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NATURAL HISTORY TRANSACTIONS
OF
NORTHUMBERLAND, DURHAM,
AND
NEWCASTLE-ON-TYNE,
BEING PAPERS READ AT THE
MEETINGS OF THE NATURAL HISTORY SOCIETY
OF
NORTHUMBERLAND, DURHAM, AND NEWCASTLE-UPON-TYNE,
AND THE
TYNESIDE NATURALISTS' FIELD CLUB, 1887-90.
VOL. X.



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RICHARD HOWSE, *Editor.*

old Series

1888-1890

CONTENTS.

iii

10

CONTENTS OF VOL. X.

Part 1
1888

	PAGE
I.—Presidential Address to Members of Tyneside Naturalists' Field Club, 1887. The Rev. J. M. Hick	1
New Members elected, 1886-7.....	16
Field Meetings, 1887.....	16
Treasurer's Report, 1886	17
Officers elected for 1887-8	18
II.—Contributions towards a Catalogue of the Flora of the Carboniferous System of Northumberland and Durham. Part I. Fossil Plants of the Hutton Collection. By Richard Howse	19
III.—Report of the Natural History Society from August, 1887, to August, 1888, with Lists of Officers, etc.	153
IV.—Presidential Address to Members of the Tyneside Naturalists' Field Club, 1888. John Philipson, Esq.	181
V.—History of the Early Life of a Hedgehog. By Miss Abbs ...	214
VI.—Miscellanea :	
Note on a curious proceeding of a Bullfinch. By John Hancock	218
On two Wild Hybrids recently captured in Northumberland. By John Hancock	218
VII.—Note on the South Durham Salt Borings, with remarks on the Fossils found in the Magnesian-Limestone Cores, and the Geological position of the Salt. By Richard Howse...	220
VIII.—Catalogue of the Local Fossils in the Museum of the Natural History Society. By Richard Howse.....	227
IX.—Report of the Natural History Society for 1888-89, with Lists of Officers, Members, etc.	289
X.—Catalogue of the Fishes of the Rivers and Coast of Northumberland and Durham and the adjacent Sea. By Richard Howse	327
XI.—Presidential Address to the Members of the Tyneside Naturalists' Field Club, 1889. By John Philipson, Esq....	391
Index	432

Part 2
1890

LIST OF ILLUSTRATIONS, VOL. X.

- Plate 1. *Neuropteris gigantea* in vernation.
- „ 2, fig. 1. *Neuropteris* and *Cyclopteris* in vernation.
- „ 2, fig. 2. *Alethopteris lonchitica* in vernation.
- „ 3. *Pteridopsis plumosa*, n. g. et spec.
- „ 4, fig. 1. *Favularia tessellata*, leaf-scars and stem.
- „ 4, fig. 2. *Sigillaria reniformis* leaf-scars and stem.
- „ 5, fig. 1. *Sigillaria scutellata*, juv., leaf-scars and stem.
- „ 5, fig. 2. *Rhytidodendron* sp., small branch with leaves.
- „ 6. *Rhytidodendron* sp., branches and leaves.
- Woodcut No. 1. Part of fertile stem and spike of *Culamites cannaeformis* (*Asterophyllites tuberculata*), p. 48.
- „ No. 2. Fertile spike of *Sphenophyllum Saxifragaefolium* (*Bowmanites Cambrensis*), Binney, p. 54.
- „ No. 3. *Pecopteris* sp., in vernation, p. 91.
- „ No. 4. *Sigillaria reniformis*, juv., leaf-scars and stem, p. 119.
- „ No. 5. *Sigillaria reniformis*, compressed leaf-scars, p. 118.
- „ No. 6. *Sigillaria scutellata*, leaf-scars and stem, p. 115.
- „ No. 7. *Cordaïtes* (*Knorria*) *taxina*, portion of stem, p. 128.
- „ No. 8. *Cordaïtes taxina* (L. et H.), stem with budding end, p. 129.

CORRIGENDA ET ERRATA.

See p. 144.

NATURAL HISTORY TRANSACTIONS

OF

NORTHUMBERLAND, DURHAM, AND NEWCASTLE-
UPON-TYNE.

ADDRESS TO THE MEMBERS OF THE TYNESIDE NATURALISTS' FIELD CLUB,

READ BY THE PRESIDENT, THE REV. J. M. HICK, AT THE FORTY-FIRST
ANNIVERSARY MEETING, HELD IN THE COMMITTEE ROOM OF THE
LITERARY AND PHILOSOPHICAL SOCIETY, NEWCASTLE-UPON-TYNE,
ON MONDAY, MAY 16TH, 1887.

LADIES AND GENTLEMEN,—The time has come that at the expiration of my year of office as President of the Tyneside Naturalists' Field Club, I should, according to custom, recount the results of our meetings during the past year. A duty which, although you did me the honour to elect me to the position of your President, I am but too conscious I shall most inadequately fulfil. My resolutions were very good, and I purposed to have given, as far as I could, a summary of the various scientific events and discoveries of the past year, but procrastination, that well-known thief of time, stepped in, and having delayed until the new year had dawned, illness of myself, of members of my family, and of my rector, all combined to prevent my proposed task being undertaken; and I am compelled to meet you with a mere bald account of our Field excursions. It may not, I think, be out of place to mention here, that I think it is rather a pity that a little more of the study of Natural History in its out-door form does not form a more prominent feature in our Field excursions. We seem to be more an Antiquarian and Architectural Society

than a Natural History Society. I remember some few years ago, that at several of our "frugal repasts" the results of our investigations of the objects of Natural History were exhibited, and other specimens which some of our members considered to be worthy of consideration were brought for the purpose of being shewn to their fellow Field Naturalists. But of late these objects seem to have grown fewer and fewer, until their appearance has become very rare, and papers read at our meetings are few and far between. I must myself plead guilty to be as great a defaulter in this respect as any; and therefore feel bound to endeavour in future to follow out my own advice.

Our FIRST FIELD MEETING took place on May 31st, at Ebchester and Shotley Bridge. It seemed rather a coincidence that our first meeting during my year of office as President should be in the same locality as the first meeting I attended after my being elected a member of this Society, and our third meeting was at the same place as a former meeting I attended before I had the slightest idea of ever becoming a member.

By the train leaving Newcastle at 11 A.M., on May 31st, a fair company were conveyed to Ebchester. Our indefatigable Secretary having despatched a messenger to Shotley Bridge, to acquaint the landlord of our destined haven with our probable number, we proceeded to the church, where we were met by the esteemed vicar, Mr. Linthwaite, who courteously acted as our cicerone in viewing the ancient church and Roman camp. One notable feature of the little church, which would appear to have been built partly, if not entirely, from the stones of the Roman camp adjoining, is the arcade of round-topped windows in the chancel. Here we saw many remains of the ancient conquerors of the world, both in the walls, and laid out for our inspection by Mr. Linthwaite. Other stones, with inscriptions on them, portions of querns and other objects, are to be seen in the walls and gardens of the houses in the village.

From the church the party went to the Roman camp, the plan of which can be distinctly traced in its position overlooking the river Derwent, which winds below, I wish I could say with

clear and limpid stream, for in its lower reaches at least the days of its purity are long past. On the opposite side our guide pointed out a round eminence, on which it is supposed an ancient British camp once stood, and on which I believe various flints have been at times discovered, tending to strengthen the supposition of its being the site of a British encampment. Leaving Ebchester and crossing the Derwent we resumed our journey, by Newlands, towards Shotley Bridge. Just before reaching Newlands we noticed a patch of the Variegated Dead Nettle (*Lamium maculatum*) growing luxuriantly under a hedge. Few flowers or insects were noticed on our way. Several varieties of Willow were the most noticeable, there being I think at least seven species, and in all nine varieties; these, with the different appearances, and this genus being dioecious, caused the number of apparent varieties of willow met with to be very large, and attracted the notice of many of our members. This most puzzling and difficult genus was represented in a most interesting manner by a collection formed by the Rev. J. Leefe, formerly Vicar of Cresswell, and I hope still kept distinct and orderly by the present holder of that benefice. I should be glad, I may here mention, of any specimens of doubtful species of the genera, *Salix*, *Rubus* or *Rosa*, found in this district, for the purpose of identification by specialists in these genera. The weather continued fine, although somewhat clouded and foggy, and after a most pleasant walk we arrived at Shotley Bridge. Those who arrived first occupied the time by a stroll about this pleasant resort. We then gathered at our hotel, and partook of a most welcome meal, and new members having been elected, some of us returned by the six train, others remaining until a later hour.

Our NEXT MEETING was to the Northumberland Lakes. Leaving Newcastle by the 6.35 train, we arrived at Haydon Bridge in time for a most welcome breakfast. The weather, which had been very threatening, so as to prevent many faint-hearted naturalists venturing into so wild a region, was by this time most unpromising, rain falling heavily; but, as if to reward those

dozen more brave spirits, shortly after breakfast was over the rain ceased, a breeze sprang up, and the clouds to a large extent rolled away, and a most pleasant day was the result. Climbing the hill, we soon reached an interesting part of our itinerary, namely, Whinnetly Moss, across which many of our party dispersed, hoping to find some objects of Natural History. No great find however was made. We saw some Grouse, Redshanks, Snipe, Golden Plover, Curlew, and other birds; and noticed the pretty Cranberry in flower, also a few species of *Carex*. It was however too early for many varieties of marsh plants. Leaving this wild spot, we pressed on, and passing Grindon Lough, which is nearly drained, we came to Housesteads, or *Borcovicus*. Here we examined with great interest the remains of the Roman station. It would appear that after the Roman occupation other lines of defence have been erected here, as, if I do not mistake, the stonework is not all of Roman origin. Among the remains of the ancient conquerors of the world we for a time rested our limbs, fatigued by our long climb from the valley of the South Tyne. Slaking our thirst with the cool water from the neighbouring well, and disposing of sundry sandwiches, with which the wise and foreseeing among us had provided ourselves. Again resuming our march, we came to Broomlee Lough, where we saw numerous Gulls, mostly of the Black-headed species. We could find no nests, as it was past the nesting time of these pretty and interesting birds. A few Wild Ducks were seen and other water birds. The Buckbean growing in great plenty at the west end of the Lough. Keeping along the side of the hill we soon came in sight of Greenlee Lough, but did not approach it. A little later on some of our party paid a visit to the shores of Crag Lough, which looked very lovely, with its varied lights and shadows. Nothing worthy of note in the way of Natural History was here discovered, and our party made the best of their way, some by one road some by another, back to Haydon Bridge. With some difficulty I myself with a companion crossed Muckle Moss, which is planted to some extent. Here I noticed many of that handsome bird the Ring Ousel. At the Anchor Inn, at Haydon Bridge, we partook of a well-earned dinner, seasoned

with an appetite which might have rendered palatable a much inferior meal than that set before us by our host. After dinner a few strolled out to visit the Langley Castle, and view the handsome cross lately erected by Mr. C. Bates in memory of the ill-fated Derwentwater family. The rain now began to fall again, and we made our way to the station, and taking the train were conveyed to our homes, after one of the most successful and enjoyable excursions I remember to have been at. Our number though small, a baker's dozen, if I remember right, nevertheless formed a very sociable party.

Our THIRD MEETING was at Staindrop and Raby. Leaving Newcastle by the 10.5 train, we reached Winston about 11.30. As our time was limited, and Winston Bridge was some distance to the south of the line, while the other points in our destination were two miles north, we reluctantly gave up our purpose of going to view, as Scott says, "sweet Winston's woodland scene," and proceeded, some by the fields and some by the road, to where Staindrop, from her sylvan bowers,

Salutes proud Raby's battled towers.

Our rendezvous was the Queen's Head Hotel, whence, having refreshed the inner and outward man, we visited the ancient church. This church is on the site of a more ancient church, which existed before the Conquest, but no remains are seen (with the exception of one or two stones built in the wall, which appear to have vestiges of Saxon work) of an earlier date than the twelfth century. We have, owing to successive enlargements and alterations, specimens of Later-Norman, Early-English, and Perpendicular Architecture. Among the objects to which our attention was called, were—the roof of the porch; the vestry, over which is a room, originally believed to have been the dwelling-place of an anchorite; a small room, opening into the south aisle, probably a vestry or robing room for the chantry priests who performed the ceremonies and masses for the dead. The alabaster monument, in memory of Ralph De Neville, first Earl of Westmoreland, and his two wives; the first of whom, Margaret,

daughter of Hugh, Earl of Stafford, was buried in Brancepeth Church, and the second was buried at Lincoln. This was the founder of the Collegiate Church of Staindrop. Another monument, in oak, three recumbent figures, was formerly covered with linen and painted. It is the monument of Henry, fifth Earl of Westmoreland, who was buried in 1564 in this church, near to his second wife, Jane, daughter of Sir Richard Chomley, Knight. It was his eldest son, by his first wife, who, as sixth and last Earl of Westmoreland, forfeited Raby Castle and all the other possessions of the Neville family to the Crown. Having rebelled, in company of the Earl of Northumberland, with the design of liberating Mary Queen of Scots, they were disappointed in the expectation of the numbers who would join them, and their forces melted away. The Earl of Westmoreland escaped to the Netherlands, where he died. Among modern monuments we remarked that to the first Duke of Cleveland, which blocks up the chancel, and sadly mars the appearance of the church. There is another monument in the chancel to the memory of a Duchess of Cleveland, which has blocked up the priest's door. A man was engaged repairing this latter monument at the time of our visit, as the marble is in many parts shewing signs of rapid decay.

Our next move was up the park to Raby Castle. On our way the splendid Red Deer were objects of interest to all. On arriving at the Castle it was decided, after a consultation, that a contribution of sixpence each should be made to provide the honorarium to the housekeeper for shewing us through the Castle. I am sorry to say that two of our party took advantage of our numbers to evade this trifling contribution. I don't think that for such purposes as this the Club funds should be drawn upon, except in the case of a very small gathering, upon whom individually the demand would press heavily. After a short parley with the porter, who, like Pharoah, being new to his office, knew not Joseph, in the person of your President, but whom the sight of Mr. W. T. Scarth's letter quickly satisfied, we were admitted to the Castle, and most courteously and efficiently shewn round it by Mrs. Haynes, the housekeeper. The chief objects of

interest in the Castle were the pictures, and also Hiram Power's statue of the Greek Slave, and the malachite tables, which were exhibited in the Great Exhibition of 1851. At one time most of the windows were plain sash windows, but the present Duke has been gradually replacing these by windows more in keeping with the building itself. The entrance for carriages passes through the Castle. The great hall, or, as it is called, the Baron's Hall, has been much spoilt as to its proportions, by the raising of the floor some four feet, making it more a long wide gallery than a hall. Here are Queen Mary's Candlestick, Queen Elizabeth's Dressing Case, and a case belonging to Mary Queen of Scots. The kitchen is about the most perfect part of the Castle. It is of a very massive character, with a stone vault, and a tower in the form of a lantern rising from the stone roof. It is square below and octagonal above. There is a passage all round in the thickness of the wall, level with the sills of the windows, which were partly for purposes of defence, but also led to two garde-robes in the thickness of the wall. Having viewed all there was to be seen in the Castle, by the kind permission of Mr. Westcott, the head gardener, we sauntered through the gardens, which were in better flower than I ever remember seeing them at this season of the year. They are generally retarded, in order to look their best upon the advent of the family in the autumn.

Returning to the Queen's Head, Staindrop, after a well-earned dinner we reached Winston Station, and arrived in Newcastle, whence each dispersed to our respective homes, well pleased with our day's outing.

For the account of our fourth and fifth Field Meetings I am indebted to our Secretary, Mr. Howse, who has given me the following, as I was myself unavoidably absent from both.

The FOURTH FIELD MEETING was held at Boroughbridge, in the central valley of the North Riding, and near the junction of the Ure and Swale, a comparatively flat district, between the Carboniferous Limestone region on the west, and the Jurassic Cleveland Hills on the east. It is a woodland, park-like stretch

of country, as yet uncontaminated by smoke and soot. It was through this district that the old Roman road, from Binchester, Piercebridge, and Catterick, stretched in a nearly straight line to York, and here at Aldboro', near Boroughbridge, was an extensive station, *Isturium*, from which have been obtained many precious relics of Roman art and civilization. Here also are remains of a much older faith and civilization left in long-enduring stone to attest the former power and skill of an almost unknown race. It was to spend a little time on this classic spot that our meeting at Boroughbridge was planned. About seven members only were present, and most of these availed themselves of the opportunity to proceed to their destination on Saturday. Others arrived on Monday, and after breakfast at the comfortable hostelry the Crown Hotel, a walk was taken to Aldborough, about half a mile distant. The walk was beneath avenues of aged trees, a perfect contrast to our own bleak neighbourhood, with foliage and flowers in profuse and luxurious growth, and in mature summer development. The site on which the old station stood is slightly higher than the surrounding country, and as the irregular and somewhat straggling village stretches, with its trees and gardens, within and beyond the camp boundaries (which are now nearly obscured), it is not easy to grasp its extent or shape, as only in one or two spots are any traces of the walls to be seen. Most of the interesting remains are preserved in the cottages and grounds of the villagers, and it is not always that these can be inspected. We visited only one or two more publicly placed than the others. The most interesting were the remains of the mosaic pavement of two Roman baths, which had been discovered in a garden attached to the principal inn of the village. A small building is erected over each of these to protect the pavement. The first we saw was a beautiful tessellated pavement, with a central group of figures, partly destroyed, and surrounded by a coloured border. The other tessellated pavement was in another building not far distant. This was of much larger pattern, with an ornamental border. Both are kept dry with a covering of sawdust, which has to be swept off for the gratification of visitors. We next

visited the "Museum Isurianum," in the garden of the Manor House, where are preserved many of the Roman reliques which have from time to time been dug up within or near the camp. These are too numerous to be recounted, but are mostly of the same character as the Roman remains found in our own neighbourhood. Near to this Museum we saw small portions of the wall which surrounded the station. Along pleasantly-shaded roads we proceeded to the site of the "Devil's Arrows," three remarkable Druidical monoliths, now standing in grass fields, surrounded with trees and hedgerows. These stone pillars seem to be the remains of a long row, of which only three now remain. We judged the highest to be about twenty-four feet. The middle stone is much the broadest. All of them are much furrowed, from the top downwards, evidently by the action of the weather. They are composed of a coarse grit, and are supposed to have been brought from Bramham Moor, west of Harrogate; but by what contrivance such immense obelisks of stone could in those early days be removed such long distances is beyond conjecture. Their identity with similar stone pillars found in other parts of England and in Brittany is pretty certain, and their connection with the ancient Druidical superstitions and beliefs of the old British race is more than matter of conjecture, but the precise age when these and similar structures were erected will ever be a matter undecided and unknown. After a comfortable dinner at the Crown Hotel our little party left by the last train for Pilmoor Junction, *en route* for Newcastle, filled with the enjoyment of the rest and pleasure they had experienced at this remarkably quiet and classical spot.

The FIFTH FIELD MEETING, at Gilsland, on Sept. 10th, was but thinly attended, the unsettled weather previous to the day of meeting having no doubt influenced the attendance, but the day was as fine as could be wished for, and the little party wended their way towards Bird Oswald, between banks still covered with autumnal flowers freshened by the recent rains. The usual exploration was made of this celebrated and well-visited camp, and the glorious view into Cumberland and along

the deep course of the Irthing was once more enjoyed, as on the last visit of the Club in 1885. Afterwards a long stroll was made along the line of wall towards Coombe Crag, but time did not permit of a visit to that romantic spot. During this ramble successful search was made for small boulders of Criffell granite, which are spread rather abundantly over the country round Gilsland, especially on the moorlands north of the hotel, wherever diggings have been made through the surface soil. Numerous specimens were found built into the walls bordering the roads. In connection with these boulders which have been transported from Dumfriesshire and South Scotland may be noticed the very red sand, which is to be seen in nearly all the sections on the banks of the Irthing, and which is sometimes of great thickness, and must have been derived from the red sandstone district of the flat country between Carlisle and the Solway. These deep-coloured sands appear not to have extended across the watershed into the Tyne Valley drainage, but to be limited to the west side of the watershed. Occasionally small boulders of the Criffell granite are found in the Tyne, and some of its main branches, but are rare as compared to the Irthing Valley. This western drift must be one of the newest alluvial deposits, as the boulders are found close to the surface, and immediately under the vegetable and peat soils. At dinner the members joined the visitors staying at the Shaw's Hotel, as no special meal could be provided, and afterwards they quietly walked to the Rosehill Station in time for the last train to Newcastle. No great discoveries were made, and no new observations were recorded by the wanderers over this well-trod and well-visited track, but much fresh balmy air was inhaled, much pleasant social conversation was indulged in, and the acquaintance with well-known spots and common wild flowers and ferns were enjoyably and almost joyously renewed under the bright blue sky and the balmy air of the moorland watering place.

Our SIXTH AND LAST FIELD MEETING took place at Cresswell and Newbiggin, on Thursday, October 14. Leaving Newcastle by the 8.20 train we arrived at Widdrington Station about 9.30.

Our first proceeding was to count our numbers, which we only found to amount to half a dozen. The previous unsettled weather probably deterred many, and an excursion of another Society on the same day may have taken away others who might have been with us. Our next move was to proceed to Widdrington village, whence a telegram was despatched to the landlord of the Ship Inn at Newbiggin, announcing the probable number of his guests. On the way we noticed the site of Widdrington Castle, now barely more than the mere site, as there is little trace of the old building left. Our party then divided, half going to view the Old Templar's House at Chibburn, the other half keeping the road towards Cresswell. We were much interested in this old building, but unfortunately we were entirely ignorant of its history; and therefore I have endeavoured to lay before you some information concerning it, which I have gathered from an interesting paper by Mr. Wm. Woodman, F.S.A., Town Clerk of Morpeth; from a paper by Mr. F. R. Wilson, of Alnwick; and Mr. J. H. Parker's "Domestic Architecture of England," Vol. II., 14 cent., p. 197. The buildings stand almost in the centre of the crescent formed by Druridge Bay. And they are curious, as affording an example probably of the oldest house in Northumberland, as distinguished from a pele-tower or a castle; and they have not been injured by modern alterations or attempts at restoration. The building has been defended by a moat, enclosing an area of about 100 yards in diameter. The walls are of stone, and have been originally covered with freestone slates. They formed a parallelogram, with a courtyard in the middle; on the west side the principal dwelling house, which is still almost perfect. This is a long low building of two stories, with external chimneys at the south end, and others in the centre. Mr. Parker, speaking of the windows, mentions that they were built with corbels, probably to attack assailants who were beneath. Internally we find the partition of oak plank, placed in a groove at top and bottom, with a narrow red ornament on the face, three inches in thickness, placed at a distance of twelve inches apart, the interstices filled with loam. The chimneys are of great size, having one very large stone over the opening for the

fireplace. The steps to the second story are solid blocks of wood, those beneath being of stone. The ceiling of the ground floor is of oaken joists, moulded, upon which are laid narrow oak planks, having their under sides smoothed, and a red ornament on them, so as not to require any plaster. The south side was formed by the chapel, which is of excellent ashlar work; at the east end is the great window, and the chapel has this peculiarity, that there is an upper floor of about two-thirds of its length from the west still remaining, with the fireplace at the proper level. This has clearly been a part of the original plan, and a good example of the domestic chapel; and it communicated with the dwelling rooms. There is a similar instance of this in the chapel within the keep of Warkworth Castle. The east and north sides are in ruins; they doubtless contained the inferior dwelling rooms, stables, etc." Mr. F. R. Wilson is of opinion that the buildings are not all of the same date. He says, "That part of the building called in the foregoing account 'the principal dwelling house,' instead of being part of the fourteenth century edifice, as conjectured, is clearly indicated by the character of the masonry to be of post-Reformation work. It is built in the semi-fortified, semi-domestic style that prevailed in those fierce times when every man's house was his castle as well as his home. I incline to fix the precise date as immediately succeeding the Reformation." With regard to the chapel floor, he says, "When the dwelling house was building advantage was taken of the fact that the chapel was in good preservation, and in disuse to secure additional chamber accommodation. The floor described by Mr. Parker as only extending two-thirds the length of the chapel was inserted, and the fireplaces and doors made precisely similar in character to those of the new house; for a door leading to other apartments in an adjacent building, now in ruins, is situated on the very angle which is erroneously supposed not to have been floored." Mr. Wilson sums up the story of Chibburn, as told by its stones, as follows. "The hospital, situated a seven mile stage from Warkworth, on the road between Holy Island and Durham—a welcome sight, no doubt, to many a weary pilgrim—was in decay when the dwelling house, now

standing, was erected. But the remains of the chapel were in such preservation as permitted additional accommodation to be obtained by throwing a floor across it, and converting both stories into chambers. A fireplace above stairs and another below stairs were inserted for the convenience of this arrangement, and the original windows, now inconveniently situated with regard to height for both stories, were filled up for the sake of strength and snugness, and others made in more suitable positions." I gather from Mr. Woodman's pamphlet that the earliest mention of the House of Chibburn which has been discovered, is contained in the return made to a mandate to inquire into the goods of the Hospitallers in the year 1313, and preserved in the Register of Bishop Nellaw at Durham. It was issued in pursuance of letters from the Nuncio, Arnaldo, Cardinal of St. Prisca, sent by Clement V. to reconcile Edward II. to the barons, and persuade him to grant the Templars' lands to the Knights of St. John. At this time, when the Hospitalers had not acquired the lands of the Templars, it appears by the document that Chibburn belonged to the Knights of St. John, therefore it must have been originally granted to them. In a document found in Malta we learn that in 1338 three of the Hospitalers resided at Chibburn. Brother John de Bilton, the preceptor; brother John Dacombe, the chaplain; and brother Simon Degayne. We have an account of the receipts and expenditure of the Preceptory. In 1540 the possessions of the Hospitalers were surrendered to the Crown. In 1553 the manor of Chibburn was granted to Sir John Widdrington and Cuthbert Musgrave. The manor of Chibburn again passed to the Crown, by the attainder of William, the fourth Lord Widdrington, for rebellion in 1715. Hodgson states that the ancient building at Low Chibburn was frequently a residence of the dowager ladies, or of junior branches of the Widdrington family.

From Chibburn we now walked down to the shore, and revelled in the beauty of Druridge Bay, which indeed looked lovely beneath the autumnal sun. On reaching Cresswell, we were shown, by a man whom we met, the traces of encampments, where troops were stationed during the scare of a French

invasion. Joining the rest of our party, who seemed rather aggrieved by the length of time we had kept them waiting, under the guidance of Mr. Fox, the gardener, we traversed the grounds of Cresswell Hall, laid out with much care and taste by the late Mr. Cresswell, whose form I well remember standing at his study window on the occasion of the last visit of the Club to the same spot. The Pele Tower was viewed with much interest. To the north of the tower was formerly I believe the old dwelling house. The tower itself is still in a most perfect condition. The walls are of rude but very strong masonry, the courses are irregular but the quoins are carefully placed, and so set that the weather might not injure it. I believe this Pele Tower is interesting, as throwing some light on the interior arrangement of the floors. I wrote to Mr. Bates, of Hetton, for some information on this point, but, owing to his absence in Russia, I have not been able to obtain it. Mr. F. R. Wilson states, in his "Churches of Lindisfarne," "that between the modern mansion and the sea rises the ancient pele the Crosswells reared in Edwardian times," and that "neither the ever-recurring waves nor the sweeping eddying winds have been able to efface, a tradition that lingers upon the shore here for perhaps a thousand years. The fishers say that a beautiful maiden, a daughter of the house of Cresswell, enamoured of a Dane, in the hardy days when the sea kings carried all before them in love and in war, saw her lover slain by two of her brothers, and that she shut herself up, inconsolable, indomitable, and starved herself to death." Cresswell was one of the manors of Bywell Barony, and has been preserved by the family of its name since the reign of King John. From the Pele Tower we passed through the gardens and grounds to the House itself. The chief object of note on the way being a plant of Traveller's Joy, or *Clematis vitalba*, which had overrun a lofty tree, and was seen hanging far over our heads. After seeing through the house, we passed down the walk towards the sea, stopping to examine the skeleton of a whale, which was the cause of a most expensive lawsuit, to decide to whom it of right belonged. As we journeyed along the sea banks we were introduced to a form of, as we might call

it, Irish outrage. Probably from a spirit of mischief, someone during the night had thrown into the small stream, the name of which I have forgotten, the cart of some Irish muggers. After a great deal of talk and vociferation, which caused us much amusement, by the aid of the past and present Presidents, the cart which was fast disappearing beneath the fast rising tide, was rescued, and restored to its sorrowing owners. After this interlude we continued our way to Newbiggin, where four members only partook of a very good dinner, provided by the landlord of the Ship Inn, and shortly afterwards we returned to Newcastle by rail; having had a very pleasant day, and feeling sorry for those members who had not partaken in our pleasure.

Our Field Meetings during the past year were but poorly attended, and we may hope that this coming season may see more avail themselves of these opportunities for pleasant excursions to the various localities to which it shall be decided to direct our pilgrim steps.

I must express my regret at the meagreness of my address, that I have not been able to take any special subject on which to enlarge. The past season has not been a very favourable one for discoveries in the branch of Natural History, to which I more particularly address myself. The most noticeable records I have seen, are those of the occurrence in large numbers of the *Convolvulus Hawk Moth*, and the continued occurrence, in apparently extended localities, of the new arrival, *Anosia plexippus*. A scare, somewhat similar to that of the Colorado Beetle scare, has been caused by the Hessian Fly, concerning which Miss Omerod has, I believe, written some interesting observations. I believe, and am happy to believe, that we have lost few of our members during the past year, and that no member of any note among us has been removed by death.

I was grieved to notice in the papers the other day the obituary of a local entomologist, Mr. Sang, of Darlington, whose knowledge of the micro-lepidoptera of the district, and of that division generally, was of a very far-reaching nature. He was of great

assistance to myself, in naming many of my captures of these minute creatures.

I can only now, on concluding my duties as President of the Tyneside Naturalists' Field Club, thank you for the honour you did me in electing me to this office, and, craving your indulgence for my shortcomings therein, express my hope that my successor may, as I believe he will, fill the office more worthily, and be a means of furthering the work of this Field Club during the coming year.

The following gentlemen were elected members of the TYNESIDE NATURALISTS' FIELD CLUB during the year 1886:—

At the ANNIVERSARY MEETING, May 24th, 1886:—Messrs. Robt. H. Read, 11, Argyle Street, Tynemouth; John E. Miller, 1, Lovaine Place, North Shields; Wm. M. Taylor, Whickham; Arthur C. Hick, 1, Oxford Street, Newcastle.

At SHOTLEY BRIDGE, May 31st:—Messrs. Mark Archer, Nesham Place, Bensham; W. B. Jackson, 36, Grey Street, W. B. Campbell, 34, Grey Street, Newcastle.

At STAINDROP, July 16th:—Mr. Westgarth Brown, Marsden Colliery, South Shields.

THE FIELD MEETINGS for 1887 were arranged to be held as follows:—

MAY 30TH (Whit Monday) .. Whitfield and West Allen.
 JUNE 20TH..... Teesdale and High Force.
 JULY Pateley Bridge and Nidderdale.
 AUGUST 1ST (Bank Holiday).. Dunstanborough.
 SEPTEMBER..... Wooler.
 OCTOBER..... Whitburn and Marsden.

THE TREASURER IN ACCOUNT WITH THE TYNESIDE NATURALISTS' FIELD CLUB.

FROM JANUARY 1ST TO DECEMBER 31ST, 1886.

Dr.		Cr.	
	£ s. d.		£ s. d.
1886.		1886.	
Jan. To Balance brought forward	149 9 6	Dec. 31. By Commission for collecting Subscriptions	3 16 3
„ Subscriptions	77 0 5	„ Printing Transactions	43 13 0
„ Sale of Transactions	3 5 6	„ Journal, Circulars, &c.	17 9 0
		„ Secretaries' Expenses	7 14 6
		„ Postage and Sundries	2 18 1
		„ Balance	154 4 7
	<u>£229 15 5</u>		<u>£229 15 5</u>

1887, May 15th.—Examined and found correct,
T. P. BARKAS, AUDITOR.

THE following gentlemen were elected officers of the Club for the years 1887-88 :—

PRESIDENT.

John Philipson, Esq.

VICE-PRESIDENTS.

Joseph Blacklock, Esq.	| James Clephan, Esq.
D. O. Drewett, Esq.	| John Hancock, Esq.

D. Embleton, Esq., M.D.	| H. B. Brady, Esq., F.R.S.
Rev. Canon Tristram, F.R.S.	| Rev. J. E. Leece, M.A.
Rev. A. M. Norman, M.A.	| Rev. G. R. Hall, M.A., F.S.A.
Rev. J. C. Bruce, LL.D.	| G. H. Philipson, Esq., M.D.
Rev. A. Bethune, M.A.	| Rev. R. E. Hooppell, LL.D.
E. J. J. Browell, Esq., J.P.	| A. S. Stevenson, Esq., J.P.
Rev. R. F. Wheeler, M.A.	| H. C. Abbs, Esq., J.P.
Prof. G. S. Brady, M.D.	Rev. J. M. Hick.

TREASURER.

R. Y. Green.

SECRETARIES.

Richard Howse.	Thomas Thompson.
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COMMITTEE.

T. W. Backhouse.	Rev. J. M. Hick.
Benj. Barkus, M.D.	Rev. W. Johnson.
E. J. J. Browell.	Wm. Maling.
T. T. Clarke.	| G. H. Philipson, M.D.
Wm. Dinning.	J. F. Spence.
Jno. Glover.	Col. J. R. Young.

AUDITORS.

J. S. Forster.	T. P. Barkas.
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II.—*Contributions towards a Catalogue of the Flora of the Carboniferous System of Northumberland and Durham.*

Part I.—Fossil Plants from the Hutton Collection.

Catalogue of those specimens of the Hutton Collection of Fossil Plants that have been presented to the Natural History Society by the Council of the Mining Institute, and are now exhibited in the Geological Room of the Museum, at Barras Bridge, Newcastle-upon-Tyne. By RICHARD HOWSE.

FROM a circular issued in February, 1829, by the founders of the Natural History Society, we learn that one of the leading features of the Society was to be the formation of Collections of Fossil Organic Remains, especially the Fossil Plants of the local Coal-measures. Up to this time, it appears, there was no public or even extensive private collection of these fossils in Newcastle, for the same gentlemen express a regret that "Brongniart, the celebrated French naturalist, when he was preparing materials for his great work on Vegetable Fossils, now in the course of publication, came down to the north in the full expectation of finding a Collection of Vegetable Fossils in Newcastle, and, of course, was much disappointed."

Brongniart's visit would be about the year 1825, for we know that shortly after this time Coal-measure Plants were sent from Newcastle to Brongniart by James Losh, Esq., Recorder of Newcastle; and also that drawings of some of our local Coal Fossils were sent to both Sternberg and Brongniart by the Rev. W. Buckland, Sir W. C. Trevelyan, and a Dr. Taylor, of Durham, who, we are told, had made drawings of Coal-measure Plants with the intention of publishing them.

It was then about this time, 1829, that Mr. Wm. Hutton, who was one of the first Secretaries of the Natural History Society, began to form his Collection of Fossil Plants, and also to have drawings made from his own collection, from specimens in the newly-formed Museum of the Natural History Society, and

from others belonging to local friends, in addition to the drawings made and sent to him, sometimes with specimens, often without, by Dr. Hibbert, of Edinburgh; Messrs. Williamson, father and son, of Scarborough; and many others. He had also at hand, for reference and figuring, the now numerous and increasing collection of Fossil Plants in the Newcastle Museum, which contained also many specimens from the Somersetshire Coal-field, presented about this time by Thomas Mead, Esq., 1834-5; and some very interesting plants from the Whitehaven Coal-field, presented to the Society by Mr. Williamson Peile in 1832.

Mr. Hutton's intimacy with Mr. John Buddle, the eminent viewer, of Newcastle, was of immense advantage to him in collecting Coal-measure Fossils, as the Bensham Seam was then worked in Jarrow Colliery, of which Mr. Buddle was head viewer, and he had under him a master-wasteman, Robert Fairley, who was one of the most successful fossil collectors in the North of England; and to his industry and diligence in collecting, Mr. Hutton, and in fact all the local collectors of Fossil Plants, were more indebted for the means of obtaining specimens than to any other person. The shale above the Bensham Coal-seam at Jarrow is exceedingly rich in specimens of numerous genera, and it was from this locality chiefly that Mr. Hutton's specimens were procured. Mr. Hutton had also another collector at the Felling, where the Low-main Seam was chiefly worked. The specimens from this pit were collected chiefly by William Pearson. Fairley I knew very well, and obtained many specimens from him forty years ago, as he collected and sold fossils long after Mr. Hutton had left off collecting, and up to the time the Jarrow pit was laid in.

The first part of the "Fossil Flora" is dated July, 1831, and the last part was issued for July, 1837. The drawings of the local Coal-measure Fossils were prepared, under Mr. Hutton's direction, by two artists, Prior and Johnson, chiefly by the former. When the arrangement, between Mr. Hutton and Prof. Lindley to publish the "Fossil Flora," was made I am unaware, but it seems to have been agreed on that Mr. Hutton should

collect the specimens, and have drawings made from them; and that these drawings should be sent to London, with the specimens occasionally, and any remarks Mr. Hutton wished to make, along with them. That the names and remarks sent by Mr. Hutton were not always attached firmly to the specimens can be easily inferred, from the request made by Prof. Lindley to Hutton that the notes and names should be pinned on or written, so that they could not be misplaced, and some mistakes that appear in the text as to localities, and which have not been corrected by a list of errata, seem to have originated in this way. And when we consider the distance the specimens had to be sent, the difficulty and expense of sending parcels and letters to and from London in 1837, we need not be at all surprised at the few mistakes that have occurred, and which are as far as possible corrected in the present Catalogue.

Mr. Hutton seems to have left off collecting Fossil Plants shortly after the completion of the third volume of the "Fossil Flora;" and on his leaving England in November, 1846, for a prolonged residence on the shores of the Mediterranean, his valuable and extensive collection of Fossil Plants were left in cabinets for more than sixteen years, where, without supervision of any kind for so long a period, they had (when brought to light again) accumulated a considerable covering of dust and dirt. About the year 1862 the collection was purchased by the Council of the Mining Institute, and by agreement with the Natural History Society they were cleaned and arranged systematically in a series of cases in the Geological Room of the Natural History Society's Museum, Westgate Road.

Only a few of the specimens in the collection were named and labelled by Mr. Hutton, and on these specimens his labels remain to the present time. The rest were entirely without name or arrangement, and many of the Type-specimens were mixed up with the others, without label or anything to indicate their value.

In 1862, at the time of the removal of the Hutton Collection from the Mining Institute to the Museum, a list of the local species that had been described in the "Fossil Flora" and

elsewhere was drawn up by myself and contributed to the Transactions of the North of England Institute of Mining Engineers, Vol. XII. And after the collection had been further arranged, each specimen was named, when possible according to the nomenclature of the "Fossil Flora," and a MS. Catalogue was made, which was placed in the hands of the Council of the Mining Institute in 1876.

At the request of the Council of the Mining Institute Prof. Lebour drew up a Catalogue from this MS. list, which was published by the Council of the Mining Institute under the title of "Catalogue of the Hutton Collection of Fossil Plants," by G. A. Lebour. About the same time a series of drawings, which had been originally prepared by Mr. Hutton for a continuation of the "Fossil Flora," or of which some had been rejected by Prof. Lindley as too imperfect for publication, was presented to the Mining Institute. A selection from these drawings was made, and, by order of the Council of the Mining Institute, were published under the editorship of Prof. Lebour. About twenty-nine of the specimens from which these drawings and illustrations were made are still in the Hutton Collection. The title of this work, to which reference is also made in this Catalogue, is "Illustrations of Fossil Plants, being an Autotype reproduction of selected drawings. Prepared under the supervision of the late Dr. Lindley between the years 1835—40, etc. 1877."

Seventy-two of Hutton's Type-specimens and a counterpart of one of the figured specimens were found in the Hutton Collection, and a few other specimens bear a label in Mr. Hutton's handwriting; and they were the only specimens named in the collection, which numbered fully six hundred specimens, besides pieces of shale of no scientific value.

The collection has been examined twice by Mr. Wm. Carruthers, of the Botanical Department of the British Museum, and twice by Mr. Robert Kidston, of Stirling, who availed himself of a careful study of this arranged and labelled collection before preparing the Catalogue of Palæozoic Fossils for the British Museum.

In 1883, before the removal of the collections of the Old

- ## Plates.

Plates.

154. *Pecopteris dentata*, = *Pecopteris plumosa*.
 156. *Sphenopteris latifolia*, L. et H. (non Brongt.) = *Sphen. trifoliata*.

VOL. III.

161. *Lepidodendron longifolium*, L. et H., = *Knorria Volkmanniana*.
 164. *Pinus anthracina*, L. et H., = *Lepidophloios larininus*.
 174. *Neuropteris attenuata*, L. et H., = *Pecopteris Bucklandii*.
 178. *Sphenopteris latifolia*, „ (non Brongt.) = *S. trifoliata*, Artis.
 180. *Asterophyllites tuberculata*, Stb., L. et H., = *Calamites cannaeformis*.
 181. *Sphenopteris furcata*, Brongt., L. et H., = *Sphenopteris*.
 197. *Neuropteris heterophylla*, L. et H., = *Neuropteris flexuosa*.
 198. *Lepidostrobus Pinaster*, „ = *Lepidophloios larininus*.
 202. *Pecopteris Serlii*, Brongt, „ = *Pecopteris Serlii*.
 204. *Sphenopteris Höninghausi*, „ (non Brongt.), = *Sp. obovata*.
 205. *Sigillaria flexuosa*, L. et H., = *Sigillaria reniformis*.
 223. *Pecopteris Bucklandii*, Brongt., L. et H., = *Pecop. Bucklandii*.
 225, f. 3. *Sternbergia approximata*, Brongt., L. et H., = *Cordaite* sp. (pith).
 225, f. 4. „ „ „ „ = „ „
 225, f. 5. „ „ „ „ = „ „
 225, f. 6. „ „ „ „ = „ „
 227A. *Endogenites striata*, L. et H., = *Sigillaria* sp. (cast of pith).
 230. *Sphenopteris linearis*, L. et H., = *Sphenopteris crassa*, L. et H.

The following Type-specimens figured in the "Fossil Flora" are in the local collection of Coal-measure Plants of the Natural History Society, viz. :—

- 7, f. 2. *Lepidodendron dilatatum*, L. et H., = *Lepidodendron Sternbergii*.
 36. *Stigmaria ficoides*, Stb., L. et H., = *Stigmaria* sp.
 47. *Sphenopteris dilatata*, L. et H., = *Sphenopteris trifoliata*.
 72. *Sigillaria ? monostachya*, L. et H., = *Sigillaria reniformis*.
 75. *Favularia tessellata*, Steinhauer, = *Favularia tessellata*.
 86. *Halongia gracilis* (part of), L. et H., = *Lepidophloios larininus*.
 100, 101. *Sphenopteris crenata*, L. et H., = *Pecopteris plumosa*.
 100, 101. *Schizopteris adnascens*, L. et H.
 113. *Lepidodendron selaginoides*, Stb., L. et H., = *Lep. selaginoides*.
 118. *Lepidodendron elegans*, Stb., L. et H., = *Lepidodendron Sternbergii*.

In this portion of the Hutton Collection are also the following Type-specimens of the "Illustrations of Fossil Plants," by Prof. G. A. Lebour :—

1. *Calamites cannaeformis*, Schloth, Leb., = *C. Suckowii*, var. *decoratus*.
 3. „ *nodosus*, L. et H., Leb., = *C. cannaeformis*, Schloth.

Plates.

4. *Asterophyllites* sp., Leb., = *Calamites Suckowii*.
5. " *tuberculata*, Stb. sp. (?) Leb., = *C. cannaformis*.
6. " sp., Leb., = *Equisetides* (?) *Cistii*.
8. " *Huttonii*, Leb., = *Calamites Suckowii* (fruct.).
9. " sp., Leb., = *Calamites cannaformis* (fruct.).
10. Root and Rootlets, Leb., = *Myriophyllites gracilis*.
11. *Cyclopteris* (*Nephropteris*) *obliqua*, Brongt., Leb., = *Neuropteris*.
15. Fragment of Neuropterid-Frond (?), Leb., = *Pecopteris muricata*.
16. *Pecopteris* (*Alethopteris*) *aquilina*, Schloth., Leb., = *P. muricata*.
19. *Sphenopteris macilentia*, L. et H., Leb., = *Pecopteris muricata*.
22. *Pecopteris* (*Alethopteris*) *serra* (?), L. et H., Leb., = *P. muricata*.
23. " *serra* (?), L. et H., Leb., = *Pecopteris plumosa*.
27. *Neuropteris* sp., Leb., = *Neuropteris Loshii*.
28. *Sphenopteris* sp., " = *Sphenopteris Artemisiaefolia*.
29. *Pecopteris laciniata*, L. et H., Leb., = *Pecopteris muricata*.
31. *Sphenopteris latifolia*, var. Brongt., Leb., = *Pecopteris muricata*.
32. " *linearis*, var. Sternb., " = *Sphenopteris tenella*.
36. " sp. ———, Leb., = *Sphenopteris Artemisiaefolia*.
41. " sp. ———, = *Sphenopteris furcata*, Brongt.
42. *Rhacophyllum* (?) ———, = *Schizopteris filiciformis*, Gutb.
43. " " = " "
44. ? ——— ———, = *Pteridopsis plumosa*, nov. gen. et sp.
46. *Spiropteris* ———, Schimper, Leb., = *Pecopteris*, in veneration.
47. " (?) ——— " " = *Neuropteris gigantea*,
in veneration.
48. Fern stem, Leb., = *Cordaites Taxina*.
49. " " = " "
61. Root (?) " = *Equisetides* (?) *Cistii*.

The Type-specimen of Plate 63 of the Ill. Foss. Plants is in the Natural History Society's Collection, and is specifically identical with Plate 44 of the same work.

The annexed diagram, extracted from Mr. John Buddle's "Synopsis of the several Seams of Coal in the Newcastle District," Dec., 1830, published in the Transactions of the Natural History Society of Northumberland, Durham, and Newcastle-on-Tyne, Vol. I., 1831, will be sufficiently accurate to shew the position in the Northern Coal-field of the three seams of coal, viz., the High-Main, the Bensham, and the Low-Main seams, from the shale-bed above which nearly all the local Coal Plants collected by Mr. Wm. Hutton were obtained. These three seams occupy very nearly the middle portion of the series of beds occurring in the Coal-measures proper of the Northern Coal-field.

SYNOPSIS OF THE COAL SEAMS IN THE NEWCASTLE-ON-TYNE DISTRICT.

	EAST OF NEWCASTLE.	Depth from Surface.	Thickness of Coal.	WEST OF NEWCASTLE.		Depth from Surface.	Thickness of Coal.
		Feet.	Ft. In.			Feet.	Ft. In.
1	Monkton and Hebburn Fell Seam.....	120	2 10	Cropped out.....			
2	Three-quarter Coal.....	612	1 2	Do.			
3	HIGH-MAIN SEAM —	792	6 0	Do.			
4	Metal Coal Seam.....	834	3 0	Do.			
5	Stone Coal Seam.....	876	0 8	Do.			
6	Yard Coal Seam.....	936	3 0	Do.			
7	BENSHAM SEAM —	1008	4 8	Do.			
8	Six-quarter Seam Coal.....	1098	2 6	Do.			
9	Five-quarter Seam Coal.....	1122	2 8	Do.			
10	LOW-MAIN COAL —	1158	6 0	Grand Lease Main Coal.....		66	6 6
11	Crow Coal.....	1218	0 10	Crow Coal.....		129	2 3
12	Ryton Five-quarter Coal.....	1275	0 5	Five-quarter.....		150	3 8
13	Ryton Ruler Coal.....	1299	5 0	Ruler Coal.....		183	1 8
14	Beaumont Seam.....	1410	3 5	Townley Main, Upper Main, or Barlow Field.....		282	3 10
15	Not yet found ..	.....	.....	Stone Coal, Five-quarter Seam, or Main Coal Seam ..		372	2 9
16	Do. ....	.....	.....	Under Five-quarter Seam or Six-quarter Seam ..		393	3 4
17	Do. ....	.....	.....	Three-quarter Seam or Yard Seam ..		417	2 6
18	Do. ....	.....	.....	Brockwell, Horsley Wood, or Splint Coal Seam ..		471	3 2

By reference to the Catalogue it will be seen that the greater number of the local specimens in the Hutton Collection were obtained from the shale above the Bensham-Seam of coal at the Jarrow Old Pit, now long disused; and a few from the High-Main roof-shale at St. Hilda's Pit, South Shields; and also several of the Type-specimens from the shale above the Low-Main Coal-Seam at Felling Colliery, near Gateshead. There are also in the collection several specimens from Burdie House and other localities near Edinburgh (from the Calcareous-Sandstone series), contributed by Dr. Hibbert and others, and specimens from the Somersetshire and Whitehaven Coal-fields. The local specimens, then, were obtained from the very limited zone included in the shale above the High-Main Seam and the shale above the Low-Main Seam, and none certainly from the lower seams, and only one or two from the Carboniferous (Mountain) Limestone proper. There were also in the original collection several foreign specimens, from German localities, obtained through dealers.

Here it may again be stated that so far as the Lower Seams of Coal in this Coal-basin are concerned their flora is entirely unrepresented in Lindley and Hutton's "Fossil Flora;" and this omission is much to be regretted, as from the investigations made during a few years in one or two of the lower beds, there is reason to believe that some species unknown or rare in the higher beds were abundant and well-preserved in the lower series. But reference to these will be more specially made in the second part of these Contributions, in which the General Collection of Local and other Fossil Plants in the Museum will be catalogued.

