is entirely absent. The diagram will shew the succession of strata exhibited in this hill, and the approximate thickness of each. The thickness of the several zones is incorrectly given in the Geological Surveys, and requires revision.

The well-known Cleveland Whin Dyke cuts through the south side of Roseberry, and extends to near Whitby on the one hand, and far into the county of Durham on the other. Here it reaches its maximum thickness, so far as it has been exposed, and as it has been very extensively quarried for road

stones and paving setts, the members had an excellent opportunity of examining its chief features. Passing along a deeply excavated trench, it could be seen that it consisted of a crystalline rock, bluish in colour and conchoidal in fracture; hard, and of close, fine texture. Remarkably little disturbance of the strata has been caused by the intrusion of this vast body of molten mineral, which here reaches a thickness of about 80 feet at the depth to which quarrying operations have been carried. In Gribdale quarries, where the stone is mined, candles were provided by the owners, and the workings were explored for several hundreds of yards.

The intrusion of the hot mass could be seen to have considerably changed the character of the Jurassic rocks with which it came into contact; and in the open workings it was noticed that occasionally in the softer shales lines of cleavage had been formed perpendicular to the bedding planes. The analysis of the basalt as given by Mr. J. E. Stead is as follows:—

Silica...	...	...	..	...	59.25 per cent.
Alumina	...	..	...	..	16.75 "
Ferric Oxide	...	...	...	...	4.00 "
Ferrous Oxide	...	...	...	...	4.82 "
Lime	...	...	...	...	6.88 "
Magnesia	...	...	...	...	3.81 "
Potash	...	...	...	...	1.92 "
Soda	...	...	..	...	2.56 "

On the way from Highcliffe to Roseberry Topping the effect of Glacial action and the damming back of melted ice and subsequent cutting of overflow channels could be well seen in Sleddale.

A considerable number of erratics was noticed, and much morainic matter seen at near the 1000 feet contour, which raises doubt as to the correctness of the generally accepted opinion that the ice barrier did not in this district rise to a height of more than 800 feet above sea level.

From an industrial point of view the Cleveland Ironstone seam is the most important geological feature, and this, by the courtesy of the owners of Spawood Mines and the aid of the manager, Mr. W. Charlton, and his son, was examined, and much information as to its nature and occurrence was gathered.

VERTEBRATE ZOOLOGY.—A toad (*Bufo vulgaris*) was observed by the mycologists in Waterfall Wood.

CONCHOLOGY.—For the Conchological Section there was no report given at the Saturday's meeting, all the work being done during the two following days. The President of the Section, Mr. Wm. Denison Roebuck, F.L.S., spent a day with the mycologists in the pretty little ravine down which a clay-coloured stream ran through Waterfall Wood. Commencing at the point where the ravine is crossed by the road to the East Coast, operations were at once begun. A colony of remarkably young examples of *Arion circumscriptus* was noted; they were about 3 mm. long, with the central keel or back-ridge very noticeable. *Limax arborum* of almost uniform pale colour was found on a branch, and another under a piece of canvas thrown down in the wood. Then were seen a colony of *Cochlicopa lubrica*, numerous examples of *Clausilia bidentata*, and of *Hyalinia alliaria*, a few *Hyalinia pura*, one or two small *Agriolimax agrestis*, a very minute *Arion hortensis*, and by the side of the stream an equally small *Agriolimax lævis*, on pieces of stick one or two *Acanthinula aculeata* and a single *Punctum pygmæum*, and numerous *Vitrea crystallina*. A halt for lunch was made on a bank-slope overlooking the Skelton Shaft ironstone-mine, where a log being turned over yielded numerous *Pyramidula rotundata*, some typical *Agriolimax agrestis*, and quite a colony of small *Arion hortensis*. Further down the course of the ravine occurred a young example of the typically marked *Limax maximus*, and under stones by a gate an example of *Azecca tridens*. A small plain under some beeches repaid some 'gravelling,' as the fallen beech-leaves yielded great number of *Carychium minimum*, *Vitrea crystallina*, *Arion minimus*, etc. *Hygromia hispida* was collected during the day. At an early hour the mycologists found they had collected as much material as they had time to examine, and all returned to Guisborough. The conchologists went out again, this time to a point on the same ravine about a mile further down stream. Here were park-like fields bordering the rivulet, with fine trees. *Pyramidula rotundata* and *Clausilia bidentata* occurred here, and there was great abundance of *Boletus flavus*, on most of the specimens of which *Arion minimus* was feeding freely.

On the Monday the whole of the same party, reinforced by a couple of geologists, drove to Kildale to investigate the woods there, which were found so productive to the Union some years ago. The conchological party was here strengthened by Mr. Baker Hudson, who had cycled over. The party at once commenced investigations, settling down to begin with in

a hollow by the picturesque waterfall. The object of search—*Acanthinula lamellata*—was soon found, several being obtained, all of which were white or whitish, a form not before known to exist, which will probably be described as a new variety in Mr. Taylor's Monograph. *Arion minimus* was abundant all through the woods, as also were *Vitrea crystallina*, *Pyramidula rotundata*, *Carychium minimum*, etc. Near the old bleach works, under stones, etc., a fine fat *Arion ater* var. *plumbea* was found, and an adult example of *Helix nemoralis* var. *carnea* 1 2 3 4 5, and young ones as well. Near here *Clausilia laminata* occurred, also *Limax maximus* type, *L. arborum* type, *Arion hortensis*, *A. circumscriptus*, *Agriolimax lævis*, *A. agrestis*, type and var. *reticulata*, *Clausilia bidentata*, *Cochlicopa lubrica* in plenty, one *Acanthinula aculeata*, a few *Euconulus fulvus*, and *Hyalinia cellaria*, and *H. alliarii*. Altogether 24 species were noted, 8 being slugs and 16 terrestrial shell-bearers, no water-shells being seen, or even looked for; but all the same it was an exceedingly pleasant and profitable day's hunting, such as the President of the Section had not been able to obtain in any of the antipodean countries in which he has travelled during the past year or two.

(To be continued).

BIRDS.

Winter Migrant, etc., at Sedbergh.—I saw the first winter migrant on Sept. 23rd, a Bramblefinch. A white black-bird was shot near Sedbergh the previous week.—W. MORRIS, Sedbergh.

Late nesting of the House Martin.—Two pairs of House Martins were feeding their young in the nests at Hartwith, on October 10th. Many pairs nest in this particular place, but all had departed except these.—R. FORTUNE, Harrogate.

Pheasant's strange nesting place.—This year at Plumpton near Harrogate, a pheasant laid 12 eggs in a nest situated in a Spruce Fir tree, 22 feet from the ground. She had utilised an old squirrel's drey, and was apparently quite comfortable, allowing me to obtain an excellent photograph from a neighbouring tree. It would have been interesting to learn how she proposed to get her chicks down, but the risk was too great, therefore the eggs, when upon the point of hatching, were removed by the keeper.—R. FORTUNE, Harrogate.

THE CHEMISTRY OF SOME COMMON PLANTS.

P. Q. KEEGAN, LL.D.,
Patterdale, Westmorland.

FLY AGARIC (*Amanita muscaria*).—In birch woods perched on turfy, non-calcareous soil, this mushroom makes a grand show by virtue of its bright scarlet cap studded with whitish warts, and its white-frilled collar. Its rather potent physiological effects have occasioned a considerable amount of chemical investigation as to the nature of its constituents. It has been employed variously as an insect poison, an intoxicant of the genus Homo, and a cure for epilepsy. Dried in air the plant yields 14.9 per cent. solid matter and 1.05 ash; it contains an oil which on analysis is found to consist of 90 per cent. oleic acid, 7.42 lecithin, and 2.58 glycerine, ergosterine, choline, and butyric and palmitic acids; a dihexon sugar (trehalose $C^{12}H^{22}O^{11}$) is also found, but no mannite or glycogen; chitin takes the part of the cellulose of ordinary plants, and therewith is connected an anhydride of glucose in place of lignin. The most potent and interesting of the constituents, however, are those which are the result of the disorganisation (hydration) of the albumenoids. A necrobiotic product, a ptomaine called muscarine $C^5H^{15}NO^2$ is found to the amount of 15 per cent. of the fresh plant, and seems to exist in greatest and most virulent amount during the period after the ripening of the spores, *i.e.* practically when the fungus has begun to decay. It is essentially a narcotic or nerve poison. Physiological experiments prove that it lessens or abolishes the action-current of nerve and induces diastole arrest of the heart, but it does not violently attack the mucous membrane of the digestive passage, nor paralyse the muscles or give myosis; it, however, seriously disturbs the nervous system with a tendency to bring on insensibility and torpor. There is also a second poison, a kind of soluble ferment which diminishes in quantity when the plant is dried, and is quite decomposed and rendered inert at 100° temp. Proteolytic enzymes analogous to enterokinase which rapidly digest albumen, and an erepsin which destroys and transforms peptone and albumoses with very great activity have also been indicated by physiological experiment. There is no laccase in the plant. The scarlet glories of the pileus are not due to carotin or tannin, but to the oxidative action of its tissues on the nuclear matter (nucleo-proteid and its decomposition products) distributed therein; the nucleic acid is decomposed and purine bases (xanthin, &c.) are liberated like what occurs in

the wings of butterflies. The scarlet pigment is similar or analogous to that in beetroot; its alcoholic solution absorbs the blue-violet portion of the spectrum. The ash of this brilliant fungus contains about 41 per cent. potassium (as phosphate, sulphate, and chloride), 7.7 phosphorus, the other constituents varying from 6.7 to 0.12.

EYEBRIGHT (*Euphrasia officinalis*).—This plant is recognised as a semi-parasite, *i.e.*, in the early stage of its growth certain cells of its roots undergo a modification whereby they elongate and penetrate into the roots of grasses in their neighbourhood, and absorb therefrom a portion of their organic nutriment. It is chiefly in luscious grassy pastures that 'the trembling Eyebright shows her sapphire blue.' Its stem is copiously branched, and varies in height from one to eighteen inches. The leaf chloroplasts are easily rendered inactive by injurious external agencies, so much so that at times no evolution of oxygen therefrom can be detected. In July the whole contains 62 per cent. of water, and the dried substance 1.5 per cent. of wax with only a little carotin and some fat-oil, but no resin, very little sugar, some mannite, cinnamic acid apparently, little starch, mucilage, or oxalate of calcium, and a considerable quantity of an iron-greening, non-phlobaphenic tannin or tannoid which precipitates bromine water but not gelatine, and turns brown in the presence of alkalis and perchloride of tin; the ash amounts to 10.1 per cent. and had 37.7 per cent. soluble salts, 19.5 lime, 9.8 silica, 10.2 P_2O_5 , 8.4 SO_3 and 7.3 chlorine. It would seem that, owing to the small size of this very dainty plant, some of the chemical principles contained therein never attain a very high degree of development. Gathered quite fresh and instantly extracted, a small quantity of the remarkable acrid and bitter glucoside rhinanthin can be obtained.

CORN-MINT (*Mentha arvensis*).—This is a plant so highly variable in external aspect that for a long time it threw the 'lumping and splitting' systematists into a very great embarrassment. Damp localities, with plenty of sun, seem eminently favourable to many of its characteristic proclivities. The over-ground parts yield 1.7 per cent. wax, resin, and volatile oil, but little carotin, also considerable mucilage, some tannoid and iron-greening quinol tannin, which precipitates gelatine and bromine water and evolves quinone on oxidation; the resin dissolves in sulphuric acid with a brown colour, passing to a splendid red, and with a solution of bromine in chloroform it yields a greenish-yellow colour. The ash contains 50 per cent.

soluble salts, 21.9 lime, 3.8 magnesia, 5.7 silica, 4.6 P_2O_5 , 8.8 SO_3 , and 6.3 chlorine. The 'strong fragrant smell abounding with a pungent volatile salt' which the Mint tribe evolves, is due to a volatile oil composed of derivatives of the hydrocarbon menthene $C^{10}H^{18}$ and chiefly of its alcohol menthol $C^{10}H^{19}OH$ which, combining with acetic or other organic acids, is mainly responsible for the powerful odour; another derivative, viz., ketone menthone $C^{10}H^{18}O$ occurs only in the flowers. The process by which the scent is produced is called etherification, and is favoured and stimulated by a great acidity of the sap, and by any conditions (such as full exposure to sunlight, dry air, elevated station, &c.), which strengthen the chlorophyllic function of the leaves, and also tend to diminish the percentage proportion of water in the plant. In Labiates the grains of chlorophyll lie close together in a restricted space, with the result that the process of deassimilation proceeds quickly and the production of volatile oil is specially abundant.

PRIMROSE (*Primula vulgaris*).—This plant, which 'on its sunny bank peeps forth to give an earnest of the Spring,' has challenged the attention of poets much more effectively than that of scientists. And inasmuch as I am not cognisant of any full chemical analysis of its constituents having appeared in any European work, I may perhaps be allowed to tackle the subject in some detail, merely premising that the following summary refers solely to the young plant just evolved in April. The root-stock as regards anatomical structure approaches that of a rhizome, *i.e.* there is the disappearance of fibres and other supporting apparatus, the appearance of starch (the cells of the cortex are crowded with large granules), the augmentation of the cortical parts, and the reduction of the pith; it contains no tannin, and very little or no mucilage, mannite, or glucose, but there is a small quantity of a saponin-like glucoside called cyclamin $C^{27}H^{28}O^{13}$ which is a typical hæmolytic (blood-corpuscle dissolving) agent producing local coagulation of fibrin, and thrombosis when introduced into the blood; there is also a sugar which yields levulose by dilute acids, and 1.5 per cent. in dry, of a heptatomic alcohol called volemite $C^7H^{16}O^7$ by Bougault and Allard. The very young smallish leaves contain 2.6 per cent. of a white pasty wax (pseudostearoptene), but very little carotin, and no fat or resin; the amount of chlorophyll is unusually large; there is only a very little quercitrin, its place being taken apparently by cyclamin; there is abundant pectosic mucilage, but only a little sugar or

oxalate of calcium; the starch, which is abundant in the fresh leaf, disappears on drying and subsequent treatment with benzine, alcohol, etc.; the ash amounts to 14.9 per cent. in dry and contains 61.9 per cent. soluble salts, 6.3 silica, 12.2 lime, 3.4 magnesia, 4.2 P^2O^5 , 4.3 SO^3 , and 17.2 chlorine; the larger leaves gathered a little later, showed in their ash 57 per cent. soluble salts, and 14.6 chlorine. The floral parts yield 1.7 per cent. wax and carotin (occurs in homogenous plastids at the base of the petal), some resin, but no fat-oil apparently; the yellow colour of the upper petal is due to quercetin; there is also an iron-greening tannin which precipitates gelatine and bromine water, some free phloroglucin, glucose, and cyclamin, a large quantity of easily coagulable mucilage, some oxalate of calcium, and traces of starch. The highly remarkable fact here is the concentration of tannic matters in the flowers, there being practically none in either leaves or roots; and moreover, this accumulation is, or rather ought to be, as it were a powerful one as regards chromogenic effects, inasmuch as it is difficult to assign the cause why the Primrose petal should not be a deep pure pink, or even a nearly pure blue. No doubt, however, it is the rapidity with which the blossoms evolve (aided greatly by the starch-packed rhizome and roots) that does not allow of sufficient time for the tannic chromogen to develop into coloured pigment.

