CLEVELAND NATURALISTS'

FIELD CLUB

RECORD OF PROCEEDINGS
1901

VOL.1. No. IV.

Edited by the Rev. J. HAWELL, M.A., F.G.S.

PRICE TWO SHILLINGS
(FREE TO MEMBERS)

MIDDLESBROUGH;
JORDISON AND CO., LD., PRINTERS AND PUBLISHERS
1903

CONTENTS.

Photo by A. W. Lofthouse.

HERRING GULLS NEST.

(Taken in situ.)

OFFICERS, 1902

President:
Thos. F. Ward

Vice-Presidents:

T.M.Fallow M.A., F.S.A	H. Simpson
Rev. J. Hawell, M.A., F.G.S.	W.H. Thomas
J. M. Meek, M.A.	W. Y. Veitch, L.R.C.P, L.R.C.S, F.G.S.

Committee:

Mrs C Hood	J. A. Jones B.Sc
R. G. Clayton	J. W. R. Punch
T. C. Elgee	W. Sachse

Hon Treasurer:
T F Ward, Park Road South, Middlesbrough

Sectional Secretaries:
Archeology –
Botany – T F Ward
Conchology – Rev. J Hawell, M.A. F.G.S
Entomology – T A Lofthouse F.E.S.
Geology – W Y Veitch L.R.C.P, L.R.C.S, F.G.S.
Ornithology and Mammalology – R G Clayton
Microscopy – H Simpson

Hon Secretary:
T A Lofthouse, 62, Albert Road, Middlesbrough

Hon Assistant Secretary:
Frank Elgee

Hon Librarian:
Baker Hudson

Past Presidents:

1881 – W Y Veitch M.R.C.S	1892 – R Lofthouse
1882 - Do	1893 – T D Ridley
1883 – J S Calvert	1894 – Angus Macpherson
1884 - T F Ward	1895 – Rev J Hawell M.A.
1885 - Do	1896 Do
1886 – Angus Macpherson	1897 – J M Meek
1887 - Do	1898 – W H Thomas
1888 – J M Meek	1899 - Do
1889 – W Y Veitch M.R.C.S.	1900 - Do
1890 - Do	1901 – T F Ward
1891 – Rev J Hawell M.A.	1902 - Do

A NESTING SITE OF THE HERRING GULL (Larus Argentatus) ON THE NORTH YORKSHIRE COAST

BY THE LATE R. LOFTHOUSE

The Colony of Herring Gulls of which I write is located in a range of Cliffs of Liassic formation not many miles from Whitby, in a little frequented locality, although there is a railway not far distant. The cliffs in places are perpendicular, or even hanging over, and are of a rather soft and crumbling nature. They average from four to five hundred feet in height, the sea washing their base with tremendous force in stormy weather; hence their aspect is for ever changing, for the sea appears to be gradually gaining on the land, so that land slips are of frequent occurrence, the land sliding down into the sea and being then gradually washed away. And where the fields are divided by hedges running up to the cliffs at right angles isolated thorn bushes may be noticed in places on ledges far down the cliff still growing away vigorously after their descent of many feet. In other places, where the cliffs have gradually dwindled in height, as they do to the south-east, the high road has had to be removed back, having been, together with houses abutting on it, swept away. Probably no better place for the study of Coast Erosion could be found than here.

Not very far from the cliff's frequented by the Gulls the railway line was originally laid close along the edge of the cliff, and a portion, about 500 yards in length I should say, slipped over into the sea, luckily before the line was opened. It now runs through a tunnel, further inland. Owing to the foundations of the cliff's being washed out as we have noticed, in course of time the overhanging mass topples over, carrying away the ground for some distance back and forming gaps in the cliff's, and sloping rocky terrace-like platforms half way down the face of the cliffs with many little sheltered terraces and corners. Here grow luxuriantly many seaside-loving plants, curiously enough intermixed with ferns, and masses of red campion and blue hyacinths.

One of these terrace-like platforms, of considerable size, is a favourite nesting place of the Herring Gulls. Looking down from the edge of the cliffs one could hardly realize that it was

possible to get down on to it; but scrambling down a little grassy ravine some thirty or forty feet there is a small perpendicular shaft in the rock open only on one side, and just large enough to admit of the body of a man. It is called "The Chimney." By careful manœuvering it is possible to get down here by taking advantage with the hands and feet of small projecting ledges at the sides. It is safer to be assisted by a rope, a man holding the rope at the top. The Chimney will be about twenty feet high. The descent then on to the plateau is comparatively easy. Large numbers of Gulls nest here, every little depression in the ground being taken advantage of for a nest. Some are formed of dead grasses, and are of various degrees of finished; in other cases the eggs are simply laid in the depression. Some are quite exposed, whilst others are placed under sheltering ferns and grasses. Immense numbers also nest on all the little ledges in the perpendicular cliff, and if we look along the edges of the cliffs the snowy white birds may be observed sitting on their nests in all directions, and unoccupied nests with two but usually with the full complement of three eggs, in some cases two or three nests being seen on one small ledge. The nests as mentioned above are made of dried grasses, some with a few feathers intermixed, and vary considerably in bulk, some being mere apologies for nests. I noticed one nest with a single egg on a flat, jutting rock right on the top of the cliff. The pale bluish-grey wind-swept grass on the top of the cliffs is thickly studded with the snowy white feathers of the Gulls, and leans over in the direction contrary to the prevailing winds.

The usual number of eggs is three, and these vary very greatly both in size and colour, and also in number, position, shape and size of markings. The colours vary from warm stone colour through shades of brown and olive green. The spots are various shades of brown and neutral tint of varying intensity, some having a softened dusty look. Morris says :-" The male bird keeps watch about the female when sitting, and comes to her assistance and defends if occasion requires." This may be correct; at all events numbers of birds stand about on the rocks, close to the sitting birds; and if a stone be thrown over the cliffs, clouds of birds immediately fly out, with loud piercing screams, which, when large numbers are congregated, is simply deafening, and the numbers have the effect of obscuring the light. Far down on the placid surface of the water (for it is bright hot summer's day, without a breath of wind) may be observed thousands of tiny white specks, reposing on the glassy surface. These are Gulls.

THE SNOW BUNTING (Plectrophanes nivalis)

BY THE LATE R. LOFTHOUSE

This handsome bird, which spends its summer in the Arctic regions, from the middle or end of April to the end of September, is a winter visitant to this country. It is of local distribution, and is, therefore, not generally known. It is usually met with near the seashore and in the estuaries of rivers, and becomes gradually scarcer as we travel southwards.

Many years ago I remember reading an exciting account of a chase after one in the snow, in, if I remember rightly, one of the southern counties, and which ended at last in the shooting of the bird, which was considered a great prize. The name of the book I do not remember. I had then myself never seen a Snow Bunting in the flesh, having been brought up in an inland part of Yorkshire. Shortly afterwards, however, I made acquaintance with them on the East Coast, at the estuary of the Tees, where they are resident during the winter months and where in stormy weather I have seen them in vast flocks streaming in from over the sea and dropping as it were out of the snow storm, which was raging at the time, the air resounding with their soft call note. One such day I remember in the beginning of November, at Tod Point, at the Tees Estuary. The birds appeared to be somewhat exhausted but moving forward in great numbers they apparently did not wait long to rest.

The earliest note I have of their arrival here is the 27th October and the same day I noticed two swallows. The day was fine and mild. Later on in the same year, immense numbers put in an appearance. They seem to arrive in irregular scattered flocks, and on striking the coast to drop from a considerable height and may sometimes be heard passing over when they cannot be seen, or if seen only as mere specks.

They seem to divide their attention between the tide-washed flats and the adjoining arable and grassland, often in company with larks and starlings. They do not, at any rate in this district, go far inland. I have never seen them more that a mile or so from the river.

They feed in flocks, and always seem to be moving forward, those in the rear constantly flying forward to the front, and exhibiting as they do so the white marking on their wings.

Their flight is strong and undulating, but when feeding the bird has a gentle hovering sort of flight, while contending for the foremost place as a flock is observed to feed across a field, and its note is very piercing and musical.

The majority of those that visit us are of a brown colour, with more or less white on the wings, and are probably birds of the year, but they vary a good deal in colour, and there is a sprinkling of tawny and lighter individuals, and some almost white.

They arrive here, as above stated, about the beginning of October, and leave in the early spring, their stay being prolonged or otherwise according to the mildness or severity of the weather. They feed on grain and seeds of grasses. The crop of one I dissected contained eight grains of wheat and some other seeds. These seeds seemed quite perfect, and when I placed them in soil, in a flowerpot, several germinated, and in three weeks the plants were from two to three inches high. The smaller seeds turned out to be grasses.

I have shot Snow Buntings at all times of their stay here, and always found them in good condition, and more often than not excessively fat. When the fields are covered with snow and they are frozen out, they repair to the tide-washed margin of the river, and there, no doubt, find abundance of food in the shape of seeds washed down from the upper reaches of the river.

The plumage of the Snow Bunting varies so much in colour that formerly it was considered there were three distinct species, the Mountain, the Tawny, and the Snow Bunting. I have a very beautiful specimen, which answers nearest to the Tawny state as described by Yarrell. It was given to me by a friend, who assured me that he shot it in August at the Tees Estuary. I have myself never seen them so early as that, but there is a notice of one in Yarrell's "Birds," in the white summer plumage, said to have been killed at Royston, in Hertfordshire, on the 22nd May, 1840.

The winter of 1880-81 was noted for the large numbers, which visited this district, and large numbers were taken with limed twigs by bird fanciers. One of these came into my hands, and I kept it in a cage for three years, and then gave it away. It proved to be a good singer. It was in the brown plumage when I got it, and therefore a young bird. It was fed on hemp and canary seed. The first year it began to sing in July, always very early in the morning. Its song was a sweet warble, something like the song of the Brown Linnet, but with some louder notes. The next year it began to sing as early as March 12th, and was in full song in April.

Sir Herbert Maxwell, in his "Memories of the Months," page 45, states that the Snow Bunting cannot be kept alive in captivity, and further states that Bechstein, most skilful of bird keepers, found it impossible to keep it in captivity for more than a few weeks, so impatient is it of a close or warm atmosphere. The

author must have had some other bird in his mind, for in my copy of Bechstein, which is a translation, dated 1837, it is stated that he kept a pair in his room, without a cage, for six years, and he further states that they were satisfied with the food common for other birds; and he goes on to say that if kept in a cage they must be fed on hemp, oats, rape, millet, and poppy seed, that they appeared delighted whilst bathing, and that heat is so contrary to their nature that they cannot be preserved unless carefully guarded from it.

Mine was kept in a small room with an eastern aspect, and which was overshadowed by higher buildings, and was therefore always a cool place even in summer.

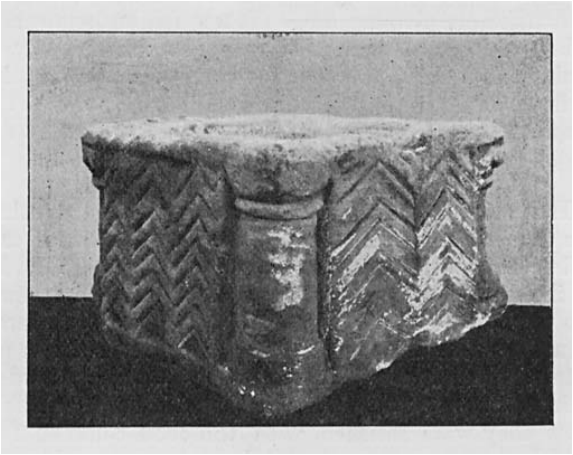
I am acquainted with a bird fancier who also informs me that he has frequently kept them in confinement without much difficulty.

NORMAN FONT AT MARSKE-BY-THE-SEA

BY T.M.FALLOW, M.A., F.S.A.

The Font was discarded when the ancient Church of St. Germain at Marske was pulled down, between seventy and eighty years ago, and the present structure erected from the designs of the house steward at Marske Hall. The Font is a fine piece of late Norman work, and, though unusual in character is not unlike that in Upleatham Church. It has been badly used, and served

at one time as a trough at a farm, and has had lime "boiled" in it, which has damaged it badly. At a later period it did duty as a flower pot in the Vicarage Gardens at Marske, and as such it is figured by the late Canon Atkinson in his unfinished work, "Cleveland Ancient and Modern", Vol II, p 76. Fortunately, although the worse for the rough treatment it has had, it is not so much out of repair as to be past use. It has been placed in St. Mark's church at the Marchioness of Zetland's expense, and was formally re-dedicated to its sacred use on November 17th, 1901, by the Archdeacon of Cleveland.

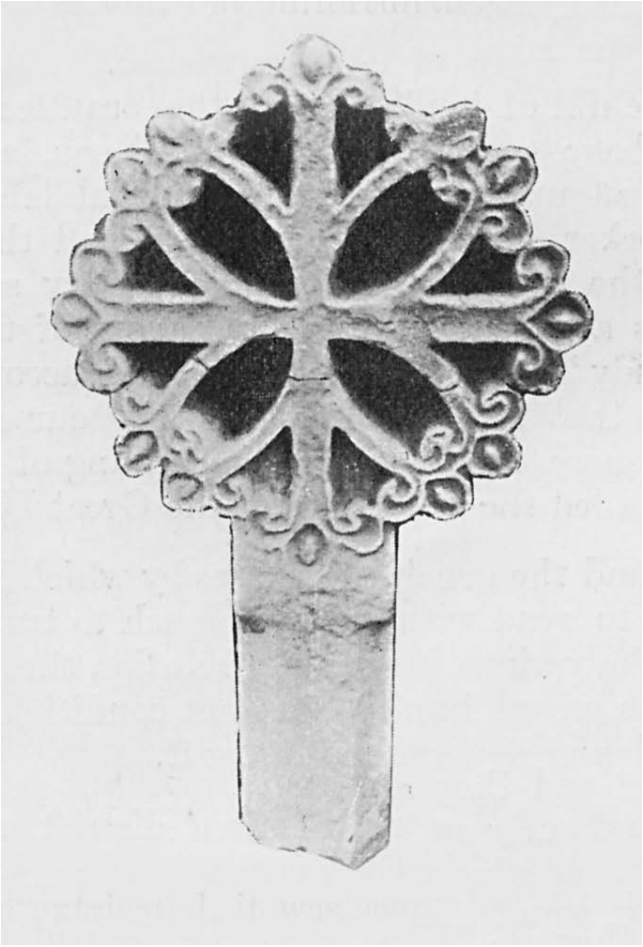


EARLY CROSS AT MARSKE-BY-THE-SEA

BY T.M.FALLOW, M.A., F.S.A.