The localities given in most works on Coal-measure Fossils from our Coal-field are exceedingly vague, and of very little scientific value. In a Catalogue lately published we have on one line the following references, "Durham; Sunderland; Northumberland; Newcastle-on-Tyne." As two of the above names are counties as well as cities the vagueness is increased. There is no coal pit, and there never has been one, in Sunderland, the city of Durham, nor in the city of Newcastle-on-Tyne

(the old walled part of this town or city stands on Boulder drift clay, which has not yet been fathomed). But there are coal-pits a few miles from the city of Durham, and one at Monkwearmouth, north of Sunderland, perhaps from which the coal underneath that town is worked, and there have been one or two pits in the county of Newcastle-on-Tyne; but the only fossil I have seen during the last forty years from any of these localities was one found in a sandstone quarry on the top of Westgate Hill, part of which is in this Museum; and numerous fossils were formerly found in the High-Main Post at Gateshead, on the south side of the Tyne. Northumberland is a very wide locality for a fossil, it includes any stratum, from the top of the Coal-measures to Calcareous-Sandstone inclusive. In Unger's Synopsis and other works we find Ad Yarow; ad Bensham ad Yarow, for the shale above the Bensham coal-seam, at the Old-Colliery, Jarrown-on-the-Tyne; ad Yawdon, for Fawdon old pit, long since disused; and such like localities for fossil plants are about as intelligible as Ad Yarow prope Bensham Angliæ by the same writers. "Newcastle Coal Field" is more than once used in the "Fossil Flora," and sometimes even that is erroneous; but the explanation of this is, I think, that the drawing had been sent to Prof. Lindley without any name attached to it, and to save time and postage (twice ninepence in those days) he wrote "Newcastle Coal Field" at a venture.

The following is a list of the more important works quoted in the following Catalogue, with the contractions used for reference:—

Schloth., Flor. d. Vorw.	Schlotheim, Flora der Vorwelt. 1804.
—— Petref.	—— Die Petrefactenkunde. 1820—23.
Sternberg, Vers.	Sternberg, Vers. Geog. Darst. 1820—38.
Brongt., Class. Vég. Foss.	Brongniart, Classification et la Distribution des Végétaux Fossiles. 1822.
—— Prod.	—— Prodromus. 1828.
—— Hist. Vég. Foss.	—— Histoire des Végétaux Fossiles. 1828—37.
Artis, Anted. Phyt.	Artis, Antediluvian Phytology. 1825.

L. et H., Foss. Flora	Lindley and Hutton, Fossil Flora of Great Britain. 1831—37.
Gutb., Vers. d. Zwick. Schwarzkohl.	Gutbier, Versteinerungen des Zwickauer Schwarzkohlengebirges. 1835.
Gœpp., Syst. Fil. Foss.	Gœppert, Systema Filicum Fossilium. 1836.
Morris, Cat. Br. Foss.	Morris, Catalogue of British Fossils. 1854.
Geinitz, Vers. d. Steinkf. in Sachs...	Geinitz, Versteinerungen der Steinkohlenformation in Sachsen. 1855.
Andrae, Vorw. Pflanz.	Andrae, C. J. Vorweltliche Pflanzen aus dem Steinkohlengebirge der preussischen Rheinlande und Westphalens. 1865-69.
Schimper, Traité Pal. Vég.....	Schimper, Traité de Paléontologie Végétale. 1869—1874.
Lesquereux, Coal Plts. Penns.	Lesquereux, Coal Plants of Pennsylvania.
Stur, Culm Flora.....	Stur, Die Culm Flora. 1875—77.
Boulay, Terr. Houill. Nord France...	Boulay, Le Terrain Houiller du Nord de la France et ses Végétaux Fossiles. 1876.
Grand'Eury, Flor. Carb.....	Grand'Eury, La Flore Carbonifère du Département de la Loire et du Centre de la France. 1877.
Lebour, Ill. Foss. Plts.....	Lebour, Illustration of Fossil Plants. 1877.
—— H. C.	—— Catalogue of the Hutton Collection of Fossil Plants. 1878.
Zeiller, Vég. Foss. Terr. Houill.....	Zeiller, R. Végétaux Fossiles du Terrain Houiller de la France. 1880.
Kidston, Cat. Brit. Mus.	Kidston, Catalogue of Palæozoic Plants in the British Museum. 1886.

It is much to be regretted that no one since Mr. Hutton's time has collected the Fossil Plants of this Coal-field systematically and extensively, and as a consequence very little is known of their distribution in the different horizons of these Coal-measures. The time and expense necessary for successfully collecting Fossil Plants would, no doubt, be very great; and in addition to time and money, much influence, both with coal-

owners, viewers, and overmen, would be required to carry on such investigations with success; and these considerations must have had great weight in deterring students and others from engaging in such expensive pursuits. Thus very few additional species have been recorded from this Coal-field since the time Lindley and Hutton discontinued the publication of the "Fossil Flora." The zest also for such pursuits, it must be admitted, has considerably cooled down in the North of England since Hutton's time, and thus, though coal has been worked enormously of late years, yet the opportunities offered for collecting Fossil Plants have been all but entirely neglected. But it is not, it is hoped, too late to mend, and perhaps this little Catalogue, by shewing what was done in this town fifty years ago, may stir up and awaken some one with the above-mentioned qualifications to the importance of engaging in a pursuit which, from the new ground to be examined, the novelties to be discovered, and the valuable information to be derived from it, ought to make it fascinating to many.

The drawings from which the woodcuts were made are from the pencil of my late friend and fellow-member, John Storey, Esq.

I cannot conclude this short introduction better than in the remarkable words of Prof. Lindley, in the preface to the "Fossil Flora," and which are as applicable to Fossil Botany in the present day, notwithstanding all the researches that have been made, as they were in the days of Lindley and Hutton, and even more so.

"It must always be remarked, that in this study, every one is a mere beginner; that he who has pursued it longest, is still but on the very threshold of the science, and that we have only just begun to clear away the impediments that accident and ages have accumulated in our path. It is no wonder that errors should be committed in such a pursuit. So perfectly hopeless is it to escape them, that botanists have, probably, been deterred from engaging in the enquiry, as much by a dread of the risk to which their scientific reputation must necessarily be exposed, as by the difficulty of the task itself. For ourselves, however, we

have no other object than the promotion of science, as far as our humble means will permit."

LIST OF ILLUSTRATIONS.

Part of fertile stem and spike (<i>Asterophyllites tuberculata</i>) of <i>Calamites cannaeformis</i>	Woodcut No. 1.
Fertile spike (<i>Bowmanites Cambrensis</i> , Binney) of <i>Sphenophyllum Saxifragæfolium</i>	— No. 2.
<i>Neuropteris gigantea</i> , in vernation	Plate 1.
<i>Neuropteris</i> and <i>Cyclopteris</i> , in vernation.....	— 2, f. 1.
<i>Pecopteris</i> (<i>Alethopteris</i>) <i>lonchitica</i> , in vernation.....	— 2, f. 2.
<i>Pteridopsis plumosa</i> , nov. gen. et spec.	— 3.
Frond of <i>Pecopteris</i> , in vernation	Woodcut No. 3.
Leaf-scars and stem of <i>Farularia tessellata</i>	Plate 4, f. 1.
Leaf-scars and stem of <i>Sigillaria reniformis</i>	— 4, f. 2.
Leaf-scars and stem of <i>Sigillaria reniformis</i> , juv.	Woodcut No. 4.
Compressed leaf-scars of <i>Sigillaria reniformis</i>	— No. 5.
Leaf-scars and stem of <i>Sigillaria scutellata</i>	— No. 6.
Leaf-scars and stem of <i>Sigillaria scutellata</i> , juv.	Plate 5, f. 1.
Portion of stem of <i>Cordaites</i> (<i>Knorria</i>) <i>taxina</i>	Woodcut No. 7.
Stem with budding end of <i>Cordaites taxina</i>	— No. 8.
Small branch with leaves of <i>Rhytidodendron</i> sp.	Plate 5, f. 2.
Branches and leaves of <i>Rhytidodendron</i> sp.....	— 6.

CATALOGUE OF FOSSIL PLANTS.

ORDER. EQUISETACEÆ.

EQUISETIDES, Schimper.

Equisetides gigantea (Lindley et Hutton).

Type—Hippurites gigantea, L. et H., F. Flora, pl. 114.

STEM.

- | | |
|--|---|
| <i>Cyclocladia major</i> , | L. et H., Foss. Flora, pl. 130. |
| <i>Calamites verticillatus</i> , | L. et H. „ pl. 139. |
| <i>Equisetites infundibuliformis</i> , | Geinitz, Vers. Steinkf. Sachs.,
pl. 10, f. 4, 5. |
| <i>Macrostachya</i> „ | Schimp., Traité I., pl. 23, f. 13, 14. |
| <i>Equisetides gigantea</i> , | „ „ p. 286. |

BRANCHES, BRANCHLETS, AND LEAVES.

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|---------------------------------|-------------------------------------|
| <i>Asterophyllites comosa</i> , | L. et H., Foss. Flora, pl. 108. |
| „ <i>longifolia</i> , | L. et H. „ pl. 18. |
| „ <i>grandis</i> , | L. et H. „ pl. 17;
pl. 19, f. 2. |
| <i>Bruckmannia longifolia</i> , | Sternb., Vers. I., pl. 58, f. 1. |
| „ <i>tenuifolia</i> , | Sternb., Vers. I., pl. 19, f. 1, 2. |

FRUCTIFICATION.

- | | |
|-------------------------------------|---|
| <i>Equisetum infundibuliforme</i> , | Brongt., Hist. Végét. Foss.,
pl. 12, f. 14. |
| „ „ | Gutb., Vers. Zwick., t. 3b,
f. 5, 6. |
| <i>Equisetites mirabilis</i> , | Sternb., Vers. II., t. 1, f. 1. |
| „ <i>infundibuliformis</i> , | Geinitz, Vers. Steinkf. Sachs.,
tab. 10, f. 6. |
| <i>Macrostachya</i> „ | Schimp., Traité Pal. Vég., t. 23,
f. 15, 16, 17. |
| „ „ | Lesq., Coal Flora Penns., pl. 3,
f. 17. |
| „ <i>carinata</i> , | Zeill., Vég. Foss. Terr. Houill.,
pl. 159, f. 4. |

STEM.

- 1.—*Hippurites gigantea*, L. et H. TYPE SPECIMEN, F. F., pl. 114.
This specimen has two internodal portions of the stem. The joints with indications of leaf-scars or apertures and elongated fringe-like leaves or bracts rising from the marginal line of the joints. Hutton's label, "*Hippurites gigantea*, Newcastle."
Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 603).
- 2.——— Cast of portion of stem with one joint; an irregular row of elliptical apertures on a line with the joint.
Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 602).
- 3.——— Two joints of a stem; space between joints narrow, entire width of stem not shewn.
Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 604).
- 4.——— Fragments of lower portion of stem with leaves or leaf-like sheath springing from joints.
Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 61).

STEM WITH LARGE BRANCH-SCARS.

- 5.—*Cyclocladia major*, L. et H. TYPE SPECIMEN, F. F., pl. 130.
The specimen shews casts of four large nipple-shaped tubercles, nearly circular, and traces of cortical layer. Not a very desirable specimen to figure and found a genus on. Hutton's label, "Jarrow, Bm."
Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 660).
- 6.——— Portion of the stem with six internodes and joints; scar-marks along the joints; row of four circular tubercles between the second and fourth joints; cast with wrinkled surface.
Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 664).
- 7.——— Fine specimen with five tubercles below the joint; tubercles much compressed, nipple-shaped; cortical integument much wrinkled and covered with numerous specimens of *Microconchus carbonarius*.
Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 661).
- 8.——— A whorl of ten nearly circular tubercles on a narrow band—the band about four inches long and four-tenths wide; distinct indications of a joint under the band; imperfect impressions of decorticated stem below the line of circular tubercles.
Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 662).

- 9.—*Cyclocladia major*, L. et H. Impression of stem with row of five tubercles, nipple-shaped; central portion of tubercles raised and distinct; small portion or impression of the stem below; branch of *A. grandis* on same slab.
 Loc.—Shale above the Low Main-Seam, Felling. (*H. C.* 666).

BRANCHES ARRANGED IN A WHORL.

- 10.—*Asterophyllites grandis*, L. et H. TYPE SPECIMEN, F. F., pl. 17.
 Fourteen branches arranged in a whorl round a portion of stem one inch and a quarter broad. Another set of branches on the same slab arranged in the same manner. Hutton's label, "*Asterophyllites grandis*. Felling L. M. P. 17."
 Loc.—Shale above the Low Main Seam, Felling. (*H. C.* 113).
- 11.—Eleven branches arranged in a whorl round an indistinct portion of stem.
 Loc.—Shale above the Low-Main Seam, Felling. (*H. C.* 112).

BRANCHLETS AND LEAVES.

- 12.—*Asterophyllites comosa*, L. et H. TYPE SPECIMEN, F. F., pl. 108.
 A very indistinct impression of a tuft, consisting of numerous whorls of slender curved leaves, indistinct impression of stem with long joints as in *A. grandis*, L. et H., from nodal portion of which six branches, each more than a line in breadth, appear to be arranged in a whorl on a slightly grooved stem. This appears to be an irregular growth or young state of part of *A. grandis*. Hutton's label, "*Asterophyllites comosa*. Jar-row, Bm."
 Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 99).
- 13.—*Asterophyllites longifolia*, L. et H. Large branch with whorls of smaller branches or branchlets. Hutton's label, "*Asterophyllites longifolia*."
 Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 96).
- 14.—A long branch with whorls of long, fine branchlets or leaves. Hutton's label, "*Asterophyllites longifolia*. Jar-row, Bm., D."
 Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 97).
- 15.—*Asterophyllites longifolia*, L. et H. Small branch with three joints; joints rather prominent, distinct, surrounded with long narrow branchlets or leaves.
 Loc.—Shale above the Low-Main Seam, Felling. (*H. C.* 92).

Remarks.—Perhaps *Calamites verticillatus*, L. et H., ought to have been chosen as the Type of this species, as it combines more of the characters of the genus than *H. gigantea* shows. But as Schimper has already referred *H. gigantea*, L. et H., to his genus *Equisetides*, and as Dr. Geinitz has long since referred both *Cyclocladia major*, L. et H., and *Calamites verticillatus*, L. et H., to *Equisetites infundibuliformis*, it seems better to retain for this species the name given by Schimper (though he failed to see the affinities pointed out by Geinitz, and seems to have entirely ignored the *Cyclocladia* of Lindley and Hutton) than to make another change. I have united Lindley and Hutton's three species into one upon the evidence afforded by a specimen in the Newcastle Museum combining the characters of *Cyclocladia* with those of *Hippurites gigantea*. There can be no doubt, I think, that the *Asterophyllites grandis*, F. F., pl. 17, represents a whorl of branches, and *Bruckmannia longifolia* and *tenuifolia*, Sternb., the verticillate foliage of the same species. Dr. Geinitz is followed in considering the fruit-spike, *Equisetum infundibuliforme*, as the fructification of this species. Schimper figures part of the stem and the fertile spike also under the name *Macrostachya infundibuliformis*, and seems to have thought that the spikes were attached to the large branch-scars.

The remains of the stem of this plant found in this Coal-field are very fragmentary, and appear to have been a long time macerated in water, as numerous *Microconchi* are attached to many of the specimens. The fruit-spike has not yet been recorded from this district. I have not followed Schimper in adopting for this species the name given originally to the fertile spike only.

CALAMITES.

Calamites (?) *Cistii*, Brongniart.

Type—*Calamites Cistii*, Brongt., Hist. Vég. Foss., pl. 20.

<i>Calamites Cistii</i> ,	Brongt., Prod., pl. 38.
? " "	Geinitz, Vers. Steink. Sachs., pl. 13, f. 7.
" <i>tuberculosis</i> , Gutb.,	Vers. Zwick. Schwarzk., pl. 2,
	f. 4, 14; pl. 3b, f. 4.

- Calamites articulatus*, Gutb., Vers. Zwick. Schwarzsk., pl. 3,
Asterophyllites jubata, L. et H., Foss. Flora, pl. 133. [f. 2, 3.
 ?*Calamites dubius*, Artis, Anted. Phyt., pl. 13.
Asterophyllites sp., Lebour, Ill. Foss. Plts., pl. 6.
 Root (?), Lebour, „ pl. 61.

- 16.—*Asterophyllites jubata*, L. et H. TYPE SPECIMEN, F. F., pl. 133.
 Specimen about nine inches long, with very long needle-shaped rootlets, arranged in whorls round the joints, and directed in brush-like mass towards base of stem. Stem indistinct, an inch wide, finely striated, with numerous joints, from an inch to half an inch apart; joints with a coronal appearance from compression.
 Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 87).
- 17.— Apparently the terminal, root, portion of a small stem, with tufts of very long needle-shaped roots, with appearance of closely-placed joints.
 Loc.—Shale above the Low-Main Seam, Felling. (*H. C.* 89).
- 18.— Tuft of long needle-shaped rootlets, apparently belong to the same species.
 Loc.—Shale above the Low-Main Seam, Felling. (*H. C.* 90).
- 19.— Terminal or basal part of stem, with tuft of rootlets. Perhaps young state of *A. jubata*.
 Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.*).

BRANCHLETS AND LEAVES.

- 20.—*Asterophyllites* sp., Lebour, Ill. Foss. Plts., pl. 6. TYPE.
 Impression of tuft of leaves, in a young state of growth.
 Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 84).
- 21.— Single whorl of leaves, more than an inch in length.
 Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 85).
- 22.— Young branches, not fully expanded, on two slabs of shale. It is probably the young undeveloped end of a fine branch.
 Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 78).
- 23.— Root (?), Lebour, Ill. Foss. Plts., pl. 61. TYPE.
 Portion of stem and branches and tufts of leaves, rather indistinct. Stem finely striated. The tufts of leaves similar to the preceding. Hutton's label, "Jarrow."
 Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 119).

Remarks.—*Asterophyllites jubata* seems to have been figured by the authors of the "Fossil Flora" only, and to have been a puzzle to many. "It looks," say these authors, "more like a gigantic Equisetum than anything modern we are acquainted with;" and they rightly consider it to be a stem with "a multitude of extremely fine thread-like processes (*rootlets*), which it is to be presumed were leaves." Schimper, followed by Kidston, place it in the genus *Calamocladus*, a very convenient receptacle for "*rami et ramuli foliosi*" of Calamites and other plants; and both these authors refer *Asterophyllites comosa et jubata*, L. et H., to the *Bruckmannia longifolia et tenuifolia*, Sternberg, = *Asterophyllites longifolia*, Brongt. It would have saved me some labour if I could have adopted this opinion, but with numerous specimens before me I could not; and have been obliged to consider Sternberg's two last-mentioned species as the foliage of *E. gigantea*, and *Aster. jubata*, L. et H., as the basal part of a narrow-jointed, finely striated stem, covered with numerous very long rootlets, which is, I think, the external appearance of specimens with the cortex preserved of *C. (?) Cistii*. At any rate, *Aster. jubata*, L. et H., is a stem and not a branch, and it is very finely striated, and agrees better with *C. Cistii*, Brongt., of which decorticated specimens only are known, than with any other organism found in this Coal-field.

To this species also is referred the branching stem and foliage figured in the "Illustrated Fossil Plants," pl. 61. The impression is very indistinct, but so far as its characters can be made out it agrees with the other examples referred to this species.

Calamites Suckowii, Brongniart.

Type—Calamites Suckowii, Brongt., Hist. Vég. Foss.,
pl. 14, f. 6; pl. 15, f. 1;
pl. 16, f. 1, 2.

STEM.

<i>Calamites Suckowii</i> ,	Schimp., Traité Pal. Vég., pl. 18, f. 1.
" (base of stem)	L. et H., Foss. Flora, pl. 96.
" "	Lesq., Coal Flor. Penn., pl. 1, f. 4.
" <i>nodosus</i> ,	Brongt., Hist. Vég. Foss., pl. 23, f. 2, 3, 4.

- Calamites nodosus*, L. et H., Foss. Flor., pl. 15 (stem).
 " " Sternb., Vers., pl. 17, f. 2.
 " " Lebour, Ill. Foss. Plts., pl. 2.

Calamites Suckowii, var. *decoratus*, Artis.

- Calamites decoratus*, Artis., Anted. Phyt., pl. 24.
 " " Brongt., Hist. Vég. Foss., pl. 14,
 f. 1-5; pl. 15, f. 6.
 " " Brongt., Class. Vég. Foss., pl. 1, f. 2.
 " *cannæformis*, Lebour, Ill. Foss. Plts., pl. 1.

BRANCHES AND BRANCHLETS WITH FOLIAGE.

- Casuarinites equisetiformis*, Schloth., Fl. d. Vorw., t. 1, f. 1;
 t. 2, f. 3.
Bechera grandis, Sternb., Vers. I., pl. 49, f. 1.
 " " L. et H., Foss. Flora, pl. 173.
Asterophyllites sp., Lebour, Ill. Foss. Plts., pl. 4.

FRUCTIFICATION.—FERTILE CONES OR SPIKES.

- Calamites nodosus*, L. et H., Foss. Flora, pl. 15, 16.
Volkmannia polystachia, Sternb., Vers. I., pl. 51, f. 1.
Calamodendron commune, Binney, Pal. Soc., 1868, pl. 4, 5.
 ? *Calamostachya typica*, Schimp., Traité Pal. Vég., pl. 23, f. 1.
Asterophyllites Huttoni, Lebour, Ill. Foss. Plts., pl. 8.

CREEPING RHIZOME OR ROOTSTOCK.

- Calamites approximatus*, L. et H., Foss. Flora, pl. 216.
 " *varians*, in part. } Cf. p. 50 infra.
 " *cruciatus* " }

ROOTS AND ROOTLETS.

- Myriophyllites gracilis*, Artis, in part. }
Hydatia prostrata, Artis, " } Cf. p. 51 infra.
 " *columnaris*, Artis, " }
Pinnularia capillacea, L. et H., " }

STEM.—*Caulis and Phragma.*

- 24.—*Calamites Suckowii*, Brongt. Cast in sandstone of root portion of stem; twelve joints. This specimen is labelled by Mr. Hutton as from the Bensham Seam, Jarrow. If from that locality, it must have been obtained from a stone-drift connected with the Bensham Seam.
 Loc.—Jarrow. (H. C. 1).

- 25.—*Calamites decoratus*, Schloth. Compressed stem with three joints in a light-coloured shale.
Loc.—Waldenburg in Silesia. (*H. C.* 56).
- 26.—*Calamites Suckowii*. Base of stem with roots radiating from it.
Loc.—Shale above the Low-Main Seam, Felling. (*H. C.* 75).
- 27.—Cicatrix of branch and portion of joint.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 33).
- 28.—Phragma of joint, L. et H. TYPE SPECIMEN, F.F., pl. 20.
Phragma well preserved, central part smooth, entire, with radiating furrows round the margin, and indications of the grooving of the stem.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 66).
- 29.—Phragma of joint, L. et H. TYPE SPECIMEN, F.F., pl. 20.
The inner portion destroyed; with an indented ridge round the greater portion of the margin.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 67).
- 30.—Torn stem, L. et H. TYPE SPECIMEN, F.F., pl. 21.
Portion of a stem torn and crushed outwards from the central portion of the specimen.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 68).

Calamites Suckowii, var. *decoratus*, Artis.

STEM.

- 31.—*Calamites decoratus*, Artis. The end of root portion of two small, much rounded stems.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 31).
- 32.—Basal, terminal portion of upright stem, shewing rootlets radiating from it.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 32).
- 33.—Lower portion of stem one inch and a half broad, with the root portion perfect, much rounded, and shewing small circular apertures round the joints for rootlets.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 15).
- 34.—= *C. cannaeformis*, Lebour, Ill. Foss. Plts., pl. 1. TYPE.
Several small stems radiating from the end of a central stem.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 30).
- 35.—Group of six stems, four of which radiate from a centre; one stem shews an appearance of other stems branching from it.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 22).

- 36.—*Calamites decoratus*, Artis. Very interesting specimen, shewing the attachment of a stem about one inch wide to the joint of another rather larger stem, from the joints of which rootlets have sprung.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 18).
- 37.— Lower portion of three stems apparently springing from a rhizome.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 20).
- 38.— Compressed, crushed portion of lower part of stem covered with carbonaceous matter, stem attached to and springing from a rhizome.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 19).
- 39.— Portion of a broad, partly compressed stem with several narrow joints. On one side there is a tapering stem springing from the tubercle of one of the joints; the ribs of the internodes have a corrugated appearance, described by Brongniart, p. 127, pl. 17. The stem to which the other is attached is identical with *C. cruciatus*, Sternb., pl. 49, f. 5, thus shewing this supposed Calamite stem to be really a rhizome or creeping rootstock.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 21).
- 40.— Two branches springing from the point of a broken stem. It seems to shew that when the main stem was damaged the two branches took a leading upright position.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 71).
- 41.—*Calamites* ——— L. et H. TYPE SPECIMEN, F. F., pl. 78. Root portion of three small stems, with branching roots attached to the lower joints of f. A, and unbranched rootlets springing from the apertures that surround the joints of figs. B, C.
Loc.—Newcastle Coal-field. (*H. C.* 28).

BRANCHES AND FOLIAGE.—*Rami et ramuli foliosi*.

- 42.—*Asterophyllites* sp., Lebour, Ill. Foss. Plts., pl. 4. TYPE. Branch and branchlets. Branch with eight prominent joints, the internodes slightly grooved and rising into ridges or knobs at the joint; slight appearance of a whorl of small leaves round the joints; branchlets springing from third, fifth, and seventh joint on the left side. There are small branches with fine branchlets at several of the joints. Branchlets with whorls of fine leaves. Resembles L. et H., figure pl. 173.
Loc.—Low Moor, Yorkshire. (*H. C.* 3).

- 43.—*Bechera grandis*, L. et H. Terminal portion of young branch with foliage resembling figure in Foss. Flora, pl. 173. The ends of the branches appear to be tufts of unexpanded leaves. Loc.—Shale above the High-Main, Gosforth. (H. C. 103).

SMALL BRANCHES WITH FRUCTIFICATION.—*Spicæ fertiles*.

- 44.—*Calamites nodosus*, L. et H. TYPE SPECIMEN, F. F., pl. 15, f. 1. On this slab there is the cast of a Calamite stem with impressions of cicatrices; only one cicatrix at each joint is visible; a small branch, with one whorl of small fertile cones, lies near, but it is very doubtful whether the branch which lies near is attached to the cicatrix of the lower joint and really belongs to the stem. The fertile branch seems to be accidentally lying near the branching part of *Calamites Suckowii*.
Loc.—Shale above the Low-Main Seam, Felling. (H. C. 50).
- 45.— L. et H. TYPE SPECIMEN, F. F., pl. 15, f. 2. Lower part of branch very similar to the branch in f. 1. The base of the branch forms a round mass or knob. The slab is covered with numerous fertile cones, but they are not attached, and do not belong to the branch.
Loc.—Shale above the Low-Main Seam, Felling. (H. C. 51).
- 46.— L. et H. TYPE SPECIMEN, F. F., pl. 16. A large slab covered with five or six branches about seven inches long, with five or six whorls of cones. The lower end of figured branch, rounded, and knob-like, as in pl. 15, f. 2; another branch shews the same peculiarity. There are six whorls of cones now shewn on the branch figured pl. 16—a piece of shale at the top having been removed by some recent investigator: none of the branches shew the terminal end perfect.
Loc.—Shale above the Low-Main Seam, Felling. (H. C. 49).
- 47.— Branch and several long fertile cones, rather indistinct.
Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 52).
- 48.— *Calamite* stem, having the appearance of *C. cannaeformis*, L. et H., on this slab, with long branch and fertile cones.
Loc.—Shale above the Low-Main Seam, Felling. (H. C. 44).
- 49.— On this slab are portions of nine or ten very long cones lying nearly parallel to each other.
Loc.—Shale above the Low-Main Seam, Felling. (H. C. 53).

- 50.—*Calamites nodosus*, L. et H. Very fine specimen, shewing whorls of fertile cones arranged apparently round the joints of two long branches.

Loc.—Shale above the Low-Main Seam, Felling. (*H. C.* 45).

- 51.—— Portion of stem of *Calamites Suckowii*, and branch with fertile cones lying across the stem.

Loc.—Shale above the Low-Main Seam, Felling. (*H. C.* 54).

- 52.—*Asterophyllites Huttoni*, Lebour, Ill. Foss. Plts., pl. 8. TYPE.

Very indistinct and imperfectly preserved specimen, but identically the same as *C. nodosus*, L. et. H. = *Volkmannia polystachia*, Stb.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 123).

Remarks.—The cast in sandstone (No. 24) is the only characteristic stem of *C. Suckowii* found in the Hutton Collection. In the MS. Catalogue all the specimens of the var. *decoratus* were referred to *C. cannaformis*, F. F., pl. 79, but the discovery of the Type specimen of pl. 79 in the Collection of the Natural History Society enables me to determine that the Hutton Type is a true *C. cannaformis*, and not a variety of *C. Suckowii* as formerly supposed.

Among the small stems there are several which serve to illustrate the habit and mode of growth of this species. Nos. 34, 35, shew a number of small stems radiating from a central stem or rootstock; 36, 37, and 38 shew stems of considerable size organically attached to a creeping rootstock or another stem; in the latter case the original stem must have become prostrate and acting functionally as a rootstock. No. 39 is peculiarly interesting, as it shews part of a compressed stem with tubercles at some of the joints, and a large stem budding off from one of the tubercles. The internodes of the compressed stem are narrow, and along the margin of one side of the joints very fine traces of rootlet scars are plainly indicated. No one would hesitate to name this compressed stem *C. cruciatus* or *approximatus* of the F. F., pl. 216, but it is evidently a creeping rootstock. Some of these specimens seem to shew that when a Calamite stem became submerged it began to take the characters and office of a rootstock. No. 40 is another instructive example. At first sight one would suppose that a stem had been broken at

the top and two branches had sprung from the broken part and took the form of stems, but as the parent stem has much finer ribs it is probably the terminal part of a rootstock which has thrown out two stems. No. 41 is figured in the F. F., pl. 78, and shews both roots and rootlets attached to several small stems.

Bechera grandis, F. F., pl. 173 (Nos. 42 and 43) represent small branches and foliage of *C. Suckowii*. *Bechera grandis*, pl. 19, f. 1, of the same author is the stem of *Sphenophyllum cuneifolium*.

The specimens Nos. 44-52 represent the fertile spikes or fructification of *S. Suckowii*. It is difficult to understand why the authors of the F. F. referred this fructification to Schlotheim's uncharacterized *C. nodosus* and not to Sternberg's *Volkmania polystachia*. The little, perhaps accidental, swelling at the base of the branch seems to be the character they have referred to, but the fine display of fertile spikes preserved on these specimens are the most interesting organisms. There can be no doubt that these spikes are identical with Sternberg's *Volkmania polystachia*, and that they are the fructification of *C. Suckowii*.

The large branching stem, F. F., pl. 15, belongs, I think, to *C. Suckowii*, but there is no proof that the fertile branch lying near it was attached to the stem or belonged to it organically. It is possible that Calamites, like some of the recent Equiseta, had fertile stems, but of this at present we have no proof; but the fructification seems to have formed large panicles of branches surrounded with whorls of fertile spikes. The upper part of the stem of *C. Suckowii*, and also the stem of *C. cannaeformis*, has been furnished, when the branching began with two branches opposite to each other on one joint, and the branches arranged crosswise on alternate nodes. This branching part is the *C. ramosus* of authors, and is not a true species, some of the specimens belonging to this and others to the following species.

The *C. cruciatus*, Sternberg, is probably the rootstock of *C. Suckowii*, at least, the specimen (No. 39) referred to above proves that the stem of *C. Suckowii* is organically connected with *C. cruciatus* as its rootstock. It is much to be regretted that the

interesting specimens catalogued above have not all been figured, as they illustrate many points in the life history of *Calamites*.

Calamites cannæformis, Schlotheim.

Type—*Calamites cannæformis*, Schloth., Petrf., pl. 20, f. 1.

STEM.

<i>Calamites cannæformis</i> ,	Brongt., Hist. Vég. Foss., pl. 21, f. 1, 2, 3, 4.
? „ <i>gigas</i> ,	Brongt., Hist. Vég. Foss., pl. 27.
„ „	Schimp., Traité Pal. Vég., pl. 20, f. 2, 4.
„ <i>cannæformis</i> ,	L. et H., Foss. Flora, pl. 79.
„ „	Gutb., Vers. d. Zwick., pl. 2, f. 7.
„ <i>cannæformis</i> ,	Lesq., Coal Flor. Penn., pl. 1, f. 1.
„ <i>pachyderma</i> ,	Brongt., Hist. Vég. Foss., pl. 22.
„ <i>undulatus</i> ,	Sternb., Vers. II., pl. 1, f. 2.
„ <i>cannæformis</i> ,	Schimp., Traité Pal. Vég., pl. 20, f. 1, 3.
„ „	Geinitz, Vers., pl. 14, f. 1, 2, 4.
„ <i>ramosus</i> ,	Lesq., Coal Foss. Penn., pl. 1, f. 2.
„ <i>carinatus</i> ,	Sternb., Vers., pl. 32, f. 1.
„ <i>ramosus</i> ,	Brongt., Hist. Vég. Foss., pl. 17, f. 5, 6.
„ „	Artis, Anted. Phyt., pl. 2.

BRANCHES AND FOLIAGE.

<i>Calamites nodosus</i> ,	Lebour, Ill. Foss. Plts., pl. 3.
<i>Asterophyllites foliosa</i> ,	L. et H., Foss. Flora, pl. 25, f. 1.
? „ <i>galioides</i> ,	L. et H., Foss. Flora, pl. 25, f. 2.
„ <i>radiatus</i> ,	Brongt., Class. Vég. Foss., pl. 2, f. 7.

FRUCTIFICATION.

<i>Asterophyllites tuberculata</i> ,	L. et H., Foss. Flora, pls. 14, 180.
<i>Bruckmannia</i> „	Sternb., Vers., pl. 45, f. 2.
<i>Asterophyllites</i> „	Lebour, Ill. Foss. Plts., pl. 5.
„ <i>foliosa</i> ,	Geinitz, Vers. Steink., pl. 16, f. 4.
? <i>Annularia longifolia</i> ,	Geinitz, Vers. Steink., pl. 18, f. 8.
„ „	Schimp., Traité Pal. Vég., pl. 22, f. 10.
<i>Volkmannia gracilis</i> ,	Sternb., Vers. II., pl. 15, f. 3.
<i>Asterophyllites</i> ,	Lebour, Ill. Foss. Plts., pl. 9.

STEM.—*Caulis*.

- 53.—*Calamites cannaeformis*, Schloth. Very large and fine compressed stem, with four joints; upper margin of internode shews a whorl of long oval apertures for rootlets or branchlets; a thin coating of finely striated carbonaceous matter (*Cortex*) covering the wide ribs. Lower part of a stem, but has not the basal internodes.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 14).
- 54.— Lower portion of small stem, shewing rootlets branching off from joints.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 27).
- 55.— Root portion of a small stem, shewing roots branching off from the joints.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 25).
- 56.— Compressed stem, with two joints; each joint shewing two cicatrices for attachment of branches, opposite to each other, and at right angles to the cicatrices on the adjoining node; round the top margin of each internode is a whorl of apertures for leaflets or branchlets—apertures of an elongated oval shape.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 41).

BRANCHES AND FOLIAGE.

- 57.—*Calamites nodosus*, Lebour, Ill. Foss. Plts., pl. 3. TYPE.
Very large slab, with part of a compressed stem or branch, ten inches long and about an inch broad, with five joints and internodes. A pair of branches is attached to each joint; those on the left side, with very long internodes, send off smaller branches and branchlets, the latter with whorls of *Asterophyllites* leaves (*A. foliosa*, L. et H.) Stem covered with thin layer of carbonaceous matter, and the longitudinal ribs indicated but not strongly marked. Very imperfectly figured in the Illustrations.
Loc.—Shale above the Low-Main Seam, Felling. (*H. C.* 114).
- 58.—*Asterophyllites foliosa*, L. et H. TYPE SPECIMEN, F.F., pl. 25, f. 1.
Long, slender stem, giving off branchlets at the joints; the branchlets surrounded with numerous stellate whorls of slightly flattened lanceolate leaves.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 131).

- 59.—? *Asterophyllites galioides*, L. et H. Branchlet, with numerous stellate whorls; whorls closer, on more approximate joints than in typical *A. foliosa*.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 133).

FERTILE STEMS AND FRUCTIFICATION.—*Spica fertilis*.

- 60.—*Asterophyllites tuberculata*, L. et H. Basal part of fertile cone or spike, six inches long, and with numerous whorls; nearly perfect in outline, but not well preserved.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 613).

- 61.—— Fertile spike, nearly perfect in outline, with twenty-seven whorls of leaves or bracts; seven inches long.

Loc.—Shale above the Low-Main Seam, Felling. (*H. C.* 619).

- 62.—*Asterophyllites tuberculata*, L. et H. TYPE SPECIMEN, F.F., pl. 180. Part of a fertile spike, imperfect at the upper end, perfect at base, and ending in a short curved stem. It has about seventeen compressed joints or whorls of short lanceolate leaves or bracts.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 612).

- 63.—— The slab has on it two labels in Mr. Hutton's own handwriting referring it to *A. tuberculata*, Foss. Flora, pl. 14, but it is not possible to identify this long specimen with either figure given in the above reference. The spike or cone is about seven inches long, nearly perfect at the tapering base, and consists of about thirty-four well-impressed whorls of leaves springing from the depressed joints; imperfect spike, as the top whorls are broken off.

Loc.—Shale above the Low Main, Felling. (*H. C.* 614).

- 64.—— A short cone-like fertile spike, apparently in a young, undeveloped state of growth; furnished with whorls of fine leaves round the joints.

Loc.—Shale above the Low-Main Seam, Felling. (*H. C.* 620).

- 65.—— Fragment of fertile spike of seven whorls; joints very distinct, but vary in width. Leaves of *Lepidophyllum* on same slab.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 611).

- 66.—— ? Apparently the same fructification in a young state, the apical portion perfect, ornamented with fine pointed leaves; basal part imperfect.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 610).

67.—*Asterophyllites* — Lebour, Ill. Foss. Plts., pl. 9. TYPE.

Long, finely-striated stem, with very long internodes, and with two or three joints of the fertile spike at the top. Compare this with the lower part of specimen figured in F. F., pl. 180. Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 607).

68.—*Aster. tuberculata*.

This specimen shews four joints or nodes of the lower or basal part of the fertile spike and an inch of the stem with a joint near the lower part. The stem is about one-sixth of an inch in width at the upper joint, and rapidly increases, till at the first joint of the spike it is half an inch. There is a transverse depression above each joint, and a whorl



No. 1.

of fine tubercles, the points of attachment of leaves or bracts, round each node of the spike. Where the top of the spike is broken off, the upper joint shews part of a whorl of seven or eight fine leaves, one-sixth of an inch in length, each leaf with distinct mid-rib. The whole surface finely striated longitudinally. (Woodcut No. 1).

Loc.—Shale above the Low Main Seam, Felling. (H. C. 616).

69. — Two joints of a slender stem, with portion of cone similar to *A. tuberculata* at the top. It is perhaps the counterpart of 67.

Loc.—Shale above the Low-Main Seam, Felling. (H. C. 607). (43A).

70. — Lebour, Ill. Foss. Plts., pl. 5. TYPE.

A portion or counterpart of the following specimen. Several spikes are attached to a fertile stem; altogether remains of twelve spikes on the slab.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 55).

- 71.—— Part of a long slender stem, with about twenty fertile spikes attached to the joints; joints of the stem numerous, and about half an inch distant. At each joint on one side spikes are attached, some of them more than two inches long, very narrow, and cylindrical. The spikes are surrounded at the joints with whorls of fine, long, pointed leaves or bracts, sessile, or nearly so. This fructification is smaller, but very similar to the *A. tuberculata* of L. et H., but the bracts or leaves are finer, and more sharply pointed.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 48).

- 72.—— Several long, slender, jointed stems on this slab. The longest stem about twelve inches, not tapering, nine or ten joints; surface finely striated longitudinally. This is probably the fertile stem on which the spikes or cones have been arranged in whorls round the joints.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 608).

- 73.—— Part of a long, slender stem, with many rootlets springing from its base. It is probably the fertile stem of this *Calamite*.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 74).

Remarks.—Schlotheim's unsatisfactory figure is always referred to as the Type of this species. The figure is unsatisfactory, as we do not know whether it is of the natural size, and the rootlet or branchlet-scars below the joints are not represented. In *C. cannaeformis* these scars are larger and oval, and not circular as in the foregoing species. The figures given by Geinitz and Schimper, referred to above, are more characteristic than Schlotheim's. I have no doubt that Brongniart's *C. gigas* belongs to this species. There are specimens from this coal-field equal to it in size, which cannot be separated from *C. cannaeformis*. The specimen figured as *C. ramosus* by Artis, and copied by Brongniart and others, represents the branching part of the stem of this species. The two branch scars are large and placed opposite on each node, and crosswise on alternate nodes, as in the preceding species. The *Calamites nodosus* of the Ill. Foss. Plants, pl. 3, is probably the upper portion of a stem of this species.

Asterophyllites foliosa and *galioides* of L. et H. are considered

in this catalogue as the foliage, and the *Asterophyllites tuberculata*, Sternb. and L. et H., as the fructification of *C. cannaformis*. From the length of the stems connected with these cones or spikes it seems very probable that they grow on a fertile stem, at the top of which the spikes were arranged in a panicle.

C. cannaformis is the largest and most striking species found in this coal-field, but none of the finest and best characterized specimens have yet been figured. Though several fine specimens were found in the Hutton Collection, Nos. 53-56, yet the only specimen figured by Lindley and Hutton was a very small, irregular, and badly-preserved specimen from the Collection of Natural History Society, the Type of which, *C. cannaformis*, F. F., pl. 79, is still preserved in the Museum. The octavo size of the Fossil Flora would, probably, prevent the authors from figuring very large specimens.

ROOTSTOCK OR RHIZOMA OF CALAMITES.

Calamites approximatus, Artis.

Type—*Calamites approximatus*, Artis, Ant. Phyt., pl. 4.

Calamites approximatus, Brongt., Hist. Vég. Foss., pl. 15, f. 7, 8.
 „ „ L. et H., Foss. Flora, pl. 77.

74.—*Calamites approximatus*, L. et H. TYPE SPECIMEN, F.F., pl. 77.

Specimen twelve inches long, with numerous narrow joints about half an inch long. The longitudinal ribs very fine and distinct, and sharply defined on the internodes. A thin layer of carbonaceous matter shewn here and there, through which the joints and ribs are not so distinctly indicated. One or two tubercles are visible on some of the joints.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 12).

75.—This specimen also shews a central, narrow-jointed, finely-furrowed axis, with smooth, wide, lateral expansion of the inner surface of the cortex on one side. Very slight indications of the joints of the axis shewn on the cortical covering, which is smooth and finely striated, and not furrowed, as in *Calamite* stems. This fragment is seven inches long, and has seventeen internodes, but no tubercles are visible at the joints.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 8).

Remarks.—Hutton's Type specimens seem referable to Artis' species, the figure of which is copied by Brongniart. This is, without doubt, the creeping rootstock of a Calamite, perhaps of *C. Cistii*, as the fineness of the ribs assimilates it to that species. When divested of the outer cortex it strongly resembles some stems of *C. Cistii*. Some authors would connect this with *C. varians*, Sternberg.

C. cruciatus is, I think, without doubt, the rootstock of *Calamites Suckowii*.

In the Newcastle Museum Collection there is a rootstock nearly eight feet long, with broad ribs under the cortical covering and very fine indications of joints, which I consider the rootstock of *Calamites cannaeformis*. Much confusion prevails with regard to these stemlike rhizoma, and this is increased by many stems of *Calamites* being grouped with them and again by true rhizoma being described as stems.

ROOTS OF CALAMITES.

Myriophyllites gracilis, Artis.

Type—*Myriophyllites gracilis*, Artis, Ant. Phyt., pl. 12.

{ A Fossil aquatic Root, }	{ <i>Myriophyllites gracilis</i> , }	L. et H., Foss. Flora, pl. 110.	
		<i>Pinnularia capillacea</i> ,	pl. 111.
		<i>Hydatia columnaris</i> ,	Artis, Anted. Phyt., pl. 5.
		" <i>prostrata</i> ,	" " pl. 1.
		Root and Rootlets,	Lebour, Ill. Foss. Plts., pl. 10.
		Rootlets	" " pls. 59, 60, 62.

76.—*Myriophyllites gracilis*, L. et H. TYPE SPECIMEN, F.F., pl. 110. Specimen about eighteen inches long; root sending off numerous rootlets in all directions. The figure in Foss. Flora much reduced in size, and the rootlets too large in proportion to the main root. *Pinnularia capillacea*, L. et H., pl. 111., is, no doubt, identical with this species; and both are most probably the roots of *Calamites*.

Loc.—Shale above the Low-Main Seam, Felling. (*H.C.* 598).

77.—Portion of root, with numerous punctures on its surface, sending off rootlets regularly and nearly at right angles: the roots are covered with numerous smaller rootlets or fibres.

Loc.—Shale above the Bensham Seam, Jarow. (*H.C.* 596).

- 78.—(Root and Rootlets, Lebour, Ill. Foss. Plts., pl. 10). TYPE.
Part of a root, sending off numerous rootlets on one side.
Portion of *Cordaites* leaf on same slab.
Loc.—Shale above the Low-Main Seam, Felling. (H. C. 527).

Remarks.—Under this heading are placed the roots with small rootlets that are now acknowledged by most writers on Fossil Botany to belong to Calamites, but the difficulty of assigning them to any one species of Calamite is so great that no attempt can be made to correlate them with any one species of Calamite.

PLANTÆ INCERTÆ SEDIS.

ANNULARIA, Sternberg.

Annularia stellata, Schlotheim sp.

Type—*Casuarinites stellatus*, Schloth., Flor. Vor., pl. 1, f. 4.

Asterophyllites equisetiformis, L. et H., Foss. Flora, pl. 124.
Annularia fertilis, Sternb., Vers. I., pl. 51, f. 2.
,, *longifolia*, Lesqx., Coal Flora Penns., pl. 2, f. 2.
,, *spinulosa*, Sternb., Vers. I., pl. 19, f. 4.

- 79.—*Asterophyllites equisetiformis*, L. et H. Presented to Mr. Hutton by Mr. Thomas Sopwith, not earlier, as far as I can ascertain, than 1837. It is a fine impression, on a slab of fine shale, of two branchlets, each about six inches in length; one has seven whorls of leaves, and the other four whorls. It is not a local specimen, but probably from one of our Western Coal-fields.
Loc.—Unknown. (H. C. 100).

Remarks.—This foliage has not been found in the Newcastle Coal-field. It has been stated that *Asterophyllites* (*Stachannularia*) *tuberculata* has been found organically connected with this foliage. If this were true, it would be strange that the fructification should occur not rarely in several localities in this coal-field and the foliage be entirely unobserved. In this catalogue *Asterophyllites tuberculata* is considered the fructification of a Calamite, and the whorls of leaves round the joints of the fertile spike strongly support this opinion.

SPHENOPHYLLUM, Brongniart.

Sphenophyllum cuneifolium, Sternberg sp.

Type—*Rotularia cuneifolia*, Sternb., Vers. I., pl. 26,
f. 4 *a*, *b*.

Sphenophyllum erosum, L. et H., Foss. Flora, pl. 13 (foliage).

Bechera grandis, „ „ pl. 19, f. 1 (stem).

FOLIAGE.

80.—*Sphenophyllum erosum*, L. et H. TYPE SPECIMEN, F. F., pl. 13.

The stem and leaves of this specimen are very indistinct and difficult to see, but there is enough shewn to identify it with the figure in the Fossil Flora, independently of the Hutton label.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 126).

81.—Small portion of stem, with distinct fragments of leaves.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 129).

STEM.

82.—*Bechera grandis*, L. et H. TYPE SPECIMEN, F. F., pl. 19, f. 1.

Several stems on the slab crossing each other; the broadest stem, with five joints, one inch and a quarter wide. The smaller stem, apparently proceeding from one of the joints, as figured in Foss. Flora, does not really belong to it, but appears to do so from mere accident of juxtaposition. Indistinct appearance of leaves round the joints, suture of the joint deeply impressed; a few distinct longitudinal grooves on the internodes; a slightly denticulated appearance at the base of each internode; the joints or nodes rather wider and more prominent than the other portion of the stem. Slight appearance like *Sphenophyllum* leaves at some of the joints.

Loc.—Shale above the Low-Main Seam, Felling. (*H. C.* 110).

83.—Small portion of stem with several prominent joints, but without branchlets or leaves.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 108).

Remarks.—The Type-specimen of *Sphenophyllum erosum*, L. et H., F. F., pl. 13, is very indistinct, but enough character is distinguishable to enable one to refer it to Sternberg's species.

Under the name of *Bechera grandis*, Lindley and Hutton have figured two very different fossils. The one figured in F. F., pl. 19, f. 1, is undoubtedly a portion of the stem of a *Sphenophyllum*,

as some of the branches on the slab have fragments of leaves attached to the joints. The broad ribs of the internodes and the thickened prominent joints also shew that it is not the stem or branch of a Calamite. Hutton's label, "Felling."

Bechera grandis, L. et H., pl. 173, is a branchlet and foliage of *C. Suckowii*. Hutton's label, "Felling, L.M."

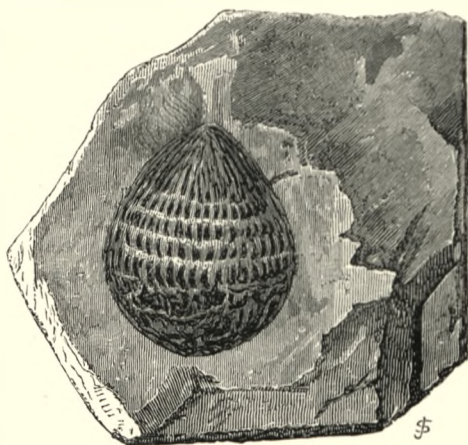
Sphenophyllum Saxifragæfolium, Sternberg.

Type—*Rotularia saxifragæfolia*, Sternb., Vers. I., pl. 55, f. 4 (stem and leaves).

Rotularia polyphylla, Sternb., Vers. I., pl. 50, f. 4.

Sphenophyllum saxifragæfolium, Zeill., Vég. Foss. Terr. Houil., pl. 161, f. 3-6.

Bowmanites Cambrensis, Binney, Obs. on the Struct. Foss. Plants, tab. 12 (fertile spike).



No. 2.