COWBERRY (*Vaccinium vitis idaea*).—Of all the mountain dwellers this one is possessed of sufficient vitality to enable it to keep its leaves during the winter rigour, their natural green too, remaining all the while. The comparative scarcity of the plant however, forbids any detailed analysis. The leaves, however, may detain our attention for a few moments. They are provided with a strong cuticle, the cells of the upper epidermis are thick-walled, as are also all the cell-walls of the mesophyll, while the edges of the leaf are strengthened by layers of fibrous sclerenchyma. The whole of their nitrogenous matter in September is in the form of albumenoid; there is a large quantity of quinic acid, and much free quinol according to Kanger; the tannin is $C^{28}H^{29}O^{10}$ which on potass-fusion yields quinol; also a considerable quantity of a resinous glucoside called ericolin, which, like most such bodies, is of doubtful definite chemical individuality; as well as a bitter principle, likewise ill-defined, named ericolin, which is inodorous, but on decomposition by dilute acids readily yields a volatile product with a characteristic odour. Other authors have detected free phloroglucin in the Ericales, but the presence of quinol is more probable and of great interest.

NOTE ON A CURIOUS FACULTY IN SPIDERS.

W. W. STRICKLAND, B.A.,
Singapore.

IN June 1905 I was seated under a jujube tree, near a shady lotus pond, in the Buitenzorg Gardens, Java, on a garden seat, for the purpose of rest and reflection, wearing a bluish coat of Madras cloth. All at once I noticed a comparatively large species of *Attida* on the sleeve of my coat. The fore part of the body was green, the abdomen brown, the eyes brown.

It made itself at home, and I looked at it fixedly without stirring a muscle. It had four or five eyes at the top of the head, and two large giglamps lower down.

All at once, to my surprise, I saw the gig-lamp eyes, which had been green, change to brown. There was *no* bright sunlight; and the proceeding was evidently under the control of the spider's will. In fact, it repeated the process several times with much deliberation; it almost seemed to have a pride in showing off. When the colour of the eye changed, it was as though a veil descended quickly behind the cornea from the outer upper side downwards. In this way it changed the colour of its eyes from green to brown and from brown to green several times. I now caught the spider, hoping to keep it alive, and took it to Major Ouens at the Zoological Museum. Unfortunately it had been crushed, and arrived moribund. Major Ouens, a well-known Dutch field naturalist, put it under the microscope, without any particular results, and afterwards into a small tube with spirits.

Some months later I called, and found to my regret that Major Ouens, being very busy arranging the collection of shells, had lost this interesting specimen. He had, indeed, tried, but in vain, to get another from the gardens.

I now went and sat for many hours in the same place, and in the same dress, hoping that the same kind might perhaps reappear. None came. There was, however, a smaller *attida*, all green, but for some yellowish stripes on the abdomen. Several of them came; they had a relatively smaller pair of gig-lamp eyes, jet-black. For several days nothing peculiar was to be observed. At last one of these spiders, which were not uncommon, came. It seemed in rather an agitated frame of mind. All at once its two black gig-lamp eyes changed to a bright green, it leapt on its prey, and disappeared. Of this extraordinary faculty in the *Attida*, Major Ouens knew nothing,

nor did the well-known Dutch naturalist, the Curator Mynheer Königsberger.

On my return to Singapore, I recounted the facts to Dr. Hanitch, the Curator of the Singapore Museum, who had also never heard of this faculty possessed by leaping spiders. This being so, I wrote to R. I. Pocock, the greatest English authority on spiders, giving an account of this wonderful faculty, and he replied to my letter, saying that the faculty was quite unknown to naturalists. With the exception of stridulating organs in deaf spiders, discovered some years ago, this is perhaps one of the strangest observations made in connection with these creatures. And having been made by a member of our Yorkshire Union, it may be worth while to publish a brief notice of it in our Yorkshire 'Naturalist.' I hope to pursue the subject further but it is not easy to obtain the spiders. The species of *Attida* are very numerous, and most likely the faculty is only possessed by a few of them.

Note.—Since then I have been visited by not a few *attidæ*, but never by the green and brown large eyed one. Almost every fresh one was quite different from the previous one. The number of different kinds must be enormous.

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The Wonders of Life. By **Ernst Haeckel.** Translated by Joseph McCabe. [Issued for the Rationalist Press Association, Ltd.] Watts & Co., 1906. Pages xiv. + 501, price 2/6 net.

The present edition of Haeckel's 'Popular Study of Biological Philosophy,' can be strongly recommended to readers of this journal on account of its cheapness, and on account of the excellent way in which it has been issued. The type is good, the paper suitable, and though the book is fairly substantial, it is light and easy to hold. At half-a-crown no one should be without 'The Wonders of Life.'

A Naturalists' Holiday: Idle hours on the Cornish Coast. By **Edward Step.** T. Nelson and Sons. 316 pages, price 3/6.

Mr. Step's work is well known as readable and reliable, and in 'A Naturalists' Holiday' he well describes the fishes, crustaceans, zoophytes, etc., occurring in the Cornish rock pools. The book is purposely written for the benefit of young readers, who will doubtless derive much pleasure from a perusal of its pages. Some of the chapters have previously appeared in the *Boys' Own Paper*, and similar publications. There are numerous illustrations in the text, and some plates, the latter however are rather too highly coloured.

A Text Book of Mining Geology. For the use of mining students and miners. By **James Park.** C. Griffin & Co., Ltd., 1906. 219 pages, price 6/-.

The title of this carefully-written work defines its scope, and it can safely be said that Professor Park's Text Book will be found most useful to those in any way interested in Mining or in Economic Geology. The prominence that has been given to Mining Geology in recent years, and the great importance and necessity of a thorough geological knowledge being possessed by all those participating in any way in mining operations, warrants such a work as the one just issued. It should receive a ready sale.

MUSEUM CONFERENCE AT CHESTER.

A conference of curators and members of governing bodies of northern museums was held at the Grosvenor Museum, Chester, on Saturday, Sept. 24th. There were representatives present from the Museums at Bolton, Bootle, Bury, Chester, Hanley, Huddersfield, Hull, Douglas (Isle of Man), Keighley, Liverpool, Manchester, Plymouth, Rochdale, St. Helens, Stockport, and Warrington. An excellent opportunity was afforded of examining the Roman antiquities and natural history specimens in the Grosvenor Museum, under the guidance of Mr. R. Newstead and Mr. A. Newstead respectively. The visitors were entertained to tea in the Art Gallery by the Chester Society of Natural Science, after which they adjourned to the Lecture Theatre.

Mr. F. W. Longbottom, who presided, said there had been a sort of threat or promise of the municipalisation of the Museum. In many ways that would be a gain, because they would get more room and even a better status from the city. Mr. Robert Newstead was almost the founder of their splendid collection there, and it was due to him that the Museum was so interesting. They hoped his brother, who had taken his place, would turn out an equally competent curator.

Mr. R. Newstead, A.L.S., of the University, Liverpool, gave an address on 'The Nature of the Archæological Collections in the Grosvenor Museum, Chester.' He dealt, in the first place, with the pre-historic remains, calling special attention to some unique specimens, including two stone celts, a bronze mace head and a small stone lamp, which, he said, were among the more interesting and rarer examples of the implements and utensils used by early man. He dealt with the numerous inscribed stones and monuments of the Romano-British period and the examples of the pottery, glass and personal ornaments, coins, etc., and gave a somewhat full description of the Saxon rune, which was the only known Cheshire example. Reference was also made to the extensive collection of objects from the submerged forest beds at Great Meols, presented to the Archæological Society by Mr. T. S. Gleadowe. They covered the period from the pre-historic times down to the reign of Queen Anne, and included relics of war, agriculture, horse trappings, etc.

Mr. Alfred Newstead, Curator of the Museum, described 'The Nature of the Natural History Collections in the Grosvenor Museum.' He dealt with the geological collections

in sequence, and subsequently gave a *resumé* of the zoological series, with a brief reference to the botanical collections. In doing so he pointed out how representative they were of the Cheshire and North Wales species, and he paid a tribute to the many years of arduous collecting by their various contributors. It was pointed out that the natural history collection had been found to be of very great interest to the students in the Science and Art Schools.

Mr. Joseph A. Clubb, B.Sc., of the Municipal Museum, Liverpool, submitted a paper on 'The Comparative Method of Exhibiting Specimens in Public Museums.' The importance of museums as educational institutions was pointed out, and he dwelt on the necessity of exhibiting specimens so that they might impart the greatest amount of interest and instruction. What was wanted, especially in the exhibition of natural history specimens, was a method of arrangement which kindled that light of enquiry which begat a higher and more intelligent interest. Too much importance, he argued, was given to what was known as the scientific or classificatory arrangement of natural history specimens in public museums.

Mr. J. W. Cutmore, of Liverpool, afterwards spoke on 'Museum Taxidermy and the Status of the Taxidermist.' The lecturer discussed the methods for preparing natural history objects, and outlined the latest methods in the casting of fishes and reptiles, which were the only scientific methods for reproducing these in anything like life form. He also dealt with the collecting and preparing of foliage and plants for mounting in groups with birds and their nests, summing up by stating that methods were all very well as far as they went, but it was the man with enthusiasm that was needed, the man who loved his work and took every opportunity to study Nature, who made the skilled artist. He agreed that until taxidermists were treated on the same level as other artistic and scientific workers there would not be the improvement in the work that was required. He concluded by suggesting the formation of a Society of British Taxidermists, which he argued could do much to advance the art of taxidermy.

On the proposition of Dr. Hoyle (Manchester), seconded by Alderman Brooks (Bolton) a hearty vote of thanks was accorded to the Officers and Committee of the Natural Science Society for their kindness in entertaining the members of the conference. Mr. Chas. Madeley, Curator of the Warrington Museum, was appointed secretary to the Conference.

FIELD NOTES.

BIRDS.

Quails in Yorkshire.—When Partridge shooting near Melmerby towards the end of September two Quails were flushed, one of which was shot by a friend of mine. Last year, also in September, a specimen was obtained at Brafferton; and in July a nest with eggs was found in the meadow grass in Garsdale when cutting the grass.—R. FORTUNE.

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FLOWERING PLANTS.

Green Hellebore (*Helleborus viridis*) in Cleveland.—I have to record the occurrence of this plant in Cleveland, from which district I believe it has not hitherto been reported. It was growing on June 4th in a pasture not far from Ingleby Greenhow, at an altitude of 425 feet, and not far from a small stream. Mr. J. W. H. Harrison informs me that he has seen it growing in woods near Whitby. In Baker's 'North Yorkshire' no records of Green Hellebore are given from the Cleveland area, though its ally, *Helleborus foetidus* grows at Great Ayton and Rosedale Abbey. Mr. J. T. Cozens, of Stokesley, was good enough to identify the plant for me.—FRANK ELGEE, Middlesbrough.

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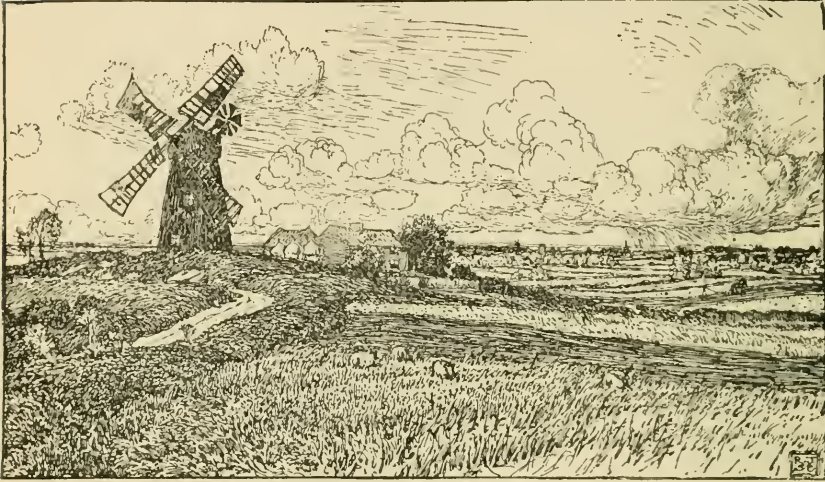
HYMENOPTERA.

Fossorial Hymenoptera new to the Yorkshire List.—A couple of insects taken by Mr. H. H. Corbett at Campsall on the 12th of July, on the occasion of the Y.N.U. excursion to Askern, have been submitted to Mr. Edward Saunders, F.R.S., who names them *Psenulus pallipes* (Pz.), and *Passalæcus gracilis* (Curt.), ♀. Thus, out of four species of this order promiscuously collected on the excursion, no fewer than three proved to be new to the Yorkshire list, demonstrating that diligent collecting of hymenopterous insects on the Campsall estate by the Doncaster (and other) entomologists would yield good results. The two species here recorded are among the minute Fossorial hymenoptera that may be reared in the spring from pierced bramble and other stems picked up during the winter. They bore the stems and store them with insects on which their larvæ feed.—WM. DENISON ROEBUCK, Leeds, 24th Oct., 1906.

REVIEWS AND BOOK NOTICES.

The East Riding of Yorkshire. By J. E. Morris. 356 pages. Messrs. Methuen & Co. 2/6 net.

In this excellent little guide book the author has given a very useful and, as a rule, accurate account of the East Riding, illustrated by views and photographs, some sketches, and a map. The book was principally compiled during the author's



An East Riding Landscape.

long vacation a year or two ago. It is perhaps somewhat unexpected to read that the Wiberforce House in High Street, Hull, 'when the writer saw it was apparently fast verging towards ruin.' We are able to reproduce one of the illustrations, which will give an idea of the rest.

The North Riding of Yorkshire. By J. E. Morris, B.A. 432 pages. Messrs. Methuen & Co. 2/6 net.