On January 24th, 1901, the Coastguard stationed at Marske, finding that the door of the observatory hut, which had been moved to a new position on the cliff, would not open properly, proceeded to examine the spot. He then discovered that the obstruction was caused by a large stone underground, which he endeavoured to dig out, but unfortunately broke in two in the process. When extricated, it was seen that the stone formed the upper part of the shaft and the head of an elaborately-designed cross. The base with the lower part of the shaft had stood close by from time immemorial till about a year before, when some thoughtless lads displaced and hurled it down to the sands below. The base, shaft, and the head have since been pieced together again, and the cross thus restored has been placed for preservation inside St. Mark's Church. This has been done at the cost of the Marquis of Zetland. Canon Greenwell, to whom a photograph of the head of the cross was sent at the time of its discovery, points out that not only is the design a very fine one, but that it is also unusual, and he says that he does not remember seeing anything like it elsewhere. The head of the cross measures 25 inches across each way, and the total height is 7 feet 6 ½ inches. The date cannot be later than *circa* 1230.

(The Society is indebted to the Rev. F Grant James for loan of the Illustrations of the Font and the cross).



THE EVOLUTION OF CLEVELAND SCENERY

BY REV. JOHN HAWELL, M.A., F.G.S.

Our appreciation of the beauty of scenery to a great extent depends upon the range of our knowledge. For the untutored savage, or the child of tender years, the beauties and glories of natural scenes have comparatively little charm, and they are in large measure lost upon many an agricultural labourer and other out of doors worker in England, who has had the advantage of going through the curriculum of an elementary school. Just at the present there is a current running in favour of the introduction of "Nature study" into these schools, and accordingly there is ground for hope that the next generation of our countrymen will grow up with a more intelligent understanding of and interest in what has been called the "Vesture of the Great Unseen".

To understand the general processes by which Nature operates, and to be able to read with some approach to truth and accuracy the history of the various stages of evolution through which any natural scene has grown into its present condition, ministers very greatly to our pleasure in contemplating it.

Taking, therefore, the very limited district with which the Cleveland Naturalists' Field Club specially concerns itself, I would attempt briefly to indicate some of the steps by which it has grown to be the " Beautiful Cleveland" which we know and love. It would be a long story to tell *ab initio* and *in extenso,* so that I cannot here enter into many details, except as regards some of the later phases. As to the earlier, I can only briefly indicate them, as the ontogeny of a vertebrate summarises its phylogeny, leaving out many of the earlier stages entirely, but revealing others always in their correct order.

The initial difficulty, as so often happens, is to know where to begin. Our view into the earliest past is completely closed. In order to produce scenery we must first obtain the materials of which to compose it. I am no materialist, and the origin of matter apart from a Creator is to me unthinkable, though we may imagine, even where we cannot pretend to ascertain by investigation, some of the processes through which the things we see around us came to be such as we know them. We may, with

Sir William Crookes,[1] picture to ourselves a time when the matter from which our solar system has been evolved existed as a vast sea of incandescent mist, which he calls “protyle,” in which atoms had not yet been formed. Then came the formation of atoms and the genesis of the elements. The earth and the other planets of our system were in course of time thrown off as gaseous rings during successive stages in the cooling process. By and by our earth acquired a molten nucleus, and after long ages a solid crust was formed.

Of course at first the earth's solid exterior would be intensely hot, and no water could rest in liquid form upon it. It is, however, supposed by some competent physicists that it would not be long before the crust - being a good non-conductor of heat- would have so far cooled as to allow of the resting upon it of water, which would of course at first have a temperature near the boiling point.

It may be a matter of opinion, but I think it is probable that the exterior surface of the earth was dimpled and embossed from the first, owing partly at least to the unequal distribution of the enormous pressure of the atmosphere of the time-about 5,000 lbs. to the square inch - and by the time the water was able to collect upon it, it had become, from differential contraction, so irregular that portions of it stood above the primitive sea-level. In this case rain and rivers, as well as the action of waves and tides, would set to work at once upon the portions projecting above the level of the water, and would tend to reduce them to that level, while the denuded material would be spread out under the water, and would become assorted more or less into coarser and finer. And so we get the beginning of that series of stratified deposits, each entombing the organisms of its own particular epoch, which has been forming unceasingly since, and which will continue to form "while the earth remaineth."

The date at which the earth’s crust was formed, and the earliest *strata* laid down, is, of course, most difficult to determine. But various attempts have been made to solve the problem. Lord Kelvin, basing his arguments on the rate of increase in the temperature of the crust as we go downwards, on the retardation of the earth’s angular velocity by tidal friction, and on the limitation of the age of the sun, came to the conclusion that “the existing state of things on the earth, life on the earth – all geological history showing continuity of life – must be limited within some such period as

[1] See his address to Section B of the British Association in 1886

100,000,000 years”.[1] Later he asserted that the allowance of time which he was prepared to grant for the evolution of geological

history was " more than twenty and less that forty million years, and probably much nearer twenty than forty." [2]

Professor G. H. Darwin, in what has been called "one of the most beautiful contributions ever made by astronomy to geology,"[3] has estimated that the time which has elapsed since the moon occupied a position nine terrestrial radii distant from the earth is at least fifty-six or fifty-seven millions of years, but may be much more. This period probably corresponded pretty nearly with the time at which the earth's crust was formed, for the moon appears to have been thrown off while the earth was a rapidly rotating molten ball, and it is thought not so long before the solidification of its surface.

In 1899, Professor Joly contributed to the Transactions of the Royal Dublin Society a remarkable and elaborate paper,[4] in which he endeavored to estimate from the rate at which salt is being carried down by the rivers into the ocean, and the amount of salt in the ocean at the present time, the date of the formation of the earliest oceans. His conclusion was that the oceans had existed for from 90 to 100 millions of years. But he only allowed for 10% of the salt carried down by the rivers being "cyclic salt," that is salt carried by winds from the sea to the land. My friend, Mr Ackroyd, of Halifax, has, however, shown pretty conclusively, I think, in various papers communicated to the " Chemical News" and the "Geological Magazine," that at least 99% of the sea-borne salt is cyclic salt. The conclusions of Professor Joly are therefore, in my opinion, entirely invalidated.

Sir Archibald Geikie, reasoning from the observed rate of denudation, comes to a conclusion comparable with those of Kelvin, Darwin and Joly, and, accordingly, we may take it as a rough estimate according to our present knowledge that from 50 to 100 millions of years have elapsed since the oceans were formed, and stratified rocks began to be deposited. The maximum thickness of these stratified rocks is apparently about 50 miles. The following Table, which I take from a paper

1 Rep. Brit. Assoc., 1886, p517

2 The Age of Earth," Presidential Address to the Victoria Institute for 1897, p10. See also Phil. Mag., Jan 1899

3 Prof. Sollas. See Geo. Mag. Oct 1900 p 451

4 Trans. Roy. Dub. Soc., Ser ii, vol. vii

contributed by Prof. Sollas to Section C. of the British Association in 1900, shows how this thickness is made up by the various formations:-

	Feet
Recent and Pleistocene	4000

Pliocene	5000
Miocene	9000
Oligocene	12000
Eocene	12000
Cretaceous	14000
Jurassic	8000
Triassic	13000
Permian	12000
Carboniferous	24000
Devonian	22000
Silurian	15000
Ordovician	17000
Cambrian	16000
Keweenawan	50000
Penokee	14000
Huronian	18000

In our district we are not concerned with the older formations. At Middlesbrough, we bore down to the Triassic for salt, and this formation is found in other places at the surface, but as to what is below it we can only speculate, though in all probability the Permian and Carboniferous would be found if we could put down borings deep enough.

We look across to the Pennines, and find the axis to be composed of Carboniferous rocks, consisting of the Carboniferous Limestone and Yoredale Beds overlaid by the Millstone Grit. Probably the Coal Measures were originally more or less continuous over these, but, being on the whole easily denuded, they have disappeared, while the hard Millstone Grit has survived the wear and tear of Nature's disintegrating forces, and protectively caps most of the higher ground. Lying unconformably on the flanks of the Carboniferous *strata,* the rocks of the Permian formation extend north and south in a band about five miles wide with a dip to E.S.E.

The valley between the Cleveland Hills and this Permian band is mainly occupied by the soft sandstones and marls of the Triassic, though, owing to the thick deposit of Glacial Drift, they are seldom to be seen. They dip to the east, passing under the rocks of the Jurassic system.

It is this system with which we are chiefly concerned in Cleveland. It is out of these rocks that the fair scenery of the district has been so deftly carved. To them, therefore, it is necessary to give special attention. They consist of the Lias below and the Oolite above. The Lias is divided into lower, middle and upper. The Lower Lias, which is about 750 feet in thickness, is chiefly composed of easily denuded shales. The best exposure in

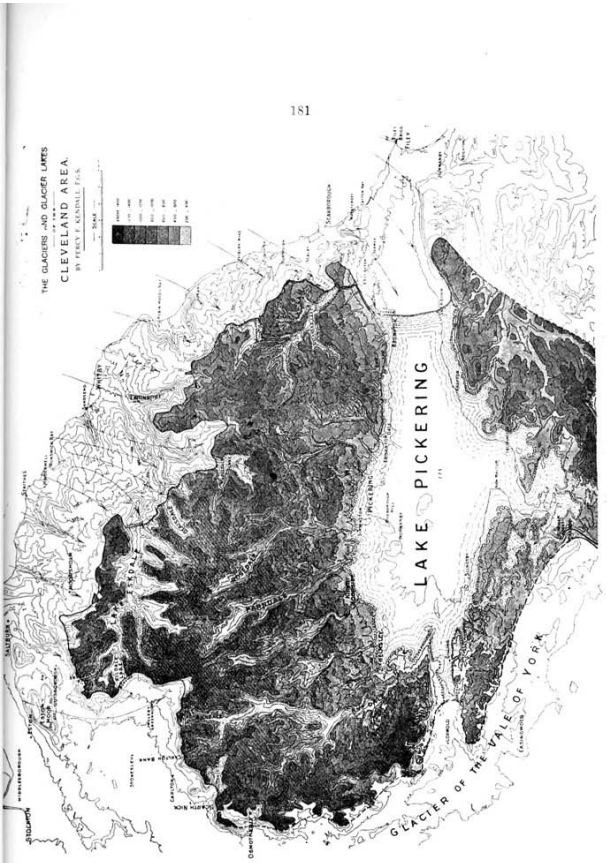
our area is on the shore at Redcar, but we often get a peep at it in the beds of streams, as about Easby and Great Ayton. The Middle Lias is composed to a large extent of harder beds, beginning with hard shales, continuing upwards into sandstone, and concluding above with the ironstone, which forms the most important mineral product of Cleveland. The entire thickness of the Middle Lias is about 450 feet. The Upper Lias, from 50 – 200 feet in thickness, consists of the soft beds of Jet and Alum Shales.

Superposed upon the Upper Lias are the hard estuarine sandstones of the Inferior Oolite. These are massive and moderately resistant to disintegration, and consequently stand out all around the edge of our Cleveland Moors as a prominent escarpment – an often perpendicular wall, – capping a steep face of Upper Liassic Shales. This light sandstone wall, surmounting here a dark blue scarp of bare shale and there a gentler slope of green grass-clothed moor bank, gives to our district one of its most characteristic features.

In the sea cliffs of the Yorkshire Coast the lower Oolites up to the Cornbrash have a thickness of nearly 700 feet, but they thin out westwards and southwards. They are full of plant remains, and thin seams of coal also occur. A hard bed, which by reason of its hardness often stands out and forms a prominent feature, is known as the Moor Grit.

Capping the Inferior Oolite comes the Cornbrash, which is a softish limestone not averaging more than 10 feet in thickness in North Yorkshire.

The highest of the Jurassic rocks occurring in Cleveland is the Kellaways Rock, which occurs at the base of the middle Oolites, and is a sandstone variable in its character. This we find preserved in a syncline in the neighbourhood of Freeborough Hill. The rest of the middle Oolites – the Oxford Clay, the Corallian Series, the Kimeridge Clay and the Portland Beds – are wanting in our area. Probably they most or all of them once extended over it, and it is not easy to resist the conclusion that the district must have



GENERAL MAP OF THE GLACIERS AND GLACIER-LAKES OF THE CLEVELND AREA, AT THE PERIOD OF MAXIMUM EXTENSION OF THE ICE.

Reduced, by kind permission, from Map published in the Quarterly Journal of the Geological Society. The Block kindly lent by the Editor of "The Friend."

The area covered by ice is left unshaded; the lakes are indicated by marginal shading; and the area occupied neither by ice nor by lakes is crossed-hatched, to show the relief of the land. The edge of the ice is indicated by a heavy black line. Broken lines are used upon the south and west, as the marginal phenomena have not yet been studied.

been under the surface of the Chalk Sea, in which were deposited the beds of chalk which we now find in the Yorkshire Wolds, and which could not well have had its shore very far short of the crest of the Pennines. But whatever came above the Kellaways Rock, Oolites, Chalk or what not, has been stripped off to make sediment for newer formations.

Out of the Triassic and Jurassic rocks, then, have the main physical features of Cleveland been carved. The beds were first deposited, and then, after long ages, moulded into their present form.

The stunted fauna of the Permian bespeaks deposition in land-locked inland seas. At the time of the formation of the Triassic, these seas were becoming shallowed and dried up. Then, during the whole of the Rhætic and Liassic periods, the land was slowly sinking, and muds brought by large and gently flowing rivers, having a south-eastern course, were being deposited in the Cleveland area. There were many fluctuations it is true from deeper to shallower and back to deeper again, and apparently the minimum amount of depression occurred during part of the period of the *Middle* Lias. Beds of oysters and cockles flourished until they were overtaken by the drift of a current, or an accumulation of sediment. Right at the top of the series we get, near Ravenscar, in a particular bed, an abundance of *Lingula*, a lamp-shell or brachiopod, which is at the present day, I believe, a somewhat deep water form. But its presence does not necessarily imply deep water, as it is a survival in practically unaltered form of a very primitive type, and may have been driven into deep water by the greater competition for existence in the shallower seas. The large rivers brought down a good deal of timber, and fossil wood is common in all the local beds of Lias. In the jet rock this has often formed the basis of jet.

The lower beds of the Oolite are fuller still of driftwood, and seem to have been deposited in the estuary of one or more large rivers flowing from the north-west, "or possibly in a series of channels or straits between the neighbouring islands."[1] But there was apparently at this period a good deal of instability, and the sea-bed of the locality sank and rose by turns. The" Dogger" at the base of the Inferior Oolite contains a great many fragments of fossils and rolled pebbles derived from Liassic beds, even down to the horizon

[1] C. Fox-Strangways " The Jurassic Rocks of Great Britian" (Mem. Geol. Surv., vol I., 1892.)

of the Lower Lias.[1] Another thin, but very persistent, marine bed, occurring a little higher in the series, is the well-known Ellerbeck Bed. But, on the other hand, there are also thin coal seams, such

as that from which the Castleton Coal was obtained. Some of these thin seams may have owed their origin to deposition along shore in sheltered shallow creeks into which much vegetable matter was carried by wind and stream and tide. Others may have been formed in marshes and lagoons. In these estuarine beds it is common to find the large Horsetail, *Equisetites columnaris*, in an upright position as when growing. Mr. A. C. Seward says, "the vertical position of such stems naturally suggests their preservation *in situ*, but in this, as in many other cases, the erect manner of occurrence is due to the settling down of the drifted plants in this particular position."[2] If Mr. Seward were as familiar as I am with the very constant occurrence of these stems in a vertical position, and seldom in contact, in Cleveland escarpments, I venture to predict that he would alter his opinion.