- 84.—*Bowmanites Cambrensis*, Binney (Woodcut No. 2). A small strobilus or cone-shaped fructification, nearly ovate in outline, covered with a thin layer of carbonaceous matter; the surface ornamented with rows nearly parallel of elongated raised ridges and intermediate depressed grooves, from the base of which acicular foliar bracts are shewn on the margin to proceed. The cone terminates at the top in a tuft of fine acicular leaves or bracts. It seems to be identical with the cone figured by Binney as *Bowmanites*.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. —).

85.——— Counterpart of the preceding specimen.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. —).

Remarks.—The little strobilus-like spike referred to this species seems to me to be identical with Binney's *Bowmanites Cambrensis*, and I am induced to refer it to this species of *Sphenophyllum* from the evidence afforded by a second specimen, in which the strobilus or spike is attached to a slender, jointed stem, with all the characters of the stem and foliage of *Sphenophyllum Saxifragæfolium*.

ORDER. FILICACEÆ.

FILICES INCERTÆ SEDIS.

SCHIZOPTERIS, Brongniart.

(*RHACOPHYLLUM*, Schimper).

Schizopteris anomala, Brongniart.

Type—Schizopteris anomala, Brongt., Hist. Végét. Foss.,
pl. 135.

Schizopteris anomala, Geinitz, Vers. Steink. Sachs., pl. 26, f. 2.

86.—Schizopteris anomala, Brongt.

Specimen very distinctly impressed; numerous tapering bifurcating stems with stag's horn appearance.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 303).

Remarks.—There were in the original Hutton Collection twelve specimens which were referred by me to the genus *Schizopteris*, Brongt. They were among a miscellaneous unsorted lot of fossil plants labelled "undetermined." Of these six slabs were selected for this Museum, one of which is figured in the "Illustrations of Fossil Plants," from Hutton's drawings, as quoted below.

The genus *Schizopteris* formed by Brongniart, for the only species he knew is just as valid at the present day as when he wrote the Prodomus, and placed *Schizopteris anomala* among the ferns. There seems no necessity to adopt Schimper's *Rhacophyllum* and suppress Brongniart's name, unless it is done for the sake of novelty and love of change and confusion.

The specimen which is here referred to *Schiz. anomala* differs somewhat in general form from the specimens figured by Brongniart, and resembles in appearance the Jurassic *Fucoides*? *arcuata*, L. et H., but the branchings have all the characters of *S. anomala*. Until the fructification of these peculiar plants is ascertained, it will remain uncertain to what order or family they really belong, and to move them from one generic name to another can serve no good purpose.

Schizopteris crispa, Gutbier sp.

Type—*Fucoides crispus*, Gutb., Vers. Zwick. Schwarzk.,
pl. 1, f. 11; pl. 6, f. 18.

<i>Fucoides linearis</i> ,	Gutb.,	Vers. Zwick., Schwarzk.,
		pl. 1, f. 10, 12.
? <i>Schizopteris lactuca</i> ,	Geinitz,	Vers. Steinkf. Sachs.,
		pl. 26, f. 1.
? <i>Rhacophyllum</i> ,,	Schimp.,	Traité, pl. 46, f. 1; pl. 47,
		f. 1.
? ,, <i>flabellatum</i> ,	Schimp.,	Traité, pl. 48, f. 8.
,, (?) ———	Lebour,	Ill. Foss. Plts., pl. 42, 43.

87.—*Schizopteris crispa*, Gutb. (*Rhacophyllum*?). Lebour, Ill. Foss. Plts., pls. 42, 43). TYPE.

The ramifications or branchings are long, narrow, and much curved, the divisions or branches going off in groups to the right and left from the flattened broad, basal part of the specimen; finely striated longitudinally.

Loc.—Shale above the Bensham Seam. (H. C. 296).

88. ——— Specimen very much branched or split up into ribbon-shaped branchings; the branchings curved, narrow, and bifurcating.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 298).

89. —? *Schizopteris crispa*, Gutb.

Very large, broad-spreading specimen; the basal part flattened and much spread out in Liverwort fashion, and splitting up into narrow bifurcating branches above.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 305, 306, 658).

Remarks.—Gutbier's figures referred to in the above references, and the plates 42, 43, in the "Illustrations of Fossil Plants,"

will give a good idea of this singular plant, which there cannot be a doubt is closely allied to the foregoing species of Brongniart. Plate 42 of the "Illustrations" is only an enlarged drawing of plate 43. No. 89 is a very large broad-spreading leaf or frond, which appears to be the basal part of this plant. The upper margin, which does not appear to be perfect, shews a tendency to form long filamentary processes or elongations, as in the figures quoted. This plant forcibly reminds one of the Liverworts in its mode of growth and general appearance.

The Type-specimen of *Schizopteris adnascens*, L. et H., Fossil Flora, pls. 100, 101, from the Whitehaven Coal-field, is in the Collection of the Natural History Society, and will be specially mentioned in the second part of these Contributions to the Coal-measure Flora.

‡ RHODEA, Presl.

Rhodea Kirkbyi, n. s.

Type—Algæ or Rootlets, Binney et Kirkby, Q. J. Geol. Soc. Lond., Aug., 1882, Vol. 38, p. 251, pl. 6.

90.—*Bifurcating stem.*

A small portion of stem bifurcating twice, but imperfect at the top; stem very compressed and smooth.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* —).

91.—— Several fragments of bifurcating stems similar to the last (No. 90), and probably the same species.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* —).

Remarks.—I have compared the two specimens Nos. 90, 91, with the specimens figured by Mr. J. W. Kirkby in the Quarterly Journal of the Geological Society, London, and I find no point of difference. No one can dispute that they bear a strong resemblance to what Stur, in the Culm Flora, Heft I., considers to be the leaves of *Archæocalamites radiatus*, especially the fig. 6 of taf. 4, but this may and probably is only resemblance, and they also have a much stronger resemblance to Stur's *Rhodea gigantea*, Culm Flora, Heft I., taf. 11, f. 2. The presence of a small vessel traversing the larger part of the stem, and bifurcating

with it, seems to preclude the affinity of this organism with the Algæ, and brings it nearer to the genus in which it is provisionally placed. As I have no doubt of the identity of the Jarrow with the Methil, Fife, specimens, I append Mr. Kirkby's name to the species, and trust that it may not be an undesired synonym.

TRIBE. SPHENOPTERIDÆ.

SPHENOPTERIS, Brongniart.

(? CALYMMOTHECA, Stur).

Sphenopteris bifida, Lindley et Hutton.

Type—*Sphenopteris* ? *bifida*, L. et H., Foss. Flora, pl. 53.

Sphenopteris bifida, Hibbert, Trans. Roy. Soc. Edinb., XIII.,
pl. 6, f. 1, 2.

" " H. Miller, Test. of the Rocks, p. 466, f. 129.

Todea Lipoldi, Stur, Culm Flora, Heft I., pl. 11, f. 8.

Rhodea Stachei, Stur, Culm Flora, II., pl. 16, f. 7.

92.—*Sphenopteris bifida*, L. et H. TYPE SPECIMEN, F. F., pl. 53.

Specimen on slab of freshwater limestone; frond imperfect, about three inches long; lateral pinnae or branches nearly opposite each other, with secondary pinnae, bifurcating from two to five times into long narrow pinnules.

Loc.—Calciferous sandstone series, Burdie House. (II. C. 189).

Remarks.—This Type-specimen, from Burdie House limestone, communicated to the authors of the "Fossil Flora" by Mr. Witham, is very badly figured in their Plate 53, so that foreign authors, as Stur, may be pardoned if they have failed in grasping the characters of this species, and added new synonyms to an already overburdened list. There are remains of three fronds, or pinnae it may be, on this slab; the upper one on the left being on a different plane, and not connected with the main figure. The pinnules are also broader than in Hutton's figure and not so wiry-looking, more regular and symmetrical. Hugh Miller's figure quoted above, though somewhat smaller, gives a better idea of the general appearance of this species. There can be no doubt that Stur's two species quoted above are representations of portions of the same species. I incline also to the opinion

that the *Sphen. Geikiei* of Kidston, Trans. Roy. Soc. Edinb., Vol. 30, pl. 30, f. 5, is only a young, succulent, growing and not fully developed frond of the same species. It seems probable that the fragments figured by Hutton and others are only small portions of a very large frond.

Sphenopteris crassa, Lindley et Hutton.

Type—*Sphenopteris crassa*, L. et H., Foss. Flora, pl. 160.

<i>Pecopteris marginata</i> ,	L. et H., Foss. Flora, pl. 213.
<i>Sphenopteris cuneolata</i> ,	L. et H., Foss. Flora, pl. 214.
„ <i>linearis</i> ,	L. et H., Foss. Flora, pl. 230.
<i>Eremopteris Macconochii</i> ,	Kidston, Trans. Roy. Soc. Edinb., Vol. XXX., pl. 32, f. 3, 3A.
<i>Sphenopteris Kiowitzensis</i> , Stur,	Culm Flora, Bd. I., taf. 6, f. 8.
„ <i>Falkenhaini</i> , Stur,	Culm Flora, Bd. I., taf. 6, f. 1.
<i>Archæopteris lyra</i> ,	Stur, Culm Flora, Bd. I., taf. 5, f. 8.
„ <i>Tschermaki</i> , Stur,	Culm Flora, Bd. I., taf. 12, f. 1; taf. 16, f. 1.
„ <i>Dawsoni</i> , Stur,	Culm Flora, Bd. I., taf. 12, f. 2, 3, 4.

93.—*Sphenopteris linearis*, L. et H. TYPE SPECIMEN, pl. 230.

Specimen from the fresh-water limestone of Burdie House. Leaves wedge-shaped, with fine radiating nervation, and the pinnules closer and not so much lobed as in Hutton's figure, which very imperfectly represents the original. The specimen is in a dun-coloured, impure limestone.

Loc.—Calcareous sandstone, Burdie House, near Edinburgh. (*H. C.* 175).

Remarks.—While there can be no doubt that the specimen No. 93 mentioned above is the Type of Hutton's plate 230, yet the figure is so unlike the original that no one would at first sight think it was drawn from the above specimen. The draughtsman has certainly given a much too free scope to his imagination and neglected the original. The impression is very imperfect, most of the pinnules on the lower side being broken off; the pinnules are flattened and wedge-shaped, and not lobed as in Hutton's figure. The specimen itself is a small portion of a very large

pinnæ of perhaps a large frond, which was bifurcated after the manner of other ferns from the Calciferous Sandstone or Culm formation. There can be no doubt about the identity of this with the *Sphen. crassa* of the same authors, as has already been pointed out by Mr. Kidston, but *S. crassa* represents a lower part of the frond with rachial pinnæ, and the same part of the same species is also given by Stur under the specific names *Archæopteris lyra*, in which the rachial pinnæ are a little more developed, and *Sph. Kiowitzensis*, *Sph. Falkenhaini*, *Archæopteris Tschermaki*, and *Archæopteris Dawsoni*, are only portions of different parts of the frond of the same species. *Eremopteris Macconochii*, of Kidston, from the Eskdale beds, is undoubtedly the same; and here also must be ranged, notwithstanding the localities given, *Pecopteris marginata* and *Sphenopteris cuneolata* of Lindley and Hutton. I am quite aware that it is stated in the "Fossil Flora" that the Type of *Sph. cuneolata* was from the "Newcastle Coal-field," and that *Pecopteris marginata* is "a fern of frequent occurrence in the Coal of the North of England," but no one can shew a specimen of either of the last two species that has been obtained from the Northumberland and Durham Coal-field. Both these impressions, in fact, belong to that striking group of ferns which so far has been found only in and are peculiar to the Calciferous Sandstone and Culm or Lower Carboniferous.

[*Sphenopteris affinis*, Lindley et Hutton.

Type—*Sphenopteris affinis*, L. et H., Foss. Flora, pl. 45.

Sphenopteris affinis, Hibbert, Trans. Roy. Soc. Edin., Vol. 13,
pl. 6, f. 4; pl. 5 bis.

„ *linearis*, Brongt., Hist. Vég. Foss., pl. 54, f. 1.

„ „ Hibbert, Trans. Roy. Soc. Edin., Vol. 13,
pl. 6, f. 3.

? *Adiantides Machanekei*, Stur, Culm Flora, Heft I., taf. 17,
f. 5, 6.

Remarks.—There were several specimens of this species in the Hutton Collection, but none of them were selected for the Natural History Society. Hutton's Type-specimen, communicated by Mr. Witham, is probably in the Witham Collection at

Lartington. Though Sternberg's Type figure is undecipherable, yet no one can doubt that the figure given by Brongniart is identically the same species as *S. affinis*, L. et H., and is probably from the Calciferous Sandstone series of Edinburgh.]

(*EREMOPTERIS*, Schimper).

Sphenopteris Artemisiaefolia, Sternberg.

Type—*Sphenopteris Artemisiaefolia*, Sternb., Vers. I.,
pl. 55, f. 1.

Sphenopteris Artemisiaefolia, Brongt., Hist. Végét. Foss.,
pl. 46, 47.
" " Lebour, Ill. Foss. Plts., pl. 33.
" sp. ———, " " pls. 28,
34, 35, 36.
" *stricta*, Sternb., Vers. I., pl. 56, f. 3.
" " Brongt., Hist. Vég. Foss., pl. 48,
f. 2.

Eremopteris Artemisiaefolia, Schimp., Traité, pl. 30, f. 4.

Variety :—

Sphenopteris Crithmifolia, L. et H., Foss. Flora, pl. 46.

SPORE-CASE, OR *Sporangium*.

Cardiocarpon acutum, L. et H., Foss. Flora, pl. 76.

94.—*Sphenopteris Artemisiaefolia*. (*Sphenopteris* sp. Lebour, Ill. Foss.
Plts., pl. 36). TYPE.

Terminal portion of a frond, in a fine state of preservation, shews the shape and nervation of pinnules distinctly. The pinnules branch off on each side and slightly bifurcate; leaves or pinnules taper gradually to a point, are not so inversely wedge-shaped as in var. *Crithmifolia*, nor so regularly split up; the nervations of the leaves are also more regular.

Loc.—Shale above the High-Main Seam, Fawdon. (*H.C.* 631).

95.— (*Sphenopteris* sp. Lebour, Ill. Foss. Plts., pl. 28). TYPE.

Frond, with very straight flattened stem, shewing the branches sometimes nearly opposite, at other parts, alternate; pinnules regularly fissured on each side, and the impressions of the nerves distinct.

Loc.—Shale above the High-Main Seam, Gosforth? (*H.C.* 192).

Var. — *stricta*.96. — var. *stricta*, Sternb.

Single frond. The leaves are much more rounded in this form and more rigid than in the typical species.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 182).

97. — Three or four flattened, broad-stemmed fronds, looking like a mis-shapen growth of *S. Artemisiaefolia*.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 183).

Var. — *Crithmifolia*.98.—*Sphenopteris Crithmifolia*, L. et H.

This specimen shews four or five inches of the rhizome, with a terminal tuft of basal part of fronds. Though somewhat indistinct it shews the attachment of the fronds to the rhizome.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 196).

99. — Portion of rhizome, shewing the attachment of the lower portion of a number of fronds to the stem.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* —).

100. — Frond, about nine inches long; not perfect at base; about three inches broad, well spread out, and shewing the shape, branching, and arrangement of the leaves and nerves of this variety well. It is very like in general form to pl. 46, Foss. Flora.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 194).

101. — A narrow, compressed stem, with branches bifurcating repeatedly into many smaller branchlets. What seems to be portions of the same specimen on two slabs.

Loc.—Shale above the High-Main Seam, Gosforth. (*H. C.* 307).

Remarks.—The drawing of this fine, characteristic local fern, first figured by Sternberg, was sent to him by Dr. Buckland; and the specimen of his *S. stricta* was said to be from Jarrow. Brongniart received the drawing of his large figure, Plate 66, from Dr. Taylor, of Sunderland, of whom further mention will be presently made. The drawing of Plate 67, f. 1, was from Rev. Dr. Buckland, and this author states that he had seen only one specimen of this remarkable species (Plate 67, f. 2). Observe on two of Brongniart's figures the spore-cases, or *sporangia*, *Cardiocarpon acutum*, L. et H., of this fern, as they differ slightly in

shape from those found associated with the var. *Crithmifolia* and from Hutton's figure.

The typical form of this fern is not figured in the Fossil Flora, but the specimen figured on Plate 33 of the Illustrations of Fossil Plants is still in the collection, and was probably presented to Hutton by Mr. Thomas Embleton, who made the drawing of this and several other examples of the same species, which are figured in the same work, Plates 28, 34, 35, 36. Mr. Embleton's specimens were obtained from Fawdon Colliery, where this fine species seems to have been plentiful and well preserved in the shale above the High-Main Coal Seam, and also at Gosforth. I have not seen a single specimen of this type form from any other local colliery. The drawings sent to Sternberg and Brongniart by the Rev. Dr. Buckland and by Dr. Taylor were probably made from Fawdon specimens. The original of Brongniart's figure of *S. stricta* was obtained from the neighbourhood of Glasgow, where the typical form also occurs.

The variety *S. Crithmifolia* occurs in the shale above the Bensham Coal Seam rather plentifully at Jarrow. The variety *stricta* occurs with it and with the typical form, though, as the latter occurs in a higher part of the coal series, it may be questioned whether the term typical should be applied to it and not to the older form *S. Crithmifolia*. This species seems to be limited to the North of England and East and West of Scotland. There seems to be no well-authenticated foreign locality for it, as I do not think Boulay's figure, quoted by Kidston, belongs to this fine characteristic British species.

In placing Lindley and Hutton's *Cardiocarpon acutum* here as the spore-case of this species, I am quite aware that it is differently assigned by other authors, but in this Coal-field it is always associated with this fern or alone, and occurs only where this fern does, and, as far as I am aware, in no other part of our district. I think it is often confounded with *C. apiculatum*, which is very rare here, and which belongs to a very different group of plants. *C. acutum* has no kernel as the latter has and is of quite a different shape and always flattened.

(URNATOPTERIS, Kidston.)

Sphenopteris tenella, Brongniart.

Type—*Sphenopteris tenella*, Brongt., Hist. Vég. Foss.,
pl. 49, f. 1.

Sphenopteris delicatula, Brongt., Hist. Vég. Foss., pl. 58, f. 4.
 „ *multifida*, L. et H., Foss. Flora, pl. 123.
 „ *linearis*, Lebour, Ill. Foss. Plts., pl. 32.
 „ sp.— Lebour, Ill. Foss. Plts., pl. 39.
Urnatopteris tenella, Kidston, Q. J. G. S., Vol. 40., p. 594,
pl. 25.

Eusphenopteris „ Kidston, Ann. and Mag. Nat. Hist.,
5th ser., Vol. 10, pl. 1, f. 1-6.
 „ „ Kidston, Roy. Phys. Soc. Ed., Vol. 7,
pl. 1, f. 1, 2 (excl. f. 3, 4, 5, 6).

(ZEILLERIA, Kidston.)

Variety.

Sphenopteris delicatula, Sternb., Vers. I., pl. 26, f. 5.
 „ *meisolia*, Sternb., Vers. II., pl. 20, f. 5.
Zeilleria delicatula, Kidston, Q. J. G. S., Vol. 40, pl. 25.

102.—*Sphenopteris multifida*, L. et H. (*Sph. linearis*, Stb. Lebour,
Ill. Foss. Plts., pl. 32). TYPE.

Impression of portion of small frond.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 623).

103. ——— Two specimens on one tablet, one slab a single pinna
shewing the terminal portion; on the other slab two or three
fronds shewing the branching and nervation distinctly.
Loc.—Shale above the High-Main Seam, Gosforth. (H. C.
625, 626).

104.—*Sphenopteris delicatula*, Sternb.

Small frond with alternating branches. This is probably the
fructification of one of the small ferns, *S. tenella*, Bt.

Loc.—Shale above the High-Main Seam, Gosforth. (H. C. 171).

Remarks.—It should always be borne in mind that Sternberg,
Brongniart, Hutton, and others often figured and described
merely small fragments of fossil plants; and the same authors
often depended on drawings made by others, and which we may
presume to say were not always strictly accurate, at least we
may be allowed to think this with respect to the drawings of
this species which were sent to Brongniart and to Hutton, and

so no rigid comparison can be instituted with these Type figures, but I have no doubt that the figures quoted above refer to the same species of fern. Brongniart tells us that the drawing of his figure was sent to him by the widow of the late Dr. Taylor, of Durham (county). Mr. James W. Kirkby informed me that he had ascertained that "Brough Taylor was a doctor in Sunderland, just rising into a good practice when he died. He collected Magnesian-Limestone and Coal fossils. After his death his widow sold the former to Sir Walter Trevelyan and the Coal fossils to the British Museum. The Rev. G. C. Abbs, of Cleadon, and Dr. Taylor had an intention of publishing on the Coal Plants, and they collected with this view. They also made drawings, of which Mr. Surtees (the historian of Co. Durham) got many." Mr. Kidston states that the Type-specimen of Taylor's drawing is still in the British Museum Collection.

No. 104 is a small portion of the fertile frond, I think, of this small fern. It is identical with Kidston's figure Q. J. G. S., Vol. 40, pl. 25, f. 2, quoted above, and which, he thinks, belongs to *Sph. delicatula*, Sternb., and enables him to separate this species generically from *Sphen. tenella*, Brongt., but it will be found eventually that the opinion expressed in the above list of synonyms is correct, and that we must regard these slightly different forms as varieties, or occasioned by difference of locality and physical conditions, and not specific. The figures of the fructification of *Sphen. tenella*, Brongt., given by Mr. Kidston in Vol. 7, pl. 1, f. 3, 4, Roy. Phys. Soc. Edinb., I regard with extreme doubt, and surprise at the minuteness of the details, which can scarcely be defined more accurately even in recent ferns; but I have good proof that the figure quoted from the Journal of the Geological Society represents the fertile frond of *Sphen. tenella*. Compare Mr. Kidston's figures of the spore-cases of this little Fern with figures of the seed-leaves of seedling Firs.

Lindley and Hutton's figure was from a Lancashire specimen, but in the Hutton Collection were several good specimens, one of which is figured in the Illustrations quoted above, and another larger figure, pl. 39 of the same work, was probably from a local specimen.

Sphenopteris obovata, Lindley et Hutton.

Type—*Sphenopteris obovata*, L. et H., Foss. Flora, pl. 109
(Jan., 1834).

- ? *Sphenopteris Hibberti*, L. et H., Foss. Flora, pl. 177.
 " *excelsa*, L. et H., Foss. Flora, pl. 212 (1837)
 " *Hoeninghausi*, L. et H. (non Brongt.), Foss. Flora,
 pl. 204.
 " *decomposita*, Kidston, Brit. Mus. Cat., p. 76.
 " " Kidston, Trans. Roy. Soc. Edinb.,
 Vol. 30, pl. 32, f. 1, 4, 5.
 ? " *Hoeninghausi*, Kidston, Trans. Roy. Soc. Edinb.,
 Vol. 30, p. 538.
 " *Haueri*, Stur, Culm Flora, Heft I., taf. 7,
 f. 3—6.
 " *Ettinghauseni*, Stur, Culm Flora, Heft I., taf. 6,
 f. 9; pl. 7, f. 1, 2.
 " *Hibberti*, Kidston, Trs. Roy. Soc. Ed., Vol. 30,
 pl. 30, f. 1.
 " *excelsa*, Kidston, Trs. Roy. Soc. Ed., Vol. 30,
 pl. 30, f. 2.

105.—*Sphenopteris obovata*, L. et H. TYPE SPECIMEN, F. F., pl. 109.
 Stated by Hutton, in Foss. Flora, ii., p. 109, to be from the
 Newcastle Coal-field, although it was drawn from a specimen
 sent to him by the late T. Allan, Esq., Lauriston Castle, Edin-
 burgh. It is, in my opinion, not from the Newcastle Coal-field,
 but from the Calciferous sandstone series of the neighbourhood
 of Edinburgh, and is identically the same species as *Sphenopteris*
excelsa and *Sphenopteris Hoeninghausi* of the same authors,
 which have also, though stated otherwise in Foss. Flora, been
 obtained from the same locality. The specimen exhibits frag-
 ments of three or four pinnæ, distinctly preserved.
 Loc.—Calciferous sandstone, near Edinburgh. (H. C. 197).

106.—*Sphenopteris Hoeninghausi*, L. et H. (non Brongt.) TYPE SPECI-
 MEN, pl. 204.

Stated by Hutton to be from Low-Main Seam, Felling Colliery,
 but it is, in my opinion, like the preceding species, from the
 Calciferous sandstone series in the neighbourhood of Edin-
 burgh. It differs entirely from Brongniart's species, specimens
 of which were sent to him from this district by James Losh,
 Esq., Recorder of Newcastle. The specimen is part of a
 large regularly grown frond, with numerous pinnæ, and the
 pinnules much lobed and the terminal pinnules obovate. I
 cannot see how this specimen can be regarded as distinct from
 the preceding, or from the *Sphenopteris excelsa*, L. et H.
 Loc.—Calciferous sandstone, near Edinburgh. (H. C. 174).

Remarks.—The Type of Lindley and Hutton's *Sphen. obovata*, which is fortunately still in the collection, is stated to be from the Newcastle Coal-field, and to have been communicated to the authors of the "Fossil Flora" by T. Allan, Esq., Lauriston Castle, Edinburgh. Their drawing was published in Jan., 1834.

Sphenopteris excelsa, L. et H., Foss. Flora, pl. 212, was published in 1837, and it is stated to be also from the Newcastle Coal-field. The Type-specimen of this was not found in the Hutton Collection, but there was a specimen which was not difficult to identify as the same species.

From the first examination of these it was clear there was some error as to the locality, as they were on shale of a very different character to any found in this district, but they were like each other as to the matrix. Comparing them with some specimens from the neighbourhood of Edinburgh, it was not difficult to arrive at the conclusion that they had been sent to Newcastle by the gentleman mentioned in the text. This I pointed out to Mr. Kidston on his first visit to inspect the Hutton Collection. Now it happens that the Lindley-Hutton Type of *Sphen. Hoeninghausi* is on identically the same kind of shale, and without doubt from the same locality and donor, and it is not at all related to *Sphen. Hoeninghausi*, Brongt., but is identically the same as *Sphen. obovata*, pl. 109, of the "Fossil Flora," where it is erroneously stated that "our specimen is from Felling Colliery." How these mistakes originated (for they are serious mistakes, as this plant is peculiar to the Calcareous Sandstone) I do not know. Others also who have examined this specimen carefully have apparently failed to detect that it was a Calcareous Sandstone specimen from the neighbourhood of Edinburgh.

Lindley and Hutton described this handsome fern, *Sphenopteris obovata*, from a fragment, first in 1834. Then Göppert in his usual manner alters their name to *Adiantites microphyllus*. Then Lindley and Hutton, unconscious that they had described the same fern before, gave it two new names, *Sphenopteris Hoeninghausi* and *S. excelsa*, plates 204 and 212 respectively. The name first given in the Fossil Flora, *Sphen. obovata*, is decidedly the most characteristic, and should be retained for the species. At

a much later date Stur, in the Culm Flora, has added to these synonyms, for who can look at Stur's figures quoted above of *S. Haueri* and *S. Ettinghauseni* and doubt their identity with *S. obovata*. And lastly Mr. Kidston, in the Transactions of the Royal Society of Edinburgh, has furnished another synonym, *S. decomposita*, to the already extensive list.

If we accept Mr. Kidston's figure Trans. Roy. Soc. Edinburgh, Vol. 30, pl. 30, f. 2, as a genuine example of *S. excelsa*, then must we also place here Kidston's figure of *Sphen. Hibberti*, var. L. et H., f. 2, of the same work.

Sphenopteris Hibberti, L. et H., pl. 177, has yet to be worked out and established. At present it is a very doubtful species, and seems to me to be a varietal form of *S. obovata* badly drawn in the figure given by Hutton. The Type-specimen if found would no doubt assist, and surely some eager collector residing near the locality given for Hutton's specimen could by collecting at the same place do much to solve this doubt.

(*DIPLOTHMEMA*, Stur).

Sphenopteris furcata, Brongniart.

Type—*Sphenopteris furcata*, Brongt., Hist. Vég. Foss., pl. 49, f. 4, 5.

Sphenopteris furcata, L. et H., Foss. Flora, pl. 181.

„ *dissecta*, Brongt., Hist. Vég. Foss., pl. 49, f. 2, 3.

„ *trichomanoides*, Brongt., Hist. Vég. Foss., pl. 48, f. 3.

„ *laxa*, Sternb., Vers. I., pl. 31, f. 3.

„ sp. — Lebour., Ill. Foss. Plts., pl. 41.

„ *alata*, Brongt., Hist. Vég. Foss., pl. 48, f. 4.

„ „ Gutb., Vers. Zwick. Schwarzk., pl. 5, f. 16, 17; pl. 11, f. 1.

„ *geniculata*, Kidston, Trans. Roy. Soc. Edinb., Vol. 33, pl. 21, f. 1.

Hymenophyllites Grandini, Goepp., Syst. Fil. Foss., pl. 15, f. 12.

Diplothmema furcatum, Zeill., Vég. Foss. Terr. Houill., pl. 162, f. 3.

107.—*Sphenopteris furcata*, L. et H. TYPE SPECIMEN, F. F., pl. 181.

Fine terminal part of frond four to five inches long, with seven pinnæ well shewn on the right hand of slab and about

the same number on the left; pinnules much divided, but with no impression of mid-rib on them as in the true *S. furcata*. Rachis with distinct mid-rib.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 186).

- 108.—*Hymenophyllites furcata*, Brongt. (*Sphenopteris* sp., Lebour, Ill. Foss. Plts., pl. 41). TYPE.

Very fine typical specimen; much branched, and leaves much divided, narrow, and with distinct mid-rib.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 187).

- 109.—Portion of two fronds; pinnæ alternate, palmate, and very much divided.

Loc.—Shale above the High-Main Seam, Gosforth? (*H. C.*—).

Remarks.—It ought not to surprise us, considering the small fragments of fern fronds that Brongniart had to describe from, that he made a few synonyms. It is more to be regretted that authors since his time, and with better materials, have gone on increasing the nomenclature with injurious additions.

The first specimen, No. 107, seems to have been referred by Lindley and Hutton to *S. furcata*, Brongt., with some hesitancy, and if we had only the Hutton drawing to refer to, and only the one specimen just mentioned, we might well be excused for a passing doubt also; but the drawing is not quite correct and the coarse shale and pressure together have combined to obliterate some of the characters, and so made the reading less easy. But comparing the Hutton Type with *S. trichomanoides*, Brongt., and with the fine specimen, No. 108, figured in the Illustrations, and several others, it seems impossible to doubt the specific identity of all the examples referred to above. It is like all species having a long range in time and space very variable in appearance; the segments of the pinnules varying much in length, width, and number, and the simple veining is not always apparent or preserved. It must also be known by every observer that among recent ferns remarkable variations occur in fronds of different age and state and place of growth, and the same thing occurs in the remains of the luxuriant vegetation of the Coal-measure period. It is evident that *S. laxa*, Sternb., belongs to this species and not to *S. Artemisiaefolia*.

Sphenopteris Hoeninghausi, Brongniart.

Type—*Sphenopteris Hoeninghausi*, Brongt., Hist. Vég. Foss., pl. 52.

Sphenopteris Hoeninghausi, Andræ, Vorw. Pflanz., pls. 4, 5.
 " " Geinitz, Vers. Steinkf. Sachs.,
 " " pl. 23, f. 5, 6.
 " " Zeiller, Vég. Foss. Terr. Houill.,
 " " pl. 162, f. 4, 5.
Calymmotheca Stangeri, Stur, Culm Flora, Heft II.,
 taf. 8, 9.

110.—*Sphenopteris* ———

Small portion of two pinnæ, with several secondary pinnæ, and numerous pinnules much lobed or divided.

Loc.—Shale above the High-Main Seam, Gosforth. (*H.C.* 622).

Remarks.—This small specimen is referred with considerable doubt to Brongniart's *S. Hoeninghausi*. As it is in a coarse micaceous shale many of its characters are obliterated and altered. Brongniart mentions that this species was communicated to him by Mr. Losh from Newcastle. It seems singular that a genuine specimen of so fine a species was not figured in the Fossil Flora, and only the present small doubtful example was found in the Hutton Collection. The few well authenticated local specimens in the Museum Collection are from the lower Coal-seams of the Auckland district.

Sphenopteris adiantoides, Lindley et Hutton.

Type—*Sphenopteris adiantoides*, L. et H., Foss. Flora, pl. 115.

111.—*Sphenopteris adiantoides*, L. et H. TYPE SPECIMEN, F.F., pl. 115.

Portion of frond with several branches of very distantly placed leaves or pinnules; the leaves somewhat rounded or fan-shaped, and very fine radiating nerves. The habit of the plant exceedingly light and elegant, reminding one of the recent Maiden-hair.

Loc.—Shale above the Bensham Seam, Jarrow. (*H.C.* 179).

Remarks.—This interesting fern, which forcibly reminds one of the recent Maiden-hair, *Adiantum Capillus-Veneris*, by its light and airy foliage, appears to be limited to our own Coal-

field, at least I can find no record of its occurrence elsewhere. As pointed out by Lindley and Hutton its nearest Coal-measure ally is the *S. macilenta* of the same authors, but the *Adiantides antiquus* of Stur's Culm Flora, Heft I., gives the best idea of the gracefulness of the foliage. It has been found only in the shale of the High-Main Seam at Killingworth, and in the shale above the Bensham Seam at Jarrow. M. Göppert, as usual with him, changes the name to *Adiantites concinnus*. Such synonyms are misleading, and ought to be avoided and suppressed.

Sphenopteris trifoliolata (Artis, sp.)

Type—*Filicites trifoliolata*, Artis, Ant. Phyt., pl. 11.

<i>Sphenopteris trifoliolata</i> ,	Brongt.,	Hist. Vég. Foss., pl. 53, f. 3.
„	„	Andræ, Vorwelt. Pflanz., taf. 9,
		f. 2, 3, 4.
„	<i>obtusiloba</i> ,	Brongt., Hist. Vég. Foss., pl. 53, f. 2.
„	„	Andræ, Vorwelt. Pflanz., taf. 10.
„	„	Schimp., Traité, pl. 30, f. 1.
„	„	Zeill., Vég. Foss., pl. 162, f. 1, 2.
„	<i>irregularis</i> ,	Sternb., Vers. I., pl. 17, f. 4.
„	„	Andræ, Vorwelt. Pflanz., taf. 8 ;
		taf. 9, f. 1.
„	„	Lebour, Ill. Foss. Plts., pl. 30.
„	<i>latifolia</i> ,	L. et H., Foss. Flora, pls. 156, 178.
„	<i>dilatata</i> ,	L. et H., Foss. Flora, pl. 47.
? „	<i>foliolata</i> ,	Stur, Culm Flora, Heft. I., taf. 5,
		f. 3-6.

112.—*Sphenopteris latifolia*, L. et H. TYPE SPECIMEN, F. F., pl. 156.

Portion of a fossil with remains of about ten pinnæ; pinnules with from one to five lobes, the lobes rounded and deeply cleft; mid-rib strong and distinct, nerves and nervules faint.

Loc.—Shale above the Bensham Seam, Jarrow. (H.C. 149).

113.———, L. et H. TYPE SPECIMEN, F. F., pl. 178.

Portion of a frond with about six well-preserved pinnæ between two and three inches long, pinnules rather close but cleft into about three distinct lobes, the nervation fine but not distinct, bifurcating from the basal portion of the leaf. Much younger and better preserved than the preceding specimen.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 155).

Remarks.—The Type-specimen of *Sphen. dilatata*, L. et H., was recently identified among the ferns in the Natural History Society's Collection. Though I had many years ago labelled it as *Sphen. dilatata*, L. et H., yet the impression was so obscure, and the shape of the stone so altered and unlike Hutton's figure, that it was at that time passed without identification. Schimper has already correctly referred Hutton's figure, pl. 47, to *Sphen. irregularis*, Sternb., and the latter and also Brongniart's *Sphen. oblusiloba* are without doubt identical with Artis' *Filicites trifoliolata*. At present I do not think that Gutbier's *Sphen. nummularia*, judging from the figures given by that author, and the figure given by Andræ, Vorw. Pflanz., pl. 11, and the specimen referred to that species below can be united to this well marked species. Like all widely distributed species it is variable in appearance, but none of the specimens that I have seen from this Coal-field have the pinnules so small as those of *Sphen. nummularia*. The *Sphenopteris latifolia* and *acutifolia*, Brongt., belong to *Pecopteris muricata*, and are very distinct from Hutton's *S. latifolia*. Stur's *S. foliolata*, referred to above, is so near to this that I do not see how it can be separated.

Sphenopteris nummularia, Gutbier.

Type—*Sphenopteris nummularia*, Gutb., Vers. Zwick.
Schwarz., t. 10,
f. 7, 8; t. 11, f. 3.

Sphenopteris nummularia, Andræ, Vorw. Pflanz., taf. 11.
,, *irregularis*, Geinitz, Vers. Steinkf. Sachs,
pl. 23, f. 2, 3, 4.

114.—*Sphenopteris nummularia*, H. Cat., p. 109.

The pinnules are very small, ovate, and with fine bifurcating nervation. The pinnae are broken up into lobes on the basal part, but are not divided at the extreme end. This specimen has very small, lobed pinnules and the appearance of crowded foliage. Very distinct in habit from any local fern.

Loc.—Unknown. ? Whitehaven Coal-field. (H. C. 638).

Remarks.—If the specimen No. 114 be correctly referred to this species, then *S. nummularia*, as figured by Gutbier and

Andræ, is very distinct from the preceding species, *Sphen. trifoliolata*, or any of its numerous variations from age or other causes. Besides being much smaller the pinnules are more rounded and entire, and the terminations of the pinnæ are often not broken up into pinnules but form a large undivided leaf. This appears to be only a fragment of the frond of a large fern, and it is on a kind of shale which I cannot identify with any belonging to this Coal-field.

TRIBE. NEUROPTERIDÆ.

ODONTOPTERIS, Brongniart.

? *Odontopteris Schlotheimii*, Brongniart.

Type—*Odontopteris Schlotheimii*, Brongt. Hist. Vég. Foss., pl. 78, f. 5.

Filicites osmundæformis, Schloth., Flor. d. Vorw., t. 5, f. 5, 6.

115.—*Fern leaves.*

On this slab are a few elongated-oval leaves which may turn out to be generically distinct from any form yet described from this Coal-field, and having much the appearance of an *Odontopteris* or the pinnules of *Otopteris* ? *dubia*. Foss. Flora, pl. 150.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 659).

Remarks.—The pinnules on No. 115 bear a strong resemblance to some of the pinnules of Schlotheim's *Filicites osmundæformis*, Flora d. Vorwelt, t. 3, f. 5, 6, especially to the elongated pinnules on fig. 6, but this last figure is rejected by Brongniart and not referred to his *Odontopteris Schlotheimii*. It is not easy to understand why Brongniart rejects fig. 6, for surely the pinnules marked *a* on both of Schlotheim's figures are alike. Then again these pinnules have a strong resemblance to Gutbier's figures, Vers. Zwick. Schwarzk, pl. 9, f. 10, 11, but the imperfect specimens and the not satisfactory figures of Gutbier, do not enable me to identify it with any of them. For the present it seems preferable to refer these pinnules to Brongniart's species based on all the figures given by Schlotheim, as quoted above.

NEUROPTERIS, Brongniart.

Neuropteris Loshii, Brongniart.

Type—*Neuropteris Loshii*, Brongt., Hist. Vég. Foss., pl. 72, f. 1; pl. 73.

- Neuropteris heterophylla*, Brongt., Class. Vég. Foss., pl. 2, f. 6.
 " " Brongt., Hist. Vég. Foss., pls. 71; 72,
 " " L. et H., Foss. Flora, pl. 200. [f. 2.
 " *Loshii*, L. et H., Foss. Flora, pl. 49.
 " " Gutb., Vers. Zwick. Schwarzk.,
 " " pl. 8, f. 6.
 " sp.—, Lebour, Ill. Foss. Plts., pl. 27.
Pecopteris adiantoides, L. et H., Foss. Flora, pl. 37.
Neuropteris Lindleyana, Schimp., Traité Pal. Vég., Vol. 1,
 " " p. 437.
 " *Soretii*, Brongt., Hist. Vég. Foss., pl. 70, f. 2.
 " " L. et H., Foss. Flora, pl. 50.

- 116.—*Neuropteris Loshii*, L. et H. TYPE SPECIMEN, F. F., pl. 49.
 Terminal portion of a large pinna which is so very inaccurately figured in the Fossil Flora, pl. 49, as to have puzzled more than one Fossil Botanist.
 Loc.—Shale above the Low-Main Seam, Felling. (H. C. 253).
- 117.— Terminal portion of a frond; pinnate in the upper part, tri-pinnate in the lower part. The specimen gives a good idea of the general form of the frond of this species.
 Loc.—Shale above the Low-Main Seam, Felling. (H. C. —).
- 118.— (*Neuropteris* sp., Lebour, Ill. Foss. Plts., pl. 27. TYPE).
 Very fine terminal portion of a large pinna, the nervation rather indistinct. The illustration quoted is from a very imperfect and inaccurate drawing of this specimen.
 Loc.—Shale above the Bensham Seam, Jarrow. (H. C. —).
- 119.—*Neuropteris Soretii*, L. et H. TYPE SPECIMEN, F. F., pl. 50.
 The Hutton label on this specimen is B. Jarrow, in Hutton's own hand-writing. The specimen shews parts of four pinnæ of *N. Loshii*. The pinnæ are arranged irregularly on the slab. The nervation of some of the pinnules is distinct. The drawing and illustration in Fossil Flora very bad.
 Loc.—Shale above the Low-Main Seam, Felling. (H. C. 255).
- 120.—*Pecopteris adiantoides*, L. et H. TYPE SPECIMEN, F. F., pl. 37.
 Impression of part of a large pinna so badly drawn as to give the appearance of a *Pecopteris*. Stem of pinna striated

longitudinally; pinnae and pinnules numerous, and the latter arranged close together and overlapping as in *N. Loshii*, and not separate as represented in the drawing.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 268).

Remarks.—I adopt the term *N. Loshii* applied to this species by Brongniart as being preferable to the vague name *heterophylla*, as I think it will be found that most of the species of this genus if not all are heterophyllous; and another reason, it records the name of a Novocastrian who did much as an early collector of fossil plants, and sent away many species from this Coal-field to Brongniart; and because it is the most common and characteristic form of this species. Hutton's Type, No. 116, being a very bad drawing, has been a puzzle to many, as also the Hutton Type, No. 119, of *N. Soretii*; but as the Type-specimens are both in the collection, there can be no doubt about their identity with Brongniart's species as referred to above. Hutton's Plate 200 also belongs to this form, of which it is merely the imperfect terminal part of a pinna. Hutton's *Pecopteris adiantoides* is a portion of a large pinna in a young state of growth, the branch of the rachis being broad from compression, at least this is the appearance it has. Another specimen figured by Hutton as *N. heterophylla*, F. F., pl. 197, does not belong to this species, but is referred to *N. flexuosa*, Brongniart, and Plate 183 of the same authors represents, I think, a pinna of another very distinct species, *N. auriculata*.

Neuropteris gigantea (Sternberg sp.)

Type—*Osmunda gigantea*, Sternb., Vers. I., pl. 22.

<i>Lithosmunda minor</i> ,	Luid.,	Lith. Brit., pl. 4, f. 189.
<i>Phytolithus Osmundæ regalis</i> ,	Martin,	Petr. Derb., pl. 19, f. 2.
<i>Filicites linyuensis</i> ,	Schloth.,	Flor. Vorw., pl. 2, f. 25.
<i>Neuropteris gigantea</i> ,	Brongt.,	Hist. Vég. Foss., pl. 69.
„	„	L. et H., Foss. Flora, pl. 52.

- 121.—*Neuropteris gigantea*, L. et H. TYPE SPECIMEN, F. F., pl. 52.
 Impression of upper surface of an imperfect pinna, with thirteen attached pinnules on the right side and seven on the left.
 Five middle pinnules dropped off. The pinnules are closer on

the specimen than in the figure, nervation very fine and close, so that the bifurcations are difficult to be seen. The specimen is a cast of the upper surface and not as pl. 52 represents the upper surface itself.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 238).

- 122.—— Nearly terminal portion of a large primary pinna, shewing the remains of four secondary lateral pinnæ and the terminal pinna.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 241).

- 123.—— A large secondary pinna, of nearly same shape as F. F., pl. 52, with nearly all the pinnules or leaves attached on one side of the stem or frond-branch and partly deciduous on the other side. The leaves or pinnules become gradually less in size towards the apex, which is not preserved; nervation distinct of the upper surface of pinnules.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 239).

- 124.—— in vernation. Plate 1. (*Spiropteris* (?) Lebour, Ill. Foss. Plts., pl. 47). TYPE.

This specimen seems to represent *N. gigantea* in vernation. It shews a primary pinna, with ten or more unexpanded secondary pinnæ, the pinnules being all folded up. The undeveloped rachial-branch is about six inches long, and appears to have been protected with a flocculent covering, as seen on the rachis of many of the larger recent ferns when in vernation.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 243).

Remarks.—This fine species, of which the pinnules appear to be more deciduous than in any other kind of this genus, is commonly distributed in this Coal-field; but as far as I have observed it is nearly always in fragments of pinnæ or pinnules, which from having *Microconchi* attached to them shew that they have been macerated for some time in water. Plate 1 will give some idea of a pinna of this fern in vernation, as there can be no doubt I think that No. 124 belongs to this species. The rachis seems to have had a flocculent covering at this stage of growth. The same specimen is also figured in the Illustration of Fossil Plants, from a drawing left unpublished by Hutton.

Neuropteris flexuosa, Brongniart.

Type—*Neuropteris flexuosa*, Brongt., Hist. Vég. Foss.,
pl. 65, f. 2, 3; pl. 68, f. 2.

Osmunda gigantea, var. B. Sternb., Vers. I., pl. 32, f. 2.

Neuropteris heterophylla, L. et H., Foss. Flora, pl. 197.

Neuropteris flexuosa, Gutb., Vers. Zwick., pl. 6, f. 12;
pl. 7, f. 1, 2.

„ *plicata*, Sternb., Vers. I., pl. 19, f. 1, 3.

„ „ Lesqx., Coal Flor. Penns., pl. 10,
f. 1-4.

125.—*Neuropteris heterophylla*, L et H. TYPE SPECIMEN, F. F., pl. 197.

This shale was worked for clay ironstone nodules very many years ago. The position of the bed is doubtful, but certainly above the High-Main Seam, which is sunk to at some depth in the Monkseaton Colliery.

A single pinna of a large bi- or tri-pinnate frond, with remains of fourteen pinnules placed nearly opposite to each other, and not alternately as in *N. gigantea*, F. F., pl. 52; the pinnules also are more curved and not so close; the nervation is also different, and distinctly seen to bifurcate three or four times.

Loc.—Ironstone shale, Whitley, Northumberland. (*H.C.* 285).

Remarks.—In the present uncertain state of our knowledge of the genus *Neuropteris*, it is oftentimes difficult to determine what species the fragmentary pinnæ and deciduous pinnules belong to; but it is quite certain that the Type specimen of the F. F., pl. 197, does not belong to *N. Loshii*, that is *N. heterophylla*, Brongt. And it bears most resemblance to the species which it is referred to above, though it must be acknowledged that the figures given of *N. flexuosa* are very fragmentary, and the same remark applies to most of the species of this genus, of which large specimens are seldom obtained.

Neuropteris auriculata, Brongniart.

Type—*Neuropteris auriculata*, Brongt., Hist. Vég. Foss.,
pl. 66.

Filicites osmundæ, Artis, Anted. Phyt., pl. 7.

Cyclopteris auriculata, Gutb. Vers. Zwick. Swarzk., pl. 6,
f. 8 and 13.

„ „ Sternb., Vers. II., pl. 22, f. 6.

- Neuropteris ingens*, L. et H., Foss. Flora, pl. 91A.
 " *Filliersii*, Brongt., Hist. Vég. Foss., pl. 64, f. 1.
 " *heterophylla*, L. et H., Foss. Flora, pl. 183.
 ? " *macrophylla*, Brongt., Hist. Vég. Foss., pl. 65, f. 1.
 " *Dufresnoyi*, Brongt., Hist. Vég. Foss., pl. 74, f. 4.
 " *anomala*, Lesqx., Coal Flor. Penns., pl. 7, f. 1.
 " *inflata*, Lesqx., Coal Flor. Penns., pl. 7, f. 2.
 " *Clarksoni*, Lesqx., Coal Flor. Penns., pl. 9.

126.—*Neuropteris auriculata*, Brongt.

Two or three large leaves of a large *Neuropteris*.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 262).

127.—Impression of a few leaves and part of a stem or rachis of this species.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 264).

128.—*Neuropteris ingens*, L. et H. TYPE SPECIMEN, F. F., pl. 91A.

Impression of a leaf or large pinnule, about two inches long and one and a half broad; the nervation distinct and radiating in close lines from the basal attachment of the leaf. This is perhaps a rachial pinna or leaf of *Neuropteris auriculata*, Brongniart.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 263).

129.—Two large leaves, one overlapping and pressed closely on the other, giving the specimen an irregular and distorted appearance; the nervation distinct and radiating in strong lines from the basal part of the leaf.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 636).

130.—A single leaf or pinnule, evidently the same as the preceding but less perfectly preserved.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 635).

131.—*Rachial pinnæ*.

A stem or rachis, with numerous impressions of leaves in connection with it, but the leaves are not certainly attached.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 286).

132.—? (Lebour, Ill. Foss. Plts., pl. 11). TYPE.

Specimen with portion of stem and two leaves attached to it, one on each side. A very interesting specimen, which may be compared with the preceding.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 634).

133.—? Small portion of rachis, with several large Cyclopteroid leaves attached.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 214).