This is a companion to the preceding, and the fact that a second edition has recently been issued is a strong proof of its excellence. As in the previous volume, it is illustrated by admirable sketches from the pen of Mr. R. J. S. Bertram. In these guides the various places are mentioned in their alphabetical order; the most interesting features in connection with each are referred to; and, whilst the information is principally antiquarian, the volumes contain much of general interest.

MUSEUM NEWS.

A coloured plate and description of a late Celtic sword found at Thorpe, near Bridlington, Yorkshire (now in the York Museum), appears in the October *Reliquary*.

In the 'Report of the Council of the Natural History Society of Northumberland, Durham, and Newcastle-on-Tyne,' the Curator of the Newcastle Natural History Museum appeals for increased financial resources and a larger staff.

The Report of the Museum Committee of Warrington shows that the Museum is working on the right lines, judging from the nature of the objects now added to the collection, and from the Curator's report of the work accomplished in the different departments.

— The Warrington Museum and Library issues slips containing particulars of the 'recent additions,' the October list being just to hand. Similarly, under the title 'Mainly About Books,' the Public Library and Museum keep the public informed of its 'recent additions to stock.'

In the 'Questions for Answers' in the October '*Museum Gazette*' we notice the first two are—'Who were Mrs. Morley and Mrs. Freeman?' and 'Some authorities suppose that the book of Job was written by Solomon, or one of his contemporaries. If this were so, what would be its relation in point of time to the Christian era?'

'The Annual Report of the Scarborough Philosophical and Archæological Society' recently received, contains a useful history of the Scarborough Museum, being an address by the President, Dr. Irving. In the same report the Scarborough Field Naturalists' Society gives a *resumé* of its excellent year's work. In this, mention is made of some fossils which are 'noteworthy,' presumably from the way in which their names are printed in the report!

We quote the following from a recent issue of *Punch*:—'A specimen of the Common Dasyure, one of the Australian "native cats," is the gift of Mr. W. B. Robinson, of Linthorpe, and has been placed near his cousin, the "Tasmanian Devil."' At least so says the Curator of the Middlesborough Museum, according to the *North Star*. We hope Mr. Robinson's cousin will pardon our familiarity, but *que diable (Tasmanien) allait-il faire dans cette galère?*

The Municipal Museum at Hull continues to publish its Quarterly Records of additions. Publication No. 33, by the Curator, Mr. T. Sheppard, F.G.S., deals with Hull Spinning Wheels, an Anglo-Saxon Cemetery in East Yorkshire, the whaler 'Truelove,' rare engravings, and Wilberforce relics. There is also an interesting article by Alderman J. Symons, dealing with Wilberforce House and its historical associations. Publication No. 34 is a reprint of the various articles, etc., which appeared in the *Eastern Morning News* in reference to the opening of Hull's new Museum, Wilberforce House, on August 24th last.

NORTHERN NEWS.

Mr. R. S. Bognall records the male of *Formicoxenus nitidulus* in Britain. Ten examples were found in the ant hills at Corbridge-on-Tyne. (*Ent. Monthly Magazine*, September.)

The seventy-second annual report of the Bootham School (York) Natural History, Literary, and Polytechnic Society is to hand, and contains a record of a useful year's work. Under 'Ornithology,' we notice 'The most prominent object of ornithological interest in the show this year was P. F. Kendall's collection of stuffed birds, his Starling, Snipe, and Sparrow hawk were perhaps the best specimens.'

Mr. C. Fox-Strangways has favoured us with a copy of his paper on 'The Geology of North-East Yorkshire in relation to the water supply of the district,' recently read to the British Association of Water-works Engineers.

The Hon. John Abercromby favours us with a reprint of his paper on 'The Ornament of the Beaker-class of Pottery,' which appears in volume 39 of the Proceedings of the Society of Antiquaries of Scotland. Numerous examples of the ornament on British 'drinking vessels' from East Yorkshire, Derbyshire, etc., are figured and described.

The *Journal of Conchology* (vol. 11, No. 11) contains three papers of interest to northern conchologists, viz. 'Observations on the Land and Mollusca of the district around Silverdale, Lancashire,' by G. Jackson; 'An attempt to breed from a sinistral *Helix pomatia*,' by J. W. Jackson; and 'West Lancashire Non-Marine Mollusca, Morecambe and District,' by H. Beeston.

In an article on Mesozoic Plants from Korea, by H. Yano, printed in English, in the *Journal of the College of Science, Imperial University of Tokyo, Japan*, a comparison is made between the Korean Mesozoic flora and that found in the rocks of the East of Yorkshire. Several specimens are figured, amongst which is a new species, *Adiantites seawardi*, named after a well-known worker in Yorkshire palæobotany.

The 1905 report of the Botanical Exchange Club is to hand, and is edited by Mr. J. W. White. It contains much useful information in reference to the plants of the northern counties, as well as of other districts. We hope, however, that the request that 'Contributors should, however, try to send fifteen to twenty examples of a plant, for they will find about thirty names among those who expect a share,' will not result in rare species being gathered wholesale for the purpose of exchange, otherwise the Botanical Exchange Club will be doing more harm than good.

In the proceedings of the Dorset Natural History and Antiquarian Field Club, volume 26, the Rev. O. Pickard-Cambridge has a valuable paper 'On New and Rare British Arachnida.' This includes the following northern county records:—*Drassus pubescens*, Thor., from Nottinghamshire; *Zora nemoralis*, Bl., from Hexham; *Agroeca celans*, Bl., found at Hexham; *Protudia patula*, Sim., from Kirkby, Lancashire; *Cryphoeca diversa*, Cambr., found in Sherwood Forest, Notts; *Hahnina helveola*, Sim., near Huddersfield; *Episinus truncatus*, Walck., from Hexham; *Onesinda minutissima*, Cambr., from Hexham and near Huddersfield; *Enoplognatha thoracica*, Hahn., Sherwood Forest; *Robertus neglectus*, Cambr., Huddersfield and Hexham; *Bathyphantes setiger*, F.O.P., Cambr., Penrith; *Tmeticus arcanus*, Cambr., near Huddersfield; *Tmeticus firmus*, sp. n. [figured], from Hexham and near Huddersfield; *Tmeticus rivalis*, sp. n. [figured], from Hexham*; *Tmeticus reprobus* Cambr., Kirkby, Lancashire; *Tmeticus Huthwaitii*, Cambr., Buxton, Derbyshire; *Stutula fausta*, Cambr., Hexham; *Eutelecara Thorellii*, Wester., Hexham; *Cnephalocotes elegans*, Cambr., from near Huddersfield; *Tapinocyba insecta* (?), L. Koch, found at Hexham; *Baryphyma pratensis*, Bl., from Hexham and Nottingham; *Wideria fugax*, Cambr., Huddersfield and Sherwood Forest; *Walckenaera nodosa*, Cambr., Hexham; *Cornicularia vigilax*, Bl., Hexham; *Singa pygmaea*, Sund., Kirkby, Lancashire; *Xysticus bifasciatus*, C. L. Koch, Hexham; *Lycosa agricola*, Thor., Kirkby, Lancashire; *Lycosa herbigrada*, Bl., Hexham; *Oligolophus Hansenii*, Kraepel., Nottinghamshire; and *Obisium maritimum*, Leach, Port Erin Bay, Isle of Man. [Mr. W. Falconer informs us that the record marked *, though copied correctly from Mr. Cambridge's paper, is inaccurate. Neither his nor Dr. Jackson's examples, on which the species is founded, came from Hexham as stated. The former were found beneath and around stones embedded in damp grass on a certain portion of Standedge, near Huddersfield, where they still occur. The latter, on the verbal and written assurance of the Doctor, were taken in Staffordshire. The entry should therefore read, 'from Staffordshire and near Huddersfield.]

THE NATURALIST.

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

EDITED BY

T. SHEPPARD, F.G.S.,

THE MUSEUM, 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.

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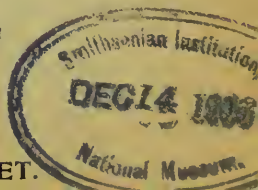
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NOTES AND COMMENTS.

COAL-MEASURE ARTHROPODS.

IN a paper printed in a recent issue of the 'Transactions of the Manchester Geological and Mining Society,' Mr. Walter Baldwin describes *Prestwichia anthrax* and *Belinurus lunatus* from Sparth Bottoms, Rochdale. The middle coal-measures at Sparth Bottoms have yielded quite an interesting fauna, many of the specimens therefrom being exhibited and described at



Prestwichia anthrax, natural size.



Belinurus lunatus, natural size.

the York Meeting of the British Association by Dr. Henry Woodward. We are kindly permitted to reproduce the figures of the two specimens described by Mr. Baldwin, the first named species being the first recorded example from the Lancashire coal field, and the second is a somewhat better specimen than that previously described by the same author, under the name of *Belinurus bellulus*.*

SCHOOL MUSEUMS.

A recent number of the *School World* (Vol. 8, No. 88) contains two suggestive papers on the above subject, viz., 'The Equipment of a School Museum' by O. H. Latter, and 'School Museums' by E. E. Unwin. Mr. Unwin concludes: 'Dispel from your minds the idea that a school museum should necessarily be a collection of all kinds of objects from all parts of the world; let a school museum be a "local" one: try to realise that it is the work done by the children that is of value; do not be afraid to make a bonfire now and then to clear the ground; and, be enthusiastic yourself, and soon you will have the whole school enthusiastic with you.'

* See 'Naturalist,' February, 1904, p. 37.

MICROSCOPY AT MANCHESTER.

The Annual Report and Transactions of the Manchester Microscopical Society' have just been received, and contain several items of interest to our readers. Amongst these are the President's Address, 'Precious Corals,' by Prof. S. J. Hickson; 'Notes on *Acanthocystis pertyana*,' by J. E. Lord; 'The Microscopic Structure of Stems,' by C. Turner; and 'Animal Colouration,' by Mark L. Sykes. The latter is illustrated by plates of lepidoptera illustrating simulation of environment. By the permission of the society we are able to reproduce these (plates XXIX., XXX.), upon which are no fewer than twenty species of butterflies.

GEOGRAPHY AT MANCHESTER.

In the 'Journal of the Manchester Geographical Society,' Vol. 21., Nos. 7 to 12, Mr. C. E. Moss has an interesting paper on the botanical geography of a Pennine stream. In this the author deals with the Alpine associations, subalpine associations, woodland associations, lowland alluvial formations, maritime formations, and the region of cultivation. It is illustrated by several photographs showing characteristic botanical features.

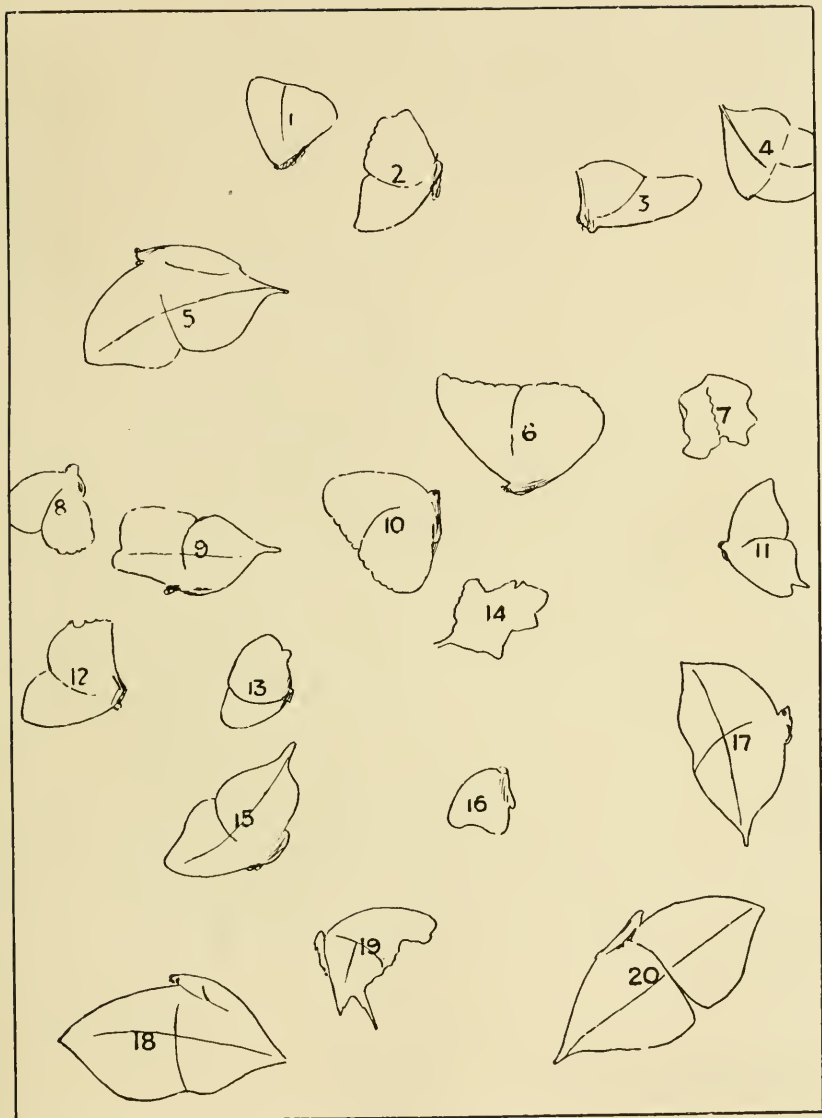
EAST YORKSHIRE AND ITS WATER SUPPLY.

The Geological Survey continues to publish its useful memoirs dealing with the water supply of definite areas. The most recent deals with East Yorkshire,* and has been prepared by Mr. C. Fox-Strangways, with contributions by Dr. H. R. Mill. There is a carefully prepared introductory chapter dealing with the geology of the area so far as it relates to the water supply; Dr. Mill follows with notes on the Rainfall, which are illustrated by a useful map. The greater part of the volume, however, is occupied by details of well sinkings and borings in the Vale of Pickering, the Vale of York, the Jurassic and Cretaceous Hills, and the Holderness plain. There are analyses of water, an extensive bibliography, and a good index. Just now, when the water supply of this district is 'in the air,' so to speak, the recently issued memoir should be of value.

* 'The Water Supply (from underground sources) of the East Riding of Yorkshire, together with the neighbouring portions of the Vales of York and Pickering, with records of Sinkings and Borings. 1906. 181 pages. Price 3/-.'



' Leaf Butterflies ' amongst Leaves.