From the Upleatham Hill, near Marske-by-the-Sea, I have recently obtained specimens of a thin *stratum* occuring in the horizon of the Lower Oolite Estuarine Beds, which is simply a tangled mass of plants such as Taenioptеris, Otozamites and Williamsonia. My attention was called to this bed by my friend Mr. J. M. Meek, who discovered it some years ago. I am preparing a Paper on this bed, which I propose to communicate to the Geological Society of London.

The succeeding beds of Oolite were mostly formed in somewhat deeper, though not deep, water, and the sea bottom in the district continued to sink until in all probability the sea of the Kimmeridge Clay period, and later the Chalk Sea, covered it, and some deposits of clay and chalk and other rocks were spread over it. It is not unlikely that the crests of the Pennines, which have indeed in all probability been elevated, but which have certainly also been greatly denuded since then, were submerged by the sea of the Upper Chalk Period; and it is by no means improbable, that this chalk, as we now find it in the Yorkshire Wold District, was formed on a sea-floor four or five hundred fathoms below the surface.

At the close of this period of great submergence our area began to rise, the main axis of uplift being in the line of the Pennines, and since it appeared above sea-level it has, so far as we can

[1] See “Naturalist,” July 1902, p. 216.
[2] “Fossil Plants”, vol. I., p. 72.

ascertain, never as a whole been depressed below that level again. I do not think, however, that in this post-cretaceous uplift the elevation of the various beds was to anything like their present altitude, though the land surface of that period may have stood out

above the sea to an even greater height. There has, of course, been an enormous amount of denudation since that time.

When this denudation had gone on during the whole of Eocene and Oligocene time, the district had apparently been reduced almost to the base level of erosion. A more or less flat surface had been formed- what it is the fashion of the day to call a "peneplain," - and though the word is an objectionable one it is very convenient.

Then came what has been called the "Great Miocene Upheaval," which affected the whole of Western Europe. It is not certain, however, that this upheaval took place during Miocene time. This uplift raised the district as a whole, but in particular ridged up the "peneplain" locally by a previously existing axis of uplift running from Ingleby Greenhow to Robin Hood's Bay, and so gave us what has been termed the "Moorland Anticlinal." During the latter part of the Pliocene period there was a movement of subsidence. Immediately before the Ice Age, the land must have stood at least 170 feet higher than at present, but Mr. Kendall finds no evidence in the district of an interglacial submergence - indeed he finds no evidence of interglacial periods at all.

It appears probable that there was at least a local depression to the extent of 30 feet after the ice had retreated, for my friend, Dr. Veitch, has called attention to a raised beach at Saltburn, which must be post-glacial. The land has risen since sufficiently to reveal this beach, and there is some indication of minor subsequent oscillations

When the post-cretaceous uplift took place, the axis of uplift being, as I have said, in the line of the Pennines, there would be a gradual slope of the surface from the flanks of the Pennine Chain eastward, or rather south-eastward, and upon it a series of rivers would be initiated, which would flow with a more or less sinuous but persistent course from the watershed to the coast. Such primary rivers, establishing themselves upon an uplifted area, have been termed by Mr. W.M Davis “consequent” rivers. These rivers follow the “dip” of the beds, and cut their way through hard and soft *strata* alike, the harder bands in the riverbeds necessarily checking the rate of erosion of the softer.

But when these “consequent” rivers have begun to deepen their beds, tributaries will begin to flow into them along the “strike” of the *strata.* These are in a more favoured condition for erosion, inasmuch as they can select the rocks they will work in and choose a soft *stratum* for their operations, while the “consequent” rivers have to take hard and soft as they come. The softer the *stratum* which the tributary stream is eroding the faster will its work

of erosion be done, the larger will it grow, extending its valley headward and on either bank, and the more it enlarges itself the faster will it tend to grow since the increasing volume of water will all the while be adding to its erosive power.

Such a stream is termed a “subsequent” stream and its actual course will not usually be directly at right angles to its “consequent,” but will to some extent depend upon the original slope of the ground, and accordingly will as a rule join the “consequent” stream, making a more or less acute angle with its head waters.

The larger “consequent” rivers will, *caeteris paribus*, deepen their beds faster than the smaller. Therefore their “subsequents,” having a steeper slope, will work faster than the “subsequents” of the other. Working in this way the strongest and most rapidly growing “subsequent” may in time invade the valley of one of the weaker “consequents” and abstract its head waters, carrying them into the strong “consequent” of which it is a tributary. In such a case between “the elbow of capture” and the head of the “beheaded” stream, which will tend to retreat gradually, an anti-dip stream will be found draining back into the strike valley along the deserted course of the beheaded consequent, of course in a reversed direction. Such a stream is termed by Mr. Davis an “obsequent” stream.

Now, anyone looking at a map of Yorkshire will observe that there are several rivers originating in the Pennines and flowing eastward or southeastward. Such are the Aire, the Wharfe, the Nidd, the Ure, the Swale, and the Tees. It is supposed by the geologists of to-day that these represent original consequent streams which at first flowed straight on to the coast, or in some cases probably to a junction with one another far to the east, but have been successively captured by the Ouse, a powerful “subsequent” of the Aire-Humber, working along the strike of the soft Triassic rocks, with the exception of the Tees, which has been captured by a “subsequent” working in the same readily eroded *strata* from the north, which before the Ice Age had captured the Swale also.

Thus Mr. F.R. Cowper Reed, to whose essay on “The Geological History of the Rivers of East Yorkshire” I am much indebted, supposes that the Ure passed through the Gilling Gap, and entered the sea at Filey, while the Swale may have gone out at Scalby. The Tees, he thinks, went down the Esk valley, and out to sea beyond Sandsend, for the coast was then further eastwards.

This last is the case with which we are at present most concerned and the view of Mr. Reed is not only highly interesting,

but in all probability correct. The course, which the Esk pursues in relation to the dip of the beds, is on any other hypothesis difficult to explain and the existence of the large Kildale Gap unaccountable.

When the Tees had been captured, the Leven began to work back as an "obsequent" stream in the bed of the old head-stream of the Esk – part of the original bed of the Tees – and apparently captured its tributary Warren Beck before the Ice Age. I assisted my friend, Mr P.F. Kendall, to put down a series of borings in order to ascertain, if possible, whether the capture of Warren Beck had really been effected before the Ice Age or not; and with the assistance of my friends, the Rev. J.C. Fowler, F.G.S. and Mr P. Huntington, I have since put down a number of additional borings. Although the problem has not been quite conclusively solved, evidence was obtained rendering it almost certain that there was a pre-glacial capture. The alternative was that Warren Beck might have been deflected by glacial agencies.

Of course, when the so-called "Miocene upheaval" took place, the courses of the streams would in most cases become steeper, the possible exception being where there was folding of the *strata.* Consequently they would receive new energy, and would denude at a greatly increased rate, for the transporting power is in proportion to the sixth power of the velocity.

What I have advanced so far will I think, have shown roughly how the materials were accumulated, and how, out of the accumulation, the larger features of Cleveland scenery were fashioned. The amount of sea-erosion during the post-cretaceous uplift is not easy to appraise correctly, but the evidence in favour of the existence of rivers running from the Pennines to the coast tends to show that the central valley between the mountains of western Yorkshire and the eastern moorlands had not begun to exist when the uplift had been completed. But ever since our district emerged from the waters, the wild waves have beaten upon its shores, wearing them back step by step, and though sometimes foiled by a slight rise of the coast-line, forcing them back and still backward until imposing coast-cliffs, 600 feet in height, have been formed, which, though for the time they look down upon the furious waters when they rage and swell with proud aloofness, will yet one day soon be compelled to drop a humble curtsey to Father Neptune as with a mighty thud and splash they pay to the sea their tribute of rock. Meanwhile, upon the inland area the rains have beaten; the frosts have cracked and crumbled the exposed portions; the rivers have eroded their beds and deepened and widened their valleys, and daily carried to the coast their burden of disintegrated rock. Our flat moorland elevations tell of the former existence of a peneplain determined in large measure by the massive and resistent nature of the rock exposed at the surface. Our moor-banks show how the

soft Liassic shales have given way under the attack of the denuding forces, while the more tenacious rock above has resisted those forces until it has been undermined by the disintegration of the subjacent shales, when it has fallen in huge tabular masses, littering with sprinkled cubes and rhombs the slope and the base of the declivity, while the hard bands of the Middle Lias form a distinctive feature in the shape of horizontal ledges or foot-hills, on which, indeed, the blocks detached from the Oolitic mass above have often found a lodgment.

Looking from the west at the escarpment extending from Kildale to Swainby, and realising that in the main only the forces which are acting to-day having acted in the past, we are impressed with a sense of the potency of Nature's graving tools, and would do well to learn the lesson that is here written for our learning, how quiet, unceasing, persistent work can remove mountains, or rather carve mountains and valleys and fairest scenes out of a few layers of rock, which but a little while ago existed in the form of disintegrated sand and slimy mud beneath the waters of the sea.

There is much more that I might say regarding the transformations, which have taken place as Cleveland has grown to be what we see it now. I might speak foldings and faultings with their effects and teachings, but for considerations of space I will refrain. And of the "Cleveland Dyke" I will only say a word, though it is a physical feature, which I cannot altogether leave unnoticed. It is composed of a basaltic rock termed an augite-andesite, which in Tertiary time welled up into a crack in the earth's crust. It did not reach the surface in our area, but as denudation has gone on it has become exposed in many parts, and has often protected adjoining rock from the denudation, which it would otherwise have undergone. The element of picturesqueness, which it must once have imparted to Cleveland scenery, has been to a large extent destroyed by the mining of the rock.

Leaving the Dyke, however, I must perforce reserve myself space in which to say something of one of the later stages in the evolution of Cleveland scenery – one which did not largely affect its main features – and yet one which left its mark permanently and indelibly on all Cleveland, except its higher moorlands – and in a minor degree even there also. I mean *The Great Ice Age.*

Speaking in terms of Geological time the date of the Ice Age was but as yesterday. If we put the period of the formation of the earth's crust as from 50 – 100 millions of years ago, we may place that of the Ice Age at from 50 – 100 thousand years back. Indeed some of those who are most competent to form an opinion on this subject are disposed to think that the close of it may

possibly have been within the last 20 thousand years; and observable in those parts of Northern Britain, which I have had the opportunity to study, my present inclination is to agree with such an estimate.

With regard to the Ice age as it affected Cleveland, I write at a very favourable moment, since Mr P. F. Kendall, F.G.S., Lecturer in Geology at the Yorkshire College, has recently done a very fine piece of investigation of glacial ice-work in the area. He laid the results of this investigation before the Geological Society of London on January 8th 1902 and the Paper then read is published in Vol. LVIII of the Journal of the Society pp 471 – 571, August 1902. The Paper is entitled "A System of Glacier Lakes in the Cleveland Hills".

On November 11th 1898, my friend Mr Kendall wrote to me that he had found very clear evidence that Eskdale was a lake in glacial times, held up by ice blocks at each end. "Overflow took place by a narrow channel cut through the spur into a lower lake about Goathland, and thence by Newtondale to Pickering, where there is a fine delta. Other lakelets occurred both south and north of Eskdale, and their outlets are clearly traceable".

These results he had obtained principally by a detailed study of the drift maps of the area. He added, "I am trying to arrange to spend my Christmas vacation at some convenient central position in Eskdale, probably at Grosmont, and I hope I may have the pleasure and profit of your company on some of my excursions".

The first day he came down to make his special study of the glaciation of the district, December 23rd 1898, I met Mr Kendall by appointment at Goathland station and we made a traverse from there to Egton Bridge. I had the pleasure of accompanying him on very many of his tours of investigation, and I was present at Burlington House when the Paper was read. And I deem it no small honour to have been so intimately associated from first to last with the brilliant piece of work, the results of which are embodied in this classical Paper.

Of course before Mr Kendall came down to commence his special work, the general facts regarding the glaciation of the district were well-known. The drift clays and gravels had been mapped by the Officers of the Geological Survey. I had myself, at the suggestion of my dear old master and friend, Sir Joseph Prestwich, reported to the Boulder Committee of the British Association on a series of 365 glacial blocks which I had examined and made notes of in the Parish of Ingleby Greenhow,[1] several of my specimens having been inspected by Professor Bonney and Mr. C. T. Clough, of the Geological Survey. But yet Mr. Kendall's work

has shed a flood of light on questions, which were shrouded in gloom when it was commenced, and the solutions relate not merely to our locality, but are of wide application, in many cases at least. Cleveland will in the future be regarded as the typical district in Britain of glacial-lakes and the connected phenomena.

This work of Mr. Kendall has enabled him to tell us exactly where the ice-face stood during the period of maximum extension of the ice; for not only has it left the marks of its former presence in the shape of morainic *debris*, but deep and striking channels cut by water flowing along the edge of the ice-face are there unto this day, which, though often filled up to some extent by a growth of peat, are almost as well defined as when they were made, and form scenic features of no small interest.

During the glacial epoch, the icecap, such as we find it now in Greenland crept southward in one mighty forward-sweeping

[1] See 15th and 16th Reports of the Committee, 1887 and 1888

stream until a large portion of our island was buried under it, while on the Continent it extended to the central German ranges. It brought, embedded within the ice-mass, fragments of rock derived from every tract across which it had ploughed, and, when it reached the greatest southern extension permitted to it for the time, dumped them down in a muddled mass to serve as a puzzle to the unlearned generations, but to act as eloquent recounters of glacial history to twentieth century scientists.

Of the glacial rocks occurring at Ingleby, on which I reported in 1887 and 1888, a considerable number were traceable to the Cheviot Hills, and others to the Lake District and Teesdale. Rocks which have travelled from Scandinavia are frequently found in the glacial drift on the Yorkshire Coast, especially south of Whitby, and one day when I was on the hills above Lockwood (Stanghow Moor), with some members of the Yorkshire Geological and Polytechnic Society, my friend, Mr. J. W. Stather, of Hull, found a specimen of Scandinavian rhomb-porphyry in boulder clay at an altitude of 810 feet above sea-level.

Mr. Kendall recognises in the area three groups of erratics, coming respectively from the west, the north and the east. The basin of the Irish Sea being full of ice, there was a pressure eastwards up the Solway Firth, and the ice pressing in here was joined by a stream from the southern Uplands of Scotland, and another from the Lake District, so that it filled the Vale of Eden until it overflowed in two streams - one over the Tyne watershed into Northumberland, and another over Stainmore into Teesdale. This latter, charged with Shap Granite and other Lake Country rocks,

reached the mouth of the Tees, and possibly left its terminal moraine on what is known as the "Rough Ground," a few miles out to sea from Tees-mouth.