Remarks.—It will be conceded that Brongniart's *Neur. auriculata* is one of the best figured and best determined species of this genus; that being so it is safer to refer *N. Villiersii* to it than to suppress the best known form, *N. auriculata*. There are some remarks about this species in the Brit. Mus. Cat. Palæozoic Plants, p. 97, which are not easy to understand, but by aid of Mr. Kidston's recent Memoir on the Somerset Coal-field, Trans. Roy. Soc. Edinb., Vol. 33, it seems to be explained that he had identified the specimens he now refers to, *N. macrophylla*, Brongt., with *N. auriculata*, Brongt., and some other species. At present it seems to me best to consider these two forms identical, and as the figure of *N. auriculata* is best characterized, I prefer to adopt it as a permanent name to any of the other synonyms of this variable species. There can not be a doubt that Lindley and Hutton's Plate 183, quoted above, represents the same species. To this species we must also refer the fragment of a pinna, *Neur. Dufresnoyi*, Brongt., pl. 74, f. 4, and Lesquereux' figures, quoted above, appear to be only different parts of the frond and different states of growth of the same fern. Unless great allowance be made for the bad figures of imperfect specimens and the often inaccurate descriptions and bad observation of authors, we shall never be able to clear away the immense mass of confusion that is daily gathering about our commonest fossil plants.

NEUROPTERIS.—RACHIAL PINNÆ.

(CYCLOPTERIS, Auctorum).

- Cyclopteris trichomanoides*, Brongt., Hist. Vég. Foss., pl. 71, f. 4.
 „ *dilatata*, L. et H., Foss. Flora, pl. 91b.
 „ *obliqua*, L. et H., Foss. Flora, pl. 90.
 „ *oblata*, L. et H., Foss. Flora, pl. 217.
 „ *orbicularis*, Brongt., Hist. Vég. Foss., pl. 61, f. 2.

134.—*Cyclopteris dilatata*, L. et H. TYPE SPECIMEN, F. F., pl. 91b.

Rachial pinna or primary leaf, nearly circular in shape; the outer margin imperfect. Nervation imperfectly preserved, but the nerves appear to bifurcate frequently.

Loc.—Shale above the Low-Main Seam, Felling. (H. C. 207).

- 135.—— Portion of a very large rachial leaf, seven inches by four; the outline rather imperfect. The nervation distinct. The nerves appear in double lines nearly parallel, and bifurcate towards the outer margin of the leaf.
Loc.—Shale above the Low-Main Seam, Felling. (II. C. —).
- 136.—*Cyclopteris obliqua*, L. et H. TYPE SPECIMEN, F. F., pl. 90B.
Large rachial pinna, with the outer margin imperfect, basal part curved round to the left. Hutton label, "*Cyclopteris obliqua*, Jarrow, Bm."
Loc.—Shale above the Bensham Seam, Jarrow. (II C. 200).
- 137.—— L. et H. TYPE SPECIMEN, F. F., pl. 90A.
Very imperfect impression of large kidney-shaped pinna or leaf; the basal portion perfect, with sharp curve to the left. Hutton label, "*Cyclopteris obliqua*, Jarrow, Bm."
Loc.—Shale above the Bensham Seam, Jarrow. (II. C. 199).
- 138.—— Part of a large rachis or stem, with a pinna or leaf of *Cyc. obliqua* apparently attached to the rachis, which shews these large specimens of *Cyclopteris* to be cauline or rachial pinnæ of one of the species of *Neuropteris*. On the same slab are some good examples of *Myriophyllites gracilis*.
Loc.—Shale above the Low-Main Seam, Felling. (II. C. 201).
- 139.—— Impression of a large circular leaf, not perfect at the margin. Nervation distinct; the nerves appear radiating in bundles, and frequently bifurcate towards the upper, outer margin. Hutton label, "*Cyclopteris*, Felling, L. M."
Loc.—Shale above the Low-Main Seam, Felling. (II. C. 198).
- 140.—— Large specimen, of somewhat oval shape, but the marginal outline irregular. Nervation not so distinct as in last.
Loc.—Shale above the Bensham Seam, Jarrow. (II. C. 202).
- 141.—— Impression of a large reniform leaf, with the nervation very distinct.
Loc.—Shale above the Bensham Seam, Jarrow. (II. C. 205).
- 142.—— ? Rachial leaf, with the nervation distinct. Resembles the figure of *C. trichomanoides*, Bt. Several *Microconchi* on this leaf.
Loc.—Shale above the Bensham Seam, Jarrow. (II. C. 210).
- 143.—— ? Fragments of several large pinnules attached to a rachis, probably *Cyclopteris*.
Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 308).

144. ——— ? Impression of a large pinna or pinnule, having somewhat the appearance of a fern in vernation.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 234).

Remarks.—There can be no doubt about *Cyclopteris* being the cauline or rachial leaves of *Neuropteris*. Mr. Kidston refers the whole of the Brongniart and Lindley-Hutton species to *N. Loshii* = *N. heterophylla*, Brongt., but the evidence in support of the opinion that they all belong to this one species of *Neuropteris* is very small, and not sufficient to decide this question. At present only very imperfect fragments of the fronds of the different species of *Neuropteris* have been found or figured, and until better evidence is produced and more perfect specimens figured, it will be impossible to determine to which species these splendid rachial, or it may be radical, leaves really belong, as the veining of these leaves, their size and form, give no clue to assist in their specific classification.

NEUROPTERIS—IN VERNATION.

(*SPIROPTERIS*, Schimper).

- 145.—*Neuropteris* in vernation. Plate 2, f. 1.

This specimen, which is of an oval shape, shews the rachis or stem of a frond curved round from left to right on the slab, and giving off two *Cyclopteris* leaves and primary pinnæ, with secondary pinnæ bearing *Neuropteris* leaves or pinnules on the left side. On the right side are distinctly seen two primary pinnæ, curving downwards and inwards towards the centre and left side, and giving off secondary pinnæ which shew traces on their sides, here and there, of *Neuropteris* pinnules. The veining of the *Cyclopteris* leaves is seen radiating off from the rachis on the left into the central mass of the specimen; and another *Cyclopteris* leaf is also seen on the upper left side, with nerves radiating down towards the centre and right and crossing the veining of the other *Cyclopteris* leaf. The great number of lines crossing each other tend to perplex the eye, but the above points are distinctly seen. The confusion of lines is still further increased by the mineralization of the carbonaceous matter which formed the mass of the central portion of the specimen before being removed from the matrix, and the shale is rather coarse and not of a nature to receive the finest impressions; but, notwithstanding,

- this specimen shews enough to prove that *Cyclopteris* leaves are only rachial pinnæ represented by a large cycloid leaf, and often placed opposite to a well-defined pinna of a *Neuropteris*.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 223).
- 146.—— In this specimen the rachis is considerably unfolded; there is a distinct impression of a *Cyclopteris* leaf; the central portion shews numerous traces of nervation, and near the upper portion of the rachis may be observed, with a lens, numerous impressions of the nervation of *Neuropteris* leaves.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 227).
- 147.—— Large circular mass, shewing the rachis curled up; visible traces of the veneration of a *Neuropteris* leaf.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 230).
- 148.—— This specimen shews a rachis with a pinna coiled up, and apparently attached to the rachis, but the central part is obscured with carbonaceous matter.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 235).
- 149.—— Very indistinct impression of an oval mass of a *Cyclopteris* in veneration; traces of the nervation are visible on parts of the impression.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 219).
- 150.—— On this slab are two oval masses of coiled up rachis and leaves of *Cyclopteris*. On the surface of each carbonaceous mass are distinct traces of the stems of pinnæ and the nervation of large *Cyclopteris* leaves.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 218).

Remarks.—In the unarranged, unassorted portion of the Hutton Collection about eighteen specimens were found, which appeared at first sight like oval masses of carbonaceous matter only. They were found on careful examination to be rolled-up fragments of fern fronds, some of which under the lens shewed imperfectly preserved traces of *Cyclopteris* leaves and *Neuropteris* pinnules, leaving no doubt that they were parts of some large ferns which had been violently torn from their rhizome in an early stage of their veneration. Enough is shewn in the specimens to determine them as belonging to some species of *Neuropteris*, but the pinnæ and pinnules are not sufficiently expanded to define what particular species they represent. Here

is undeniable proof, if such proof were required, that violent storms occurred which played havoc with the young and tender vegetation of the Coal-measure period; and also a most interesting proof that the ferns of the olden times followed the same mode of veneration as most of their representatives do at the present day. Plate 2, f. 1, is an example.

TRIBE. PECOPTERIDEÆ.

ALETHOPTERIS, Sternberg.

Alethopteris lonchitica, Schlotheim sp.

Type—*Filicites lonchiticus*, Schloth., Flor. d. Vorw.,
pl. 11, f. 22.

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| <i>Pecopteris lonchitica</i> , | Brongt., Hist. Vég. Foss., pl. 84. |
| " | L. et H., Foss. Flora, pl. 153. |
| " <i>Mantelli</i> , | L. et H., Foss. Flora, pl. 145. |
| " | Brongt., Hist. Vég. Foss., pl. 83, f. 3, 4. |
| " <i>urophylla</i> , | Brongt., Hist. Vég. Foss., pl. 86. |
| <i>Alethopteris vulgator</i> , | Sternb., Vers. I., pl. 53, f. 2. |
| <i>Pecopteris heterophylla</i> , | L. et H., Foss. Flora, pl. 38. |
| <i>Alethopteris lonchitidis</i> , | Lebour, Ill. Foss. Plts., pl. 24. |
| <i>Alethopteris Mantelli</i> , | Zeill., Vég. Foss. Terr. Houill.,
pl. 163, f. 3, 4. |

151.—*Pecopteris lonchitica*, L. et H. TYPE SPECIMEN, F. F., pl. 153, f. 1.

Terminal portion of a pinna, leaves simple and well preserved.

Hutton's label, "*Pecopteris*. Jarrow, Bm."

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 292).

152.—L. et H. TYPE SPECIMEN, F. F., pl. 153, f. 2.

Portion of a larger pinna, not quite perfect at the ends; leaves large and well preserved. Hutton's label, "*Pecopteris lonchitica*. Jarrow, Bm."

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 293).

153.—Terminal portion of a large pinna, one foot long, nearly perfect, with numerous lesser pinnæ. Hutton's label, "*Pecopteris heterophylla*. Felling, L. M. D."

Loc.—Shale above the Low-Main Seam, Felling. (*H. C.* 289).

Remarks.—This generally-distributed fern appears to be common in some localities and zones of this Coal-field and rare in others, and to vary in shape from the long, narrow-pinnuled variety, *A. Mantelli*, to the larger and typical *A. lonchitica*.

The fronds, or it may be primary pinnæ, judging from portions of imperfect specimens, were of great size and were probably the foliage of tree-ferns. This and the following are the only species that I have seen from the Northumberland and Durham Coal-field, but Mr. Kidston records an example of what is called *Alethopteris Sternbergii* from the Bishop Auckland district, preserved in the British Museum. A fine example of *A. lonchitica* in veneration, from the Collection of the Natural History Society, is figured on Plate 2, f. 2.

Alethopteris Serlii, Brongniart.

Type—*Pecopteris Serlii*, Brongt., Hist. Vég. Foss., pl. 85.

<i>Pecopteris Serlii</i> ,	L. et H., Foss. Flora, pl. 202.
<i>Neuropteris oblongata</i> ,	Sternb., Vers., pl. 22, f. 1A, 1B.
<i>Alethopteris Serlii</i> ,	Lesqx., Coal Flor. Penn., pl. 29, f. 1-5.
" "	Zeiller, Vég. Foss. Terr. Houil., pl. 163, f. 1, 2.
" <i>Davreuxi</i> ,	Kidston, Trans. Roy. Soc. Edinb., Vol. 33, pl. 24, f. 1 (non Brongt.)

154.—*Pecopteris Serlii*, L. et H. TYPE SPECIMEN, F. F., pl. 220.

Remains of four pinnæ rather well preserved in fine shale, with the nervation distinct. Hutton's label, "Somersetshire."

Loc.—Somersetshire Coal-field. (H. C. 294).

Remarks.—The Lindley-Hutton drawing of this species was made from a Somersetshire specimen, and is of the variety with rounded or obtusely-terminated pinnules. This handsome fern has not been recorded, so far as I am aware, in the Northumberland or Newcastle districts of the Northern Coal-field. In the lower seams of the Bishop Auckland district it has been collected of considerable size and in a fine state of preservation, by the late Joseph Duff and others, and these are the only well-authenticated specimens that I have seen. On these South Durham specimens both the obtuse and the acutely-terminated pinnules occur on the same slab of shale. Notwithstanding the peculiarity pointed out in the veining of the lobes of the pinnules, I think *Alethopteris Davreuxi*, Kidston, non Brongt., is merely an exuberant growth or "sport" of *A. Serlii* and not a true species.

PTERIDOPSIS, nov. gen.

Pteridopsis plumosa, nov. spec. Plate 3.

Type—*Pteridopsis plumosa*, nov. gen. et spec., Ill. Foss.
Plts, pls. 44, 63.

? ————— Lebour, Ill. Foss. Plts., pl. 44.

? ————— Lebour, Ill. Foss. Plts., pl. 63.

155.—*Pteridopsis plumosa*, nov. gen. et spec. (?— Lebour, Ill. Foss.
Plts., pl. 44). TYPE.

Only a portion of the rachis preserved, which is irregularly branched and finely striated. The leaves or pinnules are long, narrow, curved, and with the margins nearly parallel. A distinct mid-rib, from which there is a strong nervation cross-wise or at right angles to the mid-rib, as in the genus *Alethopteris*, with which it was at first sight arranged.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 195).

Remarks.—This fern is of very irregular mode of growth. The stem or rachis is strongly striated and throws off lateral branches and tufts of long curved leaves or pinnules which give it somewhat the appearance of a plume of feathers. The pinnules are long and gently tapering to a point, with a central mid-rib with strongly impressed veins set at right angles to the mid-rib, as in some species of *Alethopteris*. Only two specimens have been examined, which are figured in the references given above. Plate 3 is in the Collection of Nat. Hist. Society.

(*MARIOPTERIS*, Zeiller).

Pecopteris muricata (Schlotheim sp.).

Type—*Filicites muricatus*, Schloth., Flor. d. Vorw.,
pl. 12, f. 21, 23.

Pecopteris muricata, Brongt., Hist. Vég. Foss., pl. 95,
f. 3, 4; pl. 97.

„ *laciniata*, L. et. H., Foss. Flora, pl. 122.
Lebour, Ill. Foss. Plts., pl. 29.

Sphenopteris macilenta, Lebour, Ill. Foss. Plts., pl. 19.

Neuropteris heterophylla, Lebour, Ill. Foss. Plts., pl. 14.

Neuropteroid frond ? Lebour, Ill. Foss. Plts., pl. 15.

Sphenopteris latifolia, Brongt., Hist. Vég. Foss., pl. 57,
f. 1, 2, 3, 4.

<i>Pseudopecopteris latifolia</i> ,	Lesqx., Coal Flor. Penn., pl. 52, f. 4.
<i>Sphenopteris acutifolia</i> ,	Brongt., Hist. Vég. Foss., pl. 57, f. 5.
<i>Pecopteris Loshii</i> ,	Brongt., Hist. Vég. Foss., pl. 96, f. 6.
„ <i>incisa</i> ,	Sternb., Vers. II., pl. 22, f. 3.
„ sp.—,	Lebour, Ill. Foss. Plts., pl. 18.

Variety:—*P. nervosa*.

<i>Pecopteris nervosa</i> ,	Brongt., Hist. Vég. Foss., pls. 94, 95, f. 1, 2.
„ „	L. et H., Foss. Flora, pl. 94.
<i>Sphenopteris latifolia</i> ,	Lebour, Ill. Foss. Plts., pl. 31.
<i>Pecopteris serra</i> ?	Lebour, Ill. Foss. Plts., pl. 22.
„ (<i>Alethopteris</i>) <i>aquilina</i> ,	Lebour, Ill. Foss. Plts., pl. 16.
„ („) <i>marginata</i> ,	Lebour, Ill. Foss. Plts., pl. 17.
<i>Pseudopecopteris nervosa</i> ,	Lesqx., Coal Flor. Penn., pl. 34, f. 1-3.
„ <i>Newberryi</i> ,	Lesqx., Coal Flor. Penn., pl. 37, f. 1.
<i>Mariopteris nervosa</i> ,	Zeiller, Vég. Foss. Terr. Houil. pl. 167, f. 1-4.

156.—*Pecopteris nervosa*, L. et H. TYPE SPECIMEN, F. F., pl. 94.

Terminal portion of a very large pinna; the lower pinnule on the same slab, not figured on pl. 94, has some of the leaflets deeply cleft or notched.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 278).

157. ——— Portion of a large pinna, the pinnules with smaller, narrower leaves than in Hutton's figure.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 297).

158. ——— (*Pecopteris serra* ? Lebour, Ill. Foss. Plts., pl. 22). TYPE.

Terminal portion of frond not perfect; variety with small, narrow pinnules.

Loc.—Shale above the Low-Main Seam, Felling. (*H. C.* 276).

159. ——— (*Sphenopteris latifolia*, Lebour, Ill. Foss. Plts., pl. 31).

Very small portion of a pinna. TYPE.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 648).

160.—*Pecopteris muricata* (*Sphenopteris macilenta*, Lebour, Ill. Foss. Plts., pl. 19). TYPE.

Small pinna, the pinnules with notched or lobed margins.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* —).

161. ——— (*Neuropteroid frond*, Lebour, Ill. Foss. Plts. pl. 15). TYPE.

Small portion of a terminal pinna.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. —).

- 162.—*Pecopteris laciniata*, L. et H. TYPE SPECIMEN, F. F., pl. 122.

Fragments of two or three very much compressed pinnae. It is, as conjectured by Hutton, only a variety of *P. muricata*.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 283).

163. ——— (Lebour, Ill. Foss. Plts., pl. 29). TYPE.

A terminal pinna, with pinnules similar to the preceding, appears to be identical with Brongniart's *Sphen. acutifolia*.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 629).

Remarks.—Like all ferns common and widely distributed this has received an abundant supply of names, even from the best authorities, but if the original specimens of all the figures quoted above could be brought together for comparison, there are very few who would propose to divide such an assemblage into species. It must be owned that no very large fragments or perfect fronds have yet been found in this district, but fragments large enough and well preserved have been seen to connect the two most divergent forms, *N. muricata*, Schloth., and *N. nervosa*, Brongt., and even in the small lax forms of *N. muricata*, no specific character can be found by which they can be separated from the more robust and closely-pinnulated variations. With fossil ferns, as with recent ones, great allowances must be made for the different localities and conditions and age, and the strong tendency and power which some of the most widely distributed plants have to produce variation. The list of synonyms given above does not by any means include all the useless names attached to this species. The sooner some effectual method is found out and agreed upon to purge the nomenclature of fossil plants from these burdensome lists the better will it be for future investigators. Nothing but a careful Monograph on Fossil Plants, worked out in the same self-denying and unflinching manner in which Thomas Davidson has worked out the Fossil Brachiopoda, will be able to secure this boon.

Pecopteris Pluckenetii (Schlotheim sp.).

Type—*Filicites Pluckenetii*, Schloth., Flor. d. Vorw.,
pl. 10, f. 19.

Sphenopteris repanda, L. et H., Foss. Flora, pl. 84.
Pecopteris Pluckenetii, Brongt., Hist. Vég. Foss., pl. 107,
f. 1-3.

Pecopteris Beyrichi, Zeill., Vég. Foss. Terr. Houil.,
pl. 168, f. 1, 2.

Alethopteris ,, Geinitz, Vers. Steink. Sachs., pl. 33,
f. 4, 5.

Pecopteris bifurcata, Sternb., Vers. I., pl. 59, f. 2.

Diphlothmema Beyrichi, Stur, Culm Flora, taf. 25B, f. 3, 4.

164.—*Sphenopteris repanda*, L. et H. TYPE SPECIMEN, F. F., pl. 84.

Small frond or a pinna, very indistinctly preserved and difficult to define. Nerves much branched and spreading. It has not the character or appearance of a *Sphenopteris*. The lower part of the frond separate. The figure, pl. 84, very inaccurate and misleading.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 166, 161).

Remarks.—The Type specimen of *Sphen. repanda*, L. et H., F. F., pl. 84, is a very imperfect impression of a primary pinna of some large fern. The Hutton drawing is very incorrect, and gives quite an erroneous idea of the shape of the secondary pinnæ and pinnules. The pinnules are not pedunculated as in the drawing, but so far as the state of preservation of the specimen shews, appear to be attached to the pinna by the whole of the basal margin; and on some of the pinnæ, the pinnules are so closely placed that they overlap each other, and it is difficult to observe the real shape of the pinnules. It seems to me to be allied to Schlotheim's species. The veining, as shewn on some of the pinnules, of which the enlarged figure gives a more accurate idea than it does of the shape of the pinnules, is very similar to the veneration of the pinnules of *Pec. Pluckenetii*, Schloth. The specimen seems to be unique, and as it is too imperfect to admit of accurate description and presents many of the characters of the above species, I have no hesitation in referring it to the above.

(DACTYLOTHECA, Zeiller).

Pecopteris plumosa (Artis sp.).*Type*—*Filicites plumosa*, Artis, Anted. Phyt., pl. 17.

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| <i>Pecopteris plumosa</i> , | Brongt., Hist. Vég. Foss., pls. 121, 122. |
| „ <i>dentata</i> , | Brongt., Hist. Vég. Foss., pls. 123, 124. |
| „ <i>acuta</i> , | Brongt., Hist. Vég. Foss., pl. 119, f. 3. |
| „ <i>delicatula</i> , | Brongt., Hist. Vég. Foss., pl. 116, f. 6. |
| „ <i>dentata</i> , | L. et H., Foss. Flora, pl. 154. |
| „ <i>serra</i> , | L. et H., Foss. Flora, pl. 107. |
| <i>Sphenopteris caudata</i> , | L. et H., Foss. Flora, pls. 48 and 138. |
| „ <i>crenata</i> , | L. et H., Foss. Flora, pls. 39, 100, 101. |
| <i>Pecopteris serra</i> ? | Lebour, Ill. Foss. Plts., pl. 23. |
| „ <i>Silesiaca</i> , | Lebour, Ill. Foss. Plts., pl. 26. |
| „ <i>pennæformis</i> , | Lebour, Ill. Foss. Plts., pl. 25. |

- 165.—*Sphenopteris caudata*, L. et H. TYPE SPECIMEN, F. F., pl. 138.
 Portion of frond, shewing numerous pinnæ in a good state of preservation. Identical with Brongniart's *Pecopteris acuta*. Labelled "*Sph. caudata*," but not Hutton's writing. The locality is very doubtful.

Loc.—Shale above the Bensham Seam, Jarrow? (H. C. 643).

- 166.—L. et H. TYPE SPECIMEN, F. F., pl. 48.
 Fragments of two pinnæ on a large slab of very fine non-micaceous shale. Hutton's label, "*Sphenopteris caudata*, Jarrow, B. P. 48." From the fineness of the shale one must doubt the correctness of the locality. Shale like No. 169.
 Loc.—Shale above the Bensham Seam, Jarrow? (H. C. 642).

- 167.—*Pecopteris dentata*, L. et H. TYPE SPECIMEN, F. F., pl. 154.
 Small frond, with numerous well-preserved pinnæ; the pinnules shew slight indentations on the margins. It must be a very doubtful Jarrow specimen. Hutton's label, "Jarrow, H."
 Loc.—Somewhat doubtful, though labelled "High-Main Seam, Jarrow. (H. C. —).

- 168.—(*Pecopteris serra*? Lebour, Ill. Foss. Plts., pl. 23). TYPE.
 Small portion of a frond, with numerous pinnæ; the pinnules well preserved, and nervation distinct.
 Loc.—Uncertain. (H. C. 655).

169.—*Pecopteris serra*, L. et H. TYPE SPECIMEN, F. F., pl. 107.

Large rachis on same slab. Approaches too closely to the last to be separated as a species. "*Pecopteris serra*" on the label, but not Hutton's writing. New label by Hutton, 1856. Loc.—Whitehaven Coal-field. (*H. C.* 270).

Remarks.—There is much uncertainty about the localities of the specimens enumerated above. In my opinion No. 165 is from the Somersetshire Coal-field; No. 166 from the shale above the High-Main, Jarrow; No. 167 may be from Jarrow, but not from High-Main shale; No. 168 is uncertain; and No. 169 from Whitehaven Coal-field. Most of these, I think, have been borrowed specimens, as they have "to be returned" on them. Above I have recorded the F. F. localities with doubt. No. 165, *Sph. caudata*, L. et H., is too closely allied to *Pecop. acuta*, Brongt., judging from Brongniart's figure, to be separated from it. The other specimens are also identical with Brongniart's *P. dentata*. I cannot find any character by which *Sphen. crenata*, L. et H., can be separated from the latter. The Type-specimen from the Whitehaven Coal-field, F. F., pl. 100, 101, is preserved in the Collection of the Natural History Society's Museum, having the Type-specimen of *Schizopteris adnascens*, L. et H., twining round the stem of *S. crenata*. The specimen of *S. crenata* is not so distinctly impressed on the shale as to shew the sharp outline of Hutton's figure, pl. 101. It was sent from the Whitehaven Coal-field by the same gentleman that sent the specimen, *Pecop. serra*, L. et H. This latter specimen was first labelled *pennæformis*, and then altered, by Lindley probably, to *serra*. It seems to be the prevailing opinion that all these forms are referable to Artis' Type quoted above. Though some of the localities given by Hutton, are uncertain, yet this fern certainly occurs in this Coal-field, both in the Jarrow district and in the lower seams near Bishop's Auckland.

Pecopteris sp.——, in veneration. Woodcut No. 3.

170.—*Pecopteris*——, in veneration. (*Spiropteris*——, Lebour, Ill. Foss. Plts., pl. 46). TYPE.

A small fern, in veneration. General appearance cone-shaped, about three inches long by one inch in breadth. The unfolded pinnæ circinate on each side of the stem, curving upwards and inwards, and having the appearance of a series of small *Ammonites* on each side of the rachis. The rachis appears to have been soft, and is much flattened out by compression.

Loc.—Shale above the Bensham Seam, Jar-row. (H. C. 309).



Remarks.—This little specimen, Woodcut No. 3, is perhaps as interesting an example of a *Pecopteris* in veneration as any that has been figured. The woodcut gives a more exact representation of the size and appearance than Hutton's figure in the Illustrations. The uncoiled secondary pinnæ resemble a row of small *Ammonites* tapering away in size to the top on each side of the main stem, the bulging out of which in the centre seems to shew that it was in a fresh succulent condition when first embedded in its shaly matrix. It probably belongs to the preceding species, *P. plumosa*.

Pecopteris Bucklandi, Brongniart.

Type—*Pecopteris Bucklandi*, Brongt., Hist. Vég. Foss., pl. 99, f. 2.

Pecopteris Bucklandi, L. et H., Foss. Flora, pl. 223.

Neuropteris attenuata, L. et H., Foss. Flora, pl. 174.

171.—*Pecopteris Bucklandi*, L. et H. TYPE SPECIMEN, F. F., pl. 223.

Coal-field, Newcastle, is the locality given by Hutton; but this is erroneous, as the specimen bears evidence in the shape of a large pinnule of *N. Scheuchzeri* and the shale of the matrix that it belongs to the Somersetshire Coal-field, and probably the same locality as the Brongniartian type.

Portion of frond with numerous pinnae, most of them perfectly preserved and with the veining of the pinnules very fine and distinct. On the same slab is a large pinnule of *Neuropteris Scheuchzeri*, L. et H., three and a half inches in length and more than one inch broad.

Loc.—Somersetshire Coal-field. (H. C. 269).

172.—*Neuropteris attenuata*, L. et H. TYPE SPECIMEN, F. F., pl. 174.

Locality doubtful, but I am of opinion that, like the former, it is from the Somersetshire Coal-field, and further, that this specimen is, though described as a *Neuropteris*, identical with *Pecopteris Bucklandi*. The figure is very bad. It differs from *Bucklandi* only in not being pressed so flat. The pinnae also are much closer (in fact they overlap) than in Hutton's figure. The pinnules have the entire base attached; the nerves also are less oblique and bifurcate nearer the mid-rib of the pinnules. The *Neuropteris*-like attachment of the pinnules in Hutton's figure is purely imaginary, as this fern is a true *Pecopteris*. It is doubtless a portion of a younger and more terminal part of a pinna of *P. Bucklandi*.

Loc.—Somersetshire Coal-field. (H. C. 168).

Remarks.—Mr. Kidston has expressed a doubt as to the identity of the Lindley-Hutton Type-specimen with Brongniart's species, but assuredly this unusual caution was not required. The veining is the same, the shape of the pinnules and the locality are the same, and to prove the latter there is on the same slab a remarkably fine, large pinnule of *Neuropteris Scheuchzeri*, which I formerly took for *N. cordata*, and which species, so far as my observation goes, has never been found in this Northern Coal-field. Not only the *P. Bucklandi*, L. et H., but also the *Neuropteris attenuata*, L. et H., belongs to Brongniart's fine species and both are, likewise, from the same Somersetshire Coal-field.

MEGAPHYTON, Artis.

Megaphyton frondosum, Artis.

Type—*Megaphyton frondosum*, Artis, Anted. Phyt.,
pl. 20.

<i>Megaphyton frondosum</i> ,	Artis,	Anted. Phyt.,	pl. 20.
„ <i>approximatum</i> ,	L. et H.,	Foss. Flora,	pl. 116.
„ <i>distans</i> ,	L. et H.,	Foss. Flora,	pl. 117.
„ „	Sternb.,	Vers.,	pl. 46, f. 2.
„ <i>Goldenbergi</i> ,	Lesqx.,	Coal Flor. Penn.,	pl. 61,
„ „	Schimp.,	Traité,	pl. 54. f. 4.
„ <i>magnificum</i> ,	Dawson,	Quart. Jour. G.S.,	Vol. 22,
		p. 159,	pl. 8, f. 34.

173.—*Megaphyton approximatum*, L. et H.

Impression of one side of a stem, about a foot long, with four very distinct kidney-shaped scars; irregular appearance of what may be the upper portion of aerial rootlets flattened down on the surface on each side of the row of scars.

Loc.—Shale above the Low-Main Seam, Felling. (*H.C.* 321).

174.—Portion of a very broad stem, with distinct impressions of three scars, which are curved round and inward on each side towards the centre, forming a somewhat kidney-shaped cicatrix. The margins are ornamented with numerous irregular lines, which run into each other as in the preceding specimen, an appearance due perhaps to the basal attachment of rootlets or leaves.

Loc.—Shale above the Low-Main Seam, Felling. (*H.C.* 319).

Remarks.—We shall probably never know which of our common ferns was the graceful foliage of the Fern-stem which Fossil-botanists call *Megaphyton*. That *Megaphyton* was the stem of a tree-fern of goodly size there can be no doubt. If one might be allowed a conjecture in this matter, we should be led by the known size of the fronds to fix upon *Alethopteris lonchitica* as the leafy covering of this singular stem. The casts of the frond-scars of *Megaphyton*, when preserved in sandstone, are very prominent, and have a grotesque face-like appearance.

- 176.——— A very fine bifurcating small branch shewing leaf-scars and leaves.

Loc.—Shale above the Bensham Seam, Jarrow. (*H.C.* 347).

- 177.—*Lepidodendron elegans*, Brongt., L. et H.

Very fine impression of leaf-scars on portion of a large branch; the scars well preserved, and in size and shape very similar to those of *L. dilatatum*, L. et H.

Loc.—Shale above the Low-Main Seam, Felling. (*H.C.* 336).

- 178.—*Lepidodendron dilatatum*, L. et H.

Three rows of casts of leaf-scars with leaves attached of *L. Sternbergii*. The inner surface of the scars shewn.

Loc.—Shale above the Bensham Seam, Jarrow. (*H.C.* 324).

- 179.—*Lepidodendron obovatum*, Sternb.

A small but fine fragment of leaf-scars in clay-ironstone shale of this species.

Loc.—Uncertain, but like specimens from the neighbourhood of Durham (city). (*H. C.* 344).

- 180.—*Lepidodendron Sternbergii*, Brongt., L. et H.

Small slab of shale covered with numerous spore-capsules, spread separately over the surface.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* —).

FRUCTIFICATION.

- 181.—*Lepidostrobus variabilis*, L. et H. TYPE SPECIMEN, F.F., pl. 10, f. 2.

This slab is nearly covered with portions of strobili, but only four are figured; one small cone on the left of pl. 10, f. 2, two sections of cones and an imperfect cone near the lower margin of the slab. The sections on the slab are of most interest. There are two labels on the back of the slab; one illegible, the other, "Wm. Hutton. To be returned." The specimen was found in the collection without a legible, scientific name on it.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 431).

- 182.———, L. et H. This specimen has two of Hutton's labels on it, "*L. variabilis*, Jarrow, B. P., 10 and 11," but neither of the two cones on the slab can be identified with any of Hutton's figures in Fossil Flora. There is on the left hand side of the slab a small cone, about three inches long and an inch wide, and to the right a cross section of a cone shewing the central axis, and the remains of spore-scales arranged round and radiating from the centre.

Loc.—Shale above the Bensham Seam, Jarrow. (*H.C.* 438).

- 183.——, *L. et H.* This specimen is labelled by Hutton, "*L. variabilis*, Jarrow, B., D." There are two small cones on this slab. One cone, three inches long, attached to about the same length of a small branch of *L. Sternbergii*. The other cone is imperfect at the base, and slightly covered on one side by the other cone. The bracts appear to be pressed close, and there are transverse markings across with elevated irregular ridges, which indicate, perhaps, the outer margins of the spore-scales.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 444).
- 184.—— A large slab with impressions of several short fertile cones of *L. variabilis*.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 429).
- 185.—— Lower portion of a cone attached to a branch of *L. Sternbergii*.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 432).
- 186.—— Two impressions of *Lepidostrobi* upon short portions of small branches. They are apparently young immature cones. The bracts are pressed close to the body of the cones, and there is an appearance of depressed parallel lines along the length of the cones. The axis of the cone is indicated by three rows of raised scars, nearly transverse to the axis. The leaves of the branch curve off and upwards. This is probably the young state of the cone of *L. Sternbergii*, and indicates a violent removal from the parent plant.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 443).

Remarks.—This species being one of the commonest plants of the Coal-measures of this district and other Coal-fields of Great Britain, Europe, and many other countries, more is known of its external appearance, size, and, perhaps, also of its internal structure (though much yet remains to be found out), than of any other fossil plant. The roots (*Stigmaria ficoides*), the stem and leaf-scars (*Lepidodendron*), = (*Aspidiaria* and *Sagenaria*, etc., of the older authors), the branches, leaves (*Lycopodolithes*), and the cone (*Lepidostrobus variabilis*), are now, by the best authorities, acknowledged to be parts of this plant. Then the central pith, with its woody cylinder, as shewn in *Lepidodendron Harcourtii* and *Stigmaria ficoides*, is also admitted to belong to this or a closely allied species. The specimens Nos. 175—186

will give a general idea of the fructification, leaves, branchlets, branches, and leaf-scars of this species, and the synonyms quoted above, which are only a few of the best known from the oldest authors, shew how difficult it is to decipher, without error, the remains of one of the best known fossils of the Coal-measures.

Sternberg included in his *Lepidodendron dichotomum*, three species and genera of plants, viz., *Lep. Sternbergii*, Brongt. (t. 1), *Lepidophloios laricinus*=*Lep. acerosum*, L. et H. (t. 2), and *Lepidodendron longifolium* (t. 3), which is, in this Catalogue, referred to *Knorria longifolia*, Stb. sp. The name *dichotomum* was in itself objectionable, and became more so from including several species, so that Brongniart was fully justified in altering Sternberg's name for this species.

The Type-specimens of *Lepid. dilatatum*, L. et H., F. F., pl. 7, f. 2, and of *Lepid. elegans*, L. et H., F. F., pl. 118, are in the Collection of the Natural History Society, and these represent very characteristic portions of *L. Sternbergii*. The Lindley-Hutton figure, F. F., pl. 4, is, I think, a little improved in the shape of the leaf-scars, but their Plate 9 is a good representation of the branchlets of this plant. Plate 19 bis gives a good idea of the compressed leaf-cushions and leaf-scars of an old stem. Plates 112, 199 shew the leaf-scars and -cushions of large and small branches. Plate 203 gives a correct appearance of the stem of this tree, as it may often be seen on the shale roof of the Bensham seam in the Jarrow and Hebburn district. The stem of the Fossil tree figured in the F. F., pl. 54, and referred to *Sigillaria pachyderma*, Bt., is, I think, from careful examination of part of it still preserved in the Museum of the Natural History Society, a cast of the stem of this *Lepidodendron*. Recently, when it was mounted in its present position a section of the medullary cavity, surrounded with a ring of carbonaceous matter like that which is often seen in *Stigmaria*, was observed to traverse the whole length of the stem, and as this pith differs essentially in character from the pith of *Sigillaria*=(*Endogenites striata*, L. et H.), as observed in a specimen of *Sigillaria reniformis*, Bt., and as the ribs on the cast are not continuous as in the latter genus, but only partial and false, it is necessary to conclude

that the stem belongs to *Lepidodendron* and not to *Sigillaria*. It is probable that many of the upright stems observed in colliery workings and quarries, and referred to *Sigillaria*, belong to *Lepidodendron*. The height of *Lepidodendron* has been estimated at a hundred feet, but judging from the length of compressed stems seen on the shale which covers the coal in Hebburn Colliery, between thirty and fifty feet is the approximate height of this species in this Coal-field.

For remarks on *Stigmaria*, see further on.

Lepidodendron Anglicum, Presl.

Type—*Lepidodendron Anglicum*, Sternb., Vers. I., pl. 29, f. 3.

Aspidiaria Anglicum, Sternb., Vers. II., pl. 29.

Lepidodendron ,, Presl, Vers. II., pl. 68, f. 11.

187.—*Lepidodendron Anglicum*, Sternb.

Small slab of shale with impressions of subrhomboidal leaf-scars. The scars are separated by a sharp ridge, and touch each other near the broadest part; they are acuminate at both ends, and near the upper end there is a raised ridge across a tetragonal depression near the centre of each scar, below which is a deepish groove with obscure raised elevations beneath the tetragonal markings. This is probably Sternberg's *L. Anglicum*.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 338).

Remarks.—The specimen which I have referred to Sternberg's *L. Anglicum*, consists of a slab with impressions of rhombic-shaped leaf-cushions and -scars of part of an old stem of *Lepidodendron*. I am quite aware that Mr. Kidston has recently, *Trans. Roy. Soc. Edinb.*, Vol. 32, referred some specimens of *Phytolithus verrucosus*, Martin, to Sternberg's species quoted above under the name of *Stigmaria anglica*. I shall not discuss here whether the plant he has so referred is a *Stigmaria* or not, but the specimen catalogued above is most certainly part of the stem of a *Lepidodendron*, and it approaches most closely to Sternberg's figure, which at present I consider represents part of the stem of a *Lepidodendron*. In making this comparison I

have near me a specimen of *Phytolithus verrucosus* from the Somersetshire Coal-field, which is exactly like Mr. Kidston's figure, Plate 38, f. 10, in the work just quoted, and which does not, I think, belong to Sternberg's illustration of *Lepidodendron Anglicum*.

The *Lep. rhombicum*, Lesqx., Coal Plts. Penns., pl. 62, f. 4, comes close to this, if it be not identically the same species, but his figure appears to be from a branch or part of a younger stem. I have not been able to examine a figure of *Lep. serpentigerum*, figured by König, which species is, in the British Museum Catalogue, recorded from this Coal-field. This species occurs also in connection with the thin seams of coal which are intercalated with the upper beds of the Carboniferous-Limestone of Northumberland.

Lepidodendron selaginoides, Sternberg.

- Type—*Lepidodendron selaginoides*, Sternb., Vers.,
pl. 16, f. 3; pl. 17, f. 1.
Lepidodendron selaginoides, Sternb., Vers., pl. 16, f. 3; pl. 17, f. 1.
,, *aculeatum*, Sternb., Vers., pl. 6, f. 2; pl. 8, f. 1b.,
excl. pl. 14.
,, *rimosum*, Sternb., Vers., pl. 10, f. 1.
,, *undulatum*, Sternb., Vers., pl. 10, f. 2.
,, *crenatum*, Sternb., Vers., pl. 8, f. 2b.
,, *selaginoides*, L. et H., Foss. Flora, pl. 12; pl. 113.
,, *modulatum*, Lesqx., Coal Flor. Penns., pl. 64,
f. 13, 14.
Selaginites patens, Brongt., Hist. Vég. Foss. II., pl. 26.
Sagenaria cælata, Brongt., Class. Vég. Foss., pl. 1, f. 6.

FRUCTIFICATION.

- Lepidostrobus variabilis*, L. et H., Foss. Flora, pl. 10, f. 1; pl. 11
? *Lepidodendron ocephalum*, L. et H., Foss. Flora, pl. 206.

188.—*Lepidodendron rimosum*, Sternb.

Very fine impression of elevated casts of leaf-scars; the upper and lower parts of each scar with transverse wrinkled lines. The leaf-scars are separated by narrow bands of grooves, which are the impressions of the vascular bundles which surround each leaf-scar. This is the *L. rimosum* of Sternberg and others.

Loc.—Shale above the Bensham Seam, Jarrow. (H.C. —).

189.—*Lepidodendron aculeatum*, Sternb.

Impression of the network of vascular vessels which surround each leaf-scar. The casts of the leaf-scars very distinct, somewhat rhomboidal, and the apical parts on a line through the centre of the scar. Near the centre is the impression of two small oval scars placed below the central one. This specimen is probably a portion of the remains of an old large stem of *L. selaginoides*, and shews the impression of vessels within the outer cortex.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 377).

190.—The specimen shews numerous impressions of the vascular bundles running and forming a regular network between the leaf-scars. This belongs to the form designated by Sternberg and others *L. aculeatum*, but is merely the impression of very old leaf-scars of *L. selaginoides*.

Loc.—Shale above the High-Main Seam, Gosforth. (*H. C.* 378).

191.—*Lepidodendron selaginoides*, Sternb., L. et H. TYPE SPECIMEN, F. F., pl. 12.

A large branch with three smaller branches, two on the right side and one on the left; the upper branchlet on the right bifurcated; the lower on the right seems to throw off several smaller branches, which bifurcate once or twice before attaining their full length. These branchlets are covered with the straight, stiff pointed narrow leaves so characteristic of this species. The foliar impressions on the larger branch are sufficiently distinct to shew the narrow lozenge-shaped scars, with a central depression which distinguish it easily from *L. Sternbergii*. The lower branch on the right side is much injured by a tool mark, and the foliar scars on the small branches are too scale-like in the figure, which is not so accurate as could be wished. The impressions of the leaf-cushions on the large branch are not so perfect as in Hutton's figure.

Loc.—Shale above the Low-Main Seam, Felling. (*H. C.* 368).

192.—Two small terminal branches are shewn bifurcating from a larger branch. The outer cortex not preserved, but traces of leaf-scars can be made out.

Loc.—Shale above the Low-Main Seam, Felling. (*H. C.* 366).

193.—Portion of long branch, seventeen or eighteen inches long, with elongated lozenge-shaped leaf-scar, with central puncture or depression. Leaves on the slab of shale long, with distinct mid-rib and sides running. The lines of scars

nearly at right angles to the axis of the branch. *Microconchus* and other organisms on the same slab.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 369).

- 194.——— Portion of a small stem, with elongated lozenge-shaped scars.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 372).

- 195.—*Lepidostrobus variabilis*, L. et H. TYPE SPECIMEN, F.F., pl. 10, f. 1.

No label on this specimen when found in the collection. The slab has on it two other long specimens besides the one figured and the small fragment on the right of it which helps much to identify the specimen with Hutton's pl. 10, f. 1.

- 196.——— L. et H. This specimen is twice labelled by Hutton "*Lepidostrobus variabilis*, Jarrow, B., P. 10 and 11," but it cannot be identified with any of the figures given in those plates in the Fossil Flora. It is about six inches long, but not perfect at the apex, and about three-quarters of an inch broad. It shews some parts of the axis of the cone very distinctly; surface partly covered with subtetragonal markings. The capsular bracts are wanting, indicating an old mature cone. I am of opinion that the very long cones figured by Hutton, Fossil Flora, pl. 10, f. 1A, and the long cone on pl. 11, belong to *L. selaginoides* and not to *L. Sternbergii*.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 439).

- 197.—*Lepidostrobus* ——.

A very long narrow cone attached to a portion of branch with lozenge-shaped impressions. The bracts are long, pointed, ridged, and pressed close to the body of the cone. This is very probably the fructification of *L. selaginoides*, Sternb.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 434).

- 198.——— This specimen, about nine inches in length, is very similar to the preceding, and belongs undoubtedly to the same species of *Lepidodendron*.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 433).

Remarks.—I take Sternberg's figure, tab. 17, f. 1, and the Lindley-Hutton figure, F. F., pl. 113, to be the most typical of this very distinct species. The Type-specimen of the Foss. Flora Plate 113 is in the Collection of the Natural History Society, and accords in all particulars with Sternberg's figure, tab. 17,

f. 1, representing the young branches and foliage and the sharp angle of bifurcation so characteristic of this *Lepidodendron*. The specimen from which the drawing in the F. F. Plate 12 was made is undoubtedly a larger branch with branchlets of the same, and is a more trusty guide than the embellished drawing. It is difficult to comprehend why authors still continue to retain the large leaf-scars of this plant, namely, *Lep. aculeatum*, Stb., and *Lep. rimosum*, Stb., as distinct species. Those who contend that they are good and well-established species ought to be able to point out the branches and foliage of each of these, but such an investigation as this would certainly lead to the opinion that I came to long since, that they are only portions of the old stem, of which *Lepidodendron selaginoides* are the smaller branches and foliage.

After comparing the cones figured by Hutton, F. F., Plate 10, f. 1, pl. 11, with other long cones in the Collection, Nos. 197, 198, which are in a much younger state than those figured in the F. F., I have been obliged to refer them to this species. These cones appear to have been pendulous and are of great length.

ULODENDRON, Lindley et Hutton.

Ulodendron majus, Lindley et Hutton.

Type—*Ulodendron majus*, L. et H., Foss. Flora, pl. 5.

- | | | |
|----------------------------------|-----------|----------------------------------|
| <i>Ulodendron minus</i> , | L. et H., | Foss. Flora, pl. 6. |
| <i>Bothrodendron punctatum</i> , | L. et H., | pls. 80, 81, 218. |
| <i>Ulodendron Lindleyanum</i> , | Sternb., | Vers. II., pl. 45, f. 4. |
| „ <i>Stockesii</i> , | Buckland, | Geol. et Min. II., pl. 56, f. 5. |
| „ <i>Conybeari</i> , | Buckland, | Geol. et Min. II., pl. 56, f. 6. |
| „ <i>Lucasii</i> , | Buckland, | Geol. et Min. II., pl. 56, f. 4. |

199.—*Ulodendron minus*, L. et H. Counterpart of the Hutton TYPE-SPECIMEN, F. F., pl. 6.

This counterpart has two labels on it by Hutton, the original one, “*Ulodendron minus*, So. Shields, P. 6,” and a larger label on the back, written by Hutton after his return to Newcastle in 1855-6. Notwithstanding the labels, it is not the actual specimen figured, for in Foss. Flora, p. 6, L. et H. say, “The

stem has been pressed flat, and both sides of it are preserved in the specimen figured; on the opposite to that which has been drawn is a similar row of scars, having the same arrangement." This slab is ten inches in length, and there are four perfect circular scars and portion of two others on this slab, varying from an inch and a half to an inch and a quarter in diameter; and the best preserved have a distinctly defined circular depression in the centre, and indistinct lines radiating from it to the margin of the disc-like scar. The impression is in a carbonaceous layer on a hard matrix of gritty shale, divided by thin leaves of coal. The scars are slightly raised, being depressed in the Hutton drawing. The leaf-scars or scales not clearly defined, but of rhomboidal shape. This specimen should be carefully figured.

Loc.—Shale above High-Main Seam, So. Shields. (*H.C.* 395).

- 200.—— This specimen is from the same locality and horizon of the Coal-measures as the last, and is most likely a portion of the same plant, preserved in carbonaceous matter on a very fine block of shale. The surface of this impression is probably cast of an inner layer of the cortex. There are indications of four large scars, the central parts of which are most distinct, but like the rest of the surface covered with short raised lines or ridges, corresponding to the depressed punctures seen on *Bothrodendron punctatum*, L. et H. On one part of the slab the leaves are shewn distinctly, and apparently united to the leaf-scars. Specimen about seven inches in length.

Loc.—Shale above High-Main Seam, So. Shields. (*H.C.* 394).

- 201.—*Ulodendron majus*, L. et H.

Impression of the inner surface of three or four scars, and with very distinct appearance of the leaves arising from the scars on one side; the leaves curve upwards, and then downwards, are broadish at the base, and with a distinct midrib. They are an inch and a half long, and resemble those of *L. Sternbergii*.

Loc.—Shale above the Bensham Seam, Jarrow. (*H.C.* 397).

- 202.—— Impression of the inner surface of the cortex in coal, on which is seen the shape of three large scars, with hollows radiating from the centre of each scar, in which is a circular aperture, indicating the passage by which the vascular bundles have passed through the scars; the rest of the surface covered with impressions of the small rhomboidal leaf-scars.

Loc.—Shale above the Bensham Seam, Jarrow. (*H.C.* 392).

- 203.——— Part of a compressed stem, about fifteen inches long, with remains of five scars on each side, and where the cortex is preserved with distinct rhomboidal markings; beneath the cortex the surface is distinctly punctured. The scars are arranged rather closely on both sides of the specimen, and are alternate, or nearly so.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 383).
- 204.——— Two large scars on each side of a compressed stem, with distinct rhomboidal leaf-scars, in the centre of which is a small elongated puncture. There is a fracture across one of the scars, caused probably by pressure after fossilization.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 382).
- 205.—*Bothrodendron punctatum*, L. et H.
Impression of a very large scar, nearly six inches long and four wide, and nearly oval in outline. The surface round the scar very distinctly punctured.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 399).
- 206.——— Impression of one small oval scar.
Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 401).