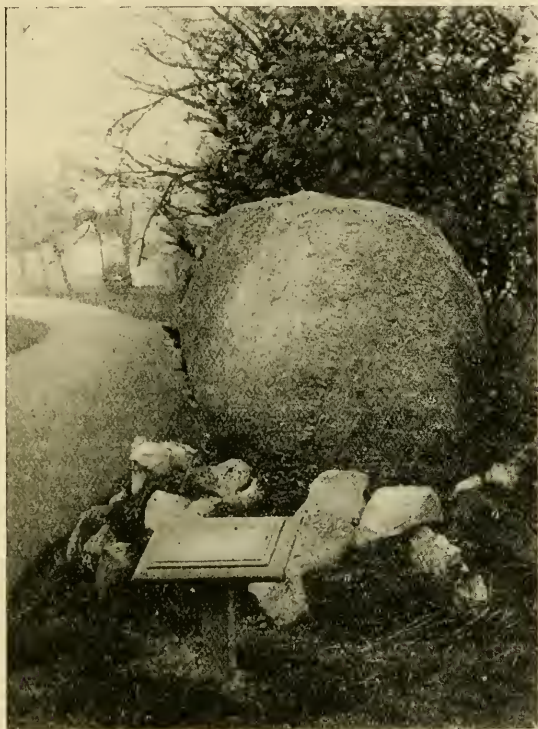


Lepidoptera shown in Plate XXIX.

- | | | |
|--------------------------------------|-------------------------------------|--------------------------------------|
| 1. <i>Euryphene soernis</i> . | 8. <i>Euryphene</i> sp. | 15. <i>Kallima albofasciata</i> . |
| 2. <i>Euphœdra medon</i> . | 9. <i>Doleschallia polibete</i> . | 16. <i>Junonia zarinia</i> . |
| 3. <i>Colenis julia</i> . | 10. <i>Euphœdra sophron</i> , male. | 17. <i>Kallima philarchus</i> . |
| 4. <i>Zaretis strigosus</i> . | 11. <i>Anæa stheno</i> . | 18. <i>K. paralekta</i> , male. |
| 5. <i>Kallima inachis</i> , male. | 12. <i>Taygetis ypthima</i> . | 19. <i>Marpesia peleus</i> . |
| 6. <i>Euphœdra sophron</i> , female. | 13. <i>Catopsilia statira</i> . | 20. <i>Kallima inachis</i> , female. |
| 7. <i>Hypena proboscidalis</i> . | 14. <i>Eriogaster lanestris</i> . | |

SHAP GRANITE BOULDERS.

Perhaps no rock has been so useful to geologists studying glacial phenomena in the North of England, as has Shap Granite. Partly from the ready way in which it can be identified, but principally from the fact that boulders of it have been scattered like seeds in various parts of the country, and in enormous numbers, it has proved most serviceable in tracing the courses



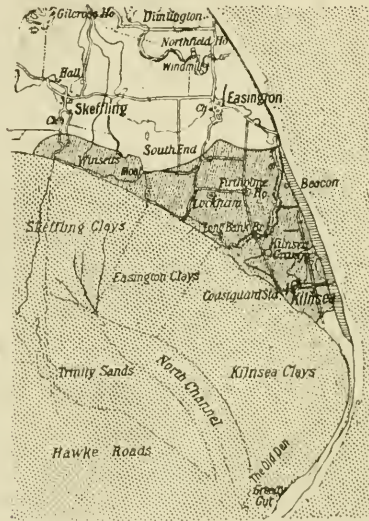
Boulder of Shap Granite from Royston.

of the various ice streams that at one time existed in England. The trails of the Shap granite boulders alone have demonstrated certain unexpected routes of some of the old glaciers. We are hoping shortly in these pages to print some interesting details on this point. In the meantime we are able to give a representation of a boulder of Shap granite, weighing about 30 cwts., which was found at Royston, and is now in the Barnsley Park. The illustration has been lent by the Yorkshire Geological

Society, and was originally used in illustration of the Rev. W. Lower Carter's paper on the Glaciation of the Don and Dearne Valleys.

COAST EROSION.

Probably at no previous period has the question of the erosion of our coast been brought so prominently before the public as during the past two or three years. Committees have been investigating and reporting, official enquiry has been made by the government, several books have been written, and magazine articles innumerable have been issued. Perhaps one of the most interesting of these last named appeared in a special



Map of the Spurn District.

The shaded portion shows the flooded area; the darker strip indicates the part eroded during the past six years.

supplement to the *Sphere*, which was illustrated by an admirable series of photographs showing the effect of the erosion of the sea in various parts of England, but particularly in South-East Yorkshire, where the floods of the past summer also played havoc. Several local photographs, and drawings by Mr. Percy Home, are reproduced, as well as plans, etc. One of the illustrations we are kindly permitted by the proprietors of the *Sphere* to reproduce.

YORK'S LOST OPPORTUNITY.

The final meeting of the Executive of the Reception Committee for the recent visit of the British Association to York, was held recently at York, the Lord Mayor (Alderman Wragge) presiding. A balance-sheet was presented, showing the total income from subscriptions to be £3394. The total expenditure was £2861, leaving a balance at the bank of £533. The total number of visitors to the Association was 1971, and the opinion was generally expressed that the York meeting was one of the most successful ever held in the history of the Association. From the Reception Committee's point of view, presumably. A substantial sum was voted to Mr. Arey and to Mr. Elmhurst for their services, and £28 was put aside for contingencies. So far so good; but 'it was decided to return the balance to the subscribers at the rate of half-a-crown in the pound.' Probably not one of those who had subscribed expected any return, and certainly few would have objected to the amount due to them being handed over to the Yorkshire Philosophical Society, had such a suggestion been made. With the surplus £500, the people of York might have carried out a much needed improvement to their museum, and without feeling the cost in any way. When the Reception Committee was first called together at York, the Lord Mayor certainly promised that 'any surplus funds raised in connection with the British Association *would be devoted to some scientific purpose.*' Why has this promise been forgotten?

A Handbook of British Inland Birds. By **Anthony Collett**, with coloured and outlined plates of eggs by Eric Parker. 290 pages. Messrs. Macmillan & Co. 6/-

Of books dealing with birds there appears to be no end, and we fail to see that in the present volume there is anything but what can be obtained in dozens of other volumes dealing with the same subject. It has, however, some useful outline plates of eggs, and some usually excellent plates printed by the three-colour process, though in the copy sent to us some of these are out of register, and the effect is anything but pleasing. According to the preface, 'the chief intention of this handbook is to supply as plain and simple a means as possible for the identification of those species of birds, as well as their nests and eggs, which are to be met with in the inland districts of this country. Though we have a very large number of shore and sea birds, they so seldom, generally speaking, happen to cross the path of by far the greater number of persons interested in bird life, that it has seemed that there should be a useful place for a book in which the space gained by omitting their numerous company was devoted to a closer account of their inland species. . . . In the course of preparing the descriptions use has frequently been made of Mr. Howard Saunders's well-known and excellent Illustrated Manual of British Birds.' We suppose it would be an easy matter to prepare still another book dealing with shore birds and omitting the inland species. The book, however, is well produced, and is generally written in readable style, and would make a suitable presentation volume.

FLORAL COMPETITION AND CYCLES.

REV. E. ADRIAN WOODRUFFE-PEACOCK, F.L.S.

EVERY one who studies topographical botany in the modern scientific spirit, attempts to discover 'the reason why' for the presence of every species on the soils it frequents, and in all the localities it prefers. When we are thus engaged, we soon discover we require a closer analysis of living nature than any existing botanical work affords. A more flexible method of observing and recording facts than has been employed up to date, will soon collect the mass of information that is required, though for the time being there is little enough of the right sort of floral records in print. As a result of this great deficiency, many of the arguments used, and conclusions drawn, in works up-to-date are founded on a misunderstanding of even general laws, and a false appreciation of the simplest facts of nature.

One of these fundamental mistakes seems to have become crystallized in the following sentence of a modern work. 'The conditions accompanying human operations of which plants seem to take advantage, are (1) the disturbance of the ground, and (2) the unnatural supply of plant food.' A systematic analysis of localities on all soils with their varying circumstances, soon proves to the critical observer, that whether one of these conditions acts alone, or both together, they are not the primary cause of the selection and combination of species found on tilth or broken ground of any kind. A very little observation, properly directed, will soon convince any unprejudiced mind, that freedom from competition is the chief influencing cause of the appearance of annuals and biennials on freshly moved soils. It settles the question of the duration of their stay; and everywhere, under natural and artificial conditions alike, freedom from competition is the most potent influence in the distribution of transitory species.

A garden or arable field may possess both the conditions named, but many 'cleared spots' or 'fallow ground' are wanting in both. Yet, annuals and biennials soon flourish; and when the soil is deep and rich, are quickly followed by the more persistent perennials. The 'floor' of a sandy-gravel pit has 'the disturbance of the ground,' but as certainly lacks 'the unnatural supply of plant food.' Yet, such a pit, within 200 yards of my study table, used within the last few weeks, demonstrates the fact that annuals, despite adverse circumstances, at once take possession of any vacant opening. An

unused macadamised road or 'floor' of a clay pit, or natural slip on the face of the Neocomian escarpment, has neither condition named. Nevertheless the annuals and biennials of tillth soon seize on the unoccupied space in all such places, and flourish for their allotted number of seasons; till they are thrust aside by stronger growing, deeper rooting species. Room to grow according to their peculiar requirements, is the first condition of plant life. It appears, too, that annuals, on account of their limited root system want more air and soil space than perennials in proportion to their leafage; or in other words, monocarps are more exacting in the circumstances of their hurried growth cycle than polycarps. The (1) mechanical and (2) chemical state of the soil—the two conditions, named above in other words—are further 'helps and aids' which annuals always take full advantage of. The better the soil conditions, too, the more rapidly are the annuals supplanted by perennials, and the briefer their stay. These two conditions come, however, a long way after the all important requirement of freedom from competition, and the moisture question certainly lies between them.

Poa annua, of our garden footpaths, proves how little is required by annuals except space and moisture. I only once in my life saw a crop of wheat actually growing which yielded $6\frac{1}{2}$ quarters per acre. The seed had been specially selected, and the soil was in the highest state of fertility; the resulting crop was so long and thick that the soil below was absolutely bare. Six weeks from the day the cereal was cut, a flock of sheep were grazing on the finest and purest crop of *Poa annua* I have ever seen! The conditions in this case were purely artificial, so another instance shall be given. Several years ago an ash tree, standing in an old pasture, was uprooted in a heavy gale. In its fall it rent the ground for three yards each away. A number of annuals took possession of the torn surface at once, and vied with one another in productivity for a time, as is their wont. Amongst others were *Veronica arvensis*, *Lamium purpureum*, *Senecio vulgaris*, and *Bromus sterilis*.

The soil, as is usual in old pasture land, was exceedingly rich, and the turf quickly asserted its former supremacy. Watching the result was worth the continual observation such a case requires. For some seasons the four species named have been driven from their former foothold, and have grown in the trifling material which, after the sun, wind, and rain of all seasons, still clings to the roots of the overthrown stump. There, two feet

above ground, in a soil so thin and dry that the plants die off before the end of May, they are free from competition.

There is a clear distinction between broken-ground and road-hedge-side species. One, speaking generally, is the refuge of annuals, which can stand little crowding, the other, of biennials and perennials capable of enduring much more; naturally perennials cannot flourish in a soil that is annually cultivated, unless, like *Agropyron repens* or *Agrostis stolonifera*, they are specially furnished for the purpose. There are, however, many curious and to me as yet inexplicable exceptions. *Sisymbrium officinale*, for instance, is far more often found in biennial localities than in annual areas. It may be on account of its short flowering time, but more likely on account of its mode of growth, *i.e.*, the time between the seed germination, and seed shedding.

There is another glaring misinterpretation of facts, and of published book records, lying at the root of our accepted estimate of the value of species as native or alien. It is one that has practically been most fruitful of errors in attempts at 'making' pasture and meadow-land. Everything is changing and fluctuating in the world of plant life, but on clear and definite lines. There is a perfectly regular sequence and cycle from broken ground to pasture. If you care to follow the course further, to forest, swamp and peat bog, in Ireland at present, and formerly in our greater or smaller fens in Lincolnshire, when Eastern England had a much moister climate than now. The combination of species in the flora this season is not exactly, only approximately, the same on any spot, as that of last year. The cycle can be studied at one point only at a given spot, and it must ever be remembered that it is only a section that can be under review at any one place or time. It is, therefore, the greatest folly to expect the species or combinations of any other portion of the cycle to be there.

A piece of tith falling perfectly naturally to pasture—'tumbled down' grass it is locally called—exhibits according to its age, the nature of the soil, rainfall, and stocking it has received, many varied and perfectly definite changes. These gradually fit the ground, to be the home for the time being of a long succession of species in temporary combinations. The earliest occupiers of the ground are soon thrust aside, and each combination in turn that follows them, steadily but more slowly, gives place to some other selection, as root soil and nitrogen accumulate, and the turf grows closer and competition more keen. What is true of a pasture growing in quality, is equally

applicable to one falling in quality. An epizootic disease amongst herbivores, as is not uncommon even in wildest Africa, may cut off the supply of stock. Now as the secret of good pasture, in nature or by art, is regular and systematic cropping, both plant and soil would suffer rapid deterioration. *Primula veris*, *Bunium* and *Chrysanthemum Leucanthemum*, to name three common pests of certain pastures, in the order in which they would reappear, would gradually return to their former habitats, as a more open turf, and its condition of growing poverty made it adapted to their requirements. It is no use looking for plants where, from the necessity of the case, they cannot be found.

It is no use opening foreign floras to discover that *Malva sylvestris* is 'a native of bushy places and pastures in most parts of Enrope, but becomes more and more confined to artificial habitats to the north-west, and in England is not recorded in natural habitats, though common about road sides and houses.' Cultivation grows more and more intense from Constantinople north-westwards in Europe, and as this increases, this species is driven more and more certainly into artificial habitats. The fact that it is thus driven is only noteworthy when considering this plant's growth cycle under intense cultivation; it has no bearing on the question of its 'nativeness' whatever. What position in continental cycles do 'bushy places and pastures' imply? Is there any one alive with a sufficient grasp of continental circumstances to say? We find words, a phrase, but no scientific exposition whatever. It simply comes to this, *Malva sylvestris* is found in bushy places and poor pastures, if such we may call them, round villages in S.W. Europe; and in the few such places which still exist in their pristine purity—impurity now—with us.