In his memoir on North Cleveland, Mr. Geo. Barrow stated that at Hob Hill, near Saltburn, when the lower boulder clay was cleared away, "the Ironstone was found to be deeply grooved, the direction of these hollows running roughly N.W. and S.E,[1] and that, "as a rule, when the clay is thin it is so largely made up of the underlying rock, or the rocks a little to the west, that their nature can be at once inferred,"[2] These two observations of Mr. Barrow, taken in conjunction with the fact that Shap Granite has been found in situ in the lower boulder clay at 'Whitby and Robin Hood's Bay,

[1] Mem. on "The Geology of North Cleveland" p66
[2] Op.cit 65

led Mr. Kendall to the conclusion that the Teesdale ice-stream was first on the ground in Cleveland. He thinks that the congestion of ice in the Irish Sea was caused specially by "a great influx of ice from the Clyde"[1] for which there is evidence in the shape of glacial striæ, shell fragments and boulders. It was the westward pressure of the Scandinavian ice-sheet, which caused the Clyde ice to attain such large proportions.

The Firth of Forth is only about 100 miles north of the mouth of the Tees, and it is consequently rather curious that the ice radiating from the head of the Baltic should have exerted such pressure for a long period up the Forth Valley as to have caused the Eden Valley ice to flow out at Tees-mouth. And that it did thus flow for a lengthened period is evidenced by the large number of blocks of Shap granite strewed along the Yorkshire Coast. Still, as Mr Kendall says, the impact of the Scandinavian ice would proceed from north to south, and it might take it a very long time to advance from the Forth to the Tees.

But in time it did reach the Tees-mouth area, and forced back the Teesdale ice into the Vale of York. It is not, however, certain that the Scandinavian ice ever actually reached the Yorkshire coastline. It might turn back the western ice without doing this, and the Scandinavian rocks found within that line may conceivably have been floated towards the coast in bergs breaking from the Scandinavian ice-face in the earlier stages of its advance, dropping upon the sea floor far to the west and later picked up by the glacier moving on from southern Scotland.

Thirdly and lastly, according to Mr Kendall, there came into our district a stream of ice from the Cheviot Hills, and probably from Tweeddale. This stream came in between the other two, and

apparently to some extent overrode them, bringing with it those blocks and pebbles of porphyrite, which are so conspicuous in the glacial drift about Ingleby Greenhow and Swainby. Some weeks ago I accompanied Mr Kendall and other friends in an excursion to Tweedale for the purpose of collecting rocks which might have given origin to boulders; and the rocks which I collected there I shall endeavour to match with specimens obtained from our local drift [2]

[1] See Mr Kendall's Paper p 563
[2] Mr Kendall writes, December 21st 1902, "We had a fine time at Kelsey Hill the other day, and I found a number of specimens of the Scottish trachytes like those above Melrose.

In support of his contention that the Tweeddale-Cheviot stream was the last on the ground, Mr Kendall says "The uppermost fringe of the drift contains a quite exceptional proportion of Cheviot rocks, I have previously pointed out that in the high-level deposits, Magnesian limestone of the type found on the coast of Durham is also exceptionally abundant, while Carboniferous rocks are proportionately rare. These facts are consistent with the view that the cheviot ice passed over the comparatively small outcrop of Carboniferous rocks in Northumberland and out to sea; then, describing a great curve, re-invaded the land somewhere between the Tyne and the Tees, bringing in stones such as flints from the bed of the North Sea, and marine shells in a more or less smashed condition from the same source"[1] He continues, "Indeed, the extension of the Cheviot ice was, in my opinion, coincident with the limit of maximum glaciation from the Wykeham moraine right round to Scarth Nick."

During this maximum extension of the ice our higher moors stood out above it. Rosedale, Farndale and Bransdale were unaffected and Bilsdale was only affected to the extent of having sent into it an overflow of water impounded by the ice-front near Ingleby Greenhow. The whole of Eskdale formed a lake from near Kildale Church to Lealholm, with ramifications into Westerdale, Danby and the Fryups. Similar lakes were impounded in Glaisdale, Wheeldale, Iburndale, Harwood Dale and Hackness valley. There was a glacier-lake in Scugdale and another in Greenhow Botton, while the whole of the Pickering valley was occupied by a large lake. There was a series held up against the moor banks south of Guisborough and Moorsholm. These drained from one into another in aligned sequence and then into Lake Eskdale, first by Ewe Crag Clack towards Danby, and then by Stonegate into Glaisdale.

The outflow from Lake Eskdale was in the direction of Goathland. The channel cut by the outflowing waters at the time of the maximum extension of the ice is to be seen curving round the edge of Murk Mire Moor to Hazel head and the Hollins, for the first

mile and a half as a typical moss-filled V-shaped overflow-trench, and afterwards as a mere shelf without retaining wall, save here and there a mass of gravel. The original retaining wall was, of course, the ice. The intake of this overflow was at first about 725 feet above sealevel, and is cut down to about 714 feet O.D. At the termination of the channel there is, as one usually finds in similar

[1] Journ. Geol. Soc. L.c., p 565

cases, a mass of gravel which had been carried through the channel or eroded from it. This has obstructed the valley of West Beck, and caused the formation of Nelly Aire Force. Between the West Beck valley and the valley of the Eller Beck there is an overflow channel across Two Howes Rigg, which is known as Moss Slack. This has an altitude of about 675 feet.

At the time of the greatest extension of the ice, therefore, Lake Eskdale, which had a length of at least 11 miles, and more probably about 14 and a depth of at least 400 feet, drained at an elevation of 725 feet into Lake Wheeldale, which was three miles long, with a surface 675 feet above present sea level. Lake Wheeldale overflowed by the Moss Slack channel into a small lake, which Mr Kendall has named the Vestibule or Ellerbeck Lake.

The Hollins channel did not, however, persist very long. As the ice retreated the overflow from the Eskdale Lake cut successive channels across the moor edge, at lower levels, first by Lady Bridge Slack and Purse Dyke Slack, and then by Moss Swang and the very striking Randay-Mere Valley. The Wheeldale and Ellerbeck Lakes also became united when the ice retreated from the end of Two Howes Rigg.

The water, which we have thus traced into the Goathland neighbourhood, overflowed the Cleveland anticline at Fen Bogs at an altitude of about 650 feet. The passage of glacial water through this channel persisted for a long while, and the decent into the Pickering Valley being steep, the very remarkable valley of Newtondale – the most noteworthy of all the British overflow channels – was formed.

The Pickering valley was occupied by a large glacial lake (see Map), and when the turbulent waters discharging down Newtondale reached its quiet shore they deposited their burden of rock fragments, gravel and sand in the form of a large delta extending over at least two or three square miles. The lake itself occupied a very large area, and being dammed in by the ice-front on the east and the Gilling Gap being also blocked by ice,

overflowing into the Plain of York near Kirkham Abbey, cutting the fine gorge existing at that point, and giving to the river Derwent its erratic inland course. Ultimately, the North Sea being blocked with ice to the northward, the water, which had flowed through Lake Eskdale and Lake Pickering found its way into the ocean through the Straits of Dover, which it in all probability assisted to cut, since these Straits did not exist before the Great Ice Age.

Besides the glacial water, which found its way into the Lake Eskdale system of drainage there was an escape through Scarth Nick, and as I have already indicated, also one from the Ingleby Greenhow neighbourhood into Bilsdale. Of similar escapes in the Robin Hoods Bay area I cannot now speak, as the locality is outside Cleveland proper.

Much might be said regarding deltaic and limneal accumulations, shore scarps and benches, and the varied phenomena of glacial erosion and deposition. But for further information regarding these matters, and for the detailed evidence on which the various conclusions are based, I must refer my reader to Mr Kendall's most valuable and illuminating Paper. It only remains for me to point out the scenic influence exercised by the visit of the glacial conditions.

As the glacial deposits do not usually reach a greater altitude than 700 or 800 feet, the higher moorlands were little affected. But we must bear in mind that the time would be one of scanty vegetation, and the moor tops would be subject to the influence of keen frosts, which would disintegrate the exposed rock, and that much snow would accumulate and remain during the greater part of the year, and when it melted there would be floods which would actively denude.

On the lower grounds the visit of the ice effected a very remarkable change. The old stream valleys were filled in with moraine stuff; mounds of sand and gravel were piled up; channels were cut across spurs and through watersheds; moor-banks were undermined by the swirl of waters, and huge slips occurred such as we should not expect to find if the process of denudation had been normal.

When the ice finally retreated, though the process was doubtless a very gradual one, there would be a scene of comparative desolation. Numerous pools would be left dotted over the face of the lower grounds. These, Nature would presently set herself to get rid of. This she would do in two ways – by drainage and by in-fill. An overflowing pool would cut a channel at the point of overflow which would tend to deepen and which might soon become sufficiently deep to drain off the pool. If the pool or lakelet were in the course of a stream, a deep gorge might be formed by

the flow of water, such as we get in the course of the Leven at Kildale, and if it cut down to hard bands of rock, waterfalls might be formed such as that which exists in the Kildale gorge, and which are usually a mark of comparatively new streams which have not yet come near to their base line of erosion. Gorges through moraine stuff, often accompanied by waterfalls where, by the blocking of pre-glacial valleys, streams have been forced into new channels and have cut into the solid rock, are common in North East Yorkshire.

On the other hand mud and sand and other materials would wash into these glacial pools, and help to fill them up. Life would come to them in the form of animals and plants, both of which would tend to obliterate them. I have bored some thirty feet through fresh water shells in a filled up pool in the Kildale moraine; while at Stanley Grange near Great Ayton, Mr E.H. Wynne-Finch pointed out to me a locality where a shallow pool of considerable size had been filled in principally by iron-pan, which is dependent for its formation upon the existence of vegetation. Some, again, are filled in by peat, and the overflow-channels of the glacier-lakes, especially near their watersheds where stream action could not operate to cleanse them, are usually filled up to a considerable extent by vegetable matter, as for example at Randy-Mere, and at West Bank near Kildale.

And so we come to Cleveland as it exists today – our soils, enriched by burdens of earth, brought hitherward packed in ice, as we now bring New Zealand mutton – our fields seeming to grow pebbles, which really grew in the distant past in the far away Cheviots or on the hills round Derwentwater.

As we stand on the moor-edge, and look down upon “Cleveland in the clay” in the time of harvest, and survey the flattened and yet undulating expanse with its chequered pattern of green and yellow and red-brown fields marked off by leafy hedgerows, and see in the dusky-distance the foam created waves lashing themselves upon the shore, and beyond that again the green-grey sea melting on the horizon into the sky of ethereal blue, the scene is indeed a fair one; but how much fuller of interest and of highest teaching is it for us when we can, through it be but dimly and uncertainly as yet, read into the vision of peaceful beauty which lies before us the history of all its past, and speculate on sound intelligent principles as to its future.

If any reader of this Paper shall be helped by it to look upon Cleveland with greater interest and fuller appreciation than before it will not have been written in vain.

THE STUDY OF NATURE

BY J. ARCHYLL JONES, B SC.

On being asked to lecture here this evening on some subject likely to be of interest to members of our Field Club, I was somewhat puzzled what form that lecture should take in order to be of interest and perchance of service to the various sections. Besides which it is somewhat difficult for anyone in my position to divest himself entirely of that didactic method which has grown up upon him and to present ideas in such a manner as to show that they are not necessarily facts but conclusions drawn from ones own experiences. "You are always so positive", has been remarked, "you speak as if your statements must be true, must carry conviction, and must be accepted". Perhaps a good deal of this is a mere mannerism, but at any rate I must ask you here to take the remarks I am about to make as the result of an experience peculiarly my own, and therefore, not necessarily true for others. Yet I fancy you will find, on analysis, that they are by no means peculiarly my own, but such as may result from the study of such experiences by any thinking individual.

I have chosen as the subject for my remarks "the Study of Nature", and I propose to deal with it –

(1) As a means of Education
(2) " " Culture
(3) " " Recreation

Taking then the first of these – The Study of Nature as a means of Education. Right here – as our American Cousins say – I must point out that I do not agree with the ordinarily accepted notion of what Education is. The general function of a teacher in a subject is considered usually to be, to give all the facts of the subject, to present these facts in such a manner that they can be easily remembered, and briefly to be a convenient encyclopedia of that subject. This is not my ideal teacher at all: far from it. The ideal teacher is the teacher who can always show us how to learn for ourselves. The ideal Education is that that enables us to learn for ourselves. I am destined, it seems, to be always arguing this point. It crops up in what subjects should a boy take at school, what subjects should he take up on choosing a profession, what subjects shall he study afterwards, and so on. I shall perhaps make clearer my attitude on the subject if I state that the subjects chosen for study in school life should be those which best serve for the development of the reasoning faculty. The educational results which are aimed at in a rational course are – the development of the spirit of enquiry; the power of accurately observing facts, and

the critical comparison of, and reasoning from them; the cultivation of precision of statement and dependence on one's own judgement; the fostering of habits of neatness and accuracy. These, I say, should be the results aimed at, not the mere assimilation of knowledge, the knowing how to get to know rather than the knowing. We have all our lives in which to learn – "all the time there is", - and if we wish to make the best use of it, we must as early as possible get to know how to learn. This may be drudgery, but it is "blessed drudgery", "blessing him who gives as well as him who receives".

Now the study of the Natural Sciences affords, I maintain, the best – shall I say the only? – means to this end. The systematic study of botany, zoology, geology, chemistry or physics are excellent training grounds, if used aright. And what is this right use? Let us for simplicity take a concrete example. The eager student would take up botany, let us say, as a subject. The usual method of beginning is to find some class or private teacher in the subject. The next step is to buy a text book – usually one written to enable the student to pass a particular examination in the subject. The class and the book are generally arranged with this definite aim, and so the student generally finds himself set to learn and assimilate, if possible masses of disconnected facts concerning the physiology or morphology of plants, many of which he has never seen, and all of which he cannot recognise. If he has a good memory, he perhaps remembers for a time a lot of this, and may succeed in passing the examination, and be labelled as a botanist. But in nine cases out of ten, where the student is not compelled to pursue the study as a profession, or for some such reason, he gives it up in disgust, and hear him afterwards say "Oh! Yes, I took up botany for a time, but it was so dry and full of such beastly hard words, that I gave it up in disgust".