Remarks.—Neither of the Lindley-Hutton Type-specimens was found in the Collection, but the counterpart of *U. minus*, Plate 6, from South Shields, and a specimen with smaller scars from the same locality, are still in the Collection. No. 202 very much resembles in size and general appearance Plates 80, 81 of the Fossil Flora, and Nos. 205, 206 are good examples of the larger scars like Hutton's figure Plate 118 of *Bothrodendron punctatum*. It seems to me that the row of oval scars on each side of the stem and branches is the chief generic character of the genus *Ulodendron*, and that it is not possible to group the present species *U. majus* with *Sigillaria* proper, and *U. Veltheimianum* with *Lepidodendron*, without doing injury to the classification and affinity of these two plants, which belong, so far as I have been able to ascertain, the one, *U. majus*, to the Coal-measures, and the other, *U. Veltheimianum*, to the Carboniferous-Limestone series, at least this is the mode of their occurrence in Northumberland.

The larger scars figured by Lindley-Hutton as *Bothrodendron punctatum* are only specimens, which shew a layer of the inner

cortex on which the small apertures for vessels connected with the leaf-scars are preserved. It is much to be regretted that many authors still consider these large stem-scars of *Ulodendron majus* as a good genus and species. A short examination of good specimens would soon dispel this illusion.

The most interesting question connected with *Ulodendron* is what are these large oval scars? that run, so far as we know, from the very base of the stem, and must therefore have been present in the young state of the plant, to the highest part, and even along the branches, for bifurcations in *Ulodendron* are known. The earliest suggestion was that they are the bases of fertile cones which have dropped off and left their scars behind. As these scars seem to have been present even on the youngest plants this suggestion seems improbable, and, besides, no cone has been found associated with these stems that would correspond to the size and shape of even the smallest scars. Are they then frond-scars? surfaces similar to the large scars of giant tree-ferns. This seems to me the most plausible suggestion, but no support is given to it by the remains found in connection with this plant. Another suggestion occurs, and that is, have aerial roots been attached to these scars like the rootlets seen on the stems of some species of recent Lycopods? We have no absolute proof of this, and, indeed, all we know of *Ulodendron* is limited to impressions of the bark, of the stem, of the leaf-scars, and of the leaves which are sometimes attached to portions of the stem, and which bear a strong resemblance to the leaves of *Lepidodendron*.

LEPIDOPHLOIOS, Sternberg.

(*HALONIA*, L. et H.)

Lepidophloios laricinus, Sternberg.

Type—*Lepidodendron laricinum*, Sternb., Vers., pl. 11,
f. 2, 3, 4.

Lepidodendron dichotomum, Sternb., Vers., pl. 2.
" *acerosum*, L. et H., Foss. Flora, pl. 7, f. 1; pl. 8.
Lepidostrobus pinaster, L. et H., Foss. Flora, pl. 198.
Pinus anthracina, L. et H., Foss. Flora, pl. 164.
Lepidophloios laricinus, Schimp., Traité, pl. 59, f. 4; pl. 60,
f. 11, 12.

- Lepidophloios laricinus*, Zeiller, Vég. Foss. Terr. Houill.,
pl. 172, f. 5, 6.
- Halonía laricinus*, Carruth., Geol. Mag., Vol. 10, pl. 7.
 „ *gracilis*, L. et H., Foss. Flora, pl. 86.
 „ *regularis*, L. et H., Foss. Flora, pl. 228.
 „ *gracilis*, Brongt., Hist. Vég. Foss., pl. 28, f. 4.
 „ *tortuosa*, L. et H., Foss. Flora, pl. 85.
 „ *tuberculata*, Brongt., Hist. Vég. Foss., pl. 37,
f. 1, 2, 3.

207.—*Lepidodendron acerosum*, L. et H.

Portion of branch and leaves; the leaf-scars on the branch are lozenge-shape or rhomboidal, and borne on small elevated cushions. The leaves are long, gradually tapering to a point, and with a single midrib. On the slab the leaves are arranged as if radiating from a stem.

Loc.—Shale above the Bensham Seam, Jarrow. (*H.C.* 826).

208.— Portion of small branch, which divides into two branchlets; the one to the left bare, the other with long leaves attached to the end. The surface of the branches covered with small elevated cushions, terminating with rhomboidal shaped leaf-scars. The leaves are long, narrow-pointed, and with a central midrib, and form a brush-like termination to the branch, as in Hutton's figures. No one ought to doubt the identity of these branchlets with the small branch figured as *Halonía gracilis*, Foss. Flora, pl. 86, even though no lateral cone ?-scars are seen.

Loc.—Shale above the Bensham Seam, Jarrow. (*H.C.* 330).

209.— A few long narrow leaves, radiating from obscure fragments of stem and leaf-scars; the disarranged parts of a small stem. There are several fragments of a small bivalve shell, *Anthracosia*, on the same surface, shewing the submerged position of these fragments before fossilization.

Loc.—Shale above the Bensham Seam, Jarrow. (*H.C.* 327).

210.— Small portion of compressed stem, with the leaf-cushions and scars obscurely indicated; but no one could doubt that this stem is identically the same species as the one figured in the Foss. Flora, *L. acerosum*, Plate 7, f. 1.

Loc.—Shale above the Bensham Seam, Jarrow. (*H.C.* 412).

211.—*Lepidostrobus pinaster*, L. et H. TYPE SPECIMEN, F.F., pl. 198.

This is a small portion of a branch of *Lepidophloios laricinus*, Sternb. The leaves represented on the sides of the branch in

the figure pl. 198, Foss. Flora, are due to the conchoidal fracture of the shale and the bad observation of the draughtsman. The rhomboidal or lozenge-shaped leaf-scars on the foliar cushions stand out rather prominently and distinct. There was no label on this specimen when found in the collection, but it is fortunate that it was carefully conserved. Presented to Hutton by Dr. Stevens, North Shields.

Loc.—Shale above High-Main Seam, So. Shields. (*H.C.* 454).

212.—*Pinus anthracina*, L. et H. TYPE SPECIMEN, F. F., pl. 164.

This specimen was presented to Hutton by John Buddle, the eminent coal-viewer, and contributor of several valuable papers connected with coal-mining to the Transactions of the Natural History Society. It is a cast in a very coarse mixture of sand and small, rounded, clay-ironstone nodules, resembling a conglomerate. Similar deposits occur in different parts of this Coal-field. This celebrated specimen is the only instance given of a cone of the genus *Pinus* in the Coal-measures by writers and compilers on Carboniferous Fossils. It is in reality only an impression of shape of the leaf-cushions of Sternberg's *Lepidophloios laricinus*. There are about fifteen of these cushions on the specimen, and they are so preserved as to give the appearance of a genuine cone, but Hutton's figure brings out more prominently than the original warrants the cone-like appearance of this curiously preserved fossil.

Loc.—Newcastle Coal-field. (*H.C.* 538).

213.—*Halonia regularis*, L. et H.

A fine bifurcating impression in shale, with the cone?-scars or tubercles very numerous and distinctly marked, and slight impressions of the leaf-scars.

Loc.—Shale above the Bensham Seam, Jarrow. (*H.C.* 418).

214.— A bifurcating impression, similar to the last-mentioned, with the tubercles or cone?-scars distinctly marked.

Loc.—Shale above the Bensham Seam, Jarrow. (*H.C.* 419).

215.— Impression in shale, with the tubercles and leaf-markings distinct.

Loc.—Shale above the Bensham Seam, Jarrow. (*H.C.* 417).

216.—*Lepidophyllum lanceolatum*?

A short branch with terminal tuft of leaves of *Lepidophyllum*.

Loc.—Shale above the Bensham Seam, Jarrow. (*H.C.* —).

217.—*Lepidophyllum lanceolatum*, L. et H. TYPE SPECIMEN, F.F., pl. 7.

There are two *Lepidophyllum* leaves on the slab. The one figured is about an inch and three-quarters long, with a distinct thickened midrib. The other leaf is smaller and placed edgewise in the shale.

Loc.—Shale above the Bensham Seam, Jarrow. (*H.C.* 455).

218.——— A large, nearly perfect bract or leaf of the fertile spike, with strong midrib, and part of the triangular spore-plate or -scale attached to the base of the leaf.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 458).

Remarks.—No one ought to have any difficulty in admitting that the specimens figured as *Lepidodendron dichotomum*, Sternb., Vers., tab. 2, and the specimens figured by Lindley-Hutton, Fossil Flora, Plate 7, f. 1, and Plate 8, represent corresponding parts of the same genus and species of fossil plant. They represent also, I think, younger branches and leaves of the stems referred to *Lepidophloios laricinus*, Sternb. The *Halonias gracilis*, Foss. Flora, Plate 86, copied by Brongniart, from Low Moor, Yorkshire, is no doubt the same species as *L. acerosum* of the same authors; and the *Lepidostrobus pinaster*, Plate 198, is undoubtedly a small portion of the stem of the same plant, which in Hutton's figure the artist has furnished with leaves, representations merely of fractures on the surface of the shale. *Pinus anthracina*, L. et H., Fossil Flora, Plate 194, represents the leaf-cushions of a small piece of the stem of *L. laricinus*, preserved in a matrix of rough conglomerate from the Coal-measures. Mr. Kidston refers *L. acerosum*, L. et H., and *Lepidostrobus pinaster*, L. et H., to the *Lepidophloios carinatus*, Weiss, but I consider these to be small branches of *L. laricinus*; and the leaf-scars in *L. acerosum* of the above Nos. 207—210 have these scars near the apex and not at the base of the leaf-cushions, and therefore I think that these leaf-scars in the drawing of *Lepidostrobus pinaster*, L. et H., F. F., Plate 198, are not shewn in their true position, and further, the drawing copied from Goldenberg by Schimper, Plate 64, f. 4, is, I think, not reliable as to the true position of the leaf-scars of this plant. The specimens of *L. acerosum* quoted above have tufts of leaves at their extremity,

so that no mistake can arise about the true position of the leaf-scars, but the disordered state of Goldenberg's figure leaves much doubt as to the true position of the scars. After long and careful examination of the specimens Nos. 207-9 in the above list, I am unable to adopt the opinion of Dr. Macfarlane and Mr. R. Kidston that the leaf-cushions and leaf-scars are directed downwards in *Lepidophloios*.

The large fossil stems figured by Lindley-Hutton under the generic name *Halionia regularis* are now by many considered the fertile or cone-bearing branches of *Lepidophloios*. Most of these large stems found in this district occur in sandstone quarries as casts, the cortex consisting of a mass of carbonaceous matter shewing very little or no structure. Some of these large stems bifurcate, and most of them are covered with large tubercles or knobs, of hemispherical shape, more or less regularly arranged along or round the stem.

It is very probable that the *Lepidostrobus ornatus*, F. F., pl. 26, represents an old cone or fertile-spike of this plant, to which may be added the two cones figured in the Ill. Foss. Plts., pls. 55, 56.

Lepidophloios sp.

STROBILUS OR CONE.

219.—*Lepidostrobus* ———?

The strobilus is nearly circular, with *Lepidophyllum* leaves attached to it. There is a *Lepidophyllum* leaf resembling *L. lanceolatum* on the same slab of limestone.

Loc.—Calcareous sandstone series, Burdie House, Edinburgh.
(H. C. —).

Remarks.—This is a very interesting fertile cone, the body of which is nearly oval, and covered with small, *Lepidophyllum* leaves, which are pressed together and terminate upwards in a sharp point. Near the cone is a leaf much like *Lepidophyllum lanceolatum*, L. et H., referred to the last species, but it seems desirable to keep this cone separate till more is known of this obscure genus of fossil plants, and of the species that occur in the Burdie House Limestone.

KNORRIA, Sternberg.

Knorria Volkmannianum (Sternberg, sp.)

Type—*Lepidodendron Volkmannianum*, Sternb., Vers. I, pl. 53, f. 3.

STEM.

- | | |
|---|---|
| <i>Lepidolepis imbricata</i> , | Sternb., Vers. I., pl. 27. |
| <i>Knorria</i> „ | Sternb., Vers. I., pl. 38. |
| „ <i>Selloni</i> , | Sternb., Vers., pl. 57. |
| „ „ | L. et H., Foss. Flora, pl. 97. |
| „ „ | Boulay, Terr. Houill. Nord France, pl. 4, f. 3, 3 bis |
| <i>Lepidodendron Volkmannianum</i> , Stur, | Culm Flora, Heft II., taf. 18, f. 4; taf. 23, f. 2, 4, 5, only. |
| <i>Sagenaria Volkmanniana</i> , | Sternb., Vers. II., t. 68, f. 8. |
| „ <i>affinis</i> , | Sternb., Vers. II., t. 68, f. 9. |
| <i>Lepidodendron Volkmannianum</i> , Brongt., | Prod., p. 85. |

FOLIAGE.

- | | |
|------------------------------------|--|
| <i>Lepidodendron longifolium</i> , | L. et H., Foss. Flora, pl. 161. |
| ? „ <i>dichotoma</i> , | Sternb., Vers. I., pl. 3. |
| <i>Sagenaria</i> „ | Geinitz, Vers. Steinkf. Sachs., pl. 3, f. 1. |

220.—*Knorria Sellonii*, L. et H. TYPE SPECIMEN, F. F., pl. 97.

Hutton's label, "Felling, L. M.," is attached to this specimen. There is no generic or specific name, merely the above, and it was found among the numerous unarranged specimens. It is so badly figured in plate 97 that one might be inclined to doubt the identity of the specimen with the plate 97, but the number of rows of scars is the same on each, and there are other unmistakable evidences that the drawing has been made from this specimen, although the drawing is inverted and the shading of the leaf scars erroneous. It would seem that the drawing only was sent to Lindley and that he has described from it, otherwise he would not have said, p. 42, "The place of the processes is occupied by flattened projections, broke at their ends, and marked by a very shallow furrow which passes from the point downwards, losing itself on the surface of the stem." In the specimen, instead of a very shallow furrow, there is a distinct ridge proceeding upwards three-eighths of an inch till it is lost on the general surface, and two furrows, one on each side of the ridge, deep at their origin near the

scar and disappearing with the ridge above. The similarity of these numerous scars is remarkable, as they vary only in appearance close to the right and left sides, where in one or two instances the central ridge is absent and the two depressions are thrown together in a broadish furrow. This appearance is exactly the reverse of what is shewn in the drawing, yet the drawing has not been made from the counterpart. If these surface impressions were due to cylindrical processes alone, we could not have expected to see such a series of uniformly regular markings. As figured, pl. 97 B, the entire surface is covered with fine wrinkled lines which is very characteristic of *Knorria*, but which I have seen in no other fossil plant, though some of the specimens which are classed here with *Cordaitea* have a minute shagreen appearance, which occasionally runs into short lines but differs from *Knorria*, and there is a transverse wrinkling shewn on Boulay's *Rhytidodendron*, but the direction differs entirely from this. These appearances make it hard to believe that *Knorria* is only the impression of an internal layer or state of preservation of a species of *Lepidodendron*, and that the scars on the surface are due merely to vessels passing from the medullary sheath or axis to the cortex. There are nearly one hundred leaf-scars on the surface of this specimen.

Loc.—Shale above the Low-Main Seam, Felling. (*H. C.* 408).

221.—*Lepidodendron longifolium*, Brongt., L. et H. TYPE SPECIMEN,
F. F., pl. 161.

No one would recognise this specimen at first sight from the drawing given of it by Lindley and Hutton in *Foss. Flora*, but there can exist no doubt that it is the genuine specimen from which the drawing was made, as it bears Hutton's own label and answers to the figure in some other particulars, although it is so badly represented. The large slab bears the impression of a small portion of a branch with a dense tuft of narrow elongated leaves more than a foot in length. On the back of this specimen there is one of Hutton's original labels, on which is written, "*Lepidodendron longifolium*, Felling, L.M.," in Mr. Hutton's own handwriting.

Loc.—Shale above the Low-Main Seam, Felling. (*H. C.* 362).

222.—*Cyperites* ————?

There are a few long acicular leaves, some with a midrib and others with numerous longitudinal lines and other organisms on this slab. The leaves have some resemblance to those

figured on Plate 43, Foss. Flora. "E. 5" on a label at the back of this specimen.

Loc.—Shale above High-Main Seam, Gosforth? (H.C. 668).

Remarks.—The Lindley-Hutton, comet-tail-like figure of their *Lepidodendron longifolium*, Plate 161, would puzzle any one, and the figure given by Sternberg, Vers., pl. 3, and which is referred to by Brongniart and Lindley-Hutton as the Type of this species, seems to be also very inaccurately represented and not at all reliable for comparison. With the help of the specimen No. 221 and two others, in the Collection of the Natural History Society, some of the characters of this fossil can be made out. These specimens appear to be terminal, rounded branches furnished with a dense tuft of long leaves. The leaves are nearly a foot long, linear, broad, and covered with numerous strong furrows or ridges which gradually run up into a fine point. In some of these the leaf-scar is imperfect, as if the base of the leaf had been broken off as in *Knorria imbricata*, but in one the leaf-cushions are distinctly seen, small as in those of *Lepidophloios*, which they resemble, but truncate at the top and with a narrow spindle-shaped leaf-scar; the compression of the leaves over this surface renders the impression of these rather indistinct, but they are visible enough to enable one to compare them with the impressions of the leaf-scars figured by Stur, Culm Flora, Heft. II., pl. 18, fig. 4, with which they seem to be identical. At least, I have no hesitation in referring *Lepidodendron longifolium* to the *Lepidodendron Volkmannianum* of Sternberg and others, but it cannot be grouped with *Lepidodendron*, as the leaves and scars are very different. *Knorria imbricata*, Stb., is, I do not doubt, only a larger branch of this species, shewing a peculiar state of preservation of the base of the leaves.

Badly as the Lindley-Hutton figure of *Knorria Selloni*, F. F., pl. 97, represents the original specimen No. 221, no one will, I think, question the identity of it with Sternberg's figure, Vers. I., pl. 57, and they appear to be only representations of portions of the stem differently preserved of the plants referred to above. It seems desirable at present, till more information can be obtained, to retain for them the generic name *Knorria*.

Sub. gen. FAVULARIA, Sternberg.

[*Favularia tessellata* (Steinhauer, sp.), Plate 4, f. 1.]*Type*—*Phytolithus tessellatus*, Trans. Amer. Phil. Soc.,
Vol. I., pl. 7, f. 2.

<i>Favularia tessellata</i> ,	L. et H., Foss. Flora, pls. 73, 74, 75.
„ <i>nodosa</i> ,	L. et H., Foss. Flora, pl. 192.
„ <i>elegans</i> ,	Sternb., Vers., pl. 52, f. 4.
„ <i>ichthyolepis</i> ,	Sternb., Vers., pl. 38, f. 2b.
<i>Palmacites hexagonatus</i> ,	Schloth., Petref., pl. 15, f. 1.
„ <i>variolatus</i> ,	Schloth., Petref., pl. 15, f. 3a-b.
<i>Aspidiaria variolata</i> ,	Sternb., Vers. II., pl. 68, f. 12.
	Parkin., Org. Rem., pl. 5, f. 8.
<i>Lepidodendron alveolare</i> ,	Sternb., Vers., pl. 9, f. 1a-b.
<i>Sigillaria tessellata</i> ,	Brongt., Hist. Vég. Foss., pl. 156, f. 1; pl. 162, f. 1, 2, 3, 4.
„ „	Lesqx., Coal. Flor. Penns., pl. 72, f. 2-4.
„ <i>elegans</i> ,	Brongt., Hist. Vég. Foss., pl. 146, f. 1; pl. 158, f. 1.
„ <i>Knorrii</i> ,	Brongt., Hist. Vég. Foss., pl. 156, f. 2, 3; pl. 162, f. 6.
„ <i>hexagona</i> ,	Brongt., Hist. Vég. Foss., pls. 155, 158, f. 1.
? „ <i>alveolaris</i> ,	Brongt., Hist. Vég. Foss., pl. 162, f. 5.
„ <i>minima</i> ,	Brongt., Hist. Vég. Foss., pl. 158, f. 2.
„ <i>ornata</i> ,	Brongt., Hist. Vég. Foss., pl. 158, f. 8.

Remarks.—There were only three specimens of this species found in the Hutton Collection, and none of these were taken for the Natural History Society, but were left for the College of Physical Science, in which Museum they are conserved. When examining and naming the Collection of Coal-measure Plants in the Natural History Society's Collection, I came upon the specimen (reduced in size since Hutton's drawing was made) figured by Hutton, Foss. Flora, pl. 75, and its counterpart. It shews only the interior impression of the leaf-scars, with a strong divisional groove or ridge between them and a central depression in each scar, the passage for the foliar vessels. It was from the shale above the Bensham Seam, Jarrow Colliery.

The specimen figured on Plate 4, f. 1, is in the Collection of the Natural History Society. It shews the varied appearances

of the leaf-scars according to the state of preservation. As the leaf-scars of this species present some peculiarities in their arrangement, and have a divisional ridge or groove between them, Sternberg's *Favularia* is retained to indicate these generic differences until more information can be obtained about this fossil stem.

The *Sigillaria Eugeniei*, Stur, Culm Flora, Heft II., taf. 25, f. 3, approaches this species so closely, if we may judge from the figure, as almost to lead to the conclusion that they are identical.]

SIGILLARIA, Brongniart.

(*SYRINGODENDRON*, *RHYTIDOLEPIS*, Sternb.)

Sigillaria scutellata, Brongniart. Pl. 5, f. 1. Woodcut No. 6.

Type—*Sigillaria scutellata*, Brongt., Class. Vég. Foss., pl. 1, f. 4.

Sigillaria scutellata, Brongt., Hist. Vég. Foss., pl. 150, f. 2, 3; pl. 163, f. 3.

„ *pachyderma*, Brongt., Hist. Vég. Foss., pl. 150, f. 1.

„ *Candollii*, Brongt., Hist. Vég. Foss., pl. 150, f. 4.

„ *mammillaris*, Brongt., Hist. Vég. Foss., pl. 163, f. 1.

„ *pyriformis*, Brongt., Hist. Vég. Foss., pl. 153, f. 3, 4.

„ *pachyderma*, L. et H., Foss. Flora, pl. 55 (excl. 54).

223.—*Sigillaria pachyderma*, L. et H. TYPE SPECIMEN, F. F., pl. 55.

The slab of shale covered with the ribbed impressions of this *Sigillaria* is nearly nine inches long and six inches wide. There are fourteen ribs in this width, ornamented with casts of scars an inch apart. The scars are suboval in shape, wider and rounder at the lower end, with impressions of two distinct, elongated slits or openings for vessels near the centre. The surface with impressions of fine longitudinal striæ. It is a cast in shale, free from any carbonaceous matter. Hutton's drawing, Foss. Flora, pl. 55, gives a very erroneous idea of this well-preserved specimen. That of the Fossil Tree, figured originally in the Trans. Nat. Hist. Soc., Vol. I., p. 206, and by Hutton, Foss. Flora, pl. 54, is not, I think, referable to *Sigillaria* but to *Lepidodendron*. Hutton's label, "*Sigillaria pachyderma*. P. 55."

Loc.—Low-Main Seam, Killingworth Colliery, near Newcastle-on-Tyne. (H. C. 476).

Remarks.—Brongniart's *S. scutellata* and not *S. pachyderma* must be taken as the Type of this genus. This is clearly enough pointed out by Brongniart himself in the Classification and Distribution of Fossil Plants.

The Lindley-Hutton figure of their *S. pachyderma* is very inaccurately figured, as the annexed Woodcut No. 6 will clearly shew. The Type-specimen is the cast of an inner layer of the cortex, shewing the impressions of the inner appearance of the elongated leaf-scars.

The Fossil Tree, figured originally in the Trans. Nat. Hist. Soc., Vol. I., p. 206, and by Hutton, Foss. Flora, pl. 54, is not, I think, referable to *Sigillaria* but to *Lepidodendron*. The smoothness of the stem and the markings on the bifurcating root, pl. 54, f. 2, alone prove this. This tree-stem is in the Museum of the Natural History Society. It shews merely the impression of an inner surface of the cortex; the surface is either quite



Storey del Woodcut No. 6. J. T. H. sc.

smooth or with a few false ribs here and there, but it has nothing like the true ribs and the apertures for vascular bundles of the leaf-scars, as seen in the stems of old *Sigillaria*. The pith or medullary sheath, surrounded with a layer of carbonaceous (woody) matter, traversed the length of the stem as far as it could be examined, and seemed to be identical in structure with the central axis of *Stigmaria*, and was not at all like the pith,

Endogenites, L. et H., found occasionally in the stems of *Sigillaria*. Sternberg's figure of *Syringodendron organum*, Vers., taf. 13, f. 2, is a representation of an inner layer of the cortex of *Lepidodendron*, shewing the false ribs similar to those on this stem, but with the small apertures for the foliar vessels of the leaf-scars.

The Woodcut Plate 5, f. 1, is an impression of a small portion of a young stem of this species, shewing the somewhat distorted impressions of the leaf-scars of this species. Woodcut No. 6 is a drawing of a small portion of the Lindley-Hutton Type-specimen, which will shew how inaccurate their figure F.F., pl. 55, is.

Sigillaria reniformis, Brongniart. Pl. 4, f. 2. Woodcuts 4, 5.

STEM AND LEAF-SCARS.

Type—*Sigillaria reniformis*, Brongt., Hist. Vég. Foss., pls. 142, 160.

<i>Sigillaria Saulii</i> ,	Brongt., Hist. Vég. Foss., pl. 151.
„ <i>orbicularis</i> ,	Brongt., Hist. Vég. Foss., pl. 152, f. 5.
„ <i>lavigata</i> ,	Brongt., Hist. Vég. Foss., pl. 143.
„ <i>reniformis</i> ,	L. et H., Foss. Flora, pl. 57; 71.
„ <i>alternans</i> ,	L. et H., Foss. Flora, pl. 56.
„ <i>catenulata</i> ,	L. et H., Foss. Flora, pl. 58.
„ <i>monostachya</i> ,	L. et H., Foss. Flora, pl. 72.
„ <i>flexuosa</i> ,	L. et H., Foss. Flora, pl. 205.
? „ <i>Murchisoni</i> ,	L. et H., Foss. Flora, pl. 149.
„ <i>oculata</i> ,	L. et H., Foss. Flora, pl. 59.
„ <i>organum</i> ,	L. et H., Foss. Flora, pl. 70.
<i>Syringodendron alternans</i> ,	Sternb., Vers. I., taf. 58, f. 2.
„ <i>complanatum</i> ,	Sternb., Vers. I., taf. 31, f. 2.
„ <i>Boghalense</i> ,	Sternb., Vers. I., taf. 37, f. 5.
„ <i>pulchellum</i> ,	Sternb., Vers. I., taf. 52, f. 2.
? <i>Palmacites oculatus</i> ,	Schloth., Petref., taf. 17, f. 1.
„ <i>sulcatus</i> ,	Schloth., Petref., taf. 16, f. 1.
„ <i>canaliculatus</i> ,	Schloth., Petref., taf. 16, f. 2.
<i>Euphorbites vulgaris</i> ,	Artis, Anted. Phyt., pl. 15.

PITH.

Endogenites striata, L. et H., Foss. Flora, pl. 227A.

224.—*Sigillaria reniformis*, L. et H. TYPE SPECIMEN, F. F., pl. 57.

There are two labels by Hutton on this slab. The original one "*Sigillaria reniformis*. P. 57." I think this specimen has been obtained from the Cramlington district. It is a compressed impression of four broad ribs on both sides of the slab of shale. The ribs are an inch and a half broad, with six scars. The scars are double, and are evidently the very enlarged slits seen on the leaf-scars of younger and better preserved specimens. The surface of the shale is finely striated longitudinally, and on the side figured bears traces of some insect burrows in the inner surface of the original bark, as seen on the figure, pl. 57.

Loc.—Coal-measures, Newcastle. (H. C. 484).

225.—*Sigillaria alternans*, L. et H. TYPE SPECIMEN, F. F., pl. 56.

The original label on this specimen is "*Sigillaria alternans*, Cramlington. P. 56." In a carbonaceous matrix. A row of five double scars or oval apertures, through which the foliar vessels passed to the leaves. These apertures are very oval and apart, which partly arises from long maceration and partly from the circumstance that these fissures on the stems of old *Sigillariae* are larger and much wider apart than they are on younger stems.

Loc.—Cramlington. (H. C. 487).

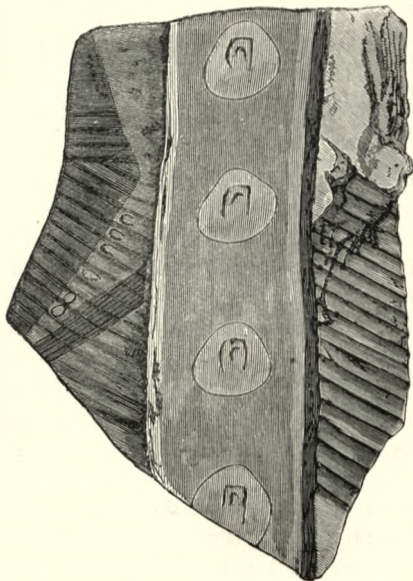
- 226.—— This is only a part probably of the Type-specimen, which, being in coal, had been broken into several pieces, which could not be fitted together or repaired. The impression consists as in the last of rows of double scars or oval fissures, very large and separate from each other. The division between the ribs slickened and nearly obliterated. This appearance is due to the decomposed state of the plant previously to being fossilized.

Loc.—Cramlington. (H. C. 487).

227.—*Sigillaria catenulata*, L. et H. TYPE SPECIMEN, F. F., pl. 58.

It is labelled by Hutton "*Sigillaria catenulata*, Jarrow, B. P. 58;" but it is a very doubtful Jarrow specimen, and the matrix is more like the Killingworth and Cramlington specimens. It is in a carbonaceous matrix. Two rows of twelve ovate apertures on two very broad ribs. The two large, vascular fissures formed into one on this specimen from maceration and subsequent compression during mineralization. This is only one of the many appearances of the bark of *S. reniformis*.

Loc.—In Coal, Jarrow Colliery. (H. C. 491).

228.—*Sigillaria reniformis* (Woodcut No. 5).

Woodcut No. 5.

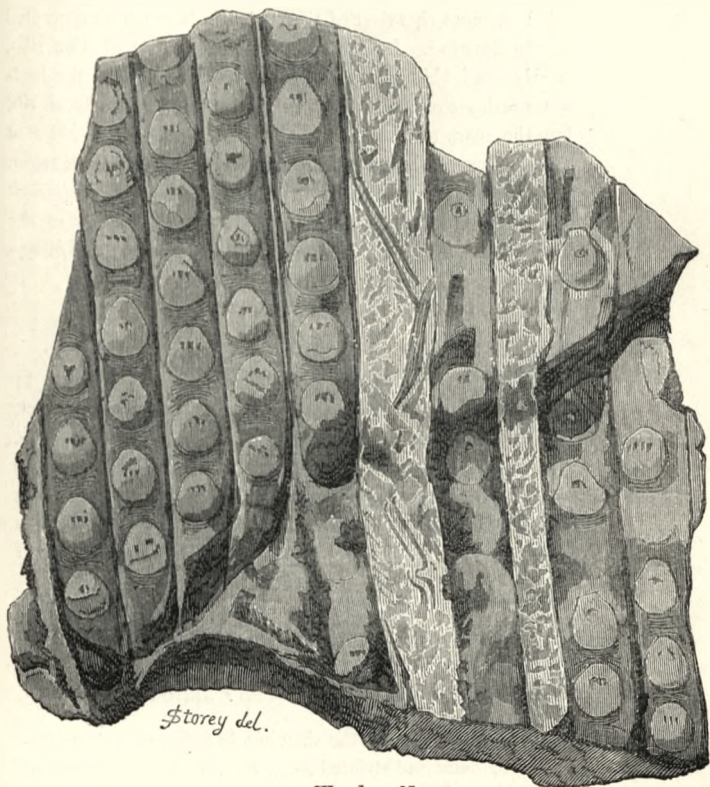
Impression of a very small portion of the outer cortex of a single rib of a stem similar to No. 229. The impression is finely longitudinally striated, and has four leaf-scars or foliar cicatrices, which are large, sub-ovate in the compressed state, and with a rounded slightly angular appearance on the sides. There is a small raised tubercle half-way between the central part of the scar and the upper margin, and on each side of it an elongated curved line, which are impressions of fissures by which vessels have passed through to the leaves. The foliar scars are about half an inch distant. The width of the compressed rib three-quarters of an inch fully.

Loc.—Shale above the Bensham Seam, Jarrow. (*H.C.* 470).

229.— One rib, nearly an inch wide and eight inches long, with seven finely-preserved sub-ovoid leaf-scars, in the upper part of which scar are two longitudinal, crescent-shaped slits, with a small circular depression between them. The scars are large, and three-quarters of an inch from each other, much compressed, and the original shape slightly enlarged and distorted by pressure during mineralization.

Loc.—Shale above the Bensham Seam, Jarrow. (*H.C.* 467).

230.—*Sigillaria Saulii*, Brongt. (Woodcut No. 4).



Woodcut No. 4.

The specimen is preserved on a fine light-coloured shale. There are remains of eight narrow ribs, three of these ribs are broken off and separate. The ribs are narrow, and bear the impressions of numerous leaf-scars very distinct and near to each other. The leaf-scars are ovate, and with a circular dot and a crescent-shaped slit on each side of it. This is the young state of *S. reniformis*, with the impression of the outer side of the cortex well preserved.

Loc.—Uncertain; Fawdon? (*H. C.* 465).

231.—*Sigillaria flexuosa*, L. et H. TYPE SPECIMEN, F. F., pl. 205.

Hutton's drawing is very incorrect, and gives a poor idea of the impressions of the leaf-scars and the casts of the numerous

fine vessels connected with the leaf-scars within the outer cortex, which are impressed minutely on this slab. The somewhat flexuose character of these vessels is much exaggerated in the drawing. It is an impression in shale of nine ribs, nearly five inches long and nearly one broad, with the leaf-scars rather close, and about nine on the longest piece of rib, but the scars are not all equally distant; from the sides of each scar curved lines run off on each side towards the margin. It is merely one of the many forms in which *S. reniformis* is preserved in the shales and carbonaceous deposits of the Coal series. Hutton label on the back, "*Sigillaria*, Killingworth Colliery. To be returned."

Loc.—Killingworth. (*H. C.* 489).

232.—*Sigillaria organum*, L. et H. TYPE SPECIMEN, F. F., pl. 70.

No Hutton label on this specimen, which is rather larger by three ribs than Hutton's figure. Portion of bark or cortex, with thirteen or more impressions of broadish ribs, on shale, with small part, three ribs, of an inner-layer of the cortex carbonized. The ribs indicate indistinctly along the centre a row of depressed double punctures three-quarters of an inch or more apart. The Figure, pl. 70, gives an erroneous idea of the shape of the scars. I have no doubt of the identity of this with *S. organum*, Stb., but it is merely a young state of *P. reniformis*. The specimen is referred with doubt to the Bensham seam.

Loc.—Shale above the Bensham Seam? Jarrow. (*H. C.* 490).

233.—Remains of seven ribs shewing indistinct reniform impression of scars and striated lines, the impressions of part of the vascular system of the plant, identically the same species as the last.

Loc.—From the Cramlington or Killingworth district. (*H. C.* 469).

234.—*Sigillaria oculata*, L. et H. TYPE SPECIMEN, F. F., pl. 59.

Slab of shale, nine inches long, with impression of five ribs, half an inch wide, with indistinct impressions of ovate-shaped scars, not oval as in the drawing, pl. 59, in the centres of which are two elongated slits or depressions. The whole surface of the ribs covered with fine longitudinal lines or furrows. Two Hutton labels on this specimen, the oldest "*Sigillaria oculata*, Killingworth, pl. 59."

Loc.—Killingworth, near Newcastle-on-Tyne, (*H. C.* 439).

(ENDOGENITES, L. et H.).

235.—*Endogenites striata*, L. et H. TYPE SPECIMEN, F. F., pl. 227A.

This small portion of an internal cylindrical pith is covered with carbonaceous matter; on one side, as figured, are a number of fine longitudinal raised lines, some of which are stronger and formed by two lines or folds uniting into one. It is about three and a half inches long and about four-fifths of an inch broad. It is the pith or medullary axis of *Sigillaria*, and differs very considerably from the axis of *Lepidodendron*. No Hutton label on this example, but the identity of this specimen with the above figure is undoubted.

Loc.—Northumberland and Durham Coal-field. (H.C. 539).

Remarks.—No one, after a careful examination of the above Lindley-Hutton Type-specimens, will doubt that they represent different stages of growth and different states of preservations of one species of *Sigillaria*. It has been usual to refer this common and best-known form to Brongniart's *S. reniformis*, Plates 142, 160, Hist. Végét. Fossiles. I am not quite assured that this reference to Brongniart's Type is correct, as his figure of the leaf-scar of this species, Plate 140, seems to be taken from an imperfect scar of a very old stem. Our specimens have the ovate leaf-scar of *S. laevigata*, which, at present, I consider as only a better preserved and younger specimen of *S. reniformis*. The shape of the leaf-scar (making due allowance for alteration of shape by maceration and compression in many directions) seems to be at present the only character by which to distinguish the species of *Sigillaria*. Unless we adhere rigidly to this character numberless false species can be made at pleasure, according to the state of preservation of the specimen. The width of the ribs and the distance apart of the leaf-scars are due to age, and stages and conditions of growth and situation, rather than specific differences. If this opinion be correct, we have then, at present known, only two specific forms of *Sigillaria* proper in this Coal-field, in some parts of which individual plants are most abundant.

Some years ago the large Sigillarian stem, *S. Boghallense*, figured by Sternberg, Plate 37, f. 5, from a drawing by the late Sir Walter C. Trevelyan, Bart., was presented to the Natural

History Society by Major Cresswell, of Cresswell, Northumberland. Within this stem, on its removal in sections, there was found the cast of the pith of this plant, extending, as far as could be observed, the entire length of the stem. This pith was nearly upright, partly in the centre, and sometimes pressed to one side, but so continuous as to leave no doubt of its being the pith of *Sigillaria*. It seems to be identical with *Endogenites striata*, L. et H., and differs essentially from the pith of *Stigmara*, which has a woody cylinder surrounding the pith, as shewn in the Lindley-Hutton figure of their *Caulopteris gracilis*, F. F., pl. 141, and their figure of the internal structure of *Stigmara ficoides*, F. F., pl. 166.

The Woodcut No. 4 represents the appearance of the scars on a very young stem and agrees with Brongniart's figure of *S. Saulii*. A cast of four leaf-scars on a single rib of an older plant is given in Woodcut No. 5. The scars are much compressed and slightly distorted. The specimen figured on Plate 4, f. 1, is intermediate in size and shews the leaf-scars not so much compressed as in the preceding examples. This fine specimen is in the Collection of the Natural History Society.

ROOTS OF LEPIDODENDRON, ETC.

STIGMARIA, Brongniart.

Stigmara ficoides, Brongniart.

Type—*Stigmara ficoides*, Brongt., Class. Vég. Foss.,
pl. 1, f. 7.

ROOTS.

<i>Palmacites verrucosus</i> ,	Schloth.,	Petref., pl. 15, f. 4.
<i>Ficoidites furcatus</i> ,	Artis,	Anted. Phyt., pl. 3.
„ <i>verrucosus</i> ,	Artis,	Anted. Phyt., pl. 10.
„ <i>major</i> ,	Artis,	Anted. Phyt., pl. 18.
<i>Phytolithus plantites</i> ,	Martin,	Petr. Derb., pl. 11, 12, 13.
<i>Variolaria ficoides</i> ,	Sternb.,	Vers. I., pl. 12, f. 1-3.
<i>Stigmara ficoides</i> ,	L. et H.,	Foss. Flora, pls. 31, 34.
„	Brongt.,	Class. Vég. Foss., pl. 1, f. 7.
„	Williamson,	Mon. Stigmara, 1887.

WOODY CYLINDER AND PITH-CAVITY.

<i>Caulopteris gracilis</i> ,	L. et H.,	Foss. Flora, pl. 141.
<i>Stigmara ficoides</i> ,	L. et H.,	Foss. Flora, pl. 166.

236.—*Stigmaria ficoides*, L. et H. TYPE SPECIMEN, F. F. pl. 34.

There is a label by Hutton on this specimen, "*Stigmaria ficoides*, Jarow, B. P. 34." Cast of portion of the compressed root covered with raised tubercles. The tubercles are arranged in quincunx obliquely across the root, with indications of vessels between them.

Loc.—Shale above the Bensham Seam, Jarow. (H. C. 504).

Remarks.—Much has been written about this fossil root, *Stigmaria ficoides*, and yet a modern writer confesses that "at present (these roots) cannot be correlated with the various stems to which they belong." This confession is very true, for though the earlier and more recent writers on this subject have ascertained much respecting some parts of its internal structure, enough, at least, to correlate it as the root of *Lepidodendron*, but no distinguishing marks have been found by which these roots can be referred to the species of *Lepidodendron* to which they belong. By some writers it has been insisted that they are the roots of *Sigillaria* exclusively, and by others that they are generically distinct and independent plants. *Stigmaria* have been found in beds and parts of the Carboniferous series in which no traces of *Sigillaria* have been found, and where, in all probability, they never existed. Also the pith of *Sigillaria* seems to be of an entirely different character to that found in *Stigmaria*, so that it is very probable that the stems found connected with Stigmarian roots, and which have been taken for *Sigillaria*, may have belonged to *Lepidodendron*, a mistake easily made from the imperfect state in which these old stems are found.

I incline to the opinion that the specimens No. 236, F. F., Plate 34, and Plates 31, 32, 33, represent the root and rootlets of *Lepidodendron Sternbergii*, but no proof can be given that this opinion is absolutely correct. Lindley and Hutton suspected that their *Caulopteris gracilis*, pl. 141, and Withams' *Anabathra pulcherrima*, were the central pith with its woody cylinder of *Stigmaria ficoides*, F. F., v. iii., p. 48. This early and correct observation has either been overlooked or not acknowledged by some later writers.

Stigmaria ——— sp.

- Stigmaria ficoides*, L. et H., Foss. Flora, pl. 35.
 „ „ Williamson, Mem. Stigm., pl. 13, f. 64-66.

237.—*Stigmaria ficoides*, L. et H. TYPE SPECIMEN, F. F., pl. 35.

The Hutton label on this specimen is, "B., to be returned," on both parts of the root, which has been cut through longitudinally and one part figured pl. 35. Only a part of the cast of the pith remains, as shewn in the plate. Other portions of evidently the same root from the same locality are in the Collection of the Natural History Society, and shew the central pith attached or with medullary rays radiating outwards.

(The statement on page 105 of the Fossil Flora, that the specimen figured on pl. 35 is from Weardale, is an error. The specimen figured on pl. 35 is a section of a stem in ironstone, from Dysart, in Scotland. The specimen figured on pl. 36 is from near Stanhope in Weardale, and is so labelled. It is in the Collection of the Natural History Society with its original label on it. Being in two pieces it was not recognised till about a year ago. It is in a fine grained sandstone of the Carboniferous-limestone series, and probably is the root of another species of *Lepidodendron*).

Loc.—In clay-ironstone, Dysart, Fifeshire, Scotland. (H.C. 507).

238.——— Counterpart of above specimen, which has been cut through longitudinally to shew the cast of the pith and the cylinder in which it was situated.

Loc.—In clay-ironstone, Dysart, Fifeshire, Scotland. (H.C. 508).

Remarks.—This specimen from the Carboniferous rocks of Dysart, Fife, appears to differ somewhat from the above Coal-measure form. The tubercles of the rootlets are, from the imperfect state of preservation, not visible. On another specimen from the same locality the tubercles are finely preserved, and shew the manner in which the rootlets have been attached to the main root. The pith-cavity and the casts of the vessels radiating from it through the woody cylinder are well preserved in this clay-ironstone example.

As mentioned above, the Lindley-Hutton Type-specimen F.F., Plate 36, is in the Collection of the Natural History Society,

and is a fine cast in sandstone of the root and rootlets of a *Stigmara*, from the Carboniferous-Limestone series of Stanhope, in Weardale; and probably it is part of the root of a *Lepidodendron*, as hitherto no traces of *Sigillaria* have been seen from this locality.

Stigmara ———.

239.—*Stigmara* ———.

Impression on shale of large root with waved longitudinal lines and raised, transverse irregular ridges. Few tubercles and very indistinctly marked on the shale. It seems to be part of next specimen.

Loc.—Felling. (*H.C.* 514).

240.—*Stigmara* ———, Williamson, Mon. Stig., pl. 13, f. 71.

A large slab of shale, shewing raised, somewhat irregular parallel lines. Between the raised lines are indistinct traces of tubercles and numerous small waved furrows. The stronger raised lines branch off to both sides or bifurcate near the lower margin of the slab, indicating a division of the root. This is perhaps only the impression of the underside of a large Stigmarian root close to the base of the stem.

Loc.—Felling. (*H.C.* 516)

Remarks.—The two specimens, Nos. 239, 240, are only impressions on shale of the underside of some large roots of *Stigmara*. The surface is curiously waved, and the impressions of tubercles are few and very indistinct.

PLANTÆ INCERTÆ SEDIS.

(*CYCADACEÆ*, *Auctorum.*)

PSYGMOPHYLLUM, Schimper.

Psymphyllum flabellatum (Lindley et Hutton sp.).

Type—*Nægerrathia flabellata*, L. et H., Foss. Flora,
pl. 28, 29.

241.—*Nægerrathia flabellata*, L. et H.

This specimen bears a general resemblance to Hutton's pl. 28. It is about ten inches in length, and composed of a compressed narrow stem and a number of cuneate or triangular leaves,

not larger than in Hutton's reduced figure. The leaves spring from the stem by a broadish base, and gradually increase in width to the distal margin; they are covered with fine veins, which bifurcate or separate occasionally with the increased width of the leaves. The stem is finely striated. Hutton label, "*Nægerrathia flabellata*, Jarrow, B."

Loc.—Shale above the Bensham Seam, Jarrow. (*H.C.* 558).

242. — This is a small cuneiform or triangular leaf, with fine radiating veins, which occasionally bifurcate or separate, according to the width of the leaf. The Hutton label on this specimen is "*Nægerrathia flabellata*, Jarrow, B., D."

Loc.—Shale above the Bensham Seam, Jarrow. (*H.C.* 560).

Remarks.—The specimen No. 241 is somewhat similar in appearance to the figure F. F., Plate 29, being the terminal part of a small stem, covered with a number of wedge-shaped or cuneate leaves, which seem to be arranged spirally but not closely round the stem. The veining of the leaves does not bifurcate strongly, but splits or separates off gradually to increase the width of the upper and broadest part of the leaf. No. 242 is a much smaller cuneate leaf of the same species.

Up to the present time this species appears to have been found only in the shale above the Bensham Seam of Coal, in the Collieries of Jarrow and Hebburn-on-Tyne, where it seems to have occurred frequently. The specimen referred to this species in the Duff Collection, from the Lower Coal-seams of the Auckland district, South Durham, is only a large *Cyclopteris* leaf.

CORDAITES.

Cordaitea regularis (Sternberg sp.).

Type—*Calamites regularis*, Sternb., Vers. I., pl. 59.

243. — There is a label on this specimen in Hutton's handwriting, "Low Moor, Yorkshire. Is not this Sternberg's *Calamites regularis*, table 59, p. 1? To be returned." Undoubtedly this specimen was sent to Lindley with the request to return it, a request found attached to several other specimens. This is a cast of four scars, and the deeply striated longitudinal markings seen on Sternberg's figure, above re-

ferred to, with which there can be no doubt it is correctly identified. But it is not a *Calamite*.

Loc.—Low Moor, Yorkshire. (*H. C.* 568).

244. ——— Fragment of stem, nine inches long by five broad, ornamented like No. 245, of which it is probably a portion. They are undoubtedly the same as Sternberg's *Calamites regularis*.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 567).

- 245.—*Calamites regularis*, Sternberg sp.

Fragment of a large, broad stem, the full width not ascertained, eight inches by six. The whole surface finely striated longitudinally, with very large somewhat elliptical apertures and large leaf-scars arranged obliquely across the stem.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 566).

Remarks.—Some authors still retain Sternberg's plant *Calamites regularis* in that genus, but the shape of the leaf-apertures or scars, and the manner in which the stem is covered with longitudinal striæ or grooves, the impressions of foliar-vessels, and the absence of joints, exclude it, at once, from that genus. The similarity of the scars, and their oblique arrangement across the stem, point to its affinity to those stems which are assigned by Grand'Eury and others to *Cordaïtes*.

Cordaïtes ——— ?

- 246.—*Cordaïtes* ——— ?

Counterpart of the next specimen No. (247), with three oblique lozenge-shaped scars up the centre, and others indicated on the sides. The surface has a finely granulated or shagreen appearance.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 415).

247. ——— Impression with several scars. The surface finely shagreened or striated all over, except the leaf-scars, which are large lozenge-shaped openings somewhat spirally arranged on the stem.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 414).

Remarks.—At first sight these two specimens might be supposed to be an inner layer of the cortex of *Halonis regularis* from the arrangement of the scars, and it is by no means certain that they are not. The strongly shagreened surface and the shape

of the large apertures induce me to place these specimens with *Cordaite* stems.

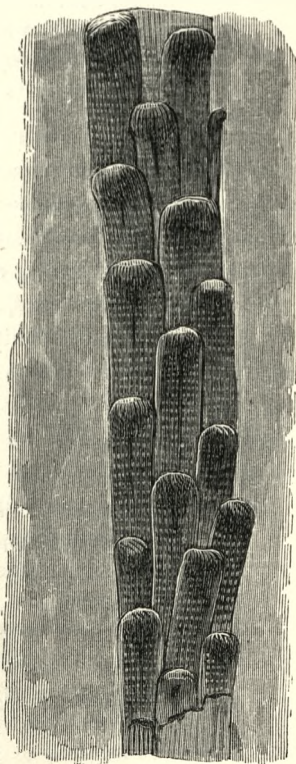
Cordaite Taxina, Lindley et Hutton (Woodcut No. 7).

Type—*Knorria taxina*, L. et H., Foss. Flora, pl. 95.

Fern Stem, Lebour, Ill. Foss. Plts., pls. 48 and 49.

248.—*Knorria taxina*, L. et H. TYPE SPECIMEN, F. F., pl. 95.
(Woodcut No. 7).