Take *Lamium album* as an instance of an unstable perennial. I find from my notes its flowering range extends on all classes of soil from the middle of April to the middle of January, if the season allows. It cannot compete with *Poa annua*, *Stellaria media*, and a few other species in this respect, but it does not suffer either from deficiency of seed or of growth period. It is often found on sandy gravelly soils, when they first 'tumble down' to grass, but is soon driven out under ordinary circumstances—stock are fond of it and consume it eagerly. In meadows it is destroyed by the stock, after the hay crop has been gathered; this is easily proved from churchyards, which are never stocked. On light soils it flourishes greatly in them, often forming an eighth of the herbage. It cannot stand the close

competition of pasture or over growth by rampant species in woods and hedges, unless they act as protectors. It has therefore with us become a broken ground species, preferring a fairly rich and open soil, and clings for this purpose to the neighbourhood of human habitations, where the scythe—no species known to me recovers more quickly after it has been cut down—and trampling feet of children prepare for it a fitting abiding place. Now, we are informed that it is a 'native in woods and forests, from Spain and Morocco to Siberia and Himalayas.' Then Great Britain is clearly within its area of range; 'woods and forests,' however, imply whole cycles of conditions most bewildering to the true student, according to peculiarities of soil, moisture, elevation, exposure, and 'openness.' So much is this the case, that we are just as wise as we were before we possessed this valuable information.

We cannot put the cart before the horse, but we can form some judgment on the question of the nativeness of *L. album* from the place this species takes in our own floral cycles. It is only thrust aside on its proper soils by (1) heavy stocking, and by (2) the competition of more adaptable species, better fitted to battle with the luxuriance our climate brings. This is simply proved. In England it is much more of a dry eastern counties' species, than of a damp western one; also by the way it clings to escarpments in broken, open, wooded ground, where there is naturally a dry soil, on which from the inclination a deep root soil cannot accumulate to attract stronger growing competitors.

On light gravelly soils, too, this species is found in the oldest and closest pasture, under certain circumstances. Where there are beds of nettles, which are only mown irregularly, or at most once annually, *L. album* is sure to take possession of them along with *Stellaria media*, and a few other species. When the *urtica* is destroyed by constant mowing the *Lamium* goes too. It cannot compete with the stock and turf *without its protectors' aid*.

Man acts as a disturber of the floral cycles of nature, as a clearer and mover of the ground, as an interrupter of competition, as a finder of elbow room for annuals, biennials, and the less powerful perennials. Directly or indirectly his influence is felt in many other ways as a modifying force. Some have hardly been fully appreciated yet. The one special manner in which every human being, by his actions or through his wants, influences plant life, is as an aider and abettor of the weaklings of our flora in their struggle for existence. This may be a strange conclusion to reach, but it is founded on the most

careful observations on Rock-Soil lines, and appears to be universally true. It may be urged that this is exactly the ordinary interpretation of facts, reached from another point of view. Is not 'the point of view' everything however in explaining the operations of nature? Just the difference between the old creationists and modern evolutionists? Both are merely methods of the mind, the way we approach surrounding phenomena to analyse and arrange them, not facts of the external world. Man did not make the floral cycles of the soils and localities he inhabits, though he is ever interrupting them, and causing fresh 'false starts.' Evolution prepared the eternal round of the plant cycle for any soil, long before man's advent, and is ever making it more perfect and elastic through the instrumentality of her greatest creation. How far have annuals, biennials, and weak perennials, as now evolved, been influenced by human intercourse since Eolithic times? This question may hardly seem worth consideration, for it cannot be fully answered with our present information. As long, however, as it remains unanswered, the alien problem remains where it is—unsolved and unsolvable! If the indirect influence of man on plant life is assumed for the sake of being proved, its application greatly complicates every enquiry. Is it better, then, to treat 'the indirect influence of human operations' as friction is treated in works on mechanics—as non-existent—for the sake of simplified illustration? This is practically what has been done up till now. It appears we ought to assume that the flora of Great Britain is quite uninfluenced by man, excepting as an outside force, introducing new species intentionally or accidentally. How do facts fit in with such a method of observation? Badly indeed; for the true difficulty of the whole alien question is to determine exactly how much annuals, biennials, and certain perennials, have been changed and adapted by their long intercourse with man. In other words, there can be no question that man, as an unconscious influencer and selector of certain species, has been, and still is, one of the chief powers of the organic world. When a new work is written with the belief 'in indirect human modification, or the dependence of species on man' clearly in view, complicated though the whole subject is by many side issues, its conclusions in many cases will be wholly different from those of any work yet published, though for the most part they may remain the same. It will just be where we want light, especially regarding those species which may be called followers of man and cultivation, that our opinions will be most radically changed.

ON A SECTION IN THE POST-GLACIAL DEPOSIT AT HORNSEA.*

T. SHEPPARD, F.G.S.

IN Mr. Clement Reid's "Geology of Holderness" (1885), a special reference is made to the peat deposits at Hornsea and to the animal and plant remains found therein. A list is given of all the mammalian, fish, shell and plant remains then known from the lacustrine deposit at Hornsea as under :—

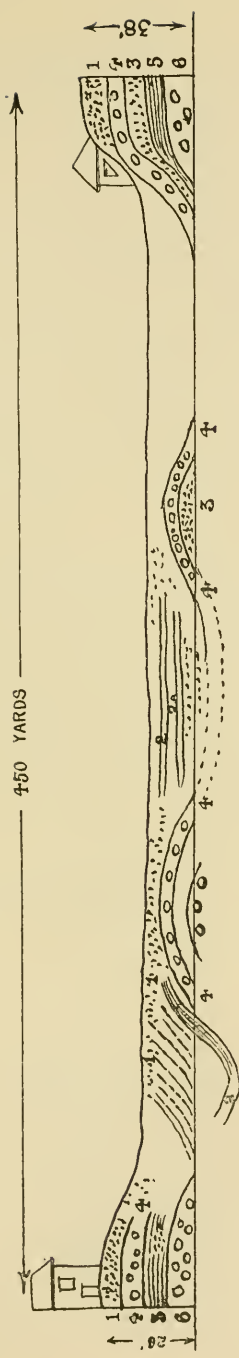
<i>Chara</i> , sp.	<i>Anodonta anatina</i> .
<i>Pinus sylvestris</i> ?	<i>Cyclas cornea</i> .
<i>Potamogeton</i> , sp.	<i>Pisidium pusillum</i> .
<i>Alnus glutinosa</i> , cones and leaves.	<i>Limnaea peregra</i> .
<i>Quercus robur</i> , leaves and cups.	<i>Planorbis contortus</i> .
<i>Salix</i> , sp., leaves.	" <i>nautilus</i> .
<i>Prunus padus</i> , stones.	<i>Bythinia tentaculata</i> .
<i>Cypris compressa</i> .	<i>Valvata piscinalis</i> .
" <i>gibba</i> .	<i>Perca fluviatilis</i> .
" <i>reptans</i> .	Fish scales.
<i>Cypridopsis obesa</i> .	<i>Bos primigenius</i> ? Hull Museum.
<i>Candona detecta</i> .	<i>Cervus elephas</i> . Hull Museum.
" <i>albicans</i> .	" <i>megaceros</i> . Hull Museum.
" <i>lactea</i> .	<i>Elephas primigenius</i> ? York
" <i>candida</i> .	Museum.
<i>Limnocythere inopinata</i> .	<i>Equus</i> , sp.
<i>Cytheridea lacustris</i> .	<i>Felis spelæa</i> . Hull Museum.

and Mr. Reid adds :—

"Two curious points are brought out by this list. Firstly, it shows that some of the extinct Pleistocene mammals, including *Felis spelæa* and perhaps *Elephas primigenius*, are true post-glacial species, not confined in the North of England, as has been stated, to Inter-glacial Beds. Unfortunately, though several teeth of the Mammoth have been found at Hornsea, it is not quite certain whether any of them really belong to this deposit, so it must still be left doubtful whether the species really lived in Holderness in post-glacial times."

"The second point is, that, notwithstanding careful search, the list of fresh-water mollusca is extremely small, forming in this respect a marked contrast to the recent fauna at Hornsea Mere. This is a real deficiency, and not due merely to imperfect search, I feel confident; for, for purposes of comparison, the recent mollusca in the Mere were also collected, and in a short time more than thrice the number of species were obtained. No doubt several others, besides these recorded, may have lived

* A paper read to Section C of the Meeting of the British Association, York.



- 1. Recent Gravels, steep bedded.
- 2. Marl, with freshwater shells.
- 3. Glacial gravels and sand.
- 4. Continuous band of tough Boulder clay (not Hessele).
- 5. Laminated clays (glacial).
- 6. Lower boulder clay.

Section at Hornsea, in cliff, immediately North of Marine Hotel. June 1906.

Shows sections through ancient ponds and lakelets, separated by bosses of boulder clay. Note the extraordinary thickness of the steep bedded recent gravel (1) and the continuity of the glacial beds especial (4).

in the old Mere, but the absence of all but these few species, and perhaps one or two others, at every locality where the lacustrine beds are seen in Holderness tends strongly to show that they were not able to live in the district, or, more probably, had yet not had time to migrate into it."

Subsequently to the publication of the Holderness Memoir the section in the Hornsea Peat Bed was covered up by a sea wall, which unfortunately (and fortunately) was washed away during the exceptionally high tide last spring. The result was that a much finer exposure of the series was visible than I had previously seen. For a distance of about four hundred yards a section varying in height from ten to fifteen feet was visible, and showed, commencing at the top, (1) a thick deposit of superficial gravels bedded at a high angle, (2) marl, (3) peat, (4) glacial gravel and sand, (5) a bed of red, regular, tough boulder clay (not Hessle clay), (6) laminated clays, (7) purple boulder clay.

The most remarkable feature perhaps in the section is the large deposit of gravel above the peat, which it is somewhat difficult to account for, as there are no surface features visible which would lend a clue to this accumulation. Whilst the section was available some time was spent in examining it, and in collecting shells, etc. therefrom, in which work I had the assistance of Mr. H. C. Drake and Mr. T. Stainforth. From the specimens thus obtained, as well as some bones of a bird obtained by Mr. F. F. Walton, we were able to draw up the following list of species from the present exposure :

Plant Remains—

<i>Ranunculus?</i>	<i>Potamogeton</i> , cf. <i>natans</i> .
<i>Potentilla</i> , sp.	<i>Viola palustris?</i>
<i>Hippuris vulgaris</i> .	<i>Salix</i> , sp.
<i>Potamogeton</i> , sp. 1.	<i>Carex</i> , sp.
" sp. 2	<i>Chara</i> .

Shells—

<i>Segmentina nitida</i> .	<i>Limnæa truncatula</i> .
<i>Planorbis albus</i> .	<i>Bythinia tentaculata</i> .
" <i>nautilicus</i> .	<i>Valvata piscinalis</i> and v. <i>antiqua</i> .
" <i>parvus</i> .	" <i>cristata</i>
" <i>spirorbis</i> .	<i>Anodonta cygnea</i> .
" <i>vortex</i> .	" <i>anatina</i> .
" <i>umbilicatus</i> .	<i>Sphærium corneum</i> .
" <i>contortus</i> .	<i>Pisidium fontinale</i> .
" <i>glaber</i> .	" <i>pusillum</i> .
<i>Limnæa peregrina</i> .	" <i>nitidum</i> .
" <i>auricularia</i> .	" <i>milium</i> .

Beetle remains—

<i>Donacia</i> , sp.	|	<i>Agabus</i> , sp.
<i>Pterostichus</i> , sp.	|	

Winter Egg of *Spongilla*.

Valves of a *Cypris*.

Vertebrate Remains—Bones of red deer, bird, and fish.

It will be noticed that the list of plant remains shows some additions to the preceding list of Mr. Reid's.

Mr. Reid has already pointed out a comparison between the shell fauna of the present Hornsea Mere and that of the peat bed representing an ancient mere. Recent investigations, however, by the Leeds Conchological Club and the Hull Scientific and Field Naturalists' Club have resulted in the list of recent shells being increased from twenty-six to thirty-three* as under:—

<i>Segmentina nitida.</i>	<i>Physa fontinalis.</i>	<i>Valvata cristata.</i>
<i>Planorbis fontanus.</i>	<i>Limnæa peregra.</i>	<i>Anodonta cygnæa.</i>
„ <i>nautilus.</i>	„ <i>auricularia.</i>	„ <i>anatina.</i>
„ <i>albus.</i>	„ <i>stagnalis.</i>	<i>Sphærium corneum.</i>
„ <i>spirorbis.</i>	„ <i>palustris.</i>	„ <i>rivicola.</i>
„ <i>vortex.</i>	„ <i>truncatula.</i>	„ <i>lucustre.</i>
„ <i>carinatus.</i>	„ <i>glabra.</i>	<i>Pisidium henslowianum.</i>
„ <i>umbilicatus.</i>	<i>Velletia lacustris.</i>	„ <i>cinereum.</i>
„ <i>corneus.</i>	<i>Bythinia tentaculata.</i>	„ <i>pusillum.</i>
„ <i>contortus.</i>	„ <i>leachii.</i>	„ <i>nitidum.</i>
<i>Bullinus hypnorum.</i>	<i>Valvata piscinalis.</i>	„ <i>milium.</i>

Of these all but *Sphærium rivicola* and *Limnæa glabra* have been confirmed.

Of the fossil species occurring in the bed recently exposed, and not recorded by Mr. Reid, are the following:—

<i>Segmentina nitida.</i>	<i>Limnæa auricularia.</i>
<i>Planorbis parvus.</i>	„ <i>truncatula.</i>
„ <i>albus.</i>	<i>Valvata cristata.</i>
„ <i>spirorbis.</i>	<i>Anodonta cygnæa.</i>
„ <i>vortex.</i>	<i>Pisidium fontinale.</i>
„ <i>umbilicatus.</i>	„ <i>nitidum.</i>
„ <i>glaber.</i>	„ <i>milium.</i>

Three of these, *Planorbis parvus*, *P. glaber*, *Pisidium fontinale*, are recorded as fossils only.

From these subsequent researches it would appear that the analogy between the recent and fossil shell fauna is closer than was apparent when the Holderness Memoir was written.

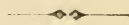
* Some little time ago Mr. W. Denison Roebuck, F.L.S., prepared some extensive notes on the Molluscan Fauna of Hornsea Mere for a meeting of the Hull Club. These will appear in due course in its Transactions.