But you will say, then, how should it be studied? Answer yourselves. What is it you want to know? Something about plants, what they are, how, when and where they grow and so on. Then why not go to the plants; see where, when and how they grow; examine them yourselves. But you answer, "I don't know how". My reply is that if you had been properly educated, you would know how, how to examine *anything* that was brought before you, how to reason about it. If this has not been so, then we may use the study of botany as a means to an end. You can begin by taking a plant – any plant will do, from a daisy to a lily – and examine it. Look at it, observe its outside characteristics – its form, colour etc. Examine it more closely take it to pieces, examine the parts, classify them, draw them, write out your analysis, and you have carried out your first exercise. Now take another plant. Examine it carefully as before, and record your observations. Now compare and contrast

the two specimens. See in what they resemble and in what they differ, and see if you can find any reason for the differences. One perhaps has a soft pulpy stem, while the stem of the other is stiff and woody; the former may be observed to grow rapidly, and at the end of the season to wither and disappear; the latter to grow more slowly, and to persist. Try and formulate some theory, some reason for the differences you observe. Never mind if you arrive at a wrong conclusion, ten wrong conclusions are sometimes better educationally than one right one. It is astonishing, how reluctant most people are to draw conclusions of their own; they usually much prefer to hear the opinion of Professor X., or the result of the observations of Mr Y. And yet, I think, this is the true test of whether an education has been successful or not – this power of reasoning – of suggesting from observed facts the probable cause. I recall, as an instance of the opposite condition, an old illiterate Welshman, whom I knew in my boyhood, who had theories most extraordinary on every conceivable point. I remember his being greatly exercised as to whether the wind caused the waves or the waves the wind. At first he was much inclined to the idea that the waves were the cause of the wind, as great waves could be caused by the internal motion of the earth, - some of the greatest waves are – the great tidal waves caused by volcanic eruptions. Afterwards I remember, he altered his opinion, because, as he agreed, when the wind dropped the waves gradually dropped, when the wind rose the waves followed, and the effect could not precede the cause. Many would have considered this old farmer as an uneducated man. He certainly could not write English, and only read and understood it imperfectly, so was heavily handicapped in the struggle after knowledge, but he managed to attain to what in my mind, then and now, was a by no means despicable stage of learning.

By studying botany in this way, we get to know intimately the various plants we have examined, and soon it becomes interesting to compare our knowledge with that of others. And, here, the first great difficulty comes in. As long as we are content with our own knowledge, with our own studies, there is no difficulty as regards names; we can call the parts of a plant, of a flower, or the plant and flower itself, by whatever name we choose, and the English language is certainly rich enough to supply our every want. But when we wish to speak to others about them, or to understand what they say or write, it becomes necessary to use the same terms for the interchange of ideas, and we must learn their names or they ours. We may speak of the root-leaf, the stem-leaf, or the flower-leaf, while another may say the cotyledon, leaf or petal; one word is as good as another except for the purposes of interchange of ideas, and there we must adopt some uniformly recognised system of nomenclature. You can become an excellent botanist without knowing the scientific name of any one flower or part of a flower, but your knowledge will be only of use to yourself. Always

get into the habit of naming everything, but don't call it by its scientific name unless you are sure of its identity. I don't like the question so often put "What is the scientific name of this plant?" as if that were the aim and object of all our botanical study. Call it what you like, but get to know it. In a delightful book called the "Seven Dreamers" a story is told of a lady who had lost her only child, the last of her family, and it pathetically paints her blank, desolate life when this the last object of her love and care was taken from her. One day, she was attracted by the movements of a caterpillar, and on examining it closer she seemed to see some resemblance singularly enough, to the head of the lost child. This caused her to watch it and care for it, bringing it fresh leaves for food, and somehow it seemed to console her a little. In course of time she noticed that it seemed to get uneasy and dissatisfied, and at last began to burrow in the soil of the flowerpot on which she had placed it. She dug it out, but again and again it buried itself, until at last she had to leave it, as with sad heart she recognised that another of those she cared for had gone. She seemed now almost resigned to her sad and lonely life, and had now one more grave to attend to. One bright morning some time after she thought she noticed a movement of the earth in the pot, and on closely watching, observed a brownish, shell emerge, from which there burst a glorious moth, which after drying itself, fluttered around her. She seemed to see in this the living representation of the fact that her own loved ones should rise transformed to a glorious life, and found once more consolation and comfort. She became an ardent student, and the writer describes visiting her and enquiring after the various specimens that she had reared. "What is that butterfly I see flying about there?" asked the enquirer. "Well, that's Mary Ann Tough. I call them Toughs because they stand the cold so well;

It's a sort of family name I give them; and that's Mary Ann, and I can see Nicodemus and Arthur out there near the gate", "Shade of Linnaeus" remarks the writer "*Vanessa atalanta* vulgarised into Mary Ann Tough". Vulgarised perhaps, but just think of what this name indicated, it was not only Tough, but a Mary Ann Tough; nay, further, was the individual Mary Ann Tough. This is the kind of study that educates and brings real knowledge, when you *know* your plant, your butterfly, or your fossil, when you greet it as an old friend, whose ways and habits you are conversant with, whose needs and requirements you know, and can help to provide for if necessary.

But the difficulty of names still remains, and must be met. It is a serious difficulty, but attack it gradually and it will be found not so serious after all. Be content at first with the surnames, so to speak, the class-names. Call all your different buttercups *Ranunculus*, your forget-me-nots *Myosotis* and so on, and you will find that the difficulty gradually fades away. The Christian names

will follow, and you begin to recognise your early spring buttercup as *Ranunculus ficaria* and the curly variegated forget-me-not as *Myosotis versicolor.* Be careful, however, to remember that it is but a means to an end, that this knowledge of words is but to enable you to learn botany, and that what is required is an intelligent knowledge of scientific method, rather than an imperfect and superficial acquaintance with a large number of facts. Botany offers much scope in its jargon of technical terms for mere memory work, or, as Scully calls it, "pretence of knowledge getting". And we must guard against accepting these as evidence of our knowledge.

One great advantage, which results from the scientific study of botany, must here be referred to. Other sciences give it in minor degrees, but botany – thanks to the labours of men like Linnaeus and De Candolle – exhibits in a wonderfully perfect manner this important principle. I mean the principle of classification. When a mass of facts is presented to our notice and we wish to study them, it becomes necessary for lucidity to arrange these facts in more or less natural classes, these classes in sub-classes, and so on. The principle adopted is a very simple one, but from its very simplicity very difficult to adopt completely. It can be best illustrated thus. Most of you will no doubt have joined in a game about Christmas time where the object is for one individual to guess at the name of a person selected by the others in his absence, and only aid given being the answering Yes or No to any question he may ask. It, at first sight, would appear impossible to arrive in a short time at the name of such a person as Julius Caesar, Caxton, or Li Hung Chang; but it is really wonderful to observe how quickly it may be done if the questioner is adroit with his questions. The first great point is – that there shall be clear delimitation between the two sections into which the questions divides the subject, that there shall be no doubt into which class the subject will fall. You will notice, of course, that the subject is necessarily divided by the form of the answer, into two and only two classes. This is the second important point. The third is – the two classes shall be as nearly as possible equal in size, for otherwise, if the object falls in the larger division, we are very little the better for our question. The first question usually asked in the game as I have mentioned it is "Is the person thought of alive?" This you will see fills excellently the first condition – that of clear delimitations, the second and the third. Having now ascertained to which class we are to direct our attention, we proceed to put a second question on exactly the same lines. Half our work is already done, and a second judicious question reduces it to one-fourth. The caution to the beginner is – don't make shots at random at the solution; proceed steadily along the orthodox way, and you will eventually save time. For example, in botany we commence by deciding that all plants shall be divided into two great classes, viz: Plants with more or less visible flowers and plants without true flowers, to

Phanerogams and Cryptogams, as they are usually called. We ask the question, has the plant a flower as is usually understood? This question gives the two great classes. The Phanerogams are then divided into two sub-classes – those having two seeds-leaves, and those have but one – the Dicotyledons and the Monocotyledons. The Cryptogams are then also divided into two sub-classes – the Aerogens, or the summit growers, and the Thallogens, or those having a thallus only – *i.e.* no distinction between stem and leaf. This process is repeated and repeated until at last we arrive at the actual individual flower. But you will say the botanist never goes to this trouble to say what a plant actually is, he recognises it at one. Well and good, if he can, but it he cannot then he goes through every step carefully and steadily until he arrives at the result, and the great advantage of a system of this kind is that if the botanist does not know, he can get to know. By and by, of course the preliminary questions are so rapidly run through that the botanist is scarcely conscious of having asked them, but he really has done so, or is using the experience of former questionings. This natural system of classification, then is excellently exemplified in botany, and a study of it and of its principles will amply repay any student for the time he devotes to it. It is however, far from perfect as it often fails to satisfy a fourth and most important law viz; - that the characteristics selected should be natural, fixed, and important characteristics, not accidental or trivial ones. I select from my botany an instance – (a) stem woolly, (b) stem hairy. Now, it is possible to find specimens of varying degrees of woolliness, and I have observed the same plant under different conditions of age, soil and aspect exhibit the greatest extremes in these conditions. The characteristics chosen should be, as far as possible, such as are most persistent and determinative. A great deal of work remains to be done in botany for the perfection of the system, and in some of the other branches of Natural Science the classification has scarcely been commenced, the method used being merely arbitrary. Here, then, is an open field for your labours, you may assist in bringing the great masses of accumulated facts into scientific order, in making a subject which is only open to a few, because of its intricacy and indeterminate nature, open to the general study of all, and attractive because of its orderly and systematic arrangement. The work of the field naturalist is apt to become that of a mere collector, providing the material for other minds to study; but you may at the same time learn the connection between the host of apparently disconnected species and individuals, you may study the evolution of the type, the adapting of itself to its special environment, the modification of shape, colour, or method of reproduction to the conditions which best assist its development.

This, I claim should be the object of the naturalist, to unite in one grand whole the heterogeneous collection of characteristics which the various stages show.

There is an attitude of mind I have often noticed and always failed to understand. There are some people who like to regard everything from the point of view of the mysterious, or the miraculous, or the inexplicable. As long as we do so they are interested, but as soon as we deign to find or to show that all is the result of very definite and fixed laws, they seem to lose all interest. "Is that all?" they said. You perhaps are watching an expert conjurer, who perhaps causes a handkerchief he held in his hand to disappear, "to vanish". They perhaps make the discovery that he had it in his hand all the time, and then they are disappointed. Or he produces a marvellous assortment of articles apparently from nowhere, flowers out of a hat, and, to give an example, they are disappointed because, say they, "I saw him buy those very flowers at Strikes". I was once in company with an old and experienced field botanist, and another gentleman who was no student of Natural Science. The botanist remarked on passing a particular spot that such and such a plant would most likely be found there, and on searching, we found it. This impressed the other very much and he eventually asked how anyone could possibly say that a particular and by no means common plant would be found in any special place. The botanist carefully explained – the plant liked moisture, a peaty soil, etc, etc. "Oh!" said the other, and his interest was killed. There was nothing miraculous in it at all, and so he failed to appreciate the reasoning faculty, which had let our friend to his conclusions. Nature does nothing miraculously, the reasons are always there, and the patient and careful observer, by critical comparison and reasoning can often readily enough explain these apparent miracles.

In this utilitarian age we are continually faced with the question " "*Cui bono"* "What good is it?" when the botanist is not classified as a lunatic he is generally accredited as a "herb-gatherer", and I was recently assured that a certain entomologist made "a lot of money out of it". If you shoulder a geologists bag and hammer, you are always prospecting for gold, or coal, or ganister. But apart from the use which the study of the sciences has in mental development, I should like to point out to the utilitarian another side which this "heuristic method" of study develops – that of the discoverer. By this method of study all your knowledge is that of discovery, and it is part of the method that you shall first of all tabulate you own observations or discoveries before comparing them with those of other workers. This attitude is a most valuable one to cultivate, and needs cultivation in this country especially, as England seems to be getting behindhand in the various sciences in the matter of original research. In a Paper recently read by Professor Frankland before

the British Association at Glasgow, he compares the number of original Papers sent in on chemistry to the chemical Societies of London and Berlin respectively. They varied in London from 47 in 1868 to 127 in 1900, in Berlin from 97 in 1868 to 636 in 1900. The reason is not difficult to find. In this country too much importance has been attached to the attainment of knowledge for examination purposes and when the school period of examination is over the student is rarely encouraged to pursue his studies; he is assumed to have obtained all the information that can be got, and is now a master of his subject. In Germany so-called post-graduate study is encouraged and indeed, it is assumed that only after a good preliminary training in method can anyone begin seriously upon the higher problems. The Englishman seems to ask "what can I learn on this subject that others already know?" the German, on the other hand "what can I learn that others do not know?" This seems to me to be the keynote of the whole, and it is a matter that deserves our most serious attention as we are being continually brought face to face with it in the various industries depending on research. The study of Natural Science offers exceptional opportunity for training ourselves in these methods of research, in this evolution of independent thought, and I would say to all – study some branch of natural science, become an earnest student, make discoveries, and they will help to encourage you and help you to appreciate the discoveries of others.

And now, turning for a while to the second head – the Study of Nature as a means of culture, Speaking as I am, to many old and enthusiastic students of Nature, it should require but few words of mine to carry conviction on this head. In the study of Nature's methods and Nature's works, we are brought face to face with nature itself and are led to admire the regularity of its laws, the perfection of its methods, the beauty of its details. The eye is trained to appreciate the various and varying shades and colours presented by mountain and moorland, woodland and stream; the ear learns to love its sounds – the twitter of the birds, the rustle of the brook, the moan of the wind; the mind is lifted from the sordid details of everyday life, the world's unkindness, the toilsome struggle; it is soothed by the placidity and beauty of Nature's presentation; and the man must be mean indeed who does not feel himself better for his intercourse with Nature, more restful, and better fitted to take up again the worldly struggle. The study of Nature seems also to encourage and cultivate the habit of accuracy of description and truthfulness. Man does not enter into competition with Nature, so it is not for him to boast of his skill or accomplishments. His "bag" is not therefore exaggerated, nor are his specimens extolled as the finest ever seen. Did you ever hear of a botanist or zoologist coming back disgusted from his day's excursion because he has found but few specimens? I think not. No, the influence of Mother Nature is wholly for good, it refines, it

softens, it tones down our asperities, it encourages and strengthens our patience, and altogether tends to develop that higher and better side in man.

And as a recreation. Surely from whatever side we regard it here, we cannot fail being struck with its efficacy. There is a tendency now-a-days to seek for novelty and elaborateness in our recreations, the older simpler forms are becoming insufficient, and as this advances, and the ordinary individual find that he cannot attain the highest pitch of perfection, he becomes content to seek his recreation and enjoyment second-hand as he does his knowledge. It is an attitude I cannot understand; for my part, I would rather play football at a street corner ten minutes that watch the best football match ever played. That is to say as a recreation. As a study it may be sometimes advantageous to observe the methods of other and better players than ourselves; as a study merely, that is, as a means of learning how we may improve our own methods, but the real amusement is in the part we play ourselves. So in the Recreation of Science, five minutes by ourselves with the microscope or with the net is worth hours of watching other people, be they ever so skilful.