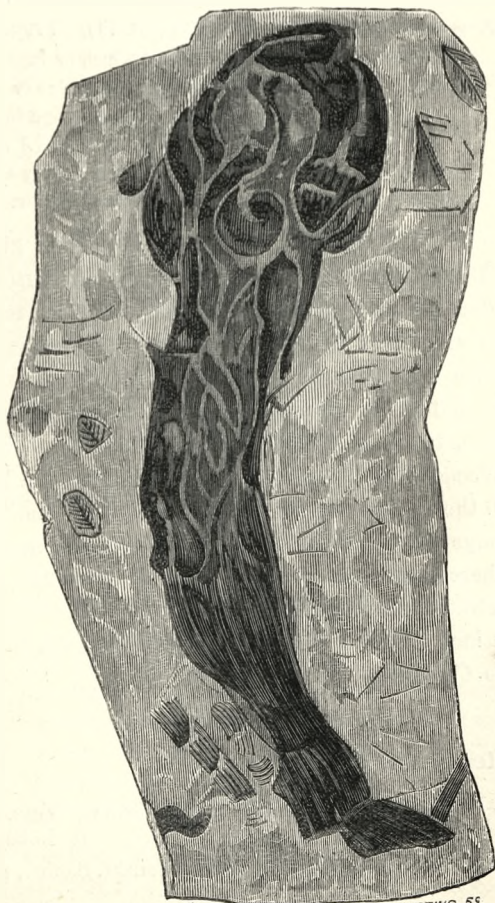
In the Fossil Flora II., p. 37, this specimen is said to be from the roof of the High-Main seam, Jarrow Colliery. This appears to be an error, for Hutton's own label has on it "Jarrow, Bm." No doubt the reduced drawing only of this specimen (for the slab itself is large, heavy, and fifteen inches long) was sent to London to Lindley, who describes from the reduced figure and at a very great disadvantage, or he would not have ejaculated, "Surely this must be a portion of the branch of the Yew, or some such plant." The drawing certainly more closely resembles Lindley's drawings of a Yew than it does the original impression on the slab. The stem is about fifteen inches long, and varies in breadth from



three-eighths of an inch at the basal end to seven-eighths in its broadest part near the middle, and then gradually tapers till it passes beyond the end of the slab. Neither end perfect. The stem is compressed quite flat, the upper part nearly straight, with a sharp curve to one side near the basal end. The surface is very distinctly longitudinally striated with fine

raised lines, and there are transverse furrows across these resulting, perhaps, from the contractions of a large central pith re-sembling the appearance of *Sternbergia*. In addition, there are the leaf-scars which begin about two inches from the basal end; they are spirally arranged, and pass obliquely across the stem from left to right upwards; each leaf-scar shews a slightly elevated leaf-cushion. All these appearances are attempted to be shewn in the Woodcut No. 7.

Loc.—Shale above the Bensham Seam, Jarrow. (*H.C.* 407).



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249. ——— (Woodcut No. 8) (Lebour, Ill. Foss. Plts., pl. 48). TYPE.

Budding part of a stem, nearly five inches long and three-quarters wide, ending in a knob of leaf-scars; the scars or cushions rather indistinct, of an irregular, sub-triangular shape, tapering downwards till lost in the stem, on which they are indistinct and indicated by depressions only. They appear to have been spirally arranged from right to left upwards. Indistinct traces of fine parallel lines on the lower portion of the stem. Hutton label, "Jarrow, B."

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C. 564*).

250.——— (Lebour, *Ill. Foss. Plts.*, pl. 49). TYPE.

Portion of a compressed stem, an inch or inch and a quarter wide, with numerous raised sub-triangular or inverted cone-shaped scars or cushions, more distinct than in the preceding and on an older stem. The surface covered with numerous small parallel lines. Scars arranged obliquely across the stem.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C. 565*).

Remarks.—The annexed Woodcut No. 7 will give a better idea of the appearance of this stem than the Hutton drawing, F. F., Plate 95, and will also enable anyone to correlate it with the other specimens enumerated above. Though it bears some resemblance to a rhizome or aerial fern-stem, the shape of the leaf-scars and the longitudinal striation of the stem, and its close resemblance to Nos. 249, 250, prevent that opinion being adopted.

The Woodcut No. 8 represents the upper part of a larger stem, on which the imperfectly preserved leaf-scars are similar in shape and arrangement, except at the apical or growing part of the stem, where these scars become crowded. No. 250, figured in the *Illustration of Fossil Plants*, has the leaf-cushions or scars more distinctly preserved. These specimens seem to be closely related to *Cordaïtes*.

(*PYCNOPHYLLUM*, *Brongniart*).

***Cordaïtes principalis* (Germar sp.).**

Type—*Flabellaria principalis*, Germar, *Vers. v. Wett.*
u. Löbej., pl. 23.

Cordaïtes principalis, Geinitz, *Vers. Steinkf. Sachs.*, pl. 21, f. 2.

251.—*Cordaïtes* ———.

This flag-shaped leaf is nearly twenty-one inches in length, but it is bent into the shale at top, where it also has been

slit. It is about half an inch wide at base, and very gradually increases till it is an inch and two-fifths at two-thirds of its length from the base, then very gradually tapers again. The surface covered with very fine longitudinal lines or nerves through its entire length. Mr. Hutton's label has on it only "Jarrow, Bm."

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* —).

252. — Basal part of a leaf fourteen inches long (the entire leaf two feet?) and one inch wide at base, and two and one-quarter inches widest part. Surface covered with fine parallel lines or nerves; basal part of leaf appears perfect.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* —).

Remarks.—These flag-shaped leaves, which have usually been referred to *Flabellaria Borassifolia*, Stb, have the nerves of the leaves uniform, and not alternately a thick and a thin nerve as in that species. Though it is by no means a rare plant in some parts of this Coal-field, yet from its occurring in fragments much broken up and not attached to the stems to which it belongs, it is impossible to correlate these leaves with any of the stems. When perfect these leaves are of an elegant slender shape, attaining a length of more than two feet and covered with fine, nearly parallel, longitudinal nerves.

Cordaites Huttoni, nov. spec.

- 253.—*Cordaites Huttoni*, nov. spec.

Small flag-shaped leaf, imperfect at base and top, between five and six inches long and from half an inch to five-eighths broad, increasing in width from the base to the middle of the leaf and tapering gradually towards the top. The surface ornamented with very fine and nearly parallel nerves, neatly and regularly arranged with bifurcations, being more crowded at the base and top. This appears to be a different species from the above.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* —).

Remarks.—This little flag-shaped leaf has always appeared to me different from the last species, but there is nothing but its size and the very fine longitudinal nerves by which it can be distinguished from the leaves referred to *C. principalis*. The

name of one of the authors of the Fossil Flora is appended to this probably distinct species till further research shall enable some one to determine its true relationship.

Although numerous fragments and the above nearly perfect leaves were found in the Hutton Collection, we find no allusion in the Fossil Flora to their occurrence in this Coal-field, and the only plant Lindley and Hutton figure allied apparently to *Cordaites* is their *Poacites cocoïna*, F. F., pl. 142B, in which two leaves or fragments of leaves are arranged one within a slit of the other, at least that appears to be the explanation of their proximity. If these are not *Cordaites* leaves it will be difficult to refer them to any other known Coal-measure plant.

INFLORESCENCE AND FRUIT.

Cardiocarpon ? *Lindleyi* (Carruthers sp.).

Type—*Antholithes Pitcairniæ*, L. et H., Foss. Flora, pl. 82.

FRUIT.

- | | | |
|--------------------------------------|----------|-----------------------------------|
| <i>Carpolithes morchellaformis</i> , | Sternb., | Vers. I., pl. 7, f. 5. |
| „ <i>acuminatus</i> , | Sternb., | Vers. I., pl. 7, f. 4. |
| „ <i>corculum</i> , | Sternb., | Vers. I., pl. 7, f. 6. |
| „ <i>contractus</i> , | Sternb., | Vers. I., pl. 7, f. 7. |
| <i>Cardiocarpon Lindleyi</i> , | Carruth. | Geol. Mag., Vol. 9, p. 56. |
| „ <i>apiculatum</i> , | Schimp., | Traité Pal. Veg., Vol. 2, p. 224. |

254.—*Antholithes Pitcairniæ*, L. et H.

Stem about five inches long, with tufts of inflorescence arranged in pairs, not exactly opposite but as if spirally arranged in short and decreasing distances up the stem, which terminates with a large inflorescence; stem flattened and finely longitudinally striated. The surface of the slab covered with numerous impressions of a small fresh-water mollusca, *Anthracomya*.

Loc.—Shale above the Low-Main Seam, Felling. (*H. C.* 570).

255.— Lower part of a rather larger spike of inflorescence; the tufts of inflorescence distinctly impressed or defined, and sending off fine filamentous threads from the centre, but shew no fruit attached. Several *Cardiocarpon apiculatum* on the slab.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 571).

Remarks.—There were five specimens of this interesting fossil found in the Hutton Collection, but neither of the Type-specimens figured in the Fossil Flora among them; neither did any of them shew the fruit attached to the long axils of the inflorescence, but on some of the slabs the remains of *Cardiocarpon apiculatum* and numerous small bivalve shells, *Anthracomya*, were present. Modern fossil botanists refer this fossil and the flag-shaped leaves above mentioned to the Cycadaceæ, but the fruit attached to this inflorescence and the inflorescence itself differ so widely from the fructification of the recent forms of this order that the affinity of Cordaites to the Cycadaceæ must be doubtful.

STERNBERGIA, Artis.

(*ARTISIA*, Sternberg).

Sternbergia approximata, Brongniart.

Type—*Sternbergia approximata*, L. et H., pl. 224, 225.

Sternbergia approximata, Brongt., Prod., p. 137.

„ *transversa*, Artis, Anted. Phyt., pl. 8.

Artisia „ Sternb., Vers. II., pl. 53, f. 7-9.

256.—*Sternbergia approximata*, L. et H. TYPE SPECIMEN, pl. 225, f. 3.

Cast of a pith in sandstone, slightly tapering, compressed, and curved, and nearly seven inches in length. The transverse markings very distinct.

Loc.—Newcastle Coal-field. (*H.C.* 537).

257.———, L. et H. TYPE SPECIMEN, F. F., pl. 225, f. 4.

Slightly compressed specimen of a pith with very distinct transverse markings; rather larger than preceding and about six inches in length.

Loc.—Newcastle-on-Tyne Coal-field. (*H. C.* 535).

258.———, L. et H. TYPE SPECIMEN, F. F., pl. 225, f. 5.

A cylindrical specimen, apparently basal part of the pith terminating in a point. About five inches in length and more than one inch in diameter; the cross-lines are less distinctly marked than in the preceding, and smaller and sharper at the edge.

Loc.—Newcastle-on-Tyne Coal-field. (*H. C.* 536).

259. ———, L. et H. TYPE SPECIMEN, F. F., pl. 285, f. 6.

This and the above Type-specimens were found in the collection without any label on them, but they are undoubtedly the specimens figured in the Fossil Flora. This specimen is rounded, smoother, and the cross markings not so strongly or distinctly marked as in the plate.

Loc.—Newcastle-on-Tyne Coal-field. (*H. C.* 534).

260. ——— Very compressed specimen in shale, shewing the compressed central axis surrounded on one side and partly enclosed in a broad carbonaceous layer; the transverse markings very distinct and indicated by a groove filled with carbon; the surface of the carbonaceous covering is faintly striated longitudinally and with very fine transverse markings.

Loc.—Shale above the Low-Main Seam, Felling. (*H. C.* —).

Remarks.—Four of the Lindley-Hutton Type-specimens were found in the Hutton Collection, F. F. Plate 225, f. 3, 4, 5, 6, numbering the figures from left to right, and of these f. 5, 6 differ a little in the width and distinctness of the folds and furrows, which are also slightly covered with longitudinal lines and having more the appearance of *Endogenites striata*, L. et H., than the other two. In No. 260 the Sternbergian pith is enclosed in a large sheath of carbonaceous matter, in which the pith lies a little out of the central line. This sheath has the appearance of an inner cylinder or layer of the stem, as the surface is merely ornamented with fine longitudinal lines and minute transverse furrows, and there are no traces of leaf-scars or apertures for foliar vessels visible, which might be expected if this sheath formed a part of the cortex or its immediate inner layers. It seems, therefore, to be a large internal sheath or cylinder enclosing or surrounding the pith, not closely placed, but with a considerable space between them. Can this pith and central cylinder be part of the stem of *Sigillaria*? There can be no doubt, I think, that *Endogenites striata* is the pith of *Sigillaria*, and if the cellular substance of the pith, as shewn in *Sternbergia*, were removed by maceration during the process of fossilization, the form of the cylinder would agree exactly with *Endogenites* of Lindley and Hutton. It seems probable that at least some of the Sternbergian piths belong to *Sigillaria*.

FOSSIL WOOD (*Coniferous*).*Araucarioxylon* ——— ?261.—*Pinites* ——— ?

There is a label on this specimen in Hutton's hand-writing, "B. Scaffold Hill, Quarry." Some very large pieces of this tree were obtained from this same Quarry in 1879, by Mr. Taylor, and presented to the Museum. It appears to be the same species as the Wideopen tree. No sections have yet been published of this fossil wood.

Loc.—In Sandstone Quarry, Scaffold Hill, near Backworth and Benton Square, Northumberland. (*H. C.* 550).

262.—*Pinites* ——— ?

This is identical with the next and has been cut for making sections.

Loc.—Sandstone above the High-Main Seam, Westgate Hill, near Newcastle-upon-Tyne. (*H. C.* 541).

263. ——— "Westgate, 1833," written in pencil by W. Hutton on a cut surface of the specimen. Very dark with much coal on it. It appears to be a fragment of a very large stem similar to some large heavy masses in the Museum.

Loc.—Sandstone above the High-Main Seam, Westgate Hill, near Newcastle-upon-Tyne. (*H. C.* 545).

Remarks.—It is quite impossible without sections to refer the above specimens to any particular species of fossil plants. They were selected from about eighteen specimens in the Hutton Collection, and all seemed to be from the two localities above mentioned. No. 261 is part of a large stem from Scaffold Hill Sandstone Quarry. The remains of this tree were lying obliquely through the sandstone in 1879, when a great portion of it was removed by the quarrymen, but a part of it is still embedded in the adjacent unworked part of the quarry. I am not aware that any section has been published of this tree. Nos. 262, 263, were from a sandstone quarry on Westgate Hill in the High-Main Post (sandstone), and is of a black colour and coated with carbonaceous matter. Sections have been cut from both these specimens. Large pieces of this tree are preserved in the Newcastle Museum. Remains of silicified tree-stems have been

found in several of the large sandstone quarries of this neighbourhood, as at Wideopen Quarry, Heworth Quarry, and in a bed of sandstone on the coast near Newbiggin. Sections of these trees have been described by Witham in the Transactions of the Natural History Society and by Lindley and Hutton in the Fossil Flora. By most authors these large stems are referred to the Coniferæ.

RHYTIDODENDRON, N. Boulay.

? *Rhytidodendron minutifolium*, N. Boulay.

Type—*Rhytidodendron minutifolium*, N. Boulay,
Le Terr. Houil. du Nord de la France, pl. 3, f. 1, 1 bis.

STEM.

264.—*Rhytidodendron minutifolium*, Boulay?

Part of a compressed or flattened stem about a foot in length and one and a half inches broad, finely striated longitudinally, with small triangular punctures or scars obliquely placed across the stem from left to right upwards. The scars or punctures of both sides visible, forming double sets of scars.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* —).

265. ——— Part of a compressed stem about two inches in width. From the manner in which the minute leaf-scars are arranged it would seem that both sides of the stem are represented, as two scars are placed in some instances near each other, the one raised and shewing the external appearance of the scar, the other depressed and hollow, but retaining the triangular form. The external surface finely striated longitudinally with very minute striæ.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 517).

266. ——— Small portion of bark of stem with distinct, very small, triangular leaf-scars; surface with long raised lines proceeding from each scar downwards. Four to five inches long.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 520).

267. ——— Impression of the inner surface of cortex and a large branch-scar. The impression of the surface is wrinkled and ornamented with small black dots quincuncially arranged. The large branch-scar at first sight has the appearance of a scar of *Ulodendron*.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* —).

FOLIAGE.

268.—*Dicranium* ——— ? (Plate 5, f. 2, and Plate 6).

Portion of stem with a small branch lying close but not attached to the stem. Numerous needle-shaped leaves with a distinct mid-rib one and a half inches long. The leaves arranged somewhat spirally round the branch and on the stem. The stem strongly striated or furrowed and with depressed leaf-scars not distinctly defined.

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. —).

Remarks.—The first three specimens, Nos. 264, 265, 266, have the appearance of a compressed flattened stem, the outer cortex probably of a branch of some tree, for broader pieces with the same leaf-scar markings occasionally occur. The surface is very finely striated longitudinally, and ornamented with minute sub-triangular scars, somewhat curved above and with a raised dot in the centre. The scars are spirally arranged, and the substance of the cortex is so thin that the depressions of the scars on the opposite side are often visible. No. 67 is apparently a finer inner layer of the same plant, the leaf-scars being represented by very small dots, but on it, in addition, is a somewhat oval branch-scar, which was at first mistaken for a scar of *Ulodendron*, which it much resembles, but differs from the *Ulodendroid* scar in many points. The specimen No. 268, Plate 6, shews a portion of two smaller branches of the same species with the leaves and leaf-scars attached. The shape of the leaf-scars on this smaller specimen appears to be identically the same as those on the larger, and seems to connect the genus *Dicranium* with *Rhytidodendron*, the one being the foliage of the other. Plate 5, f. 2, from a specimen in the Museum of the Natural History Society, shews a very small twig or branch with its crowded leaves. The leaves are so closely placed, and overlap each other so much, that I cannot determine whether the leaves bifurcate or divide at the apex into two or more parts. But for the present I refer them to the above quoted species.

TRIGONOCARPUM, Brongniart.

Trigonocarpum Parkinsonis, Brongniart.

Type—Trigonocarpum Parkinsonis, Brongt., Prod.,
p. 137.

	Parkin., Org. Rem., pl 7, f. 6-8.
<i>Trigonocarpus Parkinsoni</i> ,	Lesqx., Coal Flor. Penn., pl. 85, f. 9, 10.
<i>Rhabdocarpus amygdalæformis</i> ,	Lesqx., Coal Flor. Penn., pl. 85, f. 27, 28 ?
<i>Trigonocarpum Noeggerathi</i> ,	L. et H., Foss. Flora, pl. 142c; pl. 193b, f. 1-4; pl. 222, f. 2, 4.
? ,, <i>olivæforme</i> ,	L. et H., Foss. Flora, pl. 222, f. 1, 3.
,, <i>oblongum</i> ,	L. et H., Foss. Flora, pl. 193c.
<i>Carpolithes alatus</i> ,	L. et H., Foss. Flora, pl. 87; pl. 210b.

269.—*Carpolithes alata*, L. et H. TYPE SPECIMEN, F. F., pl. 87, f. 2.

Pericarp of a fruit of an elongated elliptical shape, about the size of a date, containing impression of a nucleus or kernel (*Trigonocarpon*), the size of a small nut; the surface divided into three distinct compartments agreeing with the three-fold division of the pericarp. The immature kernel has an elongated, three-sided tapering spike ascending to the top of the pericarp. This specimen appears to represent one-third of the pericarp, having the impression of one side of the nut and spike. Hutton's label is "Carpolites, Jarrow, Bm."

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 585).

270.—L. et H. TYPE SPECIMEN, F. F., pl. 87, f. 3.

About the same size as f. 2, but only half the base of the pericarp is preserved, and shews the circular attachment to a stem or stalk. The kernel is also present in this, and shews on its surface one of the three strong dividing ridges of the kernel and the spike, carbonized, and traces of the fine vascular lining of the interior of the pericarp. Hutton's label, "Carpolites, Jarrow, Bm."

Loc.—Shale above the Bensham Seam, Jarrow. (H. C. 587).

271.—About the same size as the preceding, and shews the fine vascular lining of the pericarp and the position of the kernel, which appears not to have been mature, or so much so as the

last-mentioned, and is turned into or preserved in a carbonized state.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 588).

- 272.—A larger example shewing nearly the entire pericarp, fully two inches in length, and at the top three divisions or lobes of the pericarp are seen, but whether the top was divided into three or six divisions the imperfection of one side of the specimen at the top does not allow to determine. The basal part of the outer surface with fine parallel lines.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 579).

- 273.— This specimen shews the external appearance of the pericarp, with its top divided as in the last into apparently three lobes. The general appearance of this specimen is like that of the flower of a *Crocus* with the petals partially expanded.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 583).

- 274.— Section of the pericarp shewing the carbonized kernel and spike; the inner surface of the pericarp with numerous fine elongated vessels of the fibrous lining.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 586).

- 275.— Section of a kernel with flattened, flanged margin all round, which passes upwards, at the apex, into a long flattened spike, more than an inch and a half long of thin carbonaceous matter.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 580).

- 276.— Two impressions of the kernel (*Trigonocarpon*) in coal; one shews the dividing edge of two sides of the kernel produced into a sharp ridge, which is continued up into the spike or bayonet-blade shaped continuation of the kernel to the top of the pericarp.

Loc.—Bensham Seam, Jarrow? (*H. C.* 590).

- 277.—*Carpolithes* ——— ?

Five specimens of the kernel smaller than usual, apparently belonging to this species, closely placed together. On the same slab is portion of a stem with two somewhat circular leaf-scars, which appears to be a fragment of the stem of *Cordaites regularis* (Sternb. sp.).

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 592).

Remarks.—The Hutton Collection contained a fine series of specimens of *Carpolithes alata*, from which the above Type-

specimens and other characteristic individuals were selected. Strangely enough none of the mature kernels *Trigonocarpum* were represented in the collection.

I am not certain whether the top or apex of the pericarp was divisible when mature into six lobes or not, but I think it was, though the specimens mentioned above shew only three divisions; but these may represent only one side, and the other three may be compressed against these, and this seems the more probable, as the specimens figured by Hutton, F. F., Plate 83, f. 2, 3, represent, I think, only one-third of the pericarp, the upper part of which when mature would split into two lobes. The *Trigonocarpum* or mature seed is found only sparingly in some of the sandstones of this Coal-field. Though one feels strongly inclined to think this fruit belongs to some *Conifer* there is no absolute proof of this affinity, and it is very probable that we shall long continue in ignorance, as the chance of finding this fruit attached to its branch is very remote.

Section of a Strobilus or Cone.

278. ——— Transverse section and its counterpart of a cone and the

279. flattened outer leaves or bracts. Very indistinct and doubtful organism.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 441).

Remarks.—This is a very doubtful plant. It was taken at first for a transverse section of a *Lepidostrobus* or fertile cone, but there is no central structure visible or central axis or radiating lines, but round the margin there is an appearance of short compressed bracts or leaves.

? Stem of Cordaites sp.

280. ——— Portion of a broad, flattened stem dividing upwards into three; the surface covered with fine longitudinal lines.

Loc.—High-Main Shale, Gosforth. (*H. C.* 518).

281. ——— Portion of stem with striated and furrowed surface and indistinct longitudinal lines.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 522).

Remarks.—It is impossible at present to refer these to any figured or described plant from the Coal-measures. No. 280 is part of a broad stem finely striated longitudinally, and divides into three apparently distinct stems or branches. No. 281 is more coarsely striated and enlarged into a knob-like swelling at one extremity. These stems are of very doubtful affinity.

Fern Stems.

RACHIS of *Pecopteris lonchitica*.

282.—*Fern stem.*

Portion of a finely-striated, compressed branching stem.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 526).

283.—*Fern stem.*

Small stem, branched, compressed, with the surface finely striated longitudinally.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* 524).

Remarks.—Perhaps these stems Nos. 282, 283 are portions of a large frond or rachis of *Alethopteris lonchitica*. The surface is finely striated longitudinally, and the striæ extend into the branching parts.

Stem with Roots.

284.—*Stem* ———.

A part of a long, simple stem, fifteen inches, with numerous rootlets spreading off from the pointed base; no internal structure to be seen in the stem, no scars on the outer surface, which is covered with fine longitudinal lines, as in the leaves of *Cordaite*s, and the rootlets are similarly marked.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* —).

285.—*Stem* ———

Counterpart or opposite portion of the rootlets and base of stem of the above specimen; the stem and rootlets all finely striated longitudinally.

Loc.—Shale above the Bensham Seam, Jarrow. (*H. C.* —).

Remarks.—No. 284 is a very long slender stem without leaf-scars or any character to connect it with any known Coal-measure plant. At the extreme end it is furnished with a tuft of very long roots or rootlets. No. 285 is a counterpart of the basal end shewing the roots.

JURASSIC PLANTS.

INFERIOR OOLITE.

Pecopteris Haiburnensis, Lindley et Hutton.

Type—*Pecopteris Haiburnensis*, L. et H., Foss. Flora, pl. 187.

286.—*Pecopteris Haiburnensis*, L. et H. TYPE-SPECIMEN, F.F., pl. 187.
Small portion of a primary pinna of a large frond, with remains of six or more imperfect pinnæ with the pinnules well preserved.

Loc.—Lower Sandstone or Shale, Inferior Oolite, Haiburn Wyke, Yorkshire. (*H. C.* 690).

Cyclopteris? longifolia, Phillips.

Type—*Cyclopteris longifolia*, Phill., Geol. Yks. Coast, pl. 7, f. 17.

Cyclopteris digitata, L. et H., Foss. Flora, pl. 64.

287.—Remains of five or six lanceolate leaves arranged on a short stem or stalk.

Loc.—Upper Sandstone, Inf. Oolite, Yorkshire Coast. (*H. C.* 683).

Otozamites Beanii (Lindley et Hutton sp.).

Type—*Cyclopteris Beanii*, L. et H., Foss. Flora, pl. 44.

288.—Five or six large leaves attached to a stem.

Loc.—Upper Sandstone, Gristhorpe Bay, near Scarborough, Yorkshire. (*H. C.* —).

Walchia Williamsonis (Brongniart sp.).

Type—*Lycopodites Williamsonis*, L. et H., Foss. Flora, pl. 93.

Lycopodites Williamsonis, Brongt., Prod., p. 83.

Lycopodites uncifolius, Phill., Geol. Yks. Coast, pl. 8, f. 3.

289.—Indistinct impression of a small cone, like the one figured in Foss. Flora, pl. 93, f. 2.

Loc.—Upper Sandstone, Gristhorpe Bay, near Scarborough. (*H. C.* 715).

290.—Stem and branches with foliage as in figure, Foss. Flora, pl. 93, f. 1.

Loc.—Upper Sandstone and Shale, Gristhorpe Bay, near Scarborough. (*H. C.* 716).

Williamsonia gigas (Lindley et Hutton sp.).

Type—*Zamia gigas*, L. et H., Foss. Flora, pl. 165.

Williamsonia gigas, Phill., Geol. Yks. Coast., pl. 24.

291.—A fine specimen of the inflorescence of this species, which may be compared with Phillips' figures, Geol. Yks. Coast, pl. 24.

Loc.—Lower Sandstone, near Whitby. (*H. C.* 710).

Strobilus?

292.—A doubtful cone-like fossil, much too obscure for identification and of unknown locality.

Loc.—Unknown. (*H. C.* 714).

ERRATA.

Page 22, line 29, read seven hundred specimens.

„ 33, „ 9, „ *Macrostachya*.

„ 48, „ 5, „ Shale above the Low Main, Felling.

„ 75, „ 30, „ *Filicites linguarius*.

„ 94, „ 29, dele *Sagenaria celata*, Brongt., etc.

„ 125, „ 31, read *Neggerathia*.

INDEX.

Names in Italics are synonyms.

	PAGE		PAGE
<i>Adiantides</i>		<i>Asterophyllites</i>	
<i>Machaneki</i> , Stur ...	60	<i>galioides</i> , L. et H. ...	45
<i>Alethopteris</i> , Stb.		<i>grandis</i> , L. et H.	33
<i>Beyrichi</i> , Gein.	88	<i>Huttoni</i> , Leb.	39
<i>Davreuxi</i> , Kids.	84	<i>jubata</i> , L. et H.	37
<i>lonchitica</i> (Schl.)	83	<i>longifolia</i> , L. et H.	33
<i>lonchitidis</i> , Leb.	83	<i>radiatus</i> , Bt.	45
<i>Mantelli</i> , Zeill.	83	sp. — 37, 39, 45	
<i>Serlii</i> (Zeill.)	84	<i>tuberculata</i> , L. et H.	45
<i>vulgatior</i> , Stb.	83	<i>Aspidiaria</i>	
<i>Annularia</i> , Stb.		<i>Anglicum</i> , Stb.	98
<i>fertilis</i> , Stb.	52	<i>variolata</i> , Stb.	113
<i>longifolia</i> , Gein.	45	<i>Araucarioxylon</i>	
<i>longifolia</i> , Lx.	52	sp.	135
<i>spinulosa</i> , Stb.	52	<i>Bechera</i>	
<i>stellata</i> (Schl.)	52	<i>grandis</i> , Stb.	39
<i>Antholithes</i>		<i>grandis</i> , L. et H.	53
<i>Pitcairniæ</i> , L. et H. ...	132	<i>Bothrodendron</i>	
<i>Archæopteris</i>		<i>punctatum</i> , L. et H.	102
<i>Dawsoni</i> , Stur.	59	<i>Bowmanites</i>	
<i>lyra</i> , Stur.	59	<i>Cambrensis</i> , Bin.	54
<i>Tschermaki</i> , Stur.	59	<i>Bruckmannia</i>	
<i>Artisia</i>		<i>longifolia</i> , Stb.	33
<i>transversa</i> , Stb.	133	<i>tenuifolia</i> , Stb.	33
<i>Asterophyllites</i>		<i>tuberculata</i> , Stb.	45
<i>comosa</i> , L. et H.	33	<i>Calamites</i> , Bt.	
<i>equisetiformis</i> , L. et H.	52	<i>articulatus</i> , Gutb.	37
<i>foliosa</i> , L. et H.	45	<i>approximatus</i> , L. et H.	39, 50
		<i>approximatus</i> , Art.	50

Calamites, Bt.	PAGE	Casuarinites	PAGE
<i>cannæformis</i> , Leb. ...	39	<i>equisetiformis</i> , Schl. ...	39
<i>cannæformis</i> , Schl. ...	45	<i>stellatus</i> , Schl.	52
<i>carinatus</i> , Stb.	45	Caulopteris	
<i>Cistii</i> , Bt.	36	<i>gracilis</i> , L. et H.	122
<i>cruciatus</i> , Stb.	39	Cordaites, Unger.	
<i>decoratus</i> , Art.	39	<i>Huttoni</i> , n. sp.	131
<i>dubius</i> , Art.	37	<i>principalis</i> (Germ.) ...	130
<i>gigas</i> , Bt.	45	<i>regularis</i> (Stb.)	126
<i>nodosus</i> , Bt.	38	<i>sp.</i> —	127
<i>nodosus</i> , L. et H.	39	<i>Taxina</i> (L. et H.)	128
<i>nodosus</i> , Leb.	39, 45	Cyclocladia	
<i>pachyderma</i> , Bt.	45	<i>major</i> , L. et H.	33
<i>ramosus</i> , Art.	45	Cyclopteris	
<i>regularis</i> , Stb.	126	<i>Beanii</i> , L. et H.	142
<i>Suckowii</i> , Bt.	38	<i>digitata</i> , L. et H.	142
<i>tuberculosus</i> , Gutb. ...	36	<i>dilatata</i> , L. et H.	79
<i>undulatus</i> , Stb.	45	? <i>longifolia</i> , Phill.	142
<i>varians</i> , Stb.	39	<i>oblata</i> , L. et H.	79
<i>verticillatus</i> , L. et H.	33	<i>obliqua</i> , L. et H.	79
Calamodendron		<i>orbicularis</i> , Bt.	79
<i>commune</i> , Bin.	39	<i>trichomanoides</i> , Bt. ...	79
Calamostachya		Dicranium	
<i>typica</i> , Schm.	39	<i>sp.</i>	137
Calymmotheca		Diplothmema	
<i>Stangeri</i> , Stur.	70	<i>furcatum</i> , Zeill.	68
Cardiocarpon		<i>Beyrichi</i> , Stur.	88
<i>acutum</i> , L. et H.	61	Endogenites	
<i>apiculatum</i> , Gœp.	132	<i>striata</i> , L. et H.	116
<i>Lindleyi</i> , Carr.	132	Equisetides, Schm.	
Carpolithes		<i>gigantea</i> (L. et H.) ...	33
<i>acuminatus</i> , Stb.	132	Equisetites	
<i>alatus</i> , L. et H.	138	<i>infundibuliformis</i> , Gein.	33
<i>contractus</i> , Stb.	132	<i>mirabilis</i> , Stb.	33
<i>corculum</i> , Stb.	132		
<i>morchellæformis</i> , Stb.	132		

<i>Equisetum</i>	PAGE
<i>infundibuliforme</i> , Bt.	33
<i>Eremopteris</i>	
<i>Artemisiæfolia</i> , Schm.	61
<i>Macconochii</i> , Kids....	59
<i>Euphorbites</i>	
<i>vulgaris</i> , Art.	116
<i>Eusphenopteris</i>	
<i>tenella</i> , Kids.....	64
<i>Favularia</i> , Stb.	
<i>elegans</i> , Stb.	113
<i>ichthyolepis</i> , Stb.	113
<i>nodosa</i> , L. et H.....	113
<i>tessellata</i> , Steinh.....	113
Fern stem.....	128, 141
<i>Ficoidites</i>	
<i>furcatus</i> , Art.....	122
<i>major</i> , Art.....	122
<i>verrucosus</i> , Art.....	122
<i>Filicites</i>	
<i>linguarius</i> , Schl.....	75
<i>lonchiticus</i> , Schl.....	83
<i>muricatus</i> , Schl.	85
<i>Osmundæformis</i> , Schl.	73
<i>Osmundæ</i> , Art.	77
<i>Pluckenetii</i> , Schl.....	88
<i>plumosa</i> , Art.	89
<i>trifoliolata</i> , Art.....	71
<i>Flabellaria</i>	
<i>principalis</i> , Germ. ...	130
<i>Fucoides</i>	
<i>crispus</i> , Gutb.....	56
<i>linearis</i> , Gutb.....	56

<i>Haloniu</i>	PAGE
<i>gracilis</i> , L. et H.....	106
<i>laricinus</i> (Carr.).....	106
<i>regularis</i> , L. et H....	106
<i>tortuosa</i> , L. et H.....	106
<i>tuberculata</i> , Bt.	106
<i>Hippurites</i>	
<i>gigantea</i> , L. et H.....	33
<i>Hydaticea</i>	
<i>columnaris</i> , Art.....	39, 51
<i>prostrata</i> , Art.....	39, 51
<i>Hymenophyllites</i>	
<i>Grandini</i> , Gœp.....	68
<i>Knorria</i> , Stb.	
<i>imbricata</i> , Stb.	110
<i>Sellonii</i> , Stb.	110
<i>taxina</i> , L. et H.	128
<i>Volkmanniana</i> (Stb.)	110
<i>Lepidodendron</i> , Stb.	
<i>acerosum</i> , L. et H. ...	105
<i>aculeatum</i> , Stb.....	94, 99
<i>alveolare</i> , Stb.....	113
<i>Anglicum</i> , Stb.....	98
<i>crenatum</i> , Stb.....	99
<i>dichotomum</i> , Stb. 94, 105,	110
<i>dilatatum</i> , L. et H....	94
<i>elegans</i> , Bt.....	94
<i>gracile</i> , L. et H.....	94
<i>longifolium</i> , L. et H.	110
<i>modulatum</i> , Lx.....	99
<i>plumarium</i> , L. et H.	94
<i>obovatum</i> , Stb.....	94
<i>oocephalum</i> , L. et H.	99
<i>rimosum</i> , Stb.....	99
<i>selaginoides</i> , Stb.....	99

	PAGE		PAGE
Lepidodendron , Stb.		Myriophyllites	
<i>Sternbergii</i> , Bt.	94	<i>gracilis</i> , Art.	39, 51
<i>undulatum</i> , Stb.	99	Neuropteris , Bt.	
<i>Volkmannianum</i> , Stb.	110	<i>anomala</i> , Lx.	78
Lepidolepis		<i>attenuata</i> , L. et H.	91
<i>imbricata</i> , Stb.	110	<i>auriculata</i> , Bt.	77
Lepidophloios , Stb.		<i>Clarksoni</i> , Lx.	78
<i>laricinus</i> , Stb.	105	<i>Dufresnoyi</i> , Bt.	78
sp.	109	<i>flexuosa</i> , Bt.	77
Lepidostrobus		<i>gigantea</i> (Stb.)	75
<i>ornatus</i> , L. et H.	109	<i>heterophylla</i> , Bt.	74
<i>pinaster</i> , L. et H.	105	<i>heterophylla</i> , L. et H.	74, 77, 78
sp.	109	<i>heterophylla</i> , Lcb.	85
<i>variabilis</i> , L. et H.	94, 99	<i>inflata</i> , Lx.	78
Lithosmunda		<i>ingens</i> , L. et H.	78
<i>minor</i> , Luid.	75	<i>Lindleyana</i> , Stb.	74
Lycopodites		<i>Loshii</i> , Bt.	74
<i>uncifolius</i> , Phill.	142	<i>macrophylla</i> , Bt.	78
<i>Williamsonis</i> , Bt.	142	<i>oblongata</i> , Stb.	84
Lycopodolithes		<i>plicata</i> , Stb.	77
<i>cordatus</i> , Stb.	94	<i>Soretii</i> , Bt.	74
<i>elegans</i> , Stb.	94	sp.	74
Macrostachya		<i>Villiersii</i> , Bt.	78
<i>carinata</i> , Zeill.	33	Neuropteroid frond?	85
<i>infundibuliformis</i> , Schm.	33	Næggerathia	
Mariopteris		<i>flabellata</i> , L. et H.	125
<i>nervosa</i> , Zeill.	86	Odontopteris , Bt.	
Megaphyton , Art.		<i>Schlotheimii</i> , Bt.	73
<i>approximatum</i> , L. et H.	93	Osmunda	
<i>distans</i> , L. et H.	93	<i>gigantea</i> , Stb.	75
<i>frondosum</i> , Art.	93	" var. B.	77
<i>Goldenbergi</i> , Lx.	93	Otozamites	
<i>magnificum</i> , Daw.	93	<i>Beanii</i> (L. et H.)	142

Palmacites

PAGE

- canaliculatus*, Schl.... 116
hexagonatus, Schl.... 113
oculatus, Schl..... 116
sulcatus, Schl..... 116
variolatus, Schl. 113
verrucosus, Schl..... 122

Pecopteris, Bt.

- acuta*, Bt. 89
adiantoides, L. et H... 74
aquilina, Leb..... 86
Beyrichi, Zeill..... 88
bifurcata, Stb..... 88
Bucklandi, Bt..... 91
delicatula, Bt..... 89
dentata, Bt..... 89
Haiburnensis, L.et H. 142
heterophylla, L. et H. 83
incisa, Stb..... 86
laciniata, L. et H.... 85
lonchitica, Bt..... 83
Loshii, Bt..... 86
Mantelli, L. et H.... 83
marginata, Leb. 86
marginata, L. et H.... 59
muricata (Schl.)..... 85
nervosa, Bt..... 86
pennaeformis, Leb.... 89
Pluckenettii (Schl.)... 88
plumosa (Art.)..... 89
Serlii, Bt 84
serra, L. et H..... 89
serra ? Leb. 86, 89
Silesiaca, Leb..... 89
sp...... 86, 91
uropophylla, Bt..... 83

Phytolithus

PAGE

- Osmundæ regalis*, Mart. 75
plantites, Mart..... 122
tessellatus, Steinh. ... 113

Pinites

- sp.* 135

Pinnularia

- capillacea*, L. et H. 39, 51

Pinus

- anthracina*, L. et H.... 105

Pseudopecopteris

- latifolia*, Lx..... 86
nervosa, Lx. 86
Newberryi, Lx..... 86

Psygmophyllum, Schm.

- flabellatum* (L. et H.) 125

Pteridopsis, n. gen.

- plumosa*, n. sp. 85

Pycnophyllum

- principale* (Germ.)... 130

Rhabdocarpus

- amygdalæformis*, Lx. 138

Rhacophyllum

- flabellatum*, Schm. ... 56
lactuca, Schm..... 56
sp., Leb..... 56

Rhytidodendron, Boulay.

- minutifolium* ? Boulay 136

Rhodea, Stb.

- Kirkbyi*, n. s. 57
Stachei, Stur..... 58

- Root and Rootlets..... 37, 51

<i>Rotularia</i>	PAGE	<i>Sigillaria</i>	PAGE
<i>cuneifolia</i> , Stb.....	53	<i>pachyderma</i> , Bt.....	114
<i>polyphylla</i> , Stb.	54	<i>pyriformis</i> , Bt.....	114
<i>saxifragæfolia</i> , Stb....	54	<i>reniformis</i> , Bt.....	116
<i>Sagenaria</i>		<i>Saulii</i> , Bt.....	116
<i>affinis</i> , Stb.....	110	<i>scutellata</i> , Bt.....	114
<i>calata</i> , Bt.....	99	<i>tessellata</i> , Steinh....	113
<i>dichotoma</i> , Gein.....	110	<i>Sphenophyllum</i> , Bt.	
<i>obovata</i> , Stb.	94	<i>cuneifolium</i> (Stb.)... 53	
<i>ophiurus</i> , Bt.....	94	<i>erosum</i> , L. et H.	53
<i>Volkmanniana</i> , Stb... 110		<i>Saxifragæfolium</i> (Stb.) 54	
<i>Schizopteris</i> , Bt.		<i>Sphenopteris</i>	
<i>anomala</i> , Bt.	55	<i>acutifolia</i> , Bt.....	86
<i>crispa</i> (Gutb.).....	56	<i>adiantoides</i> , L. et H.	70
<i>lactuca</i> , Gein.....	56	<i>affinis</i> , L. et H.	60
<i>Selaginites</i>		<i>alata</i> , Bt.....	68
<i>patens</i> , Bt.....	99	<i>Artemisiæfolia</i> , Stb.	61
<i>Sigillaria</i>		<i>bifida</i> , L. et H.	58
<i>alternans</i> , Stb.....	116	<i>caudata</i> , L. et H.	89
<i>alveolaris</i> , Bt.	113	<i>crassa</i> , L. et H.	59
<i>Candollii</i> , Bt.....	114	<i>crenata</i> , L. et H.	89
<i>catenulata</i> , L. et H....	116	<i>Crithmifolia</i> , L. et H.	61
<i>elegans</i> , Bt.	113	<i>cuneolata</i> , L. et H. ...	59
<i>flexuosa</i> , L. et H.	116	<i>decomposita</i> , Kids. ...	66
<i>hexagona</i> , Bt.	113	<i>delicatula</i> , Stb.....	64
<i>Knorrii</i> , Bt.....	113	<i>delicatula</i> , Bt.....	64
<i>lavigata</i> , Bt.	116	<i>dilatata</i> , L. et H.	71
<i>mammillaris</i> , Bt.....	114	<i>dissecta</i> , Bt.	68
<i>minima</i> , Bt.....	113	<i>Ettinghauseni</i> , Stur..	66
<i>monostachya</i> , L. et H.	116	<i>excelsa</i> , L. et H.	66
<i>Murchisonii</i> , L. et H.	116	<i>Falkenhaini</i> , Stur....	59
<i>oculata</i> , L. et H.	116	<i>foliolata</i> , Stur.....	71
<i>orbicularis</i> , Bt.....	116	<i>furcata</i> , Bt.....	68
<i>organum</i> , L. et H. ...	116	<i>geniculata</i> , Kids.....	68
<i>ornata</i> , Bt.....	113	<i>Haueri</i> , Stur.....	66
		<i>Hibberti</i> , L. et H....	66

Sphenopteris		PAGE	<i>Syringodendron</i>		PAGE
<i>Hoeninghausi</i> , L. et H.	66		<i>alternans</i> , Stb.	116	
<i>Hoeninghausi</i> , Bt.	70		<i>Boghallense</i> , Stb.	116	
<i>irregularis</i> , Stb.	71		<i>complanatum</i> , Stb.	116	
<i>irregularis</i> , Gein.	72		<i>pulchellum</i> , Stb.	116	
<i>Kiowitzensis</i> , Stur.	59		<i>Todea</i>		
<i>latifolia</i> , Bt.	85		<i>Lipoldi</i> , Stur.	58	
<i>latifolia</i> , L. et H.	71		<i>Trigonocarpum</i>		
<i>latifolia</i> , Leb.	86		<i>Noeggerathi</i> , L. et H.	138	
<i>laxa</i> , Stb.	68		<i>oblongum</i> , L. et H.	138	
<i>linearis</i> , Bt.	60		<i>oliveforme</i> , L. et H.	138	
<i>linearis</i> , Leb.	64		<i>Parkinsonis</i> , Bt.	138	
<i>linearis</i> , L. et H.	59		<i>Ulodendron</i> , L. et H.		
<i>macilenta</i> , Leb.	85		<i>Conybeari</i> , Buckl.	102	
<i>meifolia</i> , Stb.	64		<i>Lindleyanum</i> , Stb.	102	
<i>multifida</i> , L. et H.	64		<i>Lucasii</i> , Buckl.	102	
<i>nummularia</i> , Gutb.	72		<i>majus</i> , L. et H.	102	
<i>obovata</i> , L. et H.	66		<i>minus</i> , L. et H.	102	
<i>obtusiloba</i> , Bt.	71		<i>Stockesii</i> , Buckl.	102	
<i>repanda</i> , L. et H.	88		<i>Urnatopteris</i>		
<i>stricta</i> , Stb.	61		<i>tenella</i> , Kids.	64	
sp.	61, 64, 68		<i>Volkmannia</i>		
<i>tenella</i> , Bt.	64		<i>polystachia</i> , Stb.	39	
<i>trichomanoides</i> , Bt.	68		<i>gracilis</i> , Stb.	45	
<i>trifoliolata</i> (Art.)	71		<i>Variolaria</i>		
Stem of <i>Cordaite</i> ?	140		<i>ficoides</i> , Stb.	122	
Stem with roots	141		<i>Walchia</i> , Stb.		
<i>Sternbergia</i>			<i>Williamsonis</i> (Bt.)	142	
<i>approximata</i> , Bt.	133		<i>Williamsonia</i> , Carr.		
<i>transversa</i> , Art.	133		<i>gigas</i> (L. et H.)	143	
<i>Stigmaria</i>			<i>Zamia</i>		
<i>ficoides</i> , Bt.	94, 122		<i>gigas</i> , L. et H.	143	
sp.	124		<i>Zeilleria</i>		
sp.	125		<i>delicatula</i> , Kids.	64	
Strobilus?	140, 143				

NATURAL HISTORY SOCIETY
OF
NORTHUMBERLAND, DURHAM, AND NEWCASTLE-
UPON-TYNE.

ANNUAL MEETING, AUGUST 9TH, 1888.

REPORT, 1887—1888.

At the last Annual Meeting of the Society, held in the Library of the Museum, on the 11th of August (1887), your Committee were able to congratulate the members on the completion of the New Building, and its formal opening to the public by their Royal Highnesses the Prince and Princess of Wales, on the removal of the collections from the Old Museum and the sale of the Old Building to the North-Eastern Railway Company. The Honorary Treasurer was also able to state that after the payment of Mr. Clayton's mortgage (£2000) on the Old Building, and the sums due for the costs of erection of the West Corridors, etc., that a balance was left from the sale of the Old Building of £1861, which, together with a portion of the balance in the hands of the Treasurer, enabled the Committee to invest £2000 towards a Maintenance Fund for the Museum. This sum was invested in Newcastle Corporation Stock, at $3\frac{1}{2}$ per cent., in July, 1887.

The experience of the last twelve months has clearly proved to your Committee that in order to carry out the objects of the Society in an efficient manner a substantial and permanent

income, in addition to the subscriptions of members and the admission fees of the public, is required. The present annual income of the Society is barely sufficient, even on the present economical management, to maintain the limited number of officials and to defray the current expenses necessary for keeping the collections in good order and supervision, and nothing is left to complete the arrangement of the Galleries and West Corridors, or to purchase such specimens as are required to fill up the many deficiencies in the general collections, and also to provide for the repairs necessary to keep so large a building in proper condition. The necessity of a Fund for this purpose has forced itself so strongly upon your Committee, that they have been induced to draw up a Circular, in which they appeal to their friends and the public to assist them with donations towards a permanent Maintenance Fund. The following Circular has been issued by your Committee, and they trust that this appeal will be liberally responded to, so that they may be enabled to carry out the plans for the completion of the furnishings of the Museum and the enlargement and enriching the Collections.

COPY OF CIRCULAR.

“NATURAL HISTORY MUSEUM, BARRAS BRIDGE,
“NEWCASTLE-UPON-TYNE, JUNE 4TH, 1888.

“It will be seen from the Report of the Natural History Society, recently issued, that the Society, after completing the New Museum Building, the removal of the Collections, and sale of the old Building, is now quite free from debt, but the Committee have to state that the income of the Society from all sources is not sufficient for the maintenance and proper development of the Museum, even on the present very economical management, and in order to carry out the work efficiently, £400 a year, in addition to the present income, is required.

“As the Committee feel the great importance of efficiently preserving and extending the present Collections of the Society, and as the Museum is the only first-class Institution of its kind in the North of England containing extensive and unique Collections for the use of students and the public generally, they have resolved to appeal to their friends and the friends of Natural History to assist them to form a Fund, the interest of which will be sufficient with the present income to enable the Society to carry on efficiently its work in the future.

"Under these circumstances the Committee trust that you will favour the Society with a donation to the proposed Maintenance Fund.

"Donations may be sent to the credit of the Natural History Society Maintenance Fund, at Messrs. Lambton & Co., Bankers, Newcastle-on-Tyne.

"JOHN HANCOCK,

"Chairman of Committee."

When it is taken into consideration that the object of the Society is solely to promote and encourage the study and to create and extend a taste for the Natural Sciences—to form collections of all the Natural History objects found in our immediate district, and to conserve and arrange them for the use of students and the information and instruction of the public generally, and to which they are admitted at a very small charge—it must be acknowledged that such an institution is entitled to the liberal support of the more wealthy and enlightened portion of the community.

There is another subject your Committee wish to refer to, and that is the small number of members, considering the extent, population, and wealth of the district; and they wish to suggest that this would be most easily remedied by the influence and exertion of each individual member inducing a friend to join the Society, and thus increase the annual income.