On carefully examining Mr. Reid's and the present list one or two difficulties appearing in the survey memoir disappear. I have elsewhere shown* that the bone of the lion, recorded as from Hornsea, is really from Bielbecks, and thus our greatest difficulty has been removed. There can be little doubt also that the remains of *Elephas primigenius*, which Mr. Reid queries, cannot have come from the peat bed, but are from the boulder clay, and therefore of older date. The remaining fauna, as shown by Mr. Reid's list, conforms with what can be obtained from other post-glacial peat beds in the district, and presents no serious difficulty. With regard to such species as *Cervus megaceros* and *Bos primigenius*,† these seem to indicate that the deposit is older than, say, similar deposits occurring on Goole and Thorne Moors, notwithstanding the fact that, so far as flora is concerned, there is no evidence of altered climatic conditions.

The peat bed exposed in the Hornsea section is not a level deposit, but occurs in small anticlines and synclines, as though these were originally a series of small meres and not one large sheet of water.

Stratigraphically the Hornsea deposit would appear to be older than the others on the coast line in which, at any rate, there is no great accumulation of gravel above the peat, the presence of which at Hornsea is somewhat difficult to account for.

I am indebted to the kindness of Mr. Reid in identifying the plant remains, to Mr. J. W. Taylor for identifying the shells, and to Mr. J. W. Stather, F.G.S., for the drawing and details of the section on page 421.



FLOWERING PLANTS.

Wintergreen in East Yorkshire.—In July last Miss Piercy of Tibthorpe communicated to the Hull Scientific and Field Naturalists' Club, the finding by herself in a plantation near Tibthorpe, of the Wintergreen, *Pyrola minor*, of which good specimens were forwarded at the time. This is the first record of *P. minor* in the Riding east of the Yorkshire Wolds. Elsewhere with us it is not a common plant.—J. F. ROBINSON, Hull.

* 'Naturalist,' April 1904, pp. 102-104.

† The "?" to this in Mr. Reid's list can safely be removed.

BOTANICAL AND OTHER NOTES AT ARNCLIFFE.

JOSEPH FRY PICKARD,

Leeds.

IN this quaint, picturesque, and sequestered village, strikingly reminding one of the frequent phrase, 'Far from the madding crowd,' I spent a week end during July of this year, staying at the comfortable Falcon Hotel, and exploring crag and wooded glen up-stream from it, and also the wild slopes and summit of our Yorkshire 'lion' Penyghent. I had two reasons for investigating Upper Littondale—firstly, because I knew that though much very valuable work, botanically and otherwise, had been done in the dale by the Rev. W. A. Shuffrey (Vicar of Arncliffe), the late Archdeacon Boyd, Mr. F. Arnold Lees, and others, yet there was very much scope in the wilder gills, etc., for further work; secondly, because I wished to be able to impress the Yorkshire Naturalists' Union with the desirability of visiting it as one of their future excursions.

It is not far from the hotel to the famous 'Clouders,' where *Dryas octopetala*, one of those rose-like or 'wind flower' gems, so local, and yet here so plentiful, with its roots happily embedded in the limestone almost as securely as *Cotoneaster* on the Orme, flourishes in celestial beauty. Following a track of low cliffs, towards the 'Moor,' *Viola lutea* appears everywhere, and the tiny white stars of *Arenaria verna*. Wherever moisture enough occurs amongst the limestone, *Polypodium calcareum* spreads its blue-green fronds, together with an abundance of Green Spleenwort, Hartstongue, and two forms of *Cystopteris fragilis*, and I noticed quite a quantity of Moonwort (*Botrychium lunaria*) on grassy mounds, but nearly all seedling specimens. Wherever there are any remains of old lead workings, *Thlaspi alpestre* var. *occitanum*, is plentiful, and there is also a form here (as on Buckden Pike) of *Cochlearia alpina*, approaching the *grælandica* of Ben Lawers, with inflated pouches. It was beyond this floral hunting-ground, at a higher elevation amongst fern-crags in some unknown corner of the Clouders area, that Archdeacon Boyd found the decreasing Holly Fern (*Polystichum lonchitis*), and within six miles of this region, in some moist wooded dell, our rarest Yorkshire orchid, the Lady's Slipper (*Cypripedium Calceolus*), may still grow, and does turn up occasionally, plucked by some rustic maiden with a bunch of flowers; then the plant is lost,

sometimes for years. I watched a charming sunset from the steep edge of the Clouder, overlooking Cowside Beck, and with one late blooming double-petalled mountain *Dryas*, pure as the driven snow, at my feet.

One of the most interesting plants of the vicinity of Arncliffe is the pale yellow and graceful Welsh or Craven Poppy (*Meconopsis cambrica*), which is found growing plentifully in at least one station, a wood amongst limestone scree, side by side with *Geranium lucidum* and *Thalictrum montanum*, surely native? and as such one of the rarest Yorkshire plants. True, it is seen in the valley in gardens, but more likely to have been brought hither than carried thence.

Arnber Scar yields the dull purple Helleborine Orchis (*Epipactis atrorubens*), Solomon's Seal (*Polygonatum officinale*), Lily of the Valley in its adjoining copses, *Galium boreale* in fine masses on many a jutting crag, together with a profusion of Blood Geranium, and Melancholy Thistle, and many trees of *Pyrus rupicola*, so typical of this limestone country of West Yorkshire. Here, too, the Jacob's Ladder (*Polemonium caeruleum*) is fine and plentiful, and very handsome it looks lining the cliffs with its blue purple spikes. I was glad to see *Draba muralis*, both here and on the Cowside Scars, where also Yew is abundant, and there is a small montane form of *Myosotis sylvatica*, the same mentioned in 'Speight's Craven Highlands' as growing at Malham, but not the true *M. alpestris* of Mickle Fell. Near Cowside Beck, in calcareous bogs, grows *Eriophorum latifolium*, and nearer Arncliffe *Sedum villosum* occurs.

Hesleden Gill, beyond Litton, perhaps the wildest glen in West Yorkshire, is the home of the serrate-crenate and wild form of *Saxifraga umbrosa* (the London Pride), and not far from its habitat *Ribes petraeum* and *Actaea spicata* may be found. *Polygonum viviparum* is plentiful on moist lands under Fountains Fell, and at the head of the gill where the stream pours out of the rocks, and falls in a succession of cascades, there is a small quantity of the Purple Saxifrage (*S. oppositifolia*), perhaps washed down from Penyghent, but possibly bird-sown (except for the fact that the seeds are very minute), from the western crags of the mountain, as it is not to my knowledge found on the eastern cliffs, and nowhere else in Wharfedale. Mr. F. A. Lees records in his 'Flora of West Yorkshire' a few stunted Junipers in the swallow holes at Hesleden Gill Head, the only station in the dale. It was here also where I watched for ten minutes, a Heron, wading in mid-stream, within fifteen

yards of where I was standing behind a wall and trees, perfectly unconscious of my presence.

Following the road from Litton to Halton Gill, and thence to Foxup, a small hamlet just under Penyghent Low Man (2231 ft.), I was most interested to find on the banks of a rill descending to the Foxup Beck the Yellow Mountain Saxifrage (*S. aizoides*), a new plant for Littondale, and there was still more of it growing with *Draba incana*, *Saxifraga hypnoides*, and *Alchemilla vulgaris* var. *montanum* (another rare variety), on the higher Yoredale rocks of this end of the mountain, clearly in the Wharfe Basin. There was none of it on the corresponding cliffs of the High Man (2273 ft.), in the Ribble basin, but *S. oppositifolia* instead.

On grit rocks of Penyghent was some Parsley Fern, though rare, and amongst the heather, from 1500 to 2100 ft., an immense abundance of *Rubus Chamemorus*, veritably the 'Cloud-berry,' from the covert of which I disturbed a solitary Dotterel, now so scarce amongst the Yorkshire hills.

I noted fifty birds during the week end, and was glad, amongst others, to see the Buzzard both on Penyghent and Arncliffe Clouders, also a fine Merlin on Fountains Fell. A couple of Cole Titmice were making a disturbance in a hedge near Litton, and the Redstart seemed very common. To these, amongst the more interesting, I might add Ring Ousel, Snipe, Golden Plover, Curlew, Waterhen, Sandpiper, and Black-headed Gull. I saw a large Lizard on the summit plateau of Penyghent at about 2150 ft., which was in colour a mottled green. I was struck with the apparent scarcity of mammals, the only one I observed being the Rabbit, many of which, in the neighbourhood of Arncliffe, were black, and a few white.

This district must have a charm for the would-be poet also, for the visitors' book at the hotel is filled with original ventures, and extracts from Longfellow; and it is in tender memory the revered spot where one of the most famous nature-loving and gentle-hearted men of the nineteenth century, Charles Kingsley, stayed during the time when he was planning his delightful book 'Water Babies,' where he describes the mystical climb of the little chimney sweep, Tom, step by step and ledge by ledge down the steep face of limestone scarp, at the Cove of Malham, until he reaches the fresh sparkling streamlet below, which was so soon to transform him by its magic touch into a fairy of its glistening depths.

And in our Littondale 'becks' and 'gills' we see again and

again miniatures of the same nature, with moss covered hollows and grey stones bright with ferns, so that I am constantly reminded of Kingsley's song:—

“ Clear and cool, clear and cool.
By laughing shallow and dreaming pool,
Cool and clear, cool and clear,
By shining shingle and foaming weir;
Under the crag where the ousel sings,
And the ivied tower where the church bell rings,
Undeiled for the undeiled,
Play by me, bathe in me, mother and child.”

DIATOMS.

Diatoms at Askern.—Mr. M. H. Stiles, in addition to his list ('Naturalist,' April 1906, pages 128-129), records the following species as found in the Bog Pond at Askern, on the excursion of the Yorkshire Naturalists' Union on July 12th, 1906:—

<i>Achnanthes exilis</i> Kutz.	<i>Gomphonema montanum</i> var. <i>commutatum</i> .
„ <i>lancoolata</i> Breb.	<i>Navicula radiosa</i> Kutz.
<i>Cocconeis pediculus</i> Ehr.	„ <i>cuspidata</i> Kutz.
„ <i>placentula</i> Ehr.	„ <i>oblonga</i> Kutz.
<i>Cyclotella meneghiniana</i> Kutz.	„ <i>sculpta</i> Ehr.
<i>Cymatopleura solea</i> Breb.	„ <i>Reinhardtii</i> var. <i>gracilior</i> .
<i>Cymbella cymbiformis</i> var. <i>parva</i> W. Sm.	* <i>Nitzschia linearis</i> W. Sm.
<i>Denticula elegans</i> Kutz.	„ <i>sigmoidea</i> W. Sm.
* <i>Fragilaria brevistriata</i> Grun.	<i>Synedra ulna</i> var. <i>splendens</i> .
<i>Gomphonema intricatum</i> Kutz.	

In addition to these, the writer found on the same excursion, in gatherings taken from Askern Pool and some of the adjacent streams and ditches:—

<i>Achnanthes microcephala</i> Kutz.	<i>Hantzschia amphioxys</i> var. <i>vivax</i> .
<i>Cymbella affinis</i> Kutz.	<i>Navicula ambigua</i> Ehr.
„ <i>amphicephala</i> Naeg.	„ <i>amphisbæna</i> Bory.
„ <i>cistula</i> Hempr.	„ <i>cryptocephala</i> Kutz.
„ <i>Ehrenbergii</i> Kutz.	„ <i>elliptica</i> Kutz.
„ <i>Helvetica</i> Kutz.	„ <i>exilis</i> Grun.
„ <i>lancoolata</i> Ehr.	<i>Nitzschia dubia</i> W. Sm.
„ <i>lævis</i> Naeg.	„ <i>palea</i> var. <i>tenuirostris</i> .
„ <i>obtusa</i> Greg.	„ <i>vermicularis</i> (Kutz.) Grun.
<i>Ecyonema ventricosum</i> Kutz.	<i>Stauroneis phenicenteron</i> Ehr.
<i>Epithemia gibberulata</i> var. <i>rupestris</i> .	<i>Synedra amphicephala</i> Kutz.
<i>Eunotia arcus</i> Ehr.	„ <i>radians</i> (Kutz.) Grun.
<i>Fragilaria virescens</i> Ralfs.	<i>Vanheurckia vulgaris</i> V. H.
<i>Gomphonema parvulum</i> Kutz.	

—R. H. PHILIP, Hull, November 1906.

* New records for Yorkshire.

NOTES ON THE YORK RAINFALL.*

J. EDMUND CLARK.

YORK rainfall records now cover a total period of eighty-nine years. Prof. J. Phillips has preserved for us a summary of observations by Jonathan Gray from 1811 to 1824. John Ford, of the Friends' Boys School, began observations in 1831, the year when this Association was founded. From the next year on, we still have an almost unbroken series of the original daily records. From 1872, the Yorkshire Philosophical Society records have been used by the Meteorological Office.

The seven decades from 1831 to 1900 give a mean annual fall of 24.766 inches. The whole eighty-nine years work out at 24.584 inches. The sixty years, omitting the seventies, only average 24.222 inches, the mean for that decade reaching the abnormal value of 28.036 inches. The driest decade was that of the fifties (23.265).

Examining the monthly totals (reduced for comparison to thirty-day values) we find a curve from the March minimum of 1.56 inches to the October maximum of 2.54 inches, unbroken save for a peculiar drop in September. There is thus a variation of nearly an inch on a mean thirty-days fall of 2.01 inches.

The means for July, August and October are 2.48, 2.51, and 2.54 inches. This approach to identity makes the September drop the more striking. In the seventies only did it exceed each of the other three months.

Over long periods, November, August, and July have each been the wettest months of the year. Decade by decade the wettest months have been (1) November, (2) October, (3) August, (4) October, (5) September, (6) July, (7) October; the September mean for the seventies (3.36) being the highest.

Suspecting a possible association with solar activity, the annual and monthly values at maxima and minima were compared. The three years about each of these extremes were taken for each of the six cycles in the seventy years, 1831 to 1900, the first minimum being at 1833.9, and the last maximum at 1894.1

This comparison showed an excess aggregate fall for the whole year of the eighteen years at times of maxima over the

* A paper read to Section A at the meeting of the British Association, York, 1906.

eighteen years at minima of 50.00 inches on 425.73, or 12%. This is the more significant, as, taking cycle by cycle, this relation is reversed only in the fifth, thanks to the abnormal rainfall of the seventies.