The simple pleasures afforded by Nature are within reach of all, in no case is any elaborate equipment necessary, the best work being often done with the most meagre equipment. Try it for yourselves and see.

Now, ladies and gentlemen, if the remarks I have made this evening tend to set one more enquirer on the track of science my object will have been served, for every worker, however, feeble, is bound to add to the true knowledge of the subject, and the perfection of that knowledge, as far as earthly power can attain, is, or ought to be, the aim of every true scientist. In conclusion, then let me urge, as I have endeavoured to do in my Paper, study, think, discover.

CLEVELAND LEPIDOPTERA IN 1901

BY T. ASHTON LOFTHOUSE F.E.S.

* Denotes species recorded in our Proceedings for first time

The weather conditions during this year were not very favourable for insect life. Early spring was very cold and wintry. May was cold but dry, and insects were out well to time. June was fairly fine, and during July and August some very hot weather occurred, which tended to bring insects out very much before their usual time. The

year was more noteworthy for the number of new species added to our list than for any general abundance, the new species noted almost invariably being only odd specimens. Another result of the dry and hot weather in July and August was the number of insects that turned up in the Autumn as a partial second brood, among those noticed being *Leucania comma, L. pallens, L impura, Agrotis suffuse, A. segetum, Noctua c-nigrens, etc.*

Mr. Frank Elgee reports with reference to his experience of the season that "he found moths to be very scarce, especially during August. Sugar was of very little good until the autumn and then mostly common things appeared thereat. He attributes the scarcity of the July and August species to the terribly cold weather in March. The first week was fine and warm, which would bring out the hibernating larvae, which in the ensuing wintry weeks would perish. Pupae are not so much affected by cold as larvae, for just a week after the great snowstorm and cold of March 29th the Pine Beauty *(Panolis piniperda),* and the Brindled Beauty *(Phigalia pedaria)* were out in the plantations".

Lists were supplied by Messrs. Frank Elgee (F.E.) and Frank Atkinson (F.A.), the principal species from which are included in my notes. I am also indebted to one or two others of our members for assistance.

Diurni * *Argynnis euphrosyne*. – near Battersby, June

* *Argynnis aglaia* – A specimen sent to me by the Rev. J. Hawell that had been taken at Ingleby Greenhow during July. A large Fritillary seen near Great Ayton on July 27th may possibly have been of this species (F.A.)

* *Cænonympha typhon* – Taken near Glaisdale in July (F.A.)

Thecla rubi – This species, recorded for the first time last year, occurred very commonly in Glaisdale in May, and was also noticed in Basedale and Lonsdale.

Nocturni * *Chærocampa elpenor* – Taken at honeysuckle flowers near Glaisdale on July 14th (F.A.)

Smerinthus populi – Very pale buffish tinted female from Kilton, May 18th (F.E.)

* *Sesia tipulifomis* – Larvae taken in twigs of currant bushes at Yarm (F.A.), also at Middlesbrough, where *imagines* also occurred.

* *Nola cucullatella* – Linthorpe, Middlesbrough

* *Nudaria mundana* – Occurred freely at light in July at Glaisdale (F.A.)

**Porthesia similis* – Glaisdale (F.A.)

Eriogaster lanestris – Bred scores from March 10 – April 19, all of which had passed two winters in the pupal state. Nests of larvae were very numerous in the summer, and it seems to me that this species has an era of abundance every two years. Thus nests were found in 1897, none in 1898, abundant 1899, none in 1900, and common again 1901" (F.E.)

* *Drepana falcataria* – Great Ayton, June 23rd (R Archer)

* *Notodonta chaonia* – Specimen taken off fir tree trunk near Guisborough in May (T. Belk)

Noctuæ **Thyatira batis* – Taken at sugar, near Thornaby (Proud)

* *Asphalia diluta* – Great Ayton, at sugar of September 12th (F.A,)

Bryophila perla – Noted at Staithes, Glaisdale, Danby and Middlesbrough

* *Acronycta megacephala* – Single specimen taken off poplar tree trunk, Linthorpe, Middlesbrough on June 5th.

* *Acronycta menyanthidis* – *Imagines* taken at Glaidale in mid May. *Larvæ* were also found on the moors at Danby in August.

* *Diloba cæruleocephala* – *Larvæ* common at Great Ayton (F.A.)

* *Nonagria arundinis* (typhæ) – Bred from pupæ taken at Stokesley (W. Sachse)

* *Calamia lutosa* – Linthorpe, Middlesbrough in September

Neuronia popularis – Ingleby Greenhow, August (F.E.) at light, Great Ayton (F.A.)

* *Mamestra albicolon* – Specimen taken at sugar in garden, Linthorpe, Middlesbrough; also "poked" out of bents near Redcar.

Agrotis saucia – Great Ayton, September (F.A.)

Agrotis obscura – Three specimens taken at Linthorpe, Middlesbrough, one at sugar, the others in out-houses.

Panolis piniperda – Eston Nab, April 5th. Larv*æ* were exceedingly numerous in the beginning of July on Scotch fir in the same locality (F.E.)

* *Pachnobia leucographa* – First taken at Saltburn on sallows in April 1900. Again taken during April 1901.

* *Tæiocampa populeti* – Kildale, at sallows in April.

* *Orthosia suspecta* – Bred Glaisdale.

* *Othosia macilenta* – Several bred from larv*æ* taken at Kildale.

* *Anchocelis rufina* – At sugar, Great Ayton in September.

Cirrhædia xerampelina – Larvae found fairly plentifully near Glaisdale in May, also at Great Ayton and a single one at Guisborough. *Imagoes* taken at Ormesby and Hutton during August. This insect is apparently established all over Cleveland district in which its food tree, the ash, abounds.

* *Calymnia affinis* – Bread from larvae taken at Hilton-in-Cleveland (Sachse).

* *Dianthæcia cucubali* – Taken *at Lychnis flos-cuculi* flowers in June, near Kildale.

Polia flavicincta – Occurred freely at sugar at Great Ayton in September. The form taken here is darker that the type (F.A.)

Meselia oxyacanthae v. capucina – Taken at Great Ayton on September 29th (F.A.)

Aplecta occulta – Taken near Redcar in July (T.Belk)

Hadena glauca – Ingleby Greenhow, June 1st (F.E.)

Xylocampa areola – Larvae at Carlton–in-Cleveland June 29th (F.E.)

Plusia interrogationis – *Imagines* occurred freely at Glaisdale in July (F.A.)

* *Heliaca tenebrata* – Great Ayton, June 10th (F.A.)

Geometræ *Eugonia alnaiaria (tiliaria*) – Ingleby Greenhow, August 25th. Kildale, September 5th (F.E.) Great Ayton.

* *Eugonia erosaria* – Ingleby Greenhow (F.E.)

* *Himera pennaria* – Attracted by light in Kilton Woods (Proud)

* *Phigalia pedaria* – Two males on larch trunks, Eston Nab, April 5th and 8th (F.E.). Several near Great Ayton in March, including two almost black varieties and one dark brown mottled. This insect has also been taken in Middlesbrough and Guisborough.

Boarmia repandata – Very dark form, Albert Park, Middlesbrough, July 6th (F.E.)

* *Geometra papilionaria* – Glaisdale (F.A.)

* *Acidalia dimidiata (scutulata*) – Linthorpe, Middlesbrough

* *Hybernia leucophearia* – Common at Great Ayton during March.

* *Hybernia aurantiaria* – Bred November 4th and 22nd from Ingleby Greenhow *larvæ* (F.E.)

Larentia olivata – Ingleby Greenhow and Baisdale in August (F.E.)

Eubolia cervinata – *Larvæ* fairly common on mallow at Staithes on the occasion of the field Club meeting held there on July 6th.

Chesias spartiata – Ingleby Greenhow, October (F.E.)

* *Leptogramma literana* – Kildale.

* *Carpocapsa pomonella* – Very Destructive to apples at Ingleby Greenhow, destroying in one garden about 75 per cent of the crop (F.E.)

* *Depressaria heracleana* – Bred Middlesbrough.

* *Dasycera sulphurella* – Bred from rotten wood, Tollesby, also *imago* taken at Middlesborough.

REPORT ON THE COLEOPTERA OBSERVED IN CLEVELAND

BY M. LAWSON THOMPSON, F.E.S.

A few very interesting Beetles have been met with in Cleveland during 1901, as will be seen by the following list of species taken from observations made in that year. Messrs N. L. Gillespie and O.C. Hudson have kindly furnished me with some information on local species. The remaining records are from my own notebook. I

am much indebted to Mr. E.A. Newbury, of London, for his kindness in examining a few of the more critical specimens. Looking over the material at my disposal for this Report, I find that four of the insects in the list do not appear to have been previously recorded for Yorkshire. These are *Homalota fragilis, Malthodes misellus, Anaspis Garneysi and Sitomes griseus.*

COLEOPTERA

Carabus arvensis, F. – On Eston Moor (O.C. Hudson)

Leistus rufescens, F. – Kilton Wood

Anchomenus marginatus, L. – At Eston (O.C. Hudson)

Bembidium guttula, F. – Near Lythe (N.L. Gillespie). Stokesley (O.C. Hudson)

Bembidium decorum, Panzj – Common By the stream in Saltburn Wood..

Bembidium stomoides, Dej – By the stream in Saltburn Wood; one specimen in August.

Dromius meridionalis, Dej – At Saltburn

Dromius quadrinotatus, Panz – At Saltburn

Philydrus maritimus, Thoms, - Eston Marsh in brackish water, near the sea.

Chilopora longitarsis, Steph, - Eston Marsh

Homalota fragilis, Kr. – Saltburn, on the margin of a stream; one specimen in July.

Homalota circellaris, Grav. – In Saltburn Wood

Tachyusa flavitarsis, Sahl. – Saltburn, on the margin of a stream.

Gymnusa brevicollis, Payk. – Near Staithes, in June (N.L. Gillespie)

Quedius mesomelinus, Marsh, - Var. *fageti,* Thomas – Eston, on the coast, in September

Staphylinus pubescens, De G. – Eston (O.C. Hudson)

Ocypus fuscatus, Grav, - Eston Marsh, near the sea; one specimen under a stone in September.

Philonthus politus, F. – Eston

Philonthus ebeninus, Grav. – On the coast at Eston and Redcar.

Philonthus varians, Payk. – Eston

Stenus similes, Herbst. – Near Staithes (N.L Gillespie); also at Saltburn

Oxytelus sculpturatus, Grav. – On the coast at Eston

Ancyrophorus omalinus, Er. – Staithes in June (N.L Gillespie);

Ancyrophorus aureus, Fauv. (longipennis, Wat). – Staithes in June (N.L.Gillespie)

Homalium concinnum, Marsh – At Middlesbrough

Silpha atrata, L. – In Easby Wood (O.C. Hudson)

Trichopteryx lata, Mots, - Common at Saltburn.

Atomaria fuscata, Schon.– Saltburn, on roadside herbage in June.

Atomaria nigriventris, Steph.(nana,Er.)–Saltburn, by sweeping in May.

Aphrodius putridus, Sturm. – On the moor at Great Ayton.

Geotrupes typhæus, L. – Lonsdale near Kildale (O.C. Hudson)

Geotrupes spiniger,Marsh.–On the Redcar sandhills in Sept.

Agriotes sputator, L. – Saltburn, on roadside herbage.

Campylus linearis, L. – Saltburn Wood in July (a dark form); Eston Moor (O.C. Hudson; Staithes (N.L.Gillespie)

Telephorus lividus, L. – Carlton-in-Cleveland (O.C. Hudson)

Rhagomycha unicolor, Curt. *(translucidus*, Brit Cat. – Saltburn Wood in July.

Malthodes mysticus, Kies. – At Saltburn in June.

Malthodes misellus, Kies – At Saltburn Wood by sweeping: one specimen in June.

Dasytes ærosus, Kies (plumbeo-niger, Goeze) – Saltburn, by sweeping in June; near Staithes (N.L. Gillespie)

Chrysomela hyperici, Forst. – At Eston (O.C. Hudson)

Hydrothassa aucta, F. – In the Rev. J Hawells collection, taken in the neighbourhood of Ingleby Greenhow.

Longitarsus luridus, Scop. – Common at Saltburn.

Longitarsus suturellus, Duft. – Common at Saltburn.

Anaspis Garneysi, Fowler – In Saltburn Wood on whitethorn; one specimen in June.

Apion nigritarse, Kirby. – In Kilton Wood.

Apion ervi, Kirby – In Kilton Wood

Apion violaceum, Kirby – Staithes (N.L. Gillespie), Middlesbrough

Apion æthiops, Herbst. – Saltburn Wood in June

Sitones griseus, F. – On the Redcar sandhills, in September.

Polydrusus confluens, Steph, - Near Staithes, in June (N.L Gillespie)

Hypera variabilis Herbst. – Near Runswick Bay (N.L. Gillespie); also occurs at Saltburn.

Erirrhinus acridulus, L. – In Kilton Wood; also occurs at Saltburn

Anthonomus pericularius, L – Common at Saltburn on whitethorn in May and June.
Ceuthorrhynchus erysimi, F. – At Saltburn in June.

MAMMALIA NOTES FOR 1901

BY T. ASHTON LOFTHOUSE

March – **Badger** (*Meles taxus*) – During this month a mature specimen and three young ones were destroyed in Kildale Woods.

April – **Mole** (*Talpes europæa*) A cream coloured one was taken by a mole catcher at Easby – in – Cleveland.

June – **Hedge Hog** (*Erinaceus europæus*) – When going one of my rounds examining "sugar" patches for moths, a hedgehog was attracted by the acetylene light, and came running towards it in Kildale.

ORNITHOLOGICAL NOTES FROM CLEVELAND AND SOUTH DURHAM IN 1901.

BY C. MILBURN

Unless otherwise stated, the following were noted on my rambles in search of birds in Cleveland and South Durham during 1901.

Stonechat (*Pratincola rubicola*).-The pair, which in 1900 reared young near Pinchingthorpe, did not return to the breeding place in 1901, although I visited the place frequently during the nesting season. An immature bird was picked up in Woodland Street, Stockton, on September 9th, which had struck the wires during its migration, as my friend Mr. Lindsay informs me. An immigrant was obtained at Tees-mouth on October 13th.

Hedge Sparrow (*Accentor modularis*).-The small colony of hedge sparrows, which frequent the slag banks and piled-up stacks of pig iron at Connal's Wharf, nested successfully, and in June I saw several young hopping about the slags. Two nests found were placed in crevices between the "pigs," and another was situated in a hole of the slag.

Nuthatch (*Sitta cæsia*).-Although occurring rarely in Cleveland, the nuthatch is supposed to be unknown as a S.E. Durham bird of late years, but a pair, if not two, of this species breed in the neighbourhood of Wynyard.

White Wagtail (*Motacilla alba*) – A fine male at Tees-mouth on April 9th, according to Mr C Braithwaite, of Seaton Carew.