Now that the Society is located in its New Building, and is about to enter on the Sixtieth year of its existence, it may not be out of place to lay before the present members a short outline of the objects contemplated by the founders of this Society, and how far they have been carried out in that time.

The Society was formally inaugurated as an independent Scientific Institution in 1829. At that time, and for a few years afterwards, it had not a building of its own, and the collections were placed in hired rooms. In 1833, through the exertions and influence of several of its members, a site was obtained, and funds were subscribed for the erection of a Museum Building, and in it the collections were arranged and exhibited for more than fifty years, until, by the large additions to the collections, the rooms became too small. The erection of a

New Museum was proposed and planned by Mr. J. Hancock for the reception of his unique collection of British Birds, and for the over-crowded collections of the Old Museum.

During the first years of the Society's existence an effort was made to prepare a Geological Map of the district, and also to establish a depository for Mining Records. As shewn in the early quarto Transactions much was done in this direction, but the falling off of influential members at an early date, and the establishment in London of a Mining Record Office and a Geological Survey for the whole country, led to the abandonment of these early aspirations, and the eventual forming of a Mining Institute in Newcastle, for the publication of such papers on mining subjects as were prepared by local gentlemen interested in mines, deprived the Society of another of its local features; but there were left to it the objects originally contemplated, namely, the encouragement of Natural History pursuits, the formation of illustrative collections, and the publication of memoirs and catalogues of the natural productions of the district.

How far then has the Society progressed in the accomplishment of these, its primary objects, and what remains to be done in the future?

In the early Transactions of the Society, issued in the years 1831—1838, there were published by members of the Society Catalogues of the Birds, Land Mollusca, Plants, etc., of the two Northern Counties, and a Catalogue of the Zoophytes of the East Coast, and many valuable Memoirs on the Geology and Mining History of these counties.

These Transactions, with its Catalogues and Memoirs by Winch, Hutton, Alder, Dr. G. Johnston, Atkinson, Buddle, Nicholas Wood, Witham, and others, obtained for Newcastle and its Naturalists a status in the Scientific world, and a reputation which has extended down to the present day. It was also during this time that the "Fossil Flora" was published by Prof. Lindley and Wm. Hutton, one of the first Secretaries of the Society. This is the most extensive work that has yet been published on this subject in England, and it will always be a valuable work of reference on the Coal-measure Flora. About this time also

was commenced by two of the original members of the Society, Messrs. Alder and Hancock, the splendid work on the Nudi-branchiate Mollusca. A work so excellently and faithfully illustrated had not before been produced in England, and the authors obtained a world-wide reputation. These years, then, form an important epoch in the history of the Society.

During the twenty years, from 1846—66, much of the scientific work of the members was contributed to and appears in the Transactions of the Tyneside Naturalists' Field Club, a Society which owed its origin to and received early and continued support from many of the active members of the Natural History Society. To these volumes were contributed several extensive and valuable Catalogues; of the Mollusca and Zoophytes of Northumberland and Durham, by Mr. Joshua Alder; of the Diurnal Lepidoptera, by Mr. Geo. Wailes; of the Indigenous Mammalia, by Messrs. Mennell and Perkins. In the same Transactions will be found a Catalogue of the Coleoptera, by Messrs. Hardy and Bold; a Catalogue and Notes of the Permian Fossils and Fossil Mammalia, by R. Howse; of the Marine Algæ, and other contributions, by Prof. G. S. Brady and others.

Since 1866 the joint Transactions of the two Societies have been published under the title of Natural History Transactions of Northumberland, Durham, and Newcastle-on-Tyne, containing many Catalogues and papers by members of both Societies. The New Flora of Northumberland and Durham, by Messrs. Gilbert Baker and Tate; the Foraminifera, by H. B. Brady; the British Entomostracan Families, Bosminidæ, etc., by Rev. A. M. Norman and George Brady; the Echinoderms, by George Hodge; the Homoptera, Hemiptera, Aculeate Hymenoptera, and a revised Catalogue of the Coleoptera, by Thos. J. Bold; and the Catalogue of the Birds of Northumberland and Durham, by John Hancock; in addition to numerous papers on different subjects by other members.

There remains still much to be done in the way of Catalogues and Memoirs. Though much has been published on many subjects, yet there are fields of investigation as yet untouched for future research and observers. The Carboniferous Limestones

of Northumberland and Durham have not been fully searched for their Fossil remains or carefully catalogued. The Coal-measure Flora has only been very partially and imperfectly investigated, and here a rich field lies open, for future research, which can only be successfully carried out by local observers. Many groups of the animal kingdom have only been partially touched, as the Crustacea, etc., etc.; and most of the groups of minute plants and animals are entirely unrecorded. Much then remains for future investigators, and many other new fields of research will, undoubtedly, open out.

In May last the Committee decided to form a temporary Picture Gallery in the upper West Corridor of the Museum until a permanent Art Gallery is established in the city. It is intended to limit the exhibition to the works of celebrated local artists, now deceased, and a circular has been issued to ladies and gentlemen known to possess such pictures, inviting them to contribute to such an exhibition.

The Committee have been much indebted to Mr. Alderman T. P. Barkas, F.G.S, for a series of lectures to the young, on the collections in the Museum. These lectures were given every Saturday morning in the months of January, February, and March. At the first lecture nine hundred juveniles attended, but this number being much too large, the other lectures were limited to two hundred, and an average attendance of above one hundred juveniles was secured.

During the past year the Society has lost twenty-two members: there have been fourteen resignations and eight deaths. Amongst the latter we regret the loss of Mr. Henry Watson, of Millfield House, who was for many years a member of the Committee, and took an active interest in the welfare of the Society. As stated in the last report Mr. Watson had moulds prepared from the Eagles modelled by Mr. Hancock, and metal castings made from these, which are now placed on the pillars at the Entrance Gates.

Thirty-two new members have been elected during the year,

bringing the present membership up to 300, a number far too small for so extensive and populous a city as Newcastle.

The receipts at the door for admissions have amounted to £191 : 2 : 2, shewing a slight decrease in the number of persons who have visited the Museum.

The Museum has been open since May on Monday and Saturday evenings until eight o'clock, but your Committee regret to report that the number of admissions has been so few that they do not feel justified in keeping the Museum open later than six o'clock.

Your Committee have also to report that many interesting and valuable donations have been made to the Society during the current year, a detailed list of which is appended to this Report, but the following may now be specially mentioned :—

The Herbarium of our late Vice-President, R. B. Bowman, Esq., consisting of numerous portfolios of British and European Plants, which will form an important addition to the collection of British Plants, has been presented by Mrs. Bowman.

Her Grace the Dowager Duchess of Northumberland has obligingly presented the Dromedary Saddle and Trappings used by His Grace the late Duke Algernon when travelling in Egypt.

A selected collection of Australian Birds from Melbourne, Victoria, specially procured for the Museum by Mrs. E. Barnes, of Whitburn, has been presented by that lady.

Among the numerous additions to the Bird Collection made by Mr. John Hancock and others may be mentioned a specimen of Pallas' Sand Grouse, which had been killed against the telegraph wires at Cragside, and presented by Lord Armstrong. It was one of the earliest recorded specimens of this year's migration to this country of this interesting visitor.

A group of Birds of Paradise, from New Guinea, presented by Capt. Neville R. Sayers, and mounted by Mr. J. Hancock, deserves special mention, from the beauty of their plumage and the artistic manner in which they are displayed.

Capt. Sayers also presented two large Clam-Shells (*Tridacna gigas*), which he had procured from the Great-Barrier-Reef off

the N.E. Coast of Australia, and Bows and Arrows and other weapons, from the Solomon Islands and from Queensland.

Among the additions to the Ethnological Gallery, an interesting collection of native curiosities, weapons, and manufactures, from the Cameroons and adjacent parts of West Africa, has been made by George Allen, Esq., of the Cameroons.

Miss M. J. Hancock has contributed to this gallery the full dress and personal ornaments of an English lady of the early part of the eighteenth century, which are displayed on a lay figure modelled by Mr. John Hancock.

The fine set of Antlers arranged in the Entrance of the Museum has been enriched by a fine head of the Scandinavian Elk, from Sweden, presented by James Hall, Esq., Tynemouth; and a splendid head of the North American Bison, from Colorado, presented by Lieut.-Col. W. Mathwin Angus, Fenham Terrace.

The Honorary Treasurer's Balance Sheet shows a balance in hand of £110 : 5 : 9, as compared with £220 : 18 : 6, the balance of August last.

In concluding their report your Committee have to regret that owing to continued ill health the Honorary Treasurer, Mr. Joseph Blacklock, has tendered his resignation. While deeply regretting the cause for this step the Committee beg to offer to Mr. Blacklock their sympathy, and to thank him for his valuable services as a member of the Committee, Honorary Secretary, and Honorary Treasurer, for more than forty years.

The Committee regret that Capt. Noble has also been obliged to resign the office of Honorary Secretary, which he has held for many years, on account of engagements which prevent him fulfilling the official duties as he would wish to do.

The Committee propose, as an appreciation of their valued services, that Mr. Blacklock and Capt. A. Noble be elected Vice-Presidents of the Society.

ABSTRACT OF MINUTES.

It was moved by J. D. Scott, and seconded by Capt. N. R. Sayers:—

“That the Annual Report now read be adopted and printed for distribution to members.”

HONORARY TREASURER'S BALANCE SHEETS.

In the absence of the Honorary Treasurer the Financial Reports were read by the Secretary.

It was moved by Prof. Lebour, and seconded by Mr. Brooks:—

“That the Honorary Treasurer's Financial Reports be passed.”

Letters were read from the Honorary Secretary, Capt. A. Noble, and from the Honorary Treasurer, Joseph Blacklock, Esq., expressing their wishes to resign the offices which they have so long held.

It was resolved that a vote of thanks be sent to Capt. A. Noble and Joseph Blacklock for their long and valued services to the Society.

The officers of the Society were proposed and duly elected for the year 1888-89.

THE HONORARY TREASURER IN ACCOUNT

CURRENT ACCOUNT FROM 2ND AUGUST,

1887.	RECEIPTS.	£ s. d.
Aug. 2.	To Balance from last Account brought forward	220 18 6
1888.		
Aug. 4.	,, Members' Subscriptions.....	368 7 0
	,, Admissions to the Museum	191 2 2
	,, Guides to the Museum sold	5 17 2
	,, One Year's Interest on £2000 invested in $3\frac{1}{2}\%$ Newcastle Corporation Stock, less Income Tax	68 0
	,, Discounts.....	0 4
		<u>£854 9 10</u>

20th Oct., 1888.

Examined and found correct,

JOHN D. SCOTT,	} AUDITORS.
E. O. REID,	

WITH THE NATURAL HISTORY SOCIETY.

1887, TO 4TH AUGUST, 1888.

1888.		PAYMENTS.	£	s.	d.
Aug. 4.	By	Curator's Salary for one year	200	0	0
	„	Keeper's „ „	90	0	0
	„	Assistant's „ „	145	15	0
	„	Tradesmen's Accounts	106	9	10
	„	Sundries, as per Keeper's Monthly Accounts	22	14	11
	„	Coke and Coals, Gas and Water	36	9	10
	„	Taxes	12	3	6
	„	Fire Insurances	23	3	0
	„	J. Bell & Co., printing Reports, Guides, etc.	30	3	0
	„	Hall Bros., for Mast and erecting same	14	8	0
	„	F. Raine, for stuffed specimen of Sabine's Gull...	10	0	0
	„	J. Ferguson, for removing specimens of Ironstone and Limestone, presented by Messrs. Pease, from the Jubilee Exhibition, and erecting same in the Grounds and in the Museum.....	28	1	6
	„	Messrs. Sopwith, for Bird Cases	24	10	6
	„	Messrs. Lambton & Co., for Cheque Books.....	0	5	0
	„	Balance in Messrs. Lambton & Co.'s Bank.....	110	5	9
			<hr/> £854 9 10 <hr/>		

8th August, 1888.

JOSEPH BLACKLOCK,
HON. TREASURER.

THE HONORARY TREASURER IN ACCOUNT
CAPITAL ACCOUNT,

1888.	£ s. d.
Aug. 4. To Legacy bequeathed by the late Miss Alder, and Bank Interest thereon to 20th Nov., 1887 ...	23 1 10
„ Legacy bequeathed by the late Miss Isabella Bewick, and Bank Interest thereon to 8th October, 1887	194 0 0
„ Balance of Sale Account of Old Museum Buildings and two Donations transferred from New Building Fund, ordered by the Committee to be added to the above £194 0s. 0d. on De- posit Receipt with Messrs. Lambton & Co. ...	56 5 0
„ Invested in purchase of Newcastle Corporation 3½ per cent. Stock	2000 0 0
	£2273 6 10

20th Oct., 1888.

Examined and found correct,

JOHN D. SCOTT, }
E. O. REID, } AUDITORS.

WITH THE NATURAL HISTORY SOCIETY.

4TH AUGUST, 1888.

1888.	£	s.	d.
Aug. 4. By Miss Alder's Legacy, paid into the Newcastle-on-Tyne Savings Bank, at Interest, in the names of Sir Wm. Geo. Armstrong, C.B., Norman Cookson, and Nathaniel Geo. Clayton, three of the Trustees, and accumulated Interest thereon	23	1	10
„ Miss Bewick's Legacy and accumulated Interest, together with £56 5s. 0d. added, and now invested with Messrs. Lambton & Co. on Deposit Receipt No. 92,257 for and accumulating Interest thereon	250	5	0
„ Invested in Newcastle Corporation 3½ per cent. Stock	2000	0	0
	<u>£2273</u>	<u>6</u>	<u>10</u>

8th August, 1888.

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1888-89.

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LIST OF EXCHANGES AND DONATIONS TO THE MUSEUM
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OF

THE NATURAL HISTORY SOCIETY,
FROM AUGUST 4TH, 1887, TO AUGUST 10TH, 1888.

AMERICAN SOCIETIES.

Boston.:—*Society of Natural History*.

Memoirs, Vol. 4, Nos. 1—6.

The Society.

Cambridge.:—*Harvard College Museum of Comparative Zoology*.

Bulletin, Vol. 13, Nos. 2, 5, 6, 7, 8.

„ Vols. 14, 15, Three Cruises of the Blake.

„ Vol. 16, No. 1.

Memoirs. Vol. 15, Reports on Dredging in the Gulf of Mexico.

„ Vol. 16, Nos. 1, 2.

Prof. Alex. Agassiz.

Cambridge, Mass.:—*Academy of Arts and Sciences*.

Memoirs, Centennial Volume, Vol. 11, Part 5, No. 6.

Proceedings, N. S., Vol. 14, Part 2.

The Academy.

New York.:—*Academy of Sciences*.

Annals, Vol. 4, Nos. 1, 2, 3, 4.

The Academy.

Philadelphia.:—*Academy of Natural Sciences*.

Proceedings, Parts 1, 2, 3, 1887; Part 1, 1888.

Philadelphia.:—*American Philosophical Society*.

Proceedings, Vol. 24, No. 125, 126; Vol. 25, No. 127.

The Society.

Trenton.

Journal of Natural History Society, No. 3, Jan., 1888.

The Society.

Washington.:—*Smithsonian Institution*.

Annual Report, 1885, Part 2.

Miscellaneous Collections, Vol. 31, Synoptical Flora of North America,
by Asa Gray.

The Institution.

Smithsonian Report, 1885, Part 2.

Washington :—United States Geological Survey.

Bulletin, 34—39 ; Sixth Annual Report, 1884—85.

Mineral Resources of the United States, 1886.

*The Director of the Geological Survey.**U.S.A. :—American Association for the Advancement of Science.*

Proceedings, Vol. 36.

*The Association.**U.S.A. :—The Cooper Union.*

29th Report of the Trustees.

*The Trustees.**U.S.A. :—Elisha Mitchell Scientific Society.*

Journal, Vol. 4, Part 2.

The Society.

BRITISH SOCIETIES.

Berwickshire Naturalists' Field Club.

Transactions, Vol. 11, No. 2.

*The Club.**Cardiff Naturalists' Society.*

Transactions, Vols. 1—19, Parts 1, 2, 1867—87.

*The Society.**Ealing Microscopical and Natural History Society.*

Annual Report, 1887—8.

*The Society.**Edinburgh Botanical Society.*

Transactions and Proceedings, Vol. 17, Part 1, 1887.

*The Society.**Edinburgh Geological Society.*

Transactions, Vol. 5, Part 3, and Catalogue of Library.

*The Society.**Edinburgh :—Scottish Meteorological Society.*

Journal, 3rd series, No. 4, 1886.

*The Society.**Essex Naturalists' Field Club.*

Journal, Nos. 7—12, Vol. 1 ; Nos. 1, 2, 3, 5, 6, Vol. 2.

*The Club.**Greenwich.*

Magnetical and Meteorological Observations, 1885.

*The Astronomer Royal.**Leeds Literary and Philosophical Society.*

Reports, 1886—7, 1887—8.

*The Society.**Lewisham and Blackheath Scientific Association.*

Annual Report, 1886—7.

The Association.

- Liverpool Naturalists' Field Club.*
 Proceedings, 1886-7. *The Club.*
- London Geologists' Association.*
 Proceedings, Vol. 9, No. 8; Vol. 10, Nos. 2, 3, 4, 5, 6.
The Association.
- London Quekett Microscopical Club.*
 Journal, Series 2, Vol. 3, Nos. 19, 20, 21, 22. *The Club.*
- London Zoological Society.*
 Proceedings, Parts 2, 3, 4, 1887; Parts 1, 2, 1888. *The Society.*
- Manchester Field Naturalists' Society.*
 Report and Proceedings, 1886. *The Society.*
- Manchester Literary and Philosophical Society.*
 Memoirs, Vol. 10; Proceedings, Vols. 25, 26. *The Society.*
- Newcastle-on-Tyne:—North of England Institute of Mining and Mechanical Engineers.*
 Transactions (Thirty volumes)=Vols. 1, 2, 8-20, 22-36, Parts 1-4, Vol. 37. *The Institute.*
- Plymouth Institution and Devon and Cornwall Nat. Hist. Society.*
 Reports and Transactions, Vol. 9, Part 3, 1886-7. *The Institution.*
- York:—Yorkshire Philosophical Society.*
 Annual Report, 1887. *The Society.*

COLONIAL SOCIETIES.

- Canada:—Geological and Natural History Survey.*
 Catalogue of Canadian Plants, Part 3, 1886. *The Director.*
- Canadian Record of Science.*
 Vol. 3, Nos. 1, 2. *The Natural History Society, Montreal.*
- New South Wales, Sydney.*
 Annual Report of the Department of Mines, 1886.
 Geology of Vegetable Creek, Tin-mining Field, New England District, N.S.W., Maps and Sections, by T. W. Edgeworth David, Geol. Surveyor. *The Hon. the Minister of Mines, Sydney.*
- N.S.W.:—Royal Society.*
 Journal of Proceedings, Vols. 20, 21. *The Society.*

N.S.W. :—Australian Museum.

Report of the Trustees, 1886.

Descriptive Catalogue of the Medusæ of the Australian Seas: Part 1,
Scypho-Medusæ; Part 2, Hydro-Medusæ; by R. Von Leadenfeld,
Ph.D. *The Trustees, Australian Museum.*

Victoria.

Prodromus of the Zoology of Victoria, Decades 1—15. Melbourne.

The Premier of Victoria.

EUROPEAN SOCIETIES.

Belgium :—Société Royale Malacologique de Belgique.

Annales, Tome 21, 1886.

Procès-verbeaux, Tome 16, 1887; July to Dec., 1887. *The Society.**Bohemia and Hungary.*

Archiv der Landesdurchforschung von Böhmen: Band 5, Nos. 4, 5, 6;

Band 6, No. 3.

Franz Rávnac, Prague.

Trans. of the Trencsin Nat. Hist. Soc., 1886.

*The Society.**Copenhagen.*

Vedenskabelige Meddelelser fra Naturhistorisk Forening i Kjøbenhavn,
for Aaret 1887. *The Society.*

Dresden.

Der Isis, July—Dec., 1886.

*The Nat. Hist. Society, Dresden.**Norway.*

Bergens Museums Aarsberetning, for 1886.

*The Director of the Museum.**Vienna.*

Verhandlungen der K.K. Zool-Botan. Gesellschaft in Wien:

Jahrgang, 1887, Band 37, Quartal 3-4; Jahrgang, 1888, Band 38,
Quartal 1-2.

BOOKS AND PAMPHLETS.

Life in the Cameroons, by George Allen.

The Author.

Two Photographs of Natives of Abyssinia.

Capt. Neville R. Sayers.

Rhopalocera Exotica, Exotic Butterflies, by H. Grose Smith and W. F.

Kirby. Parts 1, 2, 3, 4, 5.

Purchased.

Bryologia Europaea, by Brach and W. P. Schimper, Fasc. 1—41. 1837—47.

Adumbrationes Plantarum, Schlechtendal, (Ferns). 1825. Fasc. 1—3.

Die Farnkräuter, Dr. G. Kunze, Band 1, Lief 1, 2. 1840.

Sowerby, English Botany, Supp., Nos. 67, 68, 69.

De Euphorbiacearum Generibus, Andrea de Jussieu. 1824.

Cariceæ, 44 pp., 10 coloured plates. 1840.

Mrs. Bowman.

MAMMALIA.

1888.

- Skull of Beaver, from Norway. *Mr. Thos. English.*
 Tooth of African Elephant. *Mr. Geo. Allan, Cameroons.*
 Harvest Mouse, Guildford; and Common Shrew, from Oatlands. *Mr. John Hancock.*
 Wolf, *Canis lupis*, Linn. (male), killed at Sangers' Circus, Northallerton. *Mr. George Sangers.*
 Skull of Negro, Cameroons. *Mr. Geo. Allan.*
 Head of American Bison, *Bison Americanus*. *Col. W. M. Angus.*
 Two Teeth of Indian Elephant, *Elephas Indicus*. *Mr. S. J. Pitt, Mark Lane, London.*
 A Jumping Mouse, *Jaculus Hudsonicus*; and *Hesperomus*, from Milton, Ontario. *W. E. Brooks, per J. Hancock.*
 Head of Scandinavian Elk. *Mr. James Hull, Tynemouth.*
 Skull of Wild Boar, from India. *Mr. R. Storer Carr, Riding Mill.*
 Antlers of Red Deer, Marr Lodge.
 Two Skulls of Roe Deer, Elgin.
 Head of Wild Boar, from France? *Mr. John Hancock.*
 Skeleton of Domestic Cat, from Polperro. *Re-set by Mr. John Hancock.*
 Two Cub Foxes (male and female).

BIRDS.

1887.

- A Cuckoo and two Bee-eaters, from South Africa. *Rev. F. W. Bindley, Gosforth.*
 Pendulous Nest of Weaver Bird, W. Africa. *Mr. Geo. Allan, Cameroons.*
 Black Swan, which died at Dunston Hill, Sept. 3rd, 1887. *Mr. Edmund J. Carr, Dunston Hill.*
 Sixty-two Skins of American Birds. *Mr. Adam Balmer, Daneville, Ill.*
 Long-tailed Duck, *Harelda glacialis*, shot at Holy Island. *Mr. Thos. Thompson, Winlaton.*
 A collection of twenty-six Birds, in spirits, from the Seychelles Islands. *Messrs. Galbraith, Seychelles.*
 Ring Dotterel, *Charadrius hiaticula*, shot at Whitley. *Mr. J. T. Maling.*
 A specimen of Owen's Kiwi, *Apteryx Oweni*; and Owl Parrot, *Strigops habroptilus*, from New Zealand. *Mr. Geo. Burnett, Whangarei, N.Z.*
 Hybrid between the Yellow Bunting and Reed Bunting, caught at Whitley. *Purchased.*

1888.

- A specimen of the Painted Snipe, *Rhyncea Australis*.
 Two American Golden Plovers (male and female).
 Pectoral Sandpiper (young), first plumage. *Mr. Edwd. Bidwell, per Mr. John Hancock*

Sand Martin (young), Helmsley, Yorkshire, July, 1874.

Mr. F. Raine, per Mr. John Hancock.

House Martin (young) and House Sparrow (young), Oatlands, 1887.

Mr. John Hancock.

Long-tailed Duck, *Harelda glacialis*, mature (female), winter.

Mr. Henry C. Swan.

Hybrid between the Greenfinch and Brown Linnet, caught near Kenton.

Purchased.

A Grovelling Duck, kept at Jesmond by Captain Noble, where it died,
January, 1888.

Per Mr. John Hancock.

Pallas' Sand Grouse, from Tees-mouth (1863).

Roller, from Yorkshire.

Rose-coloured Starling.

Mr. John Hancock.

Eleven Skins of *Linota linaria* (nine males, two females).

Tringoides macularius (male and female), mature.

Do. do. (male), first plumage.

Do. do. (male), downy state.

Totanus solitarius (female).

Aegialites vociferus (male).

Scolopax Wilsonii (young).

Molothrus pecores, Cow-bird (male, female, and young).

Dend. Pensylvanica, Chestnut-sided Warbler, foster-parent of the Cow-bird.

All from Milton, Ontario, Canada.

Mr. E. W. Brooks, per Mr. John Hancock.

Portion of Skeleton of Spotted Eagle, *Aquila naevia* (Brisson), Indian
form, shot near Cresswell, Northumberland Coast, October, 1885.

Mr. John Hancock.

Marsh Titmouse.

Mr. Percy Percival, Shepton Mallett.

Two Regina Birds of Paradise, *Paradisaea*.

One King Bird of Paradise, *Circinnurus regius*.

One Racquet-tailed King-Fisher, *Alcedo Dea*.

Head and Neck of Goura Pigeon, *Goura coronata*.

Captain Nevile R. Sayers.

Two Nests of the Oven Bird, *Furnarius rufus* (Gmel.), from Buenos Ayres.

Mr. J. Young, Hereford Road, Bayswater.

Black Redstart, *Ruticilla Tithys*, shot at Cullercoats, 1856.

Mr. John Hancock.

Nest of Weaver Bird, from India.

Mr. Jas. Hodgson, per Mrs. Emley.

Five Skins of Golden Oriole, one Barbet, one Roller (male), one Flycatcher,
one Woodpecker, two Bee-eaters.

Mrs. Barnes, Whitburn.

Golden Eagle, *Aquila chrysaetos* (Linn.). This bird was kept several years
in the Aviary at Heaton Park.

The Corporation of Newcastle.

- Two specimens of Grey Parrot, *Psittacus erithacus* (Linn), from Calabar Coast. *Mr. Geo. Allan, Cameroons.*
- Sky Lark, caught during snow-storm in March on the Town Moor. *Master Douglas Currie.*
- Skeleton of Yellow-crested Cockatoo, *Cacatua galerita* (Lath.). This bird lived 75 years in captivity in England. *Mr. Alfred Hume.*
- Small Foreign Finch. *Mr. T. W. Futcher.*
- Knot, *Tringa Canutus* (Linn); Pigmy Curlew, *Pelidna subarquata*. These specimens are figured in Bewick's British Birds, and were presented to Mr. John Hancock by Mr. R. R. Wingate, 1843. *Mr. John Hancock.*
- Skeleton of Scops-eared Owl, *Scops Aldrovandi*. *Mr. John Hancock.*
- Three Chinese Robins (two males and one female). *Miss Ethel Noble.*
- Barn Owl (female), from Norfolk. *Mr. Wm. Voutt.*
- Blackbird (young). *Mr. John Jackson.*
- Egg of Goshawk (eight years old), laid at her block, April 26th, 1888. *Capt. F. H. Salvin, per Mr. John Hancock.*
- A fine specimen of Pallas' Sand Grouse, *Syrrhaptes paradoxus* (female), killed against the telegraph wires, near Craggside, May 23rd, 1887. *The Right Hon. Lord Armstrong.*
- Crop of Pallas' Sand Grouse, containing Clover Seed, shot near Wickham, May 17th, 1888. *Mr. Thos. Thompson.*
- Three young Rooks, Holleyn Hall, Wylam. *Mr. Wm. Dinning.*
- Skeleton of Missel-Thrush, found at Willington, on the Coquet, April, 1888. *Mr. John Hancock.*
- Manx Shearwater, *Puffinus Anglorum* (male), downy state, from Island of Eigg. *Mr. Thos. Thompson.*
- Six Eggs of *Cereopsis Novae-Hollandiae*, laid in the Leazes Park, 1888. *Mr. Wilson.*
- Carrion Crow, with malformed beak, shot in Hexhamshire. *Mr. F. Hutchinson, Benwell.*
- Twenty-nine specimens of Australian Birds from Melbourne: one Regent Bird, two Satin (Bower) Birds, one Diamond Wren, one Rifle Bird, one Warty-faced Honey-eater, one Turtle Dove, one Azure Kingfisher, one Blue Wren, one Robin, two Spotted Pardolates, one Honey-eater, one Whisker Bird, one Whattle Bird, one Yellow Robin, one Yellow-breasted Thick-Head, two King Parrots, two Barraband Parakeets, one Scaly-breasted Parakeet, one Red Lory, two Blue-mountain Parakeets, one Swift-flying Parakeet, one Musky Parakeet, one Shell Parrot, one Rock Peblar. *Mrs. Barnes, Whitburn.*
- Puffin, *Fratercula Arctica*, caught on the Tyne. *Mr. Wardle, Gallowgate.*
- Three Cases of Stuffed Birds. *Miss Harvey, Eskdale Terrace.*

REPTILES AND FISHES.

1887.

Snake, fine specimen, Cotes des Fenouillet Hyeres, France.

Mr. Fred. Raine.

A small Tortoise (dried specimen).

Mr. J. G. Dickinson.

A Chameleon, from Alexandria.

Mr. Tate.

1888.

Lesser Spotted Dogfish, *Scyllium catulus*, from Aberdeen.

Mr. J. Courage, Point Law, Aberdeen.

Three large Fish Scales (*Barbel?*), from the Cameroons River; and a Flying

Fish, from the North Atlantic.

Mr. George Allan, Cameroons.

MOLLUSCA, ZOOPHYTES, ETC.

1888.

A small collection of Shells, chiefly from New Zealand.

Prof. Symonds, per Mr. J. Philipson.

Specimens of *Helix aspersa*, *Macra stultorum*, *Venerupis*, Bone of Cuttle

Fish, etc., from Hyeres, South of France.

Mr. Fred. Raine.

Two large specimens of *Tridacna gigas*, Corals, etc., from the great Barrier Reef off North Queensland.Ten specimens of *Natica*, and one of *Dolium*, from East Asian Seas.

Capt. N. R. Sayers.

Specimens of *Funiculina quadrangularis* (Pallas), from the entrance to Loch

Etive, Argyleshire.

Mr. W. Anderson Smith, Ledaig, Connell Ferry,

Per Mr. Alex. S. Stevenson.

Specimens of Corals, from E. Cape, New Guinea, and Sponges, from Reefs in Torres Straits.

Capt. N. R. Sayers.

Specimens of *Pennatula phosphorea?* Naples; *Alcyonium palmata*, Mediterranean; *Corallium rubrum*, Mediterranean; *Synapta rosea*, Jersey.

Mr. Thos. Henderson, Scotswood.

INSECTS, ETC.

1887.

Sawfly, *Sirex gigas*, caught in Grey Street.

Mr. R. Y. Green.

Do. do. caught at Whitfield, in Sept., 1887.

Mrs. Blackett Ord, Whitfield Hall.

Mole Cricket, from Hyeres, South of France.

Mr. F. Raine.

Nineteen Butterflies, from India.

Mr. J. C. Brooks.

Larvæ of Dragon Fly and other Insects for Pond.

Mrs. Page, Saville Place.

Tape Worm.

Rev. J. A. J. Roberts, Chatton Park.

Ten specimens of Australian Coleoptera and twenty-three of Diptera.

Mr. M. Henderson.

A small collection of Crustaceans, from Loch Fyne, Firth of Clyde, and Firth of Forth. *Per Mr. H. N. Sullivan.*

BOTANY.

1888.

Bottle of Nutmegs, from Ceylon. *Mr. Thos. English.*
 Do. do. *Mr. Edwd. Dodd, K.H.*
 Herbarium of the late Mr. R. B. Bowman. *Mrs. Bowman.*
 Plants of *Primula farinosa*, etc., from Teesdale, for rockery. *Mr. F. W. Rich.*
 Specimen of *Sphaeria Robertsii*, growing out of a Caterpillar, from New Zealand. *Mr. J. C. Brooks.*
 Five Nuts of Vegetable Ivory. *Mr. S. J. Pitts, Mark Lane, London.*

FOSSILS AND MINERALS.

1887.

A piece of Concrete, found at Puzzuoli, near Naples, in which is a copper coin of the Emperor Hadrian, in perfect preservation. *Mr. Richd. Luckley.*
 A fine specimen of *Orthoceratite*, from the Mountain Limestone of Dumfriesshire. *Mr. Hugh Miller, Edinburgh.*
 Stems of Calamites, from Wideopen Quarry; Nautilus in glaciated block of Mountain Limestone, and pieces of Sandstone with circular coloration. *Mr. W. C. Robson.*
 Fossil Plant, viz., Cordaites, from Hartley, and two rock specimens. *Mr. Peter Gray.*
 Five Shark's Teeth from Cambridgeshire, and one from So. Carolina, U.S.A. *Mr. Thos. English.*
 Leg-bones of Moa, *Dinornis casuarinus*, from New Zealand. *Mr. Edwd. Dodd, K.H., Belgrave Terrace.*
 Two specimens of Fossil Leaves, from the Leaf-beds, Island of Mull. *Mr. E. L. de Hart, 2, Harcourt Buildings, Temple, London.*
 Five specimens of Chalk Fossils, Ananchytes, etc., from Northfleet. *Mr. M. W. Kirby, Northfleet.*
 Large block of Cannel Coal, from Eltringham Colliery, near Prudhoe. *Messrs. Young, Dance, & Co.*
 Case of large Crystals of Copperas. *Messrs. Hunter & Co., Walker.*
 Two very long Flint Nodules, from the Chalk, Northfleet. *In exchange, from Mr. Alfred Hume.*
 Two boxes of Fossils, from the Carboniferous Rocks of Fife. *Mr. Jas. W. Kirkby.*
 Two Fossil Eggs, from Lobas de Alfueira Island, West Coast of So. America (75 feet below surface). *Mr. Wm. Charlton.*

A large slab of Frosterly Marble (polished), $8\frac{1}{2}$ feet by $4\frac{1}{2}$ feet, filled with Corals.

A smaller slab, from same locality, containing Lithostroton.

Rough block of Limestone, used for smelting.

A large block of Coal, Brockwell Seam, shewing thickness of seam.

A pyramid of Cleveland Ironstone, shewing thickness of stratum.

Messrs. Pease & Co.

A large piece of Fossilized Wood, from the Lignite beds (Tertiary) of County Antrim.

Mr. John Hamilton, Belfast.

Several fine slabs of *Lepidodendron* ———, from the shale above the Shilbottle coal, Shilbottle Colliery.

Mr. John Roscamp, Shilbottle.

Specimen of Paper Coal, from Bonn, Germany.

Prof. G. A. Lebour.

1888.

Crustacean Tracks in Sandstone, from Haltwhistle Quarries (Upper Yoredale series.

Messrs. A. and A. Summerson, per Mr. C. M. Adamson.

Twenty specimens of Shark's Teeth and other bones, from the Phosphate beds of S. Carolina, North America.

Mrs. Emley, Ellison Place.

Nautilus Frieslebeni, from the Marl Slate, Midderidge, Co. Durham.

Mr. Wm. Dinning.

Anthracite (cone in cone) Coal, from Powell's Duffryn Colliery, So. Wales.

Mr. John Pattinson.

A Tooth of Mastodon and one of Elephas, Vertebræ, etc., from the Phosphate beds, Bull River, South Carolina.

Mr. Robert Blair, Harton.

Gold-bearing Quartz, from the Transvaal.

Mrs. E. Bruce, Graham's Town, Cape Colony, per Rev. Dr. Bruce.

Four pieces of Cone in cone, from boulder or drift-clay, site of Fleming's Hospital, Moor Edge.

Mr. Philip Hobbs.

Iron Pyrites? (massive), said to be from the Whin Dyke, at Knowe's Gate, Wansbeck Line.

Mr. John Brown, Kenton Bank Foot.

Fossil Starfish, from Eocene Limestone, Egypt.

Mr. Robt. Blair, Harton.

Scales of *Megalichthys Hibberti*, from roof of Kilburn Seam, Denby Colliery, near Derby.

Teeth and part of Jaw of *Ctenodus*, from the Half-yard Ironstone, Clanway Colliery, near Tunstall, Staffordshire.

Portion of Spine of *Gyracanthus*, from the Black Rake Ironstone, near the Nutbrook Canal, Ilkeston, Derbyshire.

Mr. G. E. Greenwell, Duffield, near Derby.

Marsupites and Echini, from the Chalk at Aldershot, and two Bivalves, from a well in London Clay

Mr. Thos. Henderson, Scotswood.

Small collection of Inferior Oolite Fossils, from the Cordilleras, 18,000 feet above sea level, 60 miles from Corral Quimado; and Shells and Implants, from raised beach at Santo Thomas, at Arragon, Chili.

Mr. W. C. Tripler, Santiago, per Dr. H. S. Pattinson.

ETHNOLOGICAL.

1887.

An interesting collection of Native Curiosities and other productions, from the Cameroons and other districts on the West Coast of Africa:—Fetish or Idol, Model of Boat or Canoe, Stool made of Cotton-wood, Native Drum, two Musical Instruments, two Brass Dishes, Native Grass, Bags made of grass, Cap made of grass, two small Bags, Native Cloth Dress, two War Dresses made of grass; Native Woven Cloth, from Quettah, Slave Coast; Grass Dress-Cloth; Grass Sleeping-Mats, from the Gaboon; Girl's Dress or Waistband, made of Cowry shells; two Native Fly-Brushes, Native Basket, two Ivory Bracelets, two large Food-Bowls, four small Bowls, four Teeth Cleaners, five Wooden Spoons, Gourd Vessel, Moorish Knife, two Hair Combs, two Wooden Fans, ornamented; two Mats, one Grass Fan, two Ebony Sticks, six Spears with iron heads, one Bow and Arrows, Lamp for burning oil, Tobacco Pipe, Necklet, a pair of Sandals worn by Arabs on the Niger.

Mr. Geo. Allan, the Cameroons.

Portuguese Bullock Driver's Coat, made of grass.

Messrs. W. B. and E. O. Reid.

Dromedary Saddle and Trappings, used by the late Duke Algernon in Egypt.

The Dowager Duchess of Northumberland.

Spanish Courier's Trappings, Letter Bags, etc.

Mr. John Hancock.

1888.

Japanese Toys, one tablet representing a procession of Frogs, and one of Monkeys and Birds.

Mrs. Schmalz, per Mr. John Hancock.

Japanese Toys, models of Insects.

Mr. Wm. Dinning.

Bows, Arrows, and Spears, from New Guinea.

Idol, from Solomon Islands, carved with flint tools.

Mask made of Spiders' Webs? from Solomon Islands.

Three Boomerangs, from Queensland, Australia.

Necklace of Teeth (reptilian).

Capt. N. R. Sayers.

A beautifully-worked Cardbox, made of bark, from the Bermudas.

Miss Green.

Rush Stick, from Sussex, for holding the long pith of a rush saturated with grease.

Drawing of a Steel Mill, shewing the manner in which it and the flint were held to produce the sparks to give light to miners in coal pits.

Mr. Edwd. Bidwell, Twickenham.

Dress of Lady of the early part of the Eighteenth Century, on a figure modelled by Mr. John Hancock.

Five pairs of Iron, Shoe Buckles, early part of the Eighteenth Century.

Miss M. J. Hancock.

APPENDIX.

The following important Collections have been presented to or purchased by the Natural History Society during the last sixty years, from 1829—1888 inclusive:—

1836	Tankerville Collection..	Zoophytes & Sponges	The late Earl of Tankerville
1838	Russian Collection.....	Minerals and Rocks...	His Imperial Highness the late Emperor Nicholas of all the Russias
1848	Robertson Herbarium..	British Plants	Purchased
1859	Hutton Collection.....	Minerals	Sir Wm. G. Armstrong
1860	Loftus Collection	Fossils	"
1862	Winch Herbarium	British Plants	The Linnæan Society, per Prof. D. Oliver
1866	Alder Library	Works on Natural History	Sir Wm. G. Armstrong
—	Alder Collection.....	British Mollusca.. ...	"
—	Alder Collection.....	— Zoophytes, etc	"
1870	Hodge Collection	Crustacea and Echinodermata	Purchased
1871	Prior Collection.....	Fossils (Secondary or Mesozoic)	M. R. Prior, Esq., Cambridge, per H. B. Brady, Esq.
1872	Charlton Collection.....	Minerals	Purchased
1872	Cookson Collection	Minerals	Norman Cookson, Esq.
1872	Bold Collection	Coleoptera.....	Edwin Bold, Esq.
		Aculeate Hymenoptera	"
		Homoptera	"
1875	Dew-Smith Collection..	Fossils (Secondary or Mesozoic)	A. G. Dew-Smith, Esq., Cambridge, per H. B. Brady, Esq.
1876	Kirkby Collection.....	Carboniferous Fossils (Fife)	J. W. Kirkby, Esq.
		Magnesian-limestone Fossils (Durham)	"
1876	Hancock Collection	Tunicata and Boring Sponges	Misses Hancock
1878	Atthey Collection	Coal-measure Fishes and Amphibia	Lady Armstrong
1878	Hewitson Library	Works on Lepidoptera etc.	Bequeathed by W. C. Hewitson, Esq., Oatlands, Surrey
1879	Abbs Collection.....	Coal-plants & Fossil Fishes	Henry C. Abbs, Esq., Cleadon
1879	Trevelyan Collection...	Fossil Plants, etc., from Northumberland and Durham	Bequeathed by Sir W. C. Trevelyan, Bart., Wallington Hall
1880	Atthey Collection	Microscopic Sections	Purchased
1883	Hancock Collections ...	British Birds.....	Presented by John Hancock, Esq.
		Eggs and Nests of do. Groups of Foreign Birds	
1883	Wassermann Collection	British Lepidoptera....	Mrs. Wassermann

1883	Hutton Collection . . .	Type-specimens of Coal-measure Plants	The Council of the Mining Institute
1883	Allan or Tunstall Collection	Birds figured by Bewick, and South-Sea Weapons, etc.	Purchased
1884	Gibson's Drawings . . .	Recent Mollusca; and Conchological Illustrations, by John Adamson	Rev. E. H. Adamson
1884	Bewick Collection	Original Drawings of Birds and Vignettes and a complete set of Prints by Bewick	Joseph Crawhall and J. W. Barnes, Esqs., Executors of the late Miss Isabella Bewick
1884	Bewick Collection	300 Original Drawings of British Birds, etc., by Thomas Bewick	John Hancock, Esq.
1884	Hancock Collection.....	Original Drawings of Nudibranchiate Mollusca, by Albany Hancock, Esq.	Miss M. J. Hancock
1885	Goring Collection	Fossils from various Formations	Bequeathed by J. Goring, Esq., Walton-on-Thames
1886	Raine Collection.....	British Lepidoptera...	F. Raine, Esq., Durham
1886	Duff Collection	Fossil Plants & Fishes	Purchased
1888	Bowman Herbarium ...	British and Foreign Plants	Mrs. Bowman

ADDRESS TO THE MEMBERS OF THE TYNESIDE
NATURALISTS' FIELD CLUB,

READ BY THE PRESIDENT, JNO. PHILIPSON, ESQ., J.P., M.I.M.E., ETC., AT
THE FORTY-SECOND ANNIVERSARY MEETING, HELD IN THE COM-
MITTEE ROOMS OF THE LITERARY AND PHILOSOPHICAL SOCIETY,
ON WEDNESDAY, MAY 9TH, 1888.

LADIES AND GENTLEMEN,—Permit me to perform a pleasing duty in tendering my grateful thanks for the honour you conferred in electing me President of the Tyneside Naturalists' Field Club for the year 1887. The distinction was not justified by my possessing any scientific acquirements, but, I believe that in bestowing it, you were actuated by a desire to mark my long and intimate connection with your Club.

It was a source of regret to me that in the earlier months of my term of office I was unable to accompany the members on three field days. My duties in connection with our Jubilee Exhibition, an excusable local pride in the undertaking, and anxiety for its success, monopolised the major portion of my time, and debarred me from taking part in these enjoyable gatherings in which I would fain have participated.

The present is my thirty-fourth year of membership, and the period will live in my recollection as a time of friendly intercourse with such men as Mr. Albany Hancock, Mr. Joshua Alder, Dr. Charlton, Mr. John Thompson, Mr. Geo. Wailes, and others I could name; men who have contributed to our knowledge of the Natural History of our district; men who were always anxious to assist and instruct our younger members; to stimulate them to investigation and study, and to encourage them in pursuits of which it has been said, that "taken even in the light of a mere recreation for idle moments, they are at least innocent and cheerful; they never interfere with the comfort of a neighbour or bring to the cultivator a single feeling of mortification or regret."

Before proceeding to give the customary account of our field meetings during the past year I wish to express my obligations to our courteous Secretaries, who have favoured me with copious notes, which must have taken much time and trouble in their preparation.

FIRST FIELD MEETING.—The destination of the members on the occasion of the first meeting, on Monday, May 30th, was Staward Peel. The party, consisting of about thirty members, left the Central Station by the 10.15 A.M. train for Haydon Bridge, where they arrived shortly after eleven o'clock, and proceeded by road to Langley Castle, having passed upon the wayside the granite cross erected by the owner, Mr. Cadwallader Bates, to the memory of the unfortunate Earls of Derwentwater, this being one of their forfeited estates. The inscription on the cross informs the wayfarer that it stands there "In memory of James and Charles, Viscounts Langley, Earls of Derwentwater, beheaded on Tower Hill, 24th February, 1716, and 8th December, 1746, for Loyalty to their lawful sovereign."

Some time was pleasantly spent in examining the Castle, which gave the name to one of the lesser Baronies of Northumberland, and which appears to have been built by Sir Thomas de Lucy, about the middle of the fourteenth century. By the marriage of his daughter Maud with the first Earl of Northumberland it passed into the possession of the Percy family. The position it occupied was untenable after the introduction of artillery, and it surrendered to the troops of Henry IV. in 1403 and 1405, and to Lord Montagu after the Battle of Hexham in 1464. After this it seems to have gradually fallen into decay, as in 1542 the walls only were remaining. Hodgson says "the redness of the inside walls of these apartments, down to the first boarded floor, remains, in convincing testimony that they perished by fire." About three years ago the present owner, Mr. C. J. Bates, who has very kindly given me some information in regard to his work, placed a roof over the main building, and it is now possible to examine the architectural features of the several floors which were previously inaccessible. The arrangement for drawing up

the small portcullis at the entrance, by means of a cord or chain coming down through the mouth of a man's head carved in the vaulting; the arched doorway leading to the rooms on the first floor, so contrived as to fit in with the sweep of the newel stair; the elaborate tracery of the principal windows, and the exclusive devotion of the south-west tower to sanitary purposes, were some of the most interesting points noted by the visitors.

After concluding their inspection of the Castle the party journeyed on in the direction of Langley Mills, where the ores from the Alston mines used to be smelted. The road for some distance is well sheltered by trees on each side, but after passing the mills the eye encounters nothing but ranges of wild and barren-looking hill sides, the remains of the old coach road being plainly visible on that to the left. The scene, however, undergoes a pleasing transformation after passing Staward Manor House, where Derwentwater's bonnie lord waited for an opportunity to attack Newcastle. The precipitous banks of the Allen, where not devastated by the axe of the woodman, the road through the wood, and the views from the point upon which the remains of the Peel stand, are scenes of sylvan beauty not sufficiently well-known to the inhabitants of Newcastle. Lunch was partaken of at this point, and the members left the Peel, the beauties of which have been so frequently described, and the neighbourhood of which has in former years been visited by the Club.

Near the bottom of the steep and thickly wooded bank, a favourite haunt of the Strigidæ, and in close proximity to the Allen, several large ant-hills were noticed. The members walked by the Cupola Bridge to Whitfield, observing the remarkable abundance of the Forget-me-not, the Purple Orchid, the Primrose, and many other spring plants on the river banks that have been cleared of trees. After an inspection of Whitfield Church tea was procured at the Temperance Hotel "Blue Back," and the members then retraced their steps to Staward, where Dr. Embleton read a short paper on "*Loxomma Allmanni*," and the party, highly pleased with their excursion, then took the train which leaves Staward Station at 6.53 for Newcastle.

THE SECOND FIELD MEETING was held in Upper Teesdale, on Monday and Tuesday, 27th and 28th June, and was but thinly attended. Most of those present at this meeting proceeded to the High Force and Middleton on Saturday, thus avoiding the very early start made by those who joined the excursion on Monday. The first day's excursion was fixed for Cronkley Scar and High-Cup Nick. The weather was excessively hot and dry, and had been so for months, as was well testified by the vegetation everywhere, especially on the higher moors; and, as a consequence, many of the Teesdale rarities had disappeared, or nearly so, with the long continued drought. Soon after the arrival of conveyances from the first train at the High Force, the party wended their way by the path leading through the woods to the Waterfall and river side. There was very little water in the river, only what was derived from the permanent springs of the higher grounds, and consequently only little at the Force, which presented an appearance very different, quite the reverse of the scene witnessed by the members on a former visit, when the whole width of the river's bed was too narrow for the rolling flood of water that was thrown over the falls, sending the spray forty or fifty feet into the air. So there was no difficulty in crossing the stream above the falls to the other bank. Walking a mile leisurely by the river side we had the pleasure of seeing some of the peculiar Teesdale flowers in full bloom. The *Potentilla fruticosa* was in its glory, the *Polygonum viviparum* in fine flower; the Butterfly and Sweet-smelling Orchids, and other moisture-loving flowers, were in perfection, sheltered by trees and nourished by night dews, which hung heavily along the river bed at nightfall. Those of our party who were intent on reaching High-Cup Nick, tired with the slow onward pace of those intent on seeing and gathering every tiny flower, set off at full pace for the Maize Beck, and after losing themselves on the interminable fells for a long time, and after a hot laborious walk at length reached the Nick, which under favourable weather is one of the most surprising views in Teesdale.