Nine out of the twelve monthly values give an excess at maxima, August alone showing a marked excess at times of solar quiescence. The August aggregate is then 21.76 inches in excess of the fall at maxima of 38.02 inches, equal to 36½%. The contrary excess exceeds this in June (46%), September (48%), October (39%), and December (61%). July is equally wet at maxima and minima, the respective eighteen years totalling to 52.13 and 50.73, or an average for the thirty-six years of 2.86 against 2.29 (aggregate, 78 inches) for the thirty-four 'neutral' years. This is an excess of 25% at the extremes of activity and quiescence above the neutral years.

Whilst admitting that this *may* all be fortuitous, such marked differences hardly seem to be so. At any rate the writer has thought the matter worthy of further investigation, first for York, then for other districts and periods.

For this purpose the yearly and monthly totals were analysed, cycle by cycle, each cycle being brought to a mean of eleven years, in which the first was the year of minimum and the sixth of maximum solar activity. The values for the six cycles were then superposed, namely, the six years of minima, the six of the second year of the cycle, of the third, fourth, and so on to the eleventh. Limiting ourselves at present to the three months, August, September and October, the resulting curves again showed a striking contrast between August and the two succeeding months.

To bring out this contrast more plainly, the respective rainfalls were three-bloxamed, year by year. Then the August values were subtracted from the mean of those for September and October, using, as it were, a formula, $\frac{S+O}{2} - A$. The curve resulting from these values was then drawn over the corresponding curve from Wolf's and Wolfer's sunspot values. The general correspondence can hardly be denied.

Combining now the un-bloxamed values for $\frac{S+O}{2} - A$, assorted into the six cycles, as before, we find that they give us an absolutely unbroken curve. The minimum and maximum coincide absolutely with that of sun spots, but the maximum lasts over the seventh and eighth years too.

Very similar results were obtained for other British districts,

especially from the long records of Rothesay, London, and Exeter.

Going back again to the Uppingham records, from 1736 to 1798, we get a similar curve, even though the comparison is with less certain sun spot records. Also, Prof. Schuster has shown (Proceedings 'Royal Society,' A, No. 515, p. 143), that 'from 1750 to 1825 the eleven year period does not appreciably affect the periodogram.' A tendency to 'lag,' indicated even at York, is however more pronounced. This especially tends to assume the form of a 'hump' when single cycles are considered, about the eighth or ninth year of the cycle. We may note a similar hump in solar intensity curves, especially if these are 'weighted' for the solar areas most efficient at the time of the autumnal equinox.

Examination has been made, further, with reference to Brückner's suggested thirty-five year cycle. The period covers two such, namely 1831 to 1865, and 1866 to 1900. For these two the respective annual and monthly values were three-bloxamed and combined year by year. Except March and August, all thirteen curves obtained showed a larger range in the earlier part. Ten of the maxima fall in the earlier part, and six minima. There is a contrast again between August and the two following months. On eliminating the eleven year cycle, this contrast becomes yet more strongly marked. Treating the sun spot values in the same way, the residue gave a curve of solar activity closely associated with the corresponding curve for $\frac{S+O}{2} - A$.

Taking in both cases the records from 1831 to 1900, and combining the two cycles into one, the solar curve has a maximum at VI. and minimum at XXVI. $\frac{S+O}{2} - A$ shows a maximum at V. and minimum at XXVI. In both the years II.-XIX. form a period of activity; XX.-I. of quiescence. Relatively wet Augusts preponderated during the quiescent times, Septembers and Octobers during the active period.

The curves for the whole year, and those of nearly every month, are more or less similarly divided. For the whole year the mean rainfall in the thirty-six years of 'active' solar conditions is 26.09 inches, against 23.25 in the thirty-four 'quiescent' years.

The three months about the autumnal equinox have been specially considered with regard to the York rainfall, but the

others give indications of similar association with solar activity. Thus, in the eleven-year curves for the rainfall of the whole year and of the twelve months, of the twenty-six maxima and minima, twenty coincide either with the year of maximum or of minimum solar activity.

'Notes on Northumbrian Trematodes,' by M. V. Lebour, B.Sc., has been kindly sent to us by the author. The notes are reprinted from the Northumberland Sea Fisheries Report for 1925, and are illustrated by three plates.

A second edition of Postlethwaite's well-known 'Geology of the English Lake District' has just been issued by Messrs. G. & T. Coward, of Carlisle. The list and plates of fossils have been revised, and the section devoted to the Mollusca of the Skiddaw Slates has been re-arranged and the figures carefully drawn. The book is a useful companion for a visitor to the Lake District.

The report of the Moss Exchange Club for 1906, edited by Mr. W. Ingham, of York, the hon. secretary, is also to hand. It is principally occupied by a 'List of Mosses and Hepatics,' with localities, etc. This is presumably the list of species distributed during the year. The hope is expressed that a Census Moss Catalogue may shortly be prepared; and steps are being taken to form a working committee for the purpose.

The 'Report of the North Staffordshire Field Club, for 1905-1906,' is an exceptionally interesting number. There are two important palæontological papers, *viz.* 'A Newly Discovered Fish-Bed in the Cheadle Coalfield, with notes on the Distribution of Fossil Fishes in that District,' by J. Ward and J. T. Stobbs; and 'Contributions to the Geology and Palæontology of North Staffs.—No. VI. Palæontology of the Cheadle Coalfield,' by J. Ward. These papers are illustrated by excellent plates.

We have received the rules, syllabus, etc., of another recently formed Lancashire Society, *viz.* the Liverpool Botanical Society. An admirable list of lectures has been drawn up for the winter session, and it is pleasing to find that several of them have a bearing on the Liverpool district. The Society hopes to shortly undertake the preparation of a Flora of South Lancashire. The Rev. S. Gasking is the first president, and Mr. A. A. Dallman, of Lyndhurst, Prospect Vale, Liverpool, is the Hon. Secretary.

The Board of Agriculture and Fisheries draw attention to the occurrence on the larch of an insect hitherto unrecorded in destructive abundance in this country. The insect in question (*Vematus Erichsonii*) is a species of sawfly, the larvæ of which bear considerable superficial resemblance to the goose-berry caterpillar and to the caterpillar of the pine sawfly. The larvæ are about three-quarters of an inch long. They feed upon the leaves of the larch from about the middle of July till the end of August. So far, serious damage has only been reported from Cumberland, where, however, the health if not the life of an extensive larch plantation, is in danger.

The Curator of the Hull Museum has just issued two further penny hand-books, which brings the total number now published by this institution to 36. No. 35 is the usual quarterly record of additions, and contains illustrated articles on East Yorkshire pre-historic implements, Roman antiquities from North Lincolnshire, a Hull whaling log-book, a Wilberforce statuette, and a remarkable growth of teeth in a rabbit. There are several other interesting items in this quarterly. The other publication is entitled 'The Relationship between Provincial Museums and Local Scientific Societies,' and is Mr. Sheppard's presidential address to the Hull Scientific and Field Naturalists' Club. In this he demonstrates the advantage of the local societies and museums working together.

YORKSHIRE NATURALISTS AT GUISBOROUGH.

(Continued from page 396).

Mr. T. A. LOFTHOUSE writes:—From an entomological point of view, the weather on the occasion of the Guisborough meeting was not all that could be desired. The most of the previous week or ten days having been both wet and cold, while on the Saturday, although it kept fine, it was very cold, and insect life was naturally much less in evidence than it otherwise would have been.

In the macro-lepidoptera some twenty species or so were noticed, mostly only single specimens, among the principal being *Cosmia trapezina*, *Polia chi*, *Cleoceris viminalis* var. *obscura*, *Larentia olivata*, *Cidaria populata* and *truncata*, *Melanthia bicolorata*, etc.; a number of Tortrices and Tinææ were beaten out when working for larvæ. These are mostly to determine yet, and if anything of note occurs among them, a note will be sent to the 'Naturalist' later.

Alder, mountain ash, fir, birch, oak, etc., were beaten for larvæ, but with very little result, larvæ of *Hypsipetes ruberata* and *trifasciata*, *Venusia cambrica*, *Eupithecia indigata* and *lariciata*, *Hylophila prasinana*, *Habrostola tripartita*, and *Bombyx callunæ* were among the species noted.

In the district covered by the meeting some interesting species were taken within about a week of the date of the meeting, among them being *Noctua depuncta*, *N. glareosa*, *N. dahlîi*, *Calocampa solidaginis*, *Orthosia suspecta*, *Xanthio fulvago* var. *flavescens*, *Cirrhædia xerampelina*, *Agrotis agathina*, *Epione apiciaria*, *Oporabia filigrammaria*, *Thera firmata*, etc., also larvæ of *Eupithecia fraxinata*, *Acronycta ligustri*, and *Dianthæcia cucubali*.

Mr. M. L. THOMPSON reports that the following beetles were met with along the route from Ayton to Guisborough:—

<i>Nebria brevicollis</i> , F.	<i>Aphodius contaminatus</i> , Hbst.
<i>Calathus melanocephalus</i> , L.	<i>Lema lichenis</i> , Vat.
<i>Bolitobius trinotatus</i> , Er.	<i>Luperus rufipes</i> , Scop.
<i>Stenus impressus</i> , Germ.	<i>Sermyla halensis</i> , L.
<i>Oxytelus tetracarlinatus</i> , Block.	<i>Phyllotreta undulata</i> , Kuts.
<i>Adalia oblitterata</i> , L.	<i>Crepidodera ferruginea</i> , Scop.
<i>Mysia oblongoguttata</i> , L.	<i>Apion dichroum</i> , Bed.
<i>Anatis ocellata</i> , L.	<i>Apion nigritarse</i> , Kirb.
<i>Halyzia 14-guttata</i> , L.	<i>Apion virens</i> , Hbst.
<i>Brachypterus urticæ</i> , F.	<i>Apion humile</i> , Germ.
<i>Meligethes æneus</i> , F.	<i>Strophosomus coryli</i> , F.
<i>Meligethes picipes</i> , Stm.	<i>Strophosomus lateralis</i> , Pk.
<i>Aphodius fimetarius</i> , L.	<i>Phyllobius calcaratus</i> , F.
<i>Aphodius merdarius</i> , Fr.	<i>Ceuthorrhynchus contractus</i> , Marsh.

To this list Mr. W. Denison Roebuck adds *Pterostichus madidus*, F., and *Otiiorhynchus picipes*, F., found in the same neighbourhood before the end of the meeting.

Of HYMENOPTERA, Mr. M. Lawson Thompson, F.E.S., collected a couple of ichneumon flies, which were submitted to Mr. Claude Morley, F.E.S., who determined one of them as *Lissonota bellator* Gr., ♀, and the other, also ♀, as a species of *Linnæria*.

Mr. G. T. PORRITT writes:—The NEUROPTERA and TRICHOPTERA taken included *Hemerobius concinnus*, var. *quadrifasciatus*, *H. lutescens*, *H. orotypus*, *Limnophilus villatus*, and *L. centralis*, of these, *Hemerobius orotypus* had only previously been recorded from Huddersfield in the county.

Mr. C. CROSSLAND writes:—The two days' fungus hunt by the mycologists may be said to have been fairly successful considering the limited area they were confined to. Snippetts and Tocketts Wood were the only places looked into, in addition to the Abbey grounds, on the Guisborough side. On the Kildale side a bit of grand old woodland near Kildale station was worked a few hours on the Monday. Had more time been available it could have been profitably spent here: it was just the type of wood for a mycologist; over fifty species were collected. More time, coupled with careful search, would have brought to light many other, especially micro species.

Some of the members instituted a new departure in fungus collecting. They brought some out of one of the ironstone mines they visited; the fungi were growing on the timber in use in the mine, probably the wood was infected with the mycelium of the several species when taken into the pit. There were *Hypholoma fasciculare*, *Poria vaporaria*, *Merulius lacrymans* (dry rot), *Sphaeria aquila*, and a malformed Polyporous sp. not easily determinable.

As one might expect, the majority of the species collected are of common occurrence. On the other hand, one species, *Ryparobius pachyascus* Zukel., new to Yorkshire, if not to Britain, was found; also some half-dozen confirmations of hereto single records were established: often these are quite as valuable as entirely new records.

All are first records for Guisborough and Kildale.

In the appended list G=Guisborough and K=Kildale.

Phallaceæ.

Ithyphallus impudicus. G.
In woodland

Agaricaceæ.

Amanita pantherina. K.
In a mixed wood.
Amanitopsis vaginatus. K.
Among grass in a mixed wood.
Armillaria mellea. K.
Old mycelium in an encircling
network beneath the bark of
of fallen trunk.
Clitocybe dealbata. G.
Among grass in a wood.
Laccaria laccata. G., K.
Common on the ground in woods.
Collybia confluens. G. In woods.
C. dryophila. G.
Among dead leaves.
Mycena galericulata. G., K.
On dead stumps.
M. hæmatopoda. G., K.
On rotting branches in woods.
M. filipes. K. Among dead leaves.
M. sanguinolenta. G., K.
Common among decaying leaves.
M. discopoda. K. On dead branch.
Pleurotus septicus. K.
On dead wood in moist place.
Pluteus cervinus. K.
Among grass near old stump.
Entoloma sericeum. G.
In pastures.
Clitopilus orcella. G. In pasture.
Nolanea pascua. G.
Among grass, woodside.
Inocybe rimosa. G., K.
On the ground in woods.
I. geophylla. G., K.
On the ground in woods.
Galera tenera. G. In pastures.
G. ovalis. K.
Among grass in a wood.
G. hynorum. K. Among moss.
Crepidotus applanatus. K.
On decaying wood.
Agaricus campestris. G., K.
Stropharia coronilla. G.
Among grass in the Abbey
grounds.
S. stercorearia. G.
S. semiglobata. G.
Both on dung in pastures.
Hypholoma fasciculare. K.
On dead stump; also on worked
wood in a mine, G.
H. appendiculatum.
On sections of a hollow trunk
used as flower "pots," plat-
form side, Kildale station.

Psilocybe fœniscii. G.
Among grass.
Psathyra obtusata. K.
P. pennata. K.
Both on the ground in moist
woodland.
Psathyrella disseminata. G.
On mossy stump, in crowds.
P. atomata. K. Among grass.
Coprinus micaceus. G.
On rotten wood.
C. radiatus. G. On dung.
C. plicatilis. G., K.
Among grass.
Russula cyanoxantha. G.
R. fragilis. K. In woodland.
R. ochracea. K. In woodland.
Marasmius peronatus. K.
Among dead leaves.
M. oreades. G. In pasture.
M. ramealis. G., K.
On decaying branches.
M. rotula. G. On dead twigs.

Polyporaceæ.