Blue Headed Wagtail *(Motacilla flava*) – With regard to an editorial wish for confirmation of my 1900 record, in which I mentioned that on May 6th, 1900, I saw three blue headed wagtails in company with newly-arrived yellow wagtails at Tees-mouth, I may be allowed to

state that I am positive that the birds I saw were the blue headed wagtail, and not the common yellow wagtail, and, in my opinion, few ornithologists could confuse the two species when seen just as these birds were, in the full summer dress, as the bluish-grey head and olive mantle, and other distinctions, are easily recognisable when compared with the general yellow hue of the common yellow wagtail.

Rock Pipit (*Anthus obscurus*) Arrived at Tees-mouth on September 10th, and up to the end of October the light coloured form *rupestris* were equally as common along the sea walls, etc. as the dark, spotted, resident race *obscurus,* after which, up to the time of the rock pipits' departure, only dark birds were noticed. It is perhaps not generally known that the "Scandinavian Rock Pipit" as the light race is called by some authors, is a regular autumn immigrant to the Tees-mouth in September and October, when the birds are in winter dress.

Great Grey Shrike *(Lanius excubitor*) – A splendid example shot near the "Erimus" houses between Newport and Thornaby, on October 31st (G Mussell). A pair were observed for over half an hour by Mr F Elgee and the writer on December 10th near Acklam, as they flew in and out of a hawthorn hedge.

Red Backed Shrike (*Lanius collurio*) – With regard to the editorial comment under the heading of this bird in the '99 – 1900 Transactions (p115), I may state that, although I did not see the birds personally, I came across several beetles, etc., impaled upon the spikes of barbed wire not far from where the nest I recorded was found, which gave me the impression that the impaled insects were the result of a shrike's work. Consequently when I was informed where the egg (of which the owner was ignorant as to the species to which it belonged) was taken, I was quite satisfied as to the authenticity of the shrikes' breeding.

Waxwing (*Ampelia garrulous*) – About a dozen of these birds were shot between October 1901 and the following February 1902, examples being obtained at Tees-mouth (3), Stockton, Eston, Greatham, and Lazenby, while a few were seen and not obtained.

Pied Flycatcher *(Muscicapa atricapilla*) – Male seen at Gunnergate on April 30th.

Hawfinch (*Coccothraustes vulgaris*) – Still on the increase. Odd pairs breed in almost every suitable locality in Cleveland, but thanks to their shy habits when nesting, the exact breeding place is not located, although the family parties in July and onwards

advertise their presence by a vigorous attack on the garden peas near their breeding place.

Goldfinch (*Carduelis elegans*) – Saw a flock of about fifty on thistles at Tees-mouth on November 4th, which were probably immigrants.

Siskin (*Chrysomitris spinnus*) – Great arrival of Siskins at Tees-mouth on September 23rd, the slag walls and sandhills being swarming in places with these little over- sea wanderers.

Shore Lark (*Otocorys alpestris*) – Could be met with almost any time between November and the following February, 1902, near the breakwater at Tees-mouth. This bird is far from rare here. A flock of about 200 birds stayed from November, 1900, until February 1901, without attracting the unwelcome attentions of the shooters at the North side.

Nightjar (*Caprimulgus europæus*) – Saw nest with two eggs on June 22nd, 1901, near Wynyard. One noticed near Kildale (T. A. Lofthouse).

Green Woodpecker (*Gecinus viridis*) – Took eggs of this bird at Gunnergate on June 5th, 1901. Nesting hole was in a tree, which overhangs the high road.

Great Spotted Woodpecker (*Dendrocopus major*) – Had a fine male brought to me, which had been trapped behind the Albert Park on December 27th.

Hen Harrier (*Circus cyaneus*) – when, with C.B. at the North side of the river-mouth on April 28th we got a fine view of a female hen harrier beating over the Marshes with the peculiar flight which seems a kind of half owl half kestrel evolution. On May 24th when with my friend Mr T.H. Nelson, M.R.O.U. of Redcar, we saw a fine light coloured male, which on flying up caused a great commotion among the rooks, lapwings and golden plovers. When last we saw it three or four “peewits” were endeavouring to buffet it.

Peregrine Falcon (*Falco peregrinus*) – One seen on August 11th at Tees-mouth N. (C.B.)

Brent Goose (*Bernicla brenta*).- on June 3rd I saw a party of nine of these birds swimming about on an inland reservoir near Wynyard. They were not excessively wild, as the keeper and I could get within a hundred yards of them before they made away. Only one bird was seen on the 4th, and it also departed during the night.

Shelduck (*Tadorna cornuta*).-About half a dozen pairs of these conspicuous birds bred between Marske and Seaton Carew this year.

Shoveller (*Spatula clypeata*).-Three or four pairs of Shoveller bred in the vicinity of the Tees-mouth. Several young birds were shot in September.

Pintail (*Dafila acuta*).-A fine drake flew overhead, just out of shot, when on the South Gare Breakwater on February 16th.

Coot (*Fulica atra*).-Although rare in Cleveland as a breeder, perhaps owing to lack of suitable lakes and ponds, the coot is a fairly common, though local, breeder in S. E. Durham. I saw a nest containing 13 eggs on May 28th near Trimdon, which the keeper assured me were the laying of one pair only.

Lapwing (*Vanellus vulqaris*).-An immense arrival on October 27th. From 10 a.m. until 3 p.m. flocks from twenty to a hundred in number were pouring in continually. In the morning thousands of birds could be seen coming in the space of half an hour.

Grey Phalarope *(Phalaropus fulicarius*)._Two obtained just after the great storm of November 13th between Marske and the river mouth.

Red Necked Phalarope (*Phalaropus hyperboreus*) -An immature bird shot on a pond near the Golf House, Seaton Carew, by Mr. L. Burton, on September 6th. As usual the bird was ridiculously tame.

Great Snipe *(Gallinago major*).-I recognised a bird of this species in the window of M. Chambers, Marton Road, and could get no better information on enquiry than that the bird had been shot on September 1st, or thereabouts, somewhere near the river mouth.

Jack Snipe (*Gallinago gallinula*).-One shot at Tees-mouth as early as September 14th.

Ruff and Reeve *(Machetes pugnax*).-An immature ruff was obtained on August 26th at Tees-mouth, and two immature reeves in early September at the Yorkshire side.
Spotted Redshank (*Totanus fuscus*).-One shot on August 22nd at the mouth, which is in young dress.

Black Tern (*Hydrochelidon nigra*) – On September 21st I saw a pair of immature birds flying about in the river mouth, which were shot, it seems on the same date, as Mr Mussell received a pair for preservation just after.

Little Gull (*Larus minutus*) – Saw a little gull on the Fourth Buoy sands, which had evidently been shot when consorting, as usual, with the terns and had washed up dead on October 4th. It was in immature plumage, and was too far gone for preservation.

Little Auk *(Mergulus alle*)- Saw several which had perished owing to the storms about November 13th and had washed up on the beach.

Fulmar *(Fulmarus glacialis*) – Two picked up near Redcar after the storm above mentioned.

Leach's Petrel *(Oceanodroma leucorrhoa*) – One picked up which had struck the telegraph wires on November 13th near Redcar (Mussell)

ARRIVAL OF MIGRANTS

SPRING

Wheatear	April 4th	Tees-mouth
House Martin	April 4th	Marton
Ring Ouzel	April 8th	Osmotherley
Chiff Chaff	April 9th	Ormesby
Willow Wren	April 15th	Gunnergate
Swallow	April 19th	Marton
Yellow Wagtail	April 19th	Marton
Whinchat	April 20th	Grove Hill
Tree Pipit	April 20th	Great Ayton
Whitethroat	Aptil 20th	Broughton
Sand martin	April 20th	Broughton
Land Rail	April 22nd	Near Marton
Garden Warbler	April 26th	Guisborough (Mussell)
Redstart	April 27th	Billingham
Spotted Flycatcher	May 2nd	Marton
Wood Wren	May 6th	Gunnergate
Swift	May 11th	Redcar (S.D.)

AUTUMN

Redwing	Sept 23rd	Tees-mouth
Hooded Crow	Oct 10th	Tees-mouth
Brambling	Oct 2nd	Tees-mouth
Fieldfare	Oct 30th	Tees-mouth
Snow Bunting	Oct 18th	Tees-mouth

EXTRACTS FROM ORNITHOLOGICAL NOTES MADE IN THE REDCAR DISTRICT DURING 1901.

BY STANLEY DUNCAN

Jan 10th – Stone Curlew (*Edicnemus crepitans*) – On this date I had brought me an adult female of this bird. It had been shot on the beach near Coatham.

Jan 12th – Great Crested Grebe (*Podiceps cristatus*) – I procured whilst punting on the river Tees a fine mature female.

Aug 30th – Swift (*Cypselus apus*) – Hundreds noticed near Coatham Hotel.

Sept 7th – Nightjar (*Caprimulgus europæus*) – An immature female shot on Coatham Links.

Oct 12th – Hooded Crow (*Corvus cornix*) – First noticed.

Oct 12th – Snow Bunting (*Plectrophanes nivalis*) – First noticed.

Nov 13th – Black Guillemot (*Uria grylle*) – an immature female shot near Redcar.

Nov 15th – Grey Phalarope (*Phalaropus fulicarius*) – An immature female was brought to me for inspection. The bird had been shot on the Coatham Beach.

Dec 20th – Pink Footed Goose (*Anser Brachyrhynchus*) – One shot on Coatham Sands.

RAINFALL IN 1901		
	Albert Park, Middlesbrough	The Vicarage, Ingleby Greenhow
January	1.18 Inches	1.78 Inches
February	1.89 inches	2.99 inches
March	1.72 inches	2.72 inches
April	1.02 inches	1.77 inches
May	1.54 inches	1.55 inches
June	1.37 inches	2.06 inches
July	4.16 inches	4.23 inches
August	1.45 inches	1.36 inches
September	0.66 inches	0.99 inches
October	1.67 inches	2.00 inches
November	3.99 inches	4.84 inches
December	3.39 inches	4.89 inches
	24.04 inches	31.18 inches

ROGER LOFTHOUSE, F.S.I.

Born Dec 23rd 1845; Died July 14th, 1901

Roger Lofthouse was born at Horsehouse, Coverdale, Yorkshire in 1845, and having been educated at Middlesbrough, to which town he came in early life, he received his professional training in a local architect's office, and in 1875 commenced practice on his own account as an architect and surveyor at Middlesbrough.

He was one of the Ecclesiastical Surveyors for the Diocese of York, a Fellow of the Surveyors' Institution, and a Member of the Ecclesiastical Surveyors' Association.

He was connected with various local societies, including the - Cleveland Institution of Engineers, the Yorkshire Archaeological Society, the Yorkshire Parish Register Society, the Cleveland Literary and Philosophical Society, of which for some time he was a member of the Council, and the Cleveland Naturalists' Field Club, of which he was a member from the formation, and in the work of which for some years he took a very active part. During the whole period of the Club's existence he held the position of member of the Committee and Vice-President, and for the year 1892 he acted as President. At the time of his decease he was a Vice-President, and Secretary of the Archaeology Sectional Committee. He was a regular contributor to the Proceedings, one of the principal papers contributed by him being an, "Account of the Remains of Norman Architecture in Cleveland Churches."

During the whole of his life he was an ardent student of Nature, taking an interest in all sections of nature study, and for a number of years keeping a diary of notable features of interest, as to habits, distribution, unusual occurrences, &c; more especially with reference to birds and bird life, of which he was always a keen observer, frequently sending notes thereon to "The Field," “Naturalist," and other papers; one of his more noteworthy papers being on " The River Tees, its Marshes and their Fauna," published in the" Naturalist" in 1887.

He also took a deep interest in certain forms of art, having painted a good deal both in oil and watercolour. Some years ago he made a series of drawings for Canon Atkinson's History of Cleveland, many of which are engraved in the volume published. "He also did a, considerable amount of etching on copper and lithographic work. He was one of the founders of the Cleveland Sketching Club and a frequent exhibitor at its meetings in the early part of its existence.”

SECRETARY'S REPORT FOR SEASON 1901 -2.

It is my pleasing duty to report that, on the whole, the past season has been the most successful one that we have had in the annals of our Club, more interest being taken in the work of the Club, and a special feature is the support I have had from members with regard to the Winter Meetings and in Papers contributed to our Proceedings; but the general support is still far short of what it should be for a Club of this description, covering such a fine field of Natural History investigation as Cleveland.

SUMMER MEETINGS – The programme for the Summer months provided for six meetings, exclusive of the Yorkshire Naturalists' Union Meetings, none of which were held in our district during the past year. The attendance at the meetings, with the exception of the two last, was good.

The opening meeting was held on May 4th at Guisborough, when, the day being fine, a party of about 20 attended. On arriving at Guisborough, the attention of members was first directed to the interesting sculptural remains which formed the DeBrus tomb, and which are now placed in the Entrance Porch of Guisborough church. The Guisborough Abbey remains were viewed, but the excursion being planned for Upleatham and Marske, no time was spent there. Nothing very special was noticed by any of the Sections during the afternoon; both botanically and in other respects the season seemed to be backward.

The valley traversed *en route* for Upleatham seemed to be very richly vegetated, and would probably be well worth re-visiting at a somewhat later period of the year. It would probably be well worth the attention of any of our members who care to work individually, especially those interested in Botany or Entomology.

It was with regret that the party noticed the great change that is taking place at Upleatham both in the Hall and Grounds and the Village, the Hall being completely dismantled and taken down, as are also most of the houses which constituted the Village, owing to the ironstone mining which is taking place underneath; the result of taking this stone out (to a depth of 13 ft, I understand) being that all the buildings coming over the portion named have collapsed.

The contour of the ground also is very visibly altered through subsidences that have occurred. The Club was indebted to Mr W.J. Moscrop for permission to visit the Earl of Zetland's Grounds at Upleatham.

The second meeting was held at Kilton, on the 18th May, when the largest party of the season turned out, there being about 30 members present, most of whom went by the early train to Carlin How. On arrival, the party were met by Mr Garbutt (a local member of our Club), who conducted most of them through the Woods to the Castle. On arrival at the Castle, a short description of the remains was given by Mr J.S. Calvert. The botanists found the ground very interesting, and some 67 plants were noticed in flower. Not much was noticed by the entomologists, the afternoon apparently not being favourable, Lord Downe and W.H.A.Wharton, Esq granted permission to visit the Woods.

The third meeting was held at Hilton, on June 8th, when about 20 attended. I have no report as to the result of this excursion. I believe the party found the day too hot to do much investigating.

The next excursion being a coast one to Staithes, took place on July 6th, being postponed from June 29th on account of the tide not being suitable. A fair amount of members attended. The geologists of the party had a very good time, working along the shore from Staithes to Runswick, under the guidance of our Vice-President, Dr Veitch, F.G.S. The botanists went over to Runswick by the cliffs, and the entomologists of the party worked around about the vicinity of Staithes, the principal and practically only find being the caterpillars of the mallow moth, *Eubolia cervinata*, which occurred fairly plentifully on mallow plants near the station. A good deal of apparently favourable ground in the neighbouring woods was worked pretty well during the afternoon, but proved to be very barren, nothing of any note in the insect lime being turned up.