Boletus flavus. G., K.
Frequent among grass in and
about woods.
B. chrysenteron. G., K.
In woods.
B. scaber. K. In the wood among
grass, stream side.
Polyporus squamosus. G., K.
On old elm.
P. hispidus.
On ash trees on the road side
near Ayton.
Polystictus versicolor. G., K.
On dead wood.
Fomes igniarius. G., K.
On arborescent willows.
Poria vaporaria. G., K.
On dead wood; also on wood in
one of the mines.
Merulius lacrymans.
Common on wood in the same
mine as above.

Hydnaceæ.

Hydnum argutum. G., K.
On dead wood.

Thelephoraceæ.

Stereum hirsutum. K.
On dead wood.
Corticium sanguineum. G., K.
On dead wood.

Clavariaceæ.

Clavaria cinerea. K.
On moist, shaded ground.
C. rugosa. G. Among grass.

Tremellaceæ.

- Ulocolla foliaceæ.* G. On old stump,
mine-waggon road side.
Dacryomyces deliquescentis.
D. stillatus. G.
Both on decaying worked wood.
Calocera cornea. K.
On old stump.

Uredinaceæ.

- Coleosporium sonchi.* G.
On leaves of coltsfoot.
Puccinia violæ. K.
On *Viola sylvatica.*
P. lychnidearum.
On *Lychnis diurna.*

Pyrenomycetes.

- Hypocrea rufa.* G.
In the conidia stage on dead
wood.
Nectria cinnabarina. G.
On dead branches.
Xylaria hypoxylon. G., K.
On dead stumps.
Hypoxylon fuscum. K.
On fallen birch-branch.
Rhytisma acerinum. G., K.
Common on sycamore. In Kil-
dale wood this parasite was
attacking the first true leaves
of seedlings.
Eutypa lata. G., K.
On dead branches.
Byssosphæria aquila.
On decaying wood in one of the
mines.
Sardaria minuta,
S. curvula,
Sporormia intermedia. G.
All three on rabbit dung.

Perisporiaceæ.

- Sphærotheca pannosa.* G.
On cultivated rose bush.
Erysiphe communis. G.
On garden peas.

Discomycetes.

- Humaria granulata.* G.
On cow dung in pastures.

- H. fimeti.* G.
On manure heap in the nursery,
Abbey grounds.
Lachnea scutellata. K.
On dead trunk laid in the stream.
Dasycephala hyalina. G., K.
On rotten wood.
D. calycina. G.
On fallen larch twig.
Helotium citrinum. G., K.
On dead branches.
Belonidium pruinatum. K.
On dead stick, with *Eutypa lata.*
Mollisia cinerea. G., K.
Common on fallen branches.
Ryparobius pachyascus,
Ascobolus vinosus,
Succobolus violaceus. G.
All three on rabbit dung.
Orbilbia vinosa. K.
In plenty on decaying pine-bark.
Phacidium multivalve. K.
On dead holly-leaves.

Phycomycetes.

- Pilobolus crystallinus.* G.
On cow dung.
Mucor mucedo. G.
On rabbit dung.

Hyphomycetes.

- Penicillium glaucum.* G.
On decaying vegetable matter.
P. candidum. K.
On decaying *Polyporus squamosus.*
Botrytis Tilletii. K.
On dead wood.
B. cinerea. G.
On decaying vegetation.
Isaria farinosa. G.
On dead insect.

Myxomycetes.

- Stemonitis fusca.* K.
On rotten wood.
S. Friesiana,
Lycogala epidendrum,
Areteria incarnata. G.
All three on dead wood.
Badhamia panicea. K.
On dead fallen branch.

The 'Annual Report of the Huddersfield Naturalist and Photographic Society for 1906' is to hand. It contains particulars of the more interesting local records made during the year. We regret to note that to the library 'No additions have been made by purchase since 1891,' and several volumes of well known natural history periodicals are offered for sale. It is to be hoped that these are duplicates.

FIELD NOTES.

FLOWERING PLANTS.

The Dwarf Thistle (*Carduus acaulis* Linn.) in East Yorkshire, a new record for the Riding. — I have pleasure in recording an addition to the list of Flowering Plants published by Mr. J. F. Robinson in his 'Flora of East Yorkshire,' viz. the Dwarf Thistle, *Carduus acuilis* Linn. My attention was first called to the plant by the discoverer, Mr. H. Cox, of Walkington, who found it growing in Beverley Westwood. Other Yorkshire records for the plant are Conisborough, and near Anston (Lee's 'Flora of West Yorkshire,' p. 280), and near Rievaulx (Baker's 'North Yorkshire,' p. 326). Yorkshire appears to be the northern limit of the species.—J. J. MARSHALL, Beverley.

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POND LIFE.

Pond life at Askern.—The following is a list of Rotifers and other pond life from Skellow Dam, near Askern, taken at the excursion of the Yorkshire Naturalists' Union, on July 12th, 1906:—

<i>Floscularia ornata.</i>	}	Skellow Dam.
<i>Melicerta ringens.</i>		
<i>Euchlanis deflexa.</i>		
<i>Synchaeta tremula.</i>		
<i>Rotifer macrurus.</i>		
<i>Metopidia acuminata.</i>		
<i>Cathypna luna.</i>		
<i>Dinocharis pocillum.</i>		
<i>Chaetonotus latus.</i>		
<i>Vaginicola crystallina.</i>		
<i>Halteria grandinella.</i>	}	Campsall Lake.
<i>Triarthra longiseta.</i>		
<i>Anurea aculeata.</i>		

—H. MOORE, Rotherham.

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COLEOPTERA.

Ptinus sexpunctatus at Sheffield.—I have just received a live specimen of a Beetle, *Ptinus sexpunctatus*, which may be sufficiently rare to be worth noting. It was found inside a shell included in a Tasmanian collection brought over more than a year ago, and never unwrapped until a few days since. It evidently penetrated the paper wrappings after its arrival in Sheffield.—E. HOWARTH, Museum and Art Gallery, Sheffield, November 7th, 1906.

REVIEWS AND BOOK NOTICES.

Yorkshire Dales and Fells. By **Gordon Home.** A. & C. Black, 1906. 180 pages, 7/6 net.

The present work is an admirable companion to 'Yorkshire Coast and Moorland Scenes,' noticed in these columns for July 1904. The chapters deal with the Dale Country as a whole; Richmond; Swaledale; Wensleydale; Ripon and Fountains Abbey; Knaresborough and Harrogate; Wharfedale; Skipton, Malham, and Gordale; and Settle and the Ingleton Fells. Those who have attended the meetings of the Yorkshire Naturalists' Union during the past few years will find a peculiar charm in the pages of 'Yorkshire Dales and Fells,' as quite a number of the identical localities visited are here painted and described. Mr. Home is an artist of no mean ability, and he sees our beautiful county with an artist's eye: 'Even while we stand at the bridge at Hawes we can see three or four ragged cloud edges letting down on as many places torrential rains, while in between these are intervals of blazing sunshine, under which the green fells turn quite yellow or orange in powerful contrast to the indigo shadows on every side.' When, as occasionally happens, however, natural history is the subject of his story, he is not always quite so much 'at home,' and it is perhaps a little unexpected to learn (p. 58) that 'The river, too, seems to change its character, and become a pale serpent, uncoiling itself from some mountain fastness where no living creatures, beside *great auks* and carrion birds, dwell.' In his rambles from place to place he seems everywhere to find something of beauty and interest, except perhaps at Harrogate, in which 'we find nothing at all to suggest that the place really belongs to Yorkshire . . . when we have tired of the pavements and the people, we bid farewell to them without regret.'

With the volume are twenty reproductions, by the three-colour process, of landscapes, etc., from Mr. Home's own brush. Most of these are charming, one or two however have a decidedly 'bilious' look about them—by a superabundance of yellows and greens—possibly the result of the artist's efforts to get rid of the purple tint so prominent in reproductions by the three-colour process. The book, like its predecessor, is beautifully 'got up,' is printed in large type, with wide margins, on thick paper, resulting in it being perused from cover to cover all too soon. There is a good index, a map, and the binding is most suitable.

The Science of Dry Fly Fishing. By F. G. Shaw, F.G.S. Bradbury, Agnew & Co., Ltd., 1906. 142 pages, price 3/6 net.

In this 'well got up' book the author endeavours 'by explaining in simple language the science of casting and fishing with the trout fly' to enable the reader to find himself 'competent to take the field rod in hand and rapidly acquire a success which will well repay him for his trouble.' The chapters are 'How to Cast a Trout Fly,' 'Where to Cast a Trout Fly,' 'About the Fly, the Trout, and the Rise,' 'Hints on Breeding Trout and on Fishing Matters generally,' and 'The Necessities of the Trout Fisherman.' Curiously enough under the 'necessities' we find 'the broken rod'! There are several illustrations, mostly of the author, in various 'correct positions.' The book can be strongly recommended to those naturalists who pay particular attention to the freshwater fishes, and the way to catch them.

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Romance of Plant Life. By G. F. Scott Elliot, M.A., etc. London: Seeley & Co. 5/.

The sub-title of this book explains its object, namely to give 'interesting descriptions of the strange and curious in the plant world.' It is a compilation from many sources, not only of a large number of superstitious notions concerning plants and their properties, but also gives many interesting and suggestive hints on plant habits and functions. The author covers a wide range from the tropics to the poles, from aquatics to desert plants, bringing in crowds of facts and incidents likely to arouse ones curiosity. Sometimes names occur and phrases are used which strike one as peculiar, e.g. 'Bartzia,' the word 'Seaweed' is applied to algæ generally freshwater and marine. Ivy leaves are said to soak up rain, the sensitive part of a root is said to be its 'very tip.' He speaks of a pond which contains great snails and slugs, crustaceans and fishes, as being *full* of vegetable activity. Sometimes he verges on politics in a hazy way, but on the whole the book is interestingly written, and is illustrated by 34 plates, many of which are excellent.

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A Practical Manual of Tides and Waves. By W. H. Wheeler, M.Inst.C.E. Longmans, Green & Co. 1906. 201 pages, price 7/6 net.

Our contributor, Mr. W. H. Wheeler, of Boston, Lincs., author of 'The History of the Fens,' 'The Drainage of Fens, etc.' 'Tidal Rivers,' and 'The Sea Coast,' has, under the above title, added a further contribution to a subject to which he has given a life-long study. The present volume does not propose to deal with the scientific nor mathematical aspect of the tides, but includes 'information and facts relating to the tides, contained in many scattered papers, reports, and publications, which, though known to those who have made a study of tidal science, are not easily accessible.' There can be no doubt that to many who are interested in maritime pursuits, or in designing or maintaining harbours, rivers, and docks, or in protecting the sea coast, this book will be of great service; and having been written by one who has had a life-long experience in these particular matters, the volume should appeal strongly to them. The chapter devoted to the Development of Tidal Science, is a valuable historical summary of the subject. After dealing in detail with the making of the tides, tidal currents, effect of wind and atmospheric pressure on the tides, wind tides, tidal bores, etc., etc., Mr. Wheeler gives several valuable appendices, amongst which are an exhaustive 'List of books, papers, etc.' 'tidal data,' and various carefully compiled tables. There are 15 illustrations, that from a photograph of the tidal bore in the river Trent being particularly striking. There is an index.

NORTHERN NEWS.

Mr. A. Badland is the president of the Bradford Natural History and Microscopical Society for 1906-1907.

We have received a copy of the Rules of the Lancashire Union of Natural History, Literary, and Philosophical Societies. This Union has recently been inaugurated, and should have a useful career before it.

Sir Isaac Pitman & Sons are publishing 'The World's Commercial Products,' a descriptive Account of the Economic Plants of the World and their Commercial Uses, in twelve fortnightly parts, at 7d. each. Part I. is before us, and is excellently illustrated.

In the Reports of the Expedition of the Liverpool School of Tropical Medicine (Memoir XVIII.) to the Congo, 1903-1905, recently issued, Messrs. J. W. W. Stephens and R. Newstead, have an interesting paper on 'The Anatomy of the Proboscis of Biting Flies,' which is well illustrated.

Dr. D. H. Scott describes the occurrence of germinating spores in *Stauropteris oldhamia*, in a specimen from Shore-Littleborough, Lancashire (*New Phytologist*, Vol. V., No. 7). In the preceding issue of the same journal, Mrs. Scott has a note 'On the Megaspore of *Lepidostrobus foliaceus*,' based on specimens from Dulesgate and the Halifax Hard Bed.

In a paper on 'Earthworks at Claxby, near Alford, in the October *Lincolnshire Notes and Queries*, Mr. E. H. R. Tatham goes to some considerable length in describing objects, principally of a very unimportant character found on the site of what is called a 'camp.' A good proportion of the notes refers to what the author did *not* find. A subsequent paper is promised.

Mr. W. Percival Westell, who informs us that 'the pen is said to be mightier than the sword,' recently found a purple coloured toy balloon at the top of a hazel bush, and writes at some length on the discovery in *The Animal World*. To him, in 'this little incident . . . several interesting points are raised. *Firstly, it illustrates the seeing eye of a field naturalist!*' We must congratulate the author of 'My Country Diary,' on his powers of observation.

The Manchester Literary and Philosophical Society is one of the few 'Lit. and Phil.' societies in the country which is still doing grand scientific work. Its Memoirs, which appear from time to time, contain most valuable contributions. Amongst the items in part 3 of vol. 50, recently issued, the following are of particular interest to our readers: 'Observations on a Captive Mole,' by L. E. Adams; 'A New Fern from the Coal Measures: *Tubicaulis sutcliffei* spec. nov.' by M. C. Stopes; 'Notes on the Palaearctic Species of Coal Tits,' by F. Nicholson (with a beautiful coloured plate); and 'The Species of Ctenopteryx, a Genus of Dibranchiate Cephalopoda,' by J. H. Ashworth and W. E. Hoyle.

It is encouraging to find that the principal scientific societies are doing their best, by means of lecture schemes, to encourage the study of natural science. The Yorkshire Naturalists' Union has recently issued a revised list of lectures, by well-known scientific men, of which full advantage has been taken by the various societies affiliated with the Union. Similarly, the Manchester Microscopical Society, by means of its 'Extension Section,' has issued an admirable syllabus of fifty-three lectures, 'The purpose of this section is to bring scientific knowledge, in a popular form, before societies who are unable to pay large fees to professional lecturers.' The Hon. Sec. is Mr. F. B. Cocker, 22 Filey Road, Fallowfield, Manchester.

CLASSIFIED INDEX.

COMPILED BY W. E. L. WATTAM.

It is not an index in the strict 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 being regarded so much as the substantial nature of their contents.

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