The fifth meeting, postponed from July 13th to July 20th, was down to be held at Yarm for the purpose of working the banks of the Tees. From some unaccountable reason the excursion proved a blank. I heard of 4 or 5 members turning up, but they all seem to have missed each other, and in consequence there seems to have been very little done. The day was fine, but extremely hot, and this may have somewhat affected our members on this occasion.

On August 17th, the last of our summer meetings, down to be held at Grosmont, was, owing to the very moderate weather, altered to Danby at the last moment. Six enthusiasts attended; these, being principally entomologists, worked the moors for caterpillars, and proved fairly successful in spite of the weather.

One or two of our members attended the Yorkshire Naturalists' Union excursion at *Wykeham near Scarborough* in

June, and at *Wetherby* in July. On the occasion of the *Masham* meeting on August bankholiday, five of our members spent the week-end there. They had a very profitable time, the district proving to be extremely rich, especially botanically, and they were well provided for in the way of local guides.

WINTER MEETINGS – Up to this date five meetings have been held during the winter months, and one has been postponed owing to the serious illness of the lecturer, Dr Sorby, F.R.S. On the whole, the attendances have been fairly satisfactory, and the Papers have, I consider, all been well worth listening to. With the exception of the Rev Maule Cole's lecture, the Papers have been given by our own members.

The first meeting was held on November 9th, when Mr J.A. Jones B. Sc. Delivered a Paper entitled the "*Study of Nature*". There was an attendance of about 30. The Paper was a very able and interesting one. Mr Jones stated clearly the lines on which he would recommend those interested in Natural History studies to proceed. He pointed out that it was imperative that students should study things out for themselves, and not depend altogether on others for their information. I consider this Paper would be well worth printing in our Proceedings.

The second meeting was held on November 27th in the Literary and Philosphical Society's Hall, when by arrangement with the Yorkshire Naturalists' Union a lecture was delivered by the Rev E Maule Cole, M.A. F.G.S. on the "*Coast Erosion of Yorkshire*" Members of the Lit and Phil attended the lecture at our invitation. There was a fairly good attendance and the lecturer gave a most able exposition on the Erosion of the Yorkshire Coast. The slides illustrating the lecture were very clear, and illustrated excellently the geological formation of the different parts of the Yorkshire Coast.

One of the objects of the lecture was to lay before members of our society, and all interested in scientific work, the advisability of supporting the work and aims of the Yorkshire Naturalists' Union. It is hoped that our members, who are interested in their work will support them by becoming members as far as possible and thus aid them in the work of publishing valuable observations on the Flora and Fauna of the county.

On December 14th a Microscopical and Exhibition Meeting was held, when, although the weather conditions were anything but favourable, there was an attendance of between 20 and 30. The Club were very much indebted to Mr. Simpson for getting together a number of microscopes, and also arranging them and lending slides, &c. Microscopes were lent by Messrs. T. F. Ward, Thos. Brown, Hy. Simpson. Stevens, J. E. Stead, Dr. Veitch, and J. W. R.

Punch, and the Club are very much indebted to these gentlemen for kindly lending the same.

The following members exhibited Natural History objects J. W. R. Punch, Butterfly and caddis case, illustrative of protective resemblance to surroundings. W. Milburn - A case of birds' eggs that had been taken in the district during 1901, including night jar, black - headed gull, green woodpecker, hawfinch, gold crest, &c. Frank Elgee - Two cases of British Lepidoptera. M. L. Thompson - A collection of Cleveland Coleoptera; and T. A. Lofthouse - British land and fresh water shells.

We should be able to get together sufficient material for two good exhibition meetings during the winter, if we were properly supported by the general body of the members.

The fourth meeting was held on Saturday, January 18th, when Mr. Frank Elgee delivered a Paper, entitled "*The Colour of Insects*." The attendance at this meeting was somewhat disappointing, there only being an attendance of about 14. It is not satisfactory to the Lecturer, who had been at very great trouble, and prepared a Paper which covered a great deal of interesting ground relative to the colour of Insects, and exhibited a case of insects illustrative of the various points raised, one of these being protective colouration, i.e. resemblance to surroundings among which they occur.

An interesting discussion followed, which was taken part in by Messrs. Sachse, Clayton, Milburn, Lofthouse, and others, the principal point discussed being with reference to the increase of melanism in certain moths (especially the Pepper Moth, A. betularia) in this district during the past few years.

On the 13th March, Mr. Angus Macpherson delivered a lecture on Venice (which Lit. and Phil. members were invited to attend). There was a good attendance, and the lecture proved to be an extremely good one, and was illustrated by means of a remarkably fine series of slides.
It is probable that we may have another meeting on the 10th April, when the Rev J Hawell, M.A., F.G.S. will deliver a Paper entitled "*The Evolution of Cleveland Scenery"* illustrated by means of Lantern Views. This lecture should be specially interesting to our members, especially so, as, with your approval, it is proposed to have two excursions over a portion of the ground during the next Summer, when it is hoped that our friend Mr Hawell will be able to act as guide.

The Club are very much indebted to those members who have kindly come forward and given us a Paper during the past winter. I consider this portion of the work of the club is a very

important one, and I may say that it is some satisfaction to me to have so much support.

I have had the offer of a Paper from Mr Howcroft, which we have not been able to avail ourselves of as yet, and Dr Veitch has already promised a Paper for next Session on some "Raised Beaches noticed in Norway". This should be interesting, seeing that it will be a comparison with similar raised beaches, which we have in this neighbourhood. Mr Simpson also hopes to let us have a Paper. I should be glad to hear from any other members willing to contribute Papers for the next winter session.

It is worthy of note that the whole of the lectures were given voluntarily, the only expense incurred being the notices, postages, and lantern, and the out-of-pocket expenses of the Y.N.U. Lecture by the Rev E Maule Cole, the latter expense being kindly defrayed by our President Mr T. F. Ward.

COMMITTEE MEETINGS – During the year eight Committee Meetings were held, with an average attendance of seven.

The club are again very much indebted to the Council of the Cleveland Literary and Philosophical Society for permission to use their rooms both for Winter Meetings and Committees.

MEMBERSHIP – The membership of the club now stands at 105, being an increase over last year of 25. During the year 35 new members have been elected, including one honorary member. This is the largest number of new members elected in any one year since my connection with the Society. On the other hand, one member has died, 8 have resigned or left the district, and one has been struck off for arrears of subscription.

The death of my father R Lofthouse, which took place during the year, severed the connection of one who had been a member from the formation of the club, and who at the time was one of your vice-Presidents. . He always took a great deal of interest in the work done by the Club, the last occasion on which he was present being at our Annual Meeting last year. As you will know, he contributed a good deal of matter to our Proceedings, and at one time was a frequent attender at the Summer excursions, although he had not attended much during the last two or three years.

PROCEEDINGS.- During the year, the Proceedings for the years 1899 and 1900 (Part III. Vol. 1) were published, and proved to be the largest, and I believe the most valuable, of any work we have hitherto printed. Seeing that copies were sent to all

our members, it is not necessary for me to enumerate the various Papers contained therein, but I may mention that the part contained 114 pages, one full size plate and five illustrations in the text. We are indebted to Mrs. Atkinson for the loan of the portrait of the late Canon Atkinson, to Mr. T. M. Fallow, M.A., F.S.A., for permission to publish the note on the Effigy found at Normanby, and for use of block, and to the late R. Lofthouse for three of the blocks illustrating his Papers.

We are again extremely indebted to the Rev. J. Hawell, M.A., F.G.S., not only for his valuable Paper on the late Canon Atkinson contributed to the Proceedings, but also for so kindly editing our Publication, no small matter, as I know from the various proofs which passed through my hands. I have no doubt that all the members of the Club will agree with me that the work was extremely well done, and that our best thanks are due to him for the same.

I have some Papers in hand for further Proceedings, and have no doubt that other valuable material would be forthcoming if our Society can see their way clear to publish another number during the current year. To do so it will be necessary that some means should be taken to augment the present subscription. I think it is important that we should continue to publish so long as we have suitable material, as it is by this means that the membership will be increased and retained, a good many of our members not being able to devote the time to take part in the other work of the Club.

I may point out that our Society bears the cost of publishing only, and that all the communications are supplied by members or others without fee or reward.

We have a very great area to cover in the Cleveland district, and there is sufficient ground for material to keep our proceedings going for many years to come, and these publications in time will become valuable. I am sorry to say that no work has been contributed to the Proceedings on the Flora of Cleveland, or any district in it. I had hoped that some of the members would have taken up the Flora of the district along the North bank of the Tees, between Greatham and Billingham, ground which will most probably be very materially altered at no very distant date.

LIBRARY – Since out last Annual Meeting a suggestion, which was made at it has been acted upon, and our small Library has been placed (on loan) in a special case in the Reference Department of the Middlesbrough Free Library (by kind permission of the Free Library Committee). The Publications are now accessible to such of our members as wish to consult them. The

Librarian, Mr Baker Hudson, kindly published a list of the works in the February number of the Middlesbrough Free Library Magazine.

During the year I have received Vol. I., Part IV. Of the "Hull Naturalists' Trans", "The Naturalist", "The Yorkshire Naturalists' Union Trans", "Historic Places in the Derwent Valley" by J.W. Fawcett, "Birds Collected in Somaliland" &c.," by A.E. Pease, M.P.

Now we have made suitable arrangements for housing our Library, the Society would be glad to have any works bearing on Natural History, Archaeology, &c., which any of our members or others may see their way to present to us.

MUSEUM – I have usually make a few remarks at our Annual Meetings latterly with reference to the provision of accommodation for Museum purposes being provided suitable for the town, and it is very satisfactory to be able to say that through the munificence of one of our principal citizens, Mr A J Dorman, this is now being provided (on a site which I pointed out as being a most suitable one in my last Annual Report).

Mr A E Pease, M.P. is giving to the Museum a very valuable collection of Natural History objects obtained by him during his expedition to Somaliland, &c. Both these gentlemen, I am pleased to say, are members of our Club and I may state that Mr Pease has promised to give us a Paper of the result of his last expedition in Africa from a Natural History point of view.

If the Club is deemed worthy of being consulted with reference to the arrangement of the Museum, I have no doubt that many of our members would be willing to assist and also to contribute specimens of various kinds, which would go a good way towards forming the nucleus of a local collection, which I consider is of the first importance in the arrangement of a local Museum.

It should be a place where anyone coming into the district would see without much trouble exactly what the Fauna and Flora of the district was.

I do not think it would be out of place to mention here how very much the town is indebted to our valued member, Dr. Veitch, for the interest he has taken, and the great amount of time he has spent during many years past in connection with the Middlesbrough Museum, and I am quite sure it will be a pleasure and satisfaction to him to see that at last his hopes are being rewarded by a suitable building being provided.

PARK .-A matter I have referred to before is with reference to a portion of the Park being set apart for native flowers and shrubs. I think it would be of service, not only to students, but also to the community at large, if in all public parks were placed near some of the most frequented paths, special beds containing collections of British plants duly labelled with their familiar names, as well as their botanical titles. Against a background of British flowering shrubs, no mean display of beauty could be maintained.

To carry the matter still further, separate collections of British ferns, aquatic and bog plants, and products of moor, mountain, woodland and meadow, might be provided. Such an arrangement of beds would provide the public with a delightful country walk, if properly carried out, in the midst of town surroundings and would also at the same time have the additional advantage of conveying information concerning every plant observed.

GENERAL .-Before concluding, I beg to draw the attention of our members to the one unsatisfactory result of the year's working, and that is with reference to the debt which has been incurred, owing to the amount for publishing our Proceedings being larger than anticipated, and also owing to the number of our meetings being larger than usual. To provide against loss in the future, I consider it will be necessary to raise the subscription to say 5s. per annum, and this would only be barely sufficient to carry on our work properly.

In the event of it not being deemed advisable to raise the subscription, the only alternative will be to revert to the old position and only hold three or four meetings in the Summer months, abandoning the Winter meetings and Publications, and it is my opinion that more members would be lost to the Society by this means than by our raising the subscription, which would still be almost the minimum for a society of this description. I only know of one society doing similar work where the subscription is less than 5s., and that is the *Hull*, which is 4s., and in this case they make a charge to the members for Proceedings, and do not issue regular notices for the meetings. Many similar societies have a subscription of 10s. 6d.

Although we have had a good influx of new members during the past season, it is still felt that the number of members is not nearly so large as it should be, having regard to the size and importance of the Cleveland District; and there must be many persons who would gladly join the Society if their attention was called to the work being done.

It may be pointed out that for the subscription they get the Proceedings, post free, Notices for all Summer and Winter Meetings, Associate's Card of Membership of the Yorkshire Naturalists' Union, have access to the Society's small Library, also the advantage granted the Club by the North-Eastern Railway for travelling at cheaper rates, and the permission that is occasionally granted to visit the Estates of Gentlemen in the district, many of whom are members of our Society.

The Microscopy Section, formed at the last Annual Meeting, have not held any meetings as yet, but if members who are interested (and there must be a good number) would only come together, I have no doubt that such a section would be able to do very good work, and work that would be of very material assistance to many of the workers who have not the advantage of having microscopes of their own. I am quite sure that the Secretary of the Section, Mr. Simpson, would be glad to hear from any of the members interested, and would do all he could to arrange for some work being done by the Section.

In conclusion, I beg to thank, on behalf of the Club, the members of the Press for the notices they have given of our Meetings during the past year, and especially the North-Eastern Gazette, which also gave a very good review of the Proceedings which we published; and the North-Eastern Railway Company for special privileges granted by them; and also the various gentlemen in the district who have kindly granted the members of the Club permission to visit their estates.

Personally, I have to thank my co-Secretary, Mr. Frank Elgee, for the very great assistance he has given me, without which it would have been impossible for me to have carried out the duties appertaining to the office. My thanks are also due to our President, Mr. Ward, for his assistance on various occasions, and also to the members who have supported me in the carrying out of the work.

Previous numbers of the Proceedings of the Cleveland Naturalists' Field Club can be obtained of the Hon. Secretary, Mr T.A. Lofthouse, 62, Albert Road, Middlesbrough

Vol I, Part 1	-	Sixpence
Vol 1, Part 2	-	One Shilling
Vol 1, Part 3	-	Two Shillings

MEMBERSHIP

It is desirable that the Club should have a much larger membership, to ensure the continuance of the Publication of our Proceedings. Any persons at all interested in the work of our Society are invited to become Members, even if they are not able to be active members. Their support would be valuable and would also show that the work of the Society was not altogether unappreciated.

The Annual Subscription is 5/-. Further particulars would be supplied by the Hon. Secretary.