Cronkley Fells presented a rather bare, grey appearance under the influence of the long drought, and most of the alpine flowers

were stunted in size or dried up. The *Helianthemum canum* was in flower, but much stunted; but *Arenaria verna* and *Tofieldia palustris* had not suffered from the drought. It was difficult to find the few leaves that were the sole representative of the little *Gentiana verna*; only one was seen that had been in flower. Higher up the fell we came upon large patches of *Lycopodium alpinum*, bristling with its interesting fertile spikes; and among the tall heather the beautiful leaves of the Cloudberry retained their brilliant greenness. The Golden Plover standing on a hillock shewed his black breast to advantage, and uttered his mournful pipe, rendering the lonely moor more lonely with its melancholy note. No breath of air, no balmy west wind, stirred over the heather, and the intense heat reflected from the parched ground, made the unsheltered hillside almost as oppressive as an oven. With this feeling we descended to the water side, glad to be in the cooler bed of the stream, and among its greener foliage. Our friends arrived in time for our evening meal, with red, sunburnt visages, after having wandered over "moors and mosses many, O," in search of the Nick, having done what many have done before, left the bed of the stream and found themselves lost on a moor whose landmarks were unknown to them.

It was decided on Tuesday morning, as most of those present had repeatedly been to Cauldron Snout and Falcon Clints, to try a walk through the fields on the Yorkshire side, along the bank of the river, to Winch Bridge. Crossing by the wooden bridge below the High Force a pleasant road was found, leading through meadows richly decked with gay flowers of every hue, and tall grasses ripening and ready for the scythe. The bed of the stream was comparatively dry; the clear pools and small runners of water occupied a very small part of the water channel, gravel and basalt predominated, and the little islets in mid-channel were luxuriant flower gardens or willow beds. On some of these islets the splendid bloom of the shrubby *Potentilla* was superb, covered with gay golden blossoms in dense tufts, on the old twisted gnarled stems, which have rooted themselves deep, as was necessary, into the fissures of the basalt or among the accumulated gravel, where they have borne the brunt for many

a long year of winter's floods and summer's thunder spates, which come down so furiously and frequently, with but slight warning, removing rocks and gravel, and threatening destruction to all vegetation within reach. Yet these plants remain year after year the peculiar beauty and property of Higher Teesdale, and we hope will still remain to give pleasure to those who love to see rare plants luxuriating in their native haunts. The sight we here enjoyed was to a certain extent unique, and such as could only be seen in a very dry season, undisturbed by summer spates, which would certainly have destroyed in an hour the golden beauty of this lovely shrub, which is said to grow wild in only one other locality in England, Wastdale.

The bed of the Tees, from High Force to Winch Bridge, and for several miles further, runs over and through channels, cut or worn out of the hard basaltic rock of the district, and when well flooded abounds with small falls and a few larger cascades, but on this occasion the small diminished streams ran nearly unseen in the deeper channels. At Winch Bridge, after gathering some very large specimens of the Cow-wheat, we crossed, by the neat suspension bridge, the deep chasm cut through the Whinsill at this place, and wended our way back along the dusty road on the Durham side. This walk was certainly the most enjoyable of the two days' excursion, during which no new discovery was made, or was likely to be made in this now-often visited locality. Mr. and Mrs. Coltman attended, as on former occasions, to the home comforts of the party at the High Force Inn, and the only *desiderata* seemed to be a heavy shower of rain, and a fresh westerly breeze, to stir the dull grey, lifeless inactivity of every thing.

The THIRD FIELD MEETING (twelve members attended this meeting) was held at Pateley Bridge, on Bank Holiday, August 1st, and Tuesday, the 2nd. This central situation was selected to enable the members to visit the higher part of the dale and other objects of interest a few miles distant. Nidderdale is a deep narrow valley, steep, and not easy of access on the north side, but of easier slope, and more practicable for man or beast

on the south side. The little river occupies nearly the whole of the deepest part on the north side, and the narrow road to the upper valley runs along a series of old valley terraces, on the south side, nearly to Lofthouse, before reaching which the Nidd receives an important tributary from the S.W.

On the Monday, our not very large party started, on the arrival of the first train, in conveyances along this valley road to Lofthouse, where the narrow public highway terminates. After passing through Ramsgill, we alighted before reaching Lofthouse, to inspect the spot where, under ordinary circumstances, in summer, the river Nidd issues, after running under ground a distance of two miles, from a small, limestone cavern. After the unusually dry summer the stream was rather small, not at all comparable in size to the full stream of the Aire, which issues from an underground course at Malham Cove, but after and during heavy rains the surplus water that cannot pass through this subterranean passage travels along the open channel to join the underground current. Shortly after passing this spot the party, led by their guide, diverted to the left, from the main road, to visit the How-Stean Beck. How-Stone or How-Stean Beck is a deep channel or chasm, cut or worn out in some places to the depth of sixty or seventy feet, in the thick Scar-limestone, by a mountain stream, whose branches extend westward to the flanks of Great Whernside. This is the largest tributary of the Nidd, and must occasionally during heavy rains contribute a large quantity of water to the main stream; but at the time of our visit we were able to follow some distance up its tortuous, rocky bed, cut out of the grey marble, polished rather too smooth to walk over with safety. Here we could look up, through marble walls overhung and shaded with dense foliage, and now and then gain a glimpse of the further recesses of the dark gloomy channel which this small stream has hewn out for itself. Like the Tees, but more rigidly, it is

"Condemned to mine a channell'd way
Through solid sheets of marble grey."

The surroundings are laid out, for the benefit of visitors, to the upper part of the dale. Some of the party furnished with candles

followed a guide into the recesses of a darksome cave, through chinks in the limestone walls so narrow that the more bulky and corpulent members of our party could not follow. Those left behind followed the upper banks of the ravine, admiring the splendid tufts of the Hart's-tongue and other ferns, far down, out of reach of destructive tourists. Then crossing this wonderful piece of rock-cutting by a rustic bridge, the whole party strolled along by fields and farms to the largest and most pleasantly-situated village in this high part of the dale, and situated, as its name Middlesmoor implies, on the moor between the two chief forks of the valley. A fine view of the whole lower part of Nidderdale was obtained from the churchyard, and after a rest and luncheon in a country inn, a start was made along a moorland road to the Goyden Pot or Pothole, a deep sloping cavern in the main stream, where all the water of the river Nidd, under ordinary circumstances, enters, and travels two miles underground, leaving its channel nearly dry, except in winter storms and summer floods. At the time of our visit the stream did not even reach this spot, but was all absorbed at the Manchester Pot, further up the dale. Several of the more active members availed themselves of a guide, with indispensable "tenpenny dips," to explore the underground channel now dry, from the long-continued drought of summer, for more than sixty yards, until they heard water trickling along beneath the rocky bed they had scrambled over. At Manchester Pot there was no cavernous entrance visible, but the small stream loses itself among the coarse gravel.

The walk back to Lofthouse was by the margin of the nearly dry channel, for small runners, fed by perennial springs, supplied a pool here and there in the otherwise dried up bed. Patches of Sweet Cicely, growing along the banks, and a few other common autumnal flowers were the only plants observed. The valley is too narrow and too much improved to be productive of many botanical rarities, though, in comparison with more northern valleys, it must indeed be considered as very well wooded.

Most of the members visited the Brimham Rocks, which are

situated on the east side of a short valley below Pateley Bridge. These rocks are certainly the most remarkable piece of natural scenery in the neighbourhood, and perhaps unequalled, as natural rock-carving, in any part of England. Elevated nearly a thousand feet above the sea, their situation commands an extensive and fine view of the vale of York. These immense, solitary, quaint, and grotesque pillars fill the observer with awe and astonishment at the variety of forms, the rude resemblances to animated creatures, and lead to the enquiry, How were these shapes made? Who or what has fashioned these grotesque masses of coarse grit? Are they artificial or natural?

Many of the members agreed to spend the second day at Pateley, and it was arranged to visit the Stump-Cross Caverns, at Drygill, on the Watershed of Wharfedale. The start was made on foot to Bewerley Hall, White Wood, and Ravensgill, a deep, well-wooded glen, on the south side of the valley, opposite Pateley. There was an interesting climb of a couple of hours along well-kept walks, amid lofty trees. Enchanter's Nightshade, St. John's Worts, Heather Bells, Bleaberries, and many other autumnal flowers greeted the wayfarers till the elevated edge of the moor was reached, and we strode along among deep heather, enjoying a most extensive view over the central valley and central moorlands of Yorkshire. A passing shower had freshened up everything, and left the enjoyment of a bright sun and a breezy west wind, while the view round embraced the top of Great Whernside on the west and York Minster on the south-east. Shortly after we left the masses of sandstones and grits that we had been travelling over, lost the heather entirely, and came upon a track of country all limestone and grass-covered, the gentle westerly breeze modifying the sun's rays, and giving great enjoyment to the scenery as we paced along, through neatly-kept mining villages, over hill and dale to the Watershed of Wharfedale. Arriving at the entrance of the Stump-Cross Cavern the majority of the members alighted, and having donned some miners' uniforms proceeded to explore the sights of this remarkable cave, of which Dr. Embleton has kindly furnished the following interesting description.

"The Stump-Cross Cavern is situated in the moor beyond Greenhow Hill, and about midway between Pateley Bridge, in the valley of the Nidd, on the north, and Bardon Tower, in the valley of the Wharf, on the south. It is the property of Edward York, Esq., of Bewerley Hall, Pateley Bridge, and in the occupation of Mr. W. Newbould, landlord of the Grouse Inn, lower down the road, who acts also as the guide. It extends about 500 feet in a tortuous, irregular, descending channel, somewhat like a lead mine, first to the north and then to the south, to a dept of 100 feet perpendicular. At times it is narrow, at times wide, now lofty, and then suddenly so low that stooping down is necessary to prevent the head colliding with the roof.

The floor is formed of bare, damp, and rather slippery stalagmite, or of rough fragments hewn down from the walls of the passage to make it practicable as a road. Stalagmitic stumps here and there are left, and at the most irregular parts a hand-rail is conveniently placed. From the roof in many parts, especially near and at the terminal enlargement called "The Church," which is about 30 feet long and 12 feet high, hang in fantastic profusion stalactites of all possible forms and sizes, in cylindrical rods, hollow or solid; laminæ of curious make, some streaked with red and having serrated edges; some simulate the pendant ears of pigs and elephants and other and strange objects.

Some of the roof stalactites are short, slender, and pointed, as if beginning to be formed; others are of greater bulk and length; some reach downwards nearly to the corresponding stalagmitic elevation below, which is gradually increased by the deposit from the ceaseless droppings from the stalactite of a calcareous solution, and which in the course of centuries, to be reckoned by hundreds, would bring about its coalescence with the equally slowly descending stalactite; others there are which have long since completed the junction of their lower and upper parts and formed pillars which appear to support the roof. We were told by the guide that measurements had been made of one stalactite at the interval of fourteen years, and that the growth during that period had been found to have been only a fraction of an inch (?)

Each visitor was provided by the guide with a candle, and on holding this behind any of the laminæ or in the interior of a stalactite, they were seen to be translucent. The surfaces of all were crystalline, and hence they sparkled when the candle was brought near to them. When struck with a key or other small instrument they gave out a musical note accordant with the length and bulk of the part struck.

The cavern has various lateral branches probably, and extends into the fossiliferous mountain-limestone much farther than the present exploration has been carried. It is well worth a visit, as is also the hospitable Grouse Inn of Mr. Newbould, farther down the road."

FOURTH FIELD MEETING.—It was arranged at the Anniversary that the September meeting should be held at Wooler, as early in the month as the opening of the new line of railway from Alnwick to Cornhill permitted. Friday and Saturday, the 16th and 17th, were fixed for the meeting, with the intention of ascending the Great Cheviot, 2,680 feet high, on the first day, and Yeavinger Bell, 1,180 feet high, on the day following. Many of the party journeyed to Wooler, which has been described as "the metropolis of the Cheviot district, but a dreary town of low houses," on the preceding evening; and being joined early on Friday by several ladies and gentlemen, a start was made for Langleyford, near the base of the Great Cheviot. The merry party drove rapidly along, by way of Earle and Middleton Hall, to the foot of Careyburn, where the road enters the long valley of Langley Ford and the porphyritic hills that surround the base of the Great Cheviot. From this point splendid views were obtained of Hedgehope and the east end of the Great Cheviot. The bright sunshine and clear sky overhead seemed to promise a fine day for the ascent of the mountain, which "Grey" called "a landmark for Seamen, that come out of the east parts from Dannick, through the Baltick Seas, and from the King of Denmark's country, it being the first land that Mariners make for on the Coast of England."

Though late in autumn, the recent rains, after a very dry

summer, had favoured the growth and bloom of many autumnal flowers, and the ferns and foliage were still fresh and green, and contrasted well with the sombre greys of the crags and "glidders" of the lofty sides of the valley. The burn, swollen with recent rains and stained with peat from the hills, came sparkling along in the sunshine, now in mid-valley, now half-hidden under the foliage of the steep bank, for sometimes

"It flows through alder banks along,
Beneath the copse that hides the hill:
The turbid stream you cannot see,
You only hear its melody;
Pass on a little way, pass on,
And you shall catch its gleam anon."

And thus chatting and laughing, hoping for a continuance of the fine morning, and observing the novelties of the surrounding scenery, we quickly arrived at the end of the carriage road, Langleyford farm house, surrounded with evergreens and pines, stables, and byres, and noisy with the foaming burn, barking collie dogs, ducks, and poultry. Here the conveyances are left, and a start made along rougher, unbeaten tracks for the foot of the hill we are ambitious to ascend. Presently the track is left, and we proceed onward uphill, through acres of blooming heather, rank brackens, and tall coarse grass, rising ridge above ridge, as the top of the hill seems to recede farther and farther the higher we ascend. Then some ominous black clouds appear, and the blue sky is rapidly concealed from sight, small drops of moisture begin to fall, which gradually increase into a driving pelting shower; still we plod on, surrounded with the dense cloud that has drifted down from the mountain top, till complete saturation drowns all hope of reaching the top, and then all the party, except one or two, who determined to brave the storm and reach the summit, turned their faces downwards and beat an ignominious retreat to the lower part of the valley, raising on the way two beautiful Herons in fine plumage. They soon reach the shelter of byres and stables at Langleyford, consoling themselves with the reflection that many a Cheviot tourist has endured the same fate, for

“When Cheviot gets on his hat
An’ Harnam Law her hood,
A’ the wives o’ Kale and Bowmont
May expect a flude.”

After imbibing a comforting cup of tea, provided by Mrs. Telford, of Langleyford Farm, and when the ladies, who had suffered most from the drenching shower, had made themselves somewhat more comfortable, we started for Wooler, in comparatively fine weather, and regained our comfortable hostelry, where we were welcomed by our attentive host Mr. Nicholson, and did full justice to a sumptuous repast. We afterwards walked quietly to the railway station, as several friends had to leave Wooler by the last train for the South.

A general Council was held at the Station, where we carefully examined the well-arranged platforms and buildings, which evoked a general expression of approval of the enterprise of the North Eastern Railway Company, in providing so liberally for the needs of the tourist, and in opening out to the public such a beautiful country, so rich in History and Romance; a district where

“Old border castles circle round,
Which once dread feudal legions bound,
Where beacon light and trumpet sound
Rous’d men to war,
From humble cot and classic ground,
Both near and far.
’Twas here the truth Paulinus spake,
Baptized his converts in the lake,
Bless’d noble work to undertake,
With reverent awe;
And that, alone, for lost men’s sake
And Gospel law.”

The second day’s programme was carried out on Saturday by a most enjoyable trip to the gigantic hill, situated four miles or more from Wooler, known as Yeavinger Bell. Showers of rain in the early morning occasioned a somewhat late start, and it was well into the afternoon before the base of the mountain was reached. In the course of the walk from Wooler to Yeavinger some good specimens of porphyry were obtained.

Many of the smaller insects were astir, and much time was spent by one enthusiastic collector in bottling up for future examination many a little rarity. The "slugs (*Limax arboreus*) which came crawling out after a shower" in abundance excited the collecting propensities of another. The walls, built of masses of beautiful coloured porphyry from the neighbouring hills, attracted the attention of all, and "the battle mounds and border towers"—the valleys of the Glen and the Till, full of historical associations, all excited interesting subjects for observation and remark. It was so late when the foot of the hill was reached, that those who had to return home that night had to retrace their steps in haste to Wooler.

The ascent to the summit of the hill occupied considerable time; but it was accomplished without difficulty or accident, and the beautiful view from the top amply repaid the fatigues of the climb. Mr. Hall's admirable "Guide to Glendale" gives the following description of the mountain:—"Few places in Northumberland have greater attractions than Yeavinger Bell. Every tourist and pleasure seeker who rambles along the borders must climb to its summit, pore over its mysterious monuments, and enjoy the extensive and rich view it commands. There is a beauty in its shape—a cone truncated at the top and separated by valleys and deep ravines. Though its altitude is only 1,182 feet above the sea level, yet, rising steeply from the low lying plain of Milfield, its height appears greater. Though more than 1,000 feet lower than Great Cheviot, the view is more varied and distinct and comprehends more beauty and interest than that seen from the monarch of the range. The waters of the Glen, hallowed in imagination, because used in initiating the early Saxon converts to the Christian church, almost wash the base of the hill and wend their way through the richly cultivated plain of Milfield to join the 'Sullen Till,' whose serpentine course can be traced throughout this plain to the silver Tweed. The eye wanders over the Doddington range of hills on the north and sees the rocky Farne Islands and sacred Lindisfarne, while in other directions in the far distance the eye descries the three-peaked Eildon, Dunse-Law, and the Lammermuir Hills—

towers, villages, castles, pele towers, churches, and battle-fields give a human interest to the scene. On the north side of the hill there is an oak plantation, almost the only memorial left of the once extensive great forest of Cheviot." It was late in the evening before the party returned to their quarters at the Black Bull, Wooler, pretty well tired with the excursion; but the trip will be long remembered as one of the most enjoyable in the annals of the Club.

Note on the Plants and Insects observed at the Wooler Meeting.

Dear Sir,—I now enclose the note, which you did me the honour to ask for, regarding my collections during the last excursion of the Tyneside Naturalists' Field Club to Wooler.

I really feel ashamed at seeing the little that I did and the little that I have to say, but must call to mind, in my excuse, that the weather did not favour us, as it rained copiously nearly the whole time, and, for the departments of Natural History which I particularly study, the season was too far advanced.

Herewith is the list of plants which I collected, arranged according to the denominations adopted, for the Phanerogamæ and vascular Cryptogamæ, in the latest edition of the *London Catalogue of British Plants* (8th edition, 1886).

PHANEROGAMÆ.

Berberis vulgaris, L.—Between Chillingham and Chatton, in hedges dividing fields of cereals.

Polygala vulgaris, L.—Between Langleyford and the top of Cheviot.

Cerastium tetrandrum, Curt.—Between Langleyford and the top of Cheviot and at the summit.

Lychnis vespertina, Sibth.—Road from Wooler to Kirknewton.

Arenaria uliginosa, Schleich.—From Wooler to Chillingham.

Stellaria graminea, L.—From Wooler to Chillingham.

Malva sylvestris, L.—Road to Wooler and Kirknewton.

Lotus corniculatus, L.—Langleyford.

Potentilla anserina, L.—Margin of Wooler Water, in front of Wooler.

Potentilla tormentilla, Neck.—Langleyford to Wooler.

Rubus Chamæmorus, L.—Top of Cheviot.

Lonicera Periclymenum, L.—In hedges between Chillingham Chatton.

Galium saxatile, L.—Langleyford to Cheviot and top of Cheviot; abundant in the cairn rocks.

Galium verum, L.—Margin of Wooler Water, in front of Wooler.

Sherardia arvensis, L.—Wooler to Chillingham.

Scabiosa succisa, L.—Near Hope Cheviotside.

Vaccinium Myrtillus, L.—From Langleyfordside to Cheviot; very abundant on the summit of Cheviot.

Vaccinium Vitis-idaea, L.—Langleyford to Cheviot; frequent on the top.

Erica Tetralix, L.—Langleyfordside to Cheviot and Wooler and Chillingham.

Erica cinerea, L.—North side of Yeavinger Bell.

Ligustrum vulgare, L.—In hedges between Chillingham and Chatton.

Lycopsis arvensis, L.—Margin of Wooler Water, in front of Wooler.

Pedicularis sylvatica, L.—Langleyfordside to Cheviot; frequent even close to summit.

Euphrasia officinalis, L.—Between Langleyford and Cheviot.

Teucrium Scorodonia, L.—North side of Yeavinger Bell, above the trees, Langleyfordside to Cheviot.

Ballota nigra, L.—From Wooler to Chillingham.

Polygonum dumetorum, L.—Margin of Wooler Water, in front of Wooler.

Rumex Acetosella, L.—Top of Cheviot.

Quercus Robur, L., var. *sessiliflora*, Salisb.—North side of Yeavinger Bell.

Empetrum nigrum, L.—Langleyfordside to Cheviot; frequent on the summit.

Orchis maculata, L.—Langleyford, near the Hope.

Narthecium ossifragum, Huds.—Langleyford.

Juncus compressus, Jacq.—Between Langleyford and Cheviot.

Eriophorum vaginatum, L.—Langleyfordside to Cheviot, and frequent on the summit.

Agrostis alba, L.—Between Langleyford to Cheviot.

CRYPTOGAMÆ.—ACROGENES.

Lomaria spicant, Desv.—Langleyfordside to Cheviot.

Pteris aquilina, L.—Yeavinger Bell, north side.

Polypodium vulgare, L.—Idem.

Polypodium Dryopteris,

Lastraea Filix-mas, Presl.—Wooler to Chillingham, under oak trees.

Lycopodium Selago, L.—Bogs on summit of Cheviot.

Lycopodium clavatum, L.—From Langleyford to Cheviot.

Lycopodium alpinum, L.—Near the summit of Cheviot.

Sphagnum acutifolium, Ehrb?—Bogs on the summit of Cheviot and from Langleyford to Cheviot.

FUNGI.—ÆCIDIOMYCETES.

Puccinia graminis, Pers.—*Æcidii*, on leaves of the *Berberis vulgaris*, L.; *Teleutospora*, on the leaves of different Gramineæ.

The mention of the *Puccinia graminis* leads me naturally to the second part of this note.

II.

From what I saw, and from the conversation which we had at the time I found it, as also from what I afterwards had occasion to observe, it seems to me that there would be an advantage in making this fungus more popularly known amongst the agricultural classes of the north of England.

The *Puccinia graminis* is the fungus which, in two of its forms, causes the parasitical disease in cereals known in England by the names of *Corn Mildew*, *Blight*, *Rust*, or *Brand*.

It is known now that this species presents three forms completely different. The first form lives upon the *Berberis vulgaris*, as the so-called *Berberis* cluster-cups, and was formerly supposed to constitute an independent species called *Æcidium Berberidis* (Pers.). The spores coming out of those cluster-cups grow on the Gramineæ, there forming, in the beginning of spring, groups

of reddish spores, also, in former times, considered as a species of an independent genus, *Uredo linearis* (Lambert), and, finally, in the autumn, on the same mycelia, black bilocular spores, denominated *Teleutospores* (or final spores), which are those that remain as seeds, during the whole winter. When a season of higher temperature again comes round these teleutospores germinate, forming *esporidia*, which, falling upon the leaves of the *Berberis vulgaris*, reproduce the *Aecidii* or cluster-cups.

Summing up, and presenting the principal names whereby the forms of this fungus have been designated, we shall have:

Puccinia graminis, Pers. (Dispos. Method., p. 39).

Synonyma :

Aecidiumspores : *Lycoperdon poculiforme*, Jacq.

Aecidium Berberidis, Gmel.

Uredospores and Teleutospores :

Uredo linearis : *a, frumenti*, Lam.

Uredo culmarum, Schum.

Uredo frumenti, Sowerby.

Puccinia cerealis, Marb.

I do not know whether cereals have of late been much attacked by Mildew, Rust, or Brand in England, but I find, by works which I am acquainted with, that formerly they were very much; that of Lambert, in 1797 (*v. Transactions of the Linnean Society*, IV.); of Kirby, in 1799 (*v. Transactions of the Linnean Society*, V.); and of Joseph Banks and Francis Bauer, in 1803 (*v. Agricultural Journal*); of Edwin Sydney, in 1846 (*Blights of the Wheat, and their Remedies*); of M. C. Cooke, in 1865 (*Rust, Sweat, Mildew, and Mould*); and others, up to the recent experiments of Prof. A. B. Griffiths, in the Lincoln College of Science (*v. The Chemical News, Journal of the Chemical Society*, 1885), and of George Edgson, of Etton.

Shortly, however, before the Tyneside Naturalists' Field Club's excursion to Wooler, *i.e.*, in August, 1887, the French National Society of Agriculture, being informed that cereals covering 70 to 100 acres were completely ruined by the Black Rust (*Rouille noir*), sent a Commission to study the fact.

On this occasion the well-known naturalists, Professors

Duchartre and Cornu, judged it their duty to give, that notable Society, a description of the different forms of the fungus which caused the disease.

The following facts then became known: That for two years many agriculturists had their crops of cereals completely destroyed by the *Puccinia graminis*; that the invasions of the *Puccinia* were all, or nearly all, made round about *Berberis vulgaris* plants; that the official Department of Agriculture had asked the North Eastern Railway Company, for years back, that the *Berberis* which had been planted on the railway sides might be rooted up, because of the complaints of neighbouring agriculturists. That there were districts in France where, before the destruction of the *Berberis*, the cultivation of wheat had been quite impossible.

I will note, in passing, that the suspicion of the relationship between the *Berberis* and the Rust is very ancient. In 1660 the Rouen Parliament ordered that, for this reason, all the *Berberis* plants should be destroyed, while Arthur Young, the celebrated English economist, travelling in France in the last century, and being informed of this relation, declared that he did not believe it.

The Report of the Commission of the French Agricultural Society, published only six months ago, runs as follows:—

“The *Berberis* plants cause grave risks to cereals their destruction is advisable. If the *Berberis* were all destroyed the leaves of cereals contaminated with *Puccinia graminis* would be absolutely without the smallest risk.” It is proposed that the Government shall oblige all landed proprietors to destroy the *Berberis* in their woods and hedges.

In the same session of the French Agricultural Society, in which the Report was approved, Prof. Cornu said that, in his opinion, the study of the *Uredineæ* (or *Aecidiomycetes*) parasites of plants was complete at the present time, it being perfectly demonstrated that the *Puccinia graminis* can only live upon the cereals and the *Berberis vulgaris*.

I should remark that I cannot concur with Prof. Cornu in this latter part. In Portugal, where the *Berberis vulgaris* is an

exotic plant and very rare, the *Puccinia graminis* and its ravages in cereals are frequent.

Prof. A. B. Griffiths, of Lincoln, whom I have already cited, has recently advised sulphate of iron as a remedy against Corn Mildew; the quantity to be 88 lbs. to the acre.

I have already said that my reason for taking the liberty of presenting these reflections, overlengthy, perhaps, is the imperfect popular acquaintance which there seems to be, in this part of England, with modern investigation in regard to fungi. I should, however, also say that the manner in which some of the English books are written, those most consulted and followed respecting fungi, does not seem calculated for the proper education of public opinion. I will merely cite two examples: the undoubtedly important work of M. C. Cook, "Handbook of British Fungi," 2 vols., 1871, seems to be behind the year in which it was published. In 1882, Mr. Thomas Brittain, President of the Manchester Microscopical Society, published a small popular work called "*Microfungi, When and where to find them*," which, principally on account of what it says on pages 24, 44, 70, 74, and Plates I. and II., does not for the same reason, seem to me, to correctly guide the opinion of agriculturists.

III.

I now give you the list of the Arthropodes captured:—

RHYNCHOTA, = HEMIPTERA.

Velia (*Gerris*) *currens*, Fabr.—Langleyford; on the water.

COLEOPTERA.

Notiophilus punctatus, Dej.

N. aquaticus, L.—Langleyford.

Geotrupes sylvaticus, Fabr.—Langleyford.

Aphodius inquinatus, Fabr.—Wooler.

Aphodius sp.—Wooler.

? *Ilybius obscurus*, Marsh.—Langleyford, in the water. In a bog at the top of Cheviot.

Omaseus nigrita, Fabr.—In the neighbourhood of Wooler.

Ocypus fuscatus, Grav.—Wooler.

Lina ænea, Fabr.—Wooler. = *Melasoma æneum*, Bold, Cat.

Adalia oblitterata, L.—Neighbourhood of Wooler.

HYMENOPTERA.

Neuroterus lenticularis, Olio.—Leaves of the *Quercus robur*, with the common spangle galls. From Wooler to Chillingham.

Bombus lucorum, Linn.

B. sylvarum, Linn.

B. lapidarius, Linn., Sm.

B. Derhamellus, Kirb.

} In the flowers of Compositæ.

Andrena? *Afzeliella*, Kirb., Sm.—Neighbourhood of Wooler.

ARACHNIDA.

Gamarus Coleoptratorum, L. Parasites on *Geotrupes sylvaticus*, Fabr.

Araneidæ.—Six or seven species.

Phalangidæ.—Two or three species.

I have not been able to determine, in time, some species of Hexapodes, and the species of *Araneidæ* and of *Phalangidæ*. I expect to do it in a few days, and to send you a list of the names. This leads me to the closing part of my note.

IV.

There does not exist in Newcastle any good Library of Natural Sciences. Students of Natural History in Newcastle have no literary means of working. When an animal or vegetable species is found, which is not represented in the collection of the Barras Bridge Museum, there are no means of determining it in Newcastle.

It will suffice, by way of example, to say that there does not exist, either in the Library of the Literary and Philosophical Society, the Free Library, or in the small Library of the Museum, any one book, later than 1864, with the genera of the *Araneidæ* of Europe, or even of England. Nor in any of these Libraries is there found, complete, the *Prodromus Systematis naturalis Regni Vegetabilis* of Aug. Pyr and Alph. de Candolle, and the Monographies which have continued it up to date, and which

make it the only systematic and continuous description of species of Dicotyledoneæ.

How is this fundamental fact to be remedied?

Others who know the country better than I do will be able to answer the question satisfactorily.—J. BATALHA-REIS.

May 8th, 1888.

THE LAST MEETING was held on Friday, October 7th. About twenty members left the Central Station and were joined by several others at Roker. The "improvements," as they are called, were examined, and some time was spent at the mouth of Roker Dene, but Spottee's Hole was barricaded, and the road through the Dene had been "improved" so much that scarcely a common wild flower was left to testify to its former wildness. One of the party gave a short account of the low Magnesian-limestone cliff, which he saw when young, extending from the mouth of Roker Dene to the North Docks, all now covered up deep in ballast, deposited from the ships that formerly loaded coals in the North Docks. Then this part of the coast was unfrequented, except by Whitburn fisher folk. The Bee-orchis and other rare plants grew in the Dene, and all was wild and waste and unimproved, and Spottee reigned the undisputed lord of the manor. At the entrance of the Dene several hammers and chisels were speedily unpocketed, shewing, in a manner not to be mistaken, that some work was intended. Several unfruitful searches for fossils were made in new localities, but it was not until a well known spot had been reached that the search became successful. *Axinus dubius*, *Myalina Hausmanni*, *Pleurophorus costatus*, small bivalves, which are almost the only fossils found in the upper limestone beds, were secured, but not in abundance. Further on the same species were found enclosed in the lower part of one of the large conglobated spheres. This was an unusual discovery and new to the locality.

From fossils our attention was turned to the very peculiar lithological structure of the beds of limestone forming the cliff on this part of the coast. These beds are so peculiar and unusual that, in no other part of England or on the continent, or any

other known country do they occur in so unique and interesting a manner as they do at this locality and a few other places in the county of Durham.

In one part of the cliff we carefully examined the huge conglobated masses of limestone, with a structure radiating from the centre of the ball to the outer rim, or, as it is more frequently the case, the spheres have a more homogeneous appearance, each ball touching the adjoining ones in some part of its circumference. In continuation the same beds become *botryoidal* in structure, the little spheres being not larger than marbles, quite as round, and touching and united to each other, so that when a small piece is detached it has quite the appearance of a bunch of grapes. The interstices between the several spheres are generally filled with a fine, soft yellow marl. The theory proposed and discussed with some amiable warmth was the infiltration of lime subsequent to the deposition of the beds of soft marl, and the stalactitical arrangement of the infiltrated matter into the shape of small balls or spheres in the original bed of soft marl, the marl itself being either incorporated or replaced.

During our survey of this half a mile of cliff, the majority of our friends had passed beyond view. So we began, as the old botanists say, "to cull simples," and we gathered not a few sea-shore species of plants. We were more fortunate in being able to collect some fine specimens of *Helix virgata* along the short range of sand-banks still left, though much altered, by the continually extended "improvements," as they are somewhat doubtfully called.

On former occasions the members of the Club have had, though rare, an opportunity of examining a piece of submerged forest, situated at the south end of Whitburn sand. This can only be seen when the "set" of the tide from some long-prevailing wind washes the sand and gravel entirely out of this part of the bay. Then can be seen, beneath a surface-layer of clay, a deposit of vegetable matter, leaves, nuts, stems, and roots of trees; and other organisms, similar to the submerged forest, that extends under the sands, from West Hartlepool to the mouth of the Tees and which occurs also in many other parts of the east coast.

Whitburn Bay indicates the outlet of an old pre-glacial valley, which seems to have communicated with both the old valleys of the Tyne and Wear. From the rocks near Roker to the fishing village of Whitburn, the bay is bounded on the west side by a low cliff of drifted clay, much newer than the lower-seated boulder clay which fills the deepest part of this old valley; and which upper drift bed, for distinction's sake and from its containing chalk flints in some places, may be considered "Scandinavian drift." The depth of this old pre-glacial valley has been proved at the Sunderland Water Works, on the south side of the old valley, and also at the Brockley Whins Coal Pit, both very nearly west of the bay. Before this valley was filled up with glacial, boulder clay, the Cleadon Hills and adjoining land formed a large insular tract of land. And even since that time, and when the land was a hundred feet lower than at present, there is indisputable evidence to shew that part of the Cleadon Hills was an island in the later glacial period, having its sea-cliffs and sea-formed caves, and this is proved by the existence in many places, inland, of large accumulations of sea-worn stones forming raised beaches of considerable extent.

The tide was at its lowest ebb as we reached the tawny, ripple-marked, wave-beaten sands, and a delightful stroll along the water's edge, where the waves were sportively curling over and resounding in never-ending symphonies, soon brought us to the neat village of Whitburn. Here a halt was made for lunch, much required after the appetizing morning walk. The fine autumnal morning changed at noon with the flowing tide, and threatening rain defeated our intention of following the sinuosities of this remarkably picturesque coast to Marsden. A sharp walk soon brought us to our long-lost companions in Marsden Bay, where, with tea and talk the time passed so pleasantly away, in the caverned rooms of Peter Allan's Grotto, that we quite forgot the darksome walk that intervened between us and the nearest railway station. But a start was made, and through rain and darkness we merrily tracked, as on many former visits, our unseen way to Shields.

The extensive quarries of the Whitburn Coal Company were

visited by many of the members, who were obligingly shewn over the quarry, through the kind permission of Mr. John Daglish, by the intelligent foreman. The bed of limestone quarried belongs to the lower part of the Upper-series of the Magnesian-limestone formation. It is obtained in very large blocks, and is suitable for pier works and other building and economic purposes, and from its being a nearly pure carbonate of lime (98.38 per cent.), and containing only a trace of carb. magnesia (1.25 per cent.), is much used for chemical purposes and for burning into lime. Only a few fossils occur in this bed, as the characteristic bivalve *Axinus dubius*, which occurs of large size, and generally with the valves open; *Myalina Hausmanni*, also large, and more rarely *Pleurophorus costatus*. In some of the associated beds these shells form the centre of a globular radiating concretion, and are often so perfectly preserved that they can be easily removed from the central cavity.

The Presidential chair of your Society has usually been filled by specialists in some branch of Natural History, and those eminent scientists have often concluded their address by giving the results of their own personal observations, as bearing on some particular department of study. I will not attempt to follow them in this, but, by the kindness of several members and friends, I have been able to incorporate with this Address several valuable papers, namely:—On "*The Stump-Cross Cavern*," by Dr. Embleton; "*A List of the Plants and Insects collected during our last Field day*;" "*Notes on the Puccinia Graminis*," by Signor Batalha-Reis; and the following Note on "*A Rare Lichen Lecidea diacapsis*," by Rev. W. Johnson.

"**LICHENES:** *Lecidea diacapsis* (Ach.), Johnson.—In going over and re-naming Mr. Winch's Lichens, in the Barras Bridge Museum, I found two specimens called *Urceolaria diacapsis*, Ach. (see my note in list of Winch's Lichens). Dr. Nylander, Paris, has examined one of the specimens, and confirms my diagnosis, and accepts the name I suggested, and which I have placed at the head of this note. In a second note, Dr. Nylander urges me to try and find this lichen in its habitat, which I shall endeavour

to do next week. He also informs me that he has mentioned my rescuing this fine lichen from oblivion in his forthcoming 'Addenda Nova ad Lichenographiam Europæam,' to be published next month by A. Hue, Paris. Dr. Nylander, I may observe, is the Prince of Lichenology in Europe."—*W. Johnson.*

As I am not a specialist, but a lover of Natural History for itself, I intend to confine myself to some remarks on the position of our Society, which during the forty-two years of its existence has done so much for the study of the beauties of Nature, and has resulted in the publication of Transactions that have become famous throughout the kingdom, on account of their intrinsic scientific value.

During the thirty-four years of my membership I have numbered among my friends such eminent men as Alder, Hancock, Sopwith, Belt, Thompson, Charlton, Carr-Ellison, Bigge, Atthey, and others, who, throughout their industrious lives, shed lustre on our Society; and we still rejoice in the companionship of Mr. Jno. Hancock, Messrs. Green, Blacklock, Adamson, Browell, Dinning, and our indefatigable Secretaries, Messrs. Howse and Thompson. We cannot, however, disguise the fact that we are deficient in young men, whom we might reasonably expect to fill the spaces left in our ranks by the Scythe-bearer. We want young enthusiastic students, who will be assisted by their elder co-workers in their task of unravelling the mysteries of Nature.

In 1865 the number of members on the roll was 573. It is now 450; a numerical decline of 123 members in twenty-three years. Of the 250 members with us in 1854 but 33 now remain. Amongst that number I find the names of 10 of the original 87 members, and out of this 10 we have 3 of the first Committee, Mr. Jno. Hancock, Dr. Embleton, and Mr. Howse.

The youthful ardour which characterized the work of our and similar Societies a quarter of a century ago does not now make itself so fully manifest. Is it because the younger generation imagines that in the Text Books used in our Schools and Colleges it possesses all that is to be learnt concerning the works of the

Great Master? Do our young men imagine that, to use a homely phrase, they have everything ready to their hands?

There never was a time when greater inducement was offered for scientific study, yet for a long period we have neither had evening meetings nor the reading of papers, which, when forthcoming, seldom fail to elicit interesting and healthful discussion. To the man of business the pursuits of the naturalist, in the field, at any rate, possess quite as many features of enjoyment as the sports of hunting, shooting, and fishing. They are equally healthy, while they do not entail a tithe of the expense necessary in following those recreations I have named, sports that appeal more to our animal than our intellectual natures. Surely it cannot be that with the march of civilization and science we are becoming grosser? I am unwilling to believe it.

There is one source from which I anticipate a considerable accession of younger men to our ranks, and that is the new College of Physical Science, which, owing to the untiring energy of the worthy Principal Garnett, is now so rapidly approaching completion. It is mainly to the exertions of that eminent man, whose whole being seems absorbed in his work, that we have been presented with those models and specimens which were a feature of our Jubilee Exhibition. At the Exhibition the merest tyro could learn much of the wonders of geology from the maps of Professor Lebour and of Mr. T. Embleton, mining engineer, a brother of our much esteemed past President, Dr. Embleton, and from the models of strata by the late Thos. Sopwith; while by the specimens of ore, etc., he could judge what other sciences had done for the development of our local industries, and for the growth of such manufacturing centres as Middlesbrough and Jarro. By his outdoor lessons in geology Professor Lebour is engaged in a commendable undertaking, and the seed sown by him will, it is hoped, bear fruit in the near future.

In alluding to a want of vigour and progressiveness in our Club, I do not by any means wish it to be inferred that we are actually receding; but with the changes wrought by time, and when so many counter-attractions for the young exist, we must adapt ourselves to circumstances, and endeavour to popularize

the study of Natural History. A step in the direction has been made, and it is to a member of this Society that we are indebted for one of these progressive educational schemes, and entered upon in such a disinterested spirit. Alderman Barkas has given, with all his characteristic eloquence and lucidity, a course of ten popular lectures to juveniles at the Museum. So popular did they prove that the number attending had to be restricted. Who can say that some of the children, who listened to the Alderman with interest and delight, may not in the future rival in their attainments the most eminent naturalists of our time? And, again, we have had other naturalists in our midst, who have worked with that modest, unobtrusive assiduity that has ever been a characteristic of great men.

I have said that there have been very few papers contributed of late, but I would like to congratulate Mr. Abel Chapman upon his admirable account of a voyage to Spitzbergen, and I believe that a narrative of his late visit to Spain would be welcomed by the members.

The painstaking and intelligent Keeper of the Museum, Mr. Joseph Wright (who, it will be remembered, contributed an interesting Memoir of the late Thomas Belt to our Transactions), informs me that the relatives of the deceased gentleman propose to publish a second edition of his valuable work, "The Naturalist in Nicaragua." I was glad to hear that Mr. Wright's memoir was included in the new edition.

The Newcastle of to-day presents many advantages to students of Nature that were not within our reach a quarter of a century ago. In addition to our Museum we have several beautiful public parks, and in particular Jesmond Dene, which, after many years of careful cultivation, and stocking with numerous varieties of plants, shrubs, and trees, by Lord and Lady Armstrong, has been handed over to the city, for the benefit of the public; a beautiful arboretum and an aviary combined, where the feathered songsters may live and multiply unmolested.

Perhaps some botanist will emulate the example of Alderman Barkas, and will invite the children to accompany him to the Park, where he may give them simple, practical lessons in

botany, and it would be difficult indeed to find a better lecture room, or such a collection of specimens, whereon to base a dozen lessons or a series of lectures.

It is my melancholy duty to refer to the loss we have sustained by the death of three leading members of our Society. My venerable and beloved friend Mr. James Clephan, Mr. Henry Watson, of Newcastle, and Mr. Cadogan Hodgson-Cadogan, of Brinkburn Priory, a gentleman well-known and highly respected in the North of England. Mr. Cadogan was a man of culture in the highest sense of the word, and as an archæologist did much to preserve, by careful and judicious restoration, the beautiful Priory of Brinkburn. He was an ardent student of Nature, and was a frequent attender at the meetings of the Berwickshire Field Club, of which he was this year President. He was ever ready to open his beautiful and romantic grounds to the visits of both Societies, to whom he showed the greatest kindness and hospitality. In a word, Mr. Cadogan was an English gentleman.

It requires no words from me to make you acquainted with the qualities that endeared James Clephan to all with whom he came in contact. His gentleness, his courtesy, and his kindness will live in the recollection of hundreds of Novocastrians. I was frequently indebted to him for advice and assistance in literary matters, and, like many others, I found the help of the scholar was cheerfully, nay eagerly, accorded. Animated Nature had in James Clephan the gentlest and kindest of defenders. Our local "Dicky Bird Society," which is working such incalculable benefits for coming generations, had his support; and we will long treasure the remembrance of his genial companionship during our trips to Marsden, a place he never failed to visit from 1853 to 1873.

In Mr. Henry Watson Newcastle lost a worthy citizen. In addition to our own Society he took the liveliest interest in the development of the local branch of the Arts Society, acting as Chairman for many years. Mr. Watson was one of those who advocated a knowledge of drawing and colours, as conducing not only to a better appreciation of Nature's beauties but to the

improvement of the artizan, who, with such a knowledge, takes deeper and more intellectual interest in his work.

I thank you sincerely for the honour you have done me, and for the patience with which you have listened to this address. I beg again to ask that every individual member will do something for the good of our Club, and for our pursuits, which were described by Joshua Alder in words that are ever worthy of remembrance, words that, Dr. Embleton says, are characteristic of the man, and are replete with useful remarks and good advice. Mr. Alder said, "To search out Nature's treasures in the woods and fields is a rational, a healthful, and a pleasant pursuit; but the naturalist who confines himself to the collecting and naming of specimens only, loses one-half the pleasure and instruction it is calculated to impart. The works of Nature can never be rightly understood without an examination of the structure of the plants and animals he collects. Their habits, their uses, and the beautiful adaptation of their organs to the functions they have to perform, afford a highly interesting enquiry; and if the microscope be used, a still more wonderful and elaborate organization is revealed, extending even beyond the limits which our instruments can reach. In this way only can we truly appreciate the works of Nature, and perceive how infinitely they surpass the rude efforts of human skill. Nor need we go far for examples, for rarity is not an element in this investigation."

"Not a tree,
A plant, a leaf, a blossom, but contains
A folio volume. We may read, and read,
And read again, and still find something new,
Something to please and something to instruct,
E'en in the noisome weed."

Member elected during 1887-8:—

At HIGH FORCE, June 27th, 1887:—Mr. M. Mackey, 8, Milton Street, Newcastle-on-Tyne.

THE FIELD MEETINGS for 1888 were arranged to be held as follows:—

MAY 21ST (Whit Monday) .. Hallington Waterworks.
JUNE Brinckburn and the Coquet.
JULY Dunstanborough.
AUGUST 6TH (Bank Holiday).. Whittingham and the Breamish.
SEPTEMBER W. Hartlepool & Seaton Carew.
OCTOBER Marsden.

V.—*History of the Early Life of a Hedgehog.* By Miss ABBS.

Communicated by JOHN HANCOCK.

Could they walk perhaps the gardeners find them out

ON the evening of the 30th of June, 1886, we found two very young hedgehogs near the kitchen garden, at Oatlands, where the gardener had been mowing the long grass among the shrubs, and had no doubt disturbed the nest. The young hedgehogs were not able to see or feed themselves, and as their parents could not be found we took them into the house, and a system of feeding them had to be established. Miss Abbs, who was our visitor at the time, took them in charge, and arranged a sucking apparatus, which answered very well. It was made out of a quill, with a piece of perforated wash leather tied on to the end, so that the little creatures could suck it. The milk was diluted with a little warm water, slightly sweetened with sugar, and after a little careful teaching they soon learned to suck it through the quill. They were attended to at night as well as in the daytime, and fed every two or three hours.

To distinguish them, one was called Billy, the other one Peter. From the first Peter was the strongest. Both continued to thrive until the 3rd of July, when Billy began to refuse its food, but by the perseverance of their foster-parent he was kept alive until the 8th, when it was found dead in its beautiful soft nest of moss. I stuffed this pretty little creature, but its death was mourned by the whole household. Miss Abbs left Oatlands on the 12th of July, to go on a visit into Lincolnshire, and of course took Peter with her, so we lost sight of him for a few weeks, and his history must be continued in extracts from her letters about him. He had just got his eyes open when he left Oatlands, but as he was still very young he had to be fed twice on the journey—at King's Cross and at Louth.

We heard on the 18th of July that he had got some front teeth, is thriving nicely, and follows his nurse about the garden, where she takes him every evening, that he may enjoy his natural insect food, and eats beetles, moths, and white slugs, which she catches for him, he running after her in expectation of them.

The following is another account of Peter since he made his journey into Lincolnshire :—

“July 26th.—Peter’s supper last night was five white slugs, which he ate with great relish. Moths are his favourite dainty. He will eat small horse flies, but refuses bluebottles. He is very tame, loves to be nursed and kept warm, and likes to nibble and lick my hand if I let him creep about me. When he is hungry he takes my finger right into his mouth, and bites as he can, but not to hurt; and when he yawns, as he sometimes does when I take him out of his basket, he shows a mouth full of little bright sharp teeth.”

Third communication from Miss Abbs:

“July 28th.—Peter continues to flourish, and is most interesting. I am very sorry you cannot see him as he is now, it is so amusing to watch his ways. When he is thirsty he licks my finger, when hungry he bites it. He is decidedly grown, but does not roll himself quite into a ball yet, though he can put himself into all kinds of attitudes to wash himself. He rolls on to his back, with all four legs up in the air, bends his head forward, and licks his belly all over; then just rolls over to right himself; and he can throw his head over his shoulder to lick all his spines. He runs fast now, and every night about ten o’clock, when I can just see him in the dusk, I take him into the garden for half an hour, and he runs about picking up white slugs. He has a great idea of hunting for himself now. Last night I lost count of the number of slugs he ate, but it must have been over a dozen.”

Fourth communication from Miss Abbs:

“I wish you could see the little hedgehog now. You would not know him, he is so much changed. So lively, and takes his food very greedily. He has all his little teeth, and can chew small pieces of raw meat chopped fine; and eats biscuit soaked in milk very greedily. I shall be quite sorry when he leaves off sucking, it looks so ridiculous. Sometimes I can hardly feed him for laughing. When sucking he stands on his hind legs, pushing his body through my left hand, and working with his fore arms and hands, as if he was swimming. I am sure the

warmth has a great deal to do with his thriving. He squeaks when he is hungry. I always let him run about the grass after feeding him, and when he is tired I just hold the basket down and in he creeps, making a little hole for himself by scratching in the moss, and then curls round, tucking in his little head and feet. He does not grow much however, so I think hedgehogs must be slow-growing things, as he eats very well and appears to be thriving."

Extract from a letter from Miss A. to J. H. :

"August 10th. The Hazels, Grimsby, Lincolnshire. Now for Peter, which, I am sure, will be more interesting to you. He is quite a big fellow now, and has adopted his natural nocturnal habits; sleeps all day, and rouses up about nine o'clock in the evening, when I take him into the garden for half an hour. He runs so fast I have to keep my eye upon him as he starts off hunting for himself now. If I had been at Oatlands or Cleadon I think I would have let him off to fend for himself. He pounces upon white slugs, worms, or beetles; and I find he is very fond of fruit. Will eat, plums, greengages, or very ripe pears quite greedily. Holds the fruit steady with his little hands and tears it off. One evening I gave him an egg. He seized it but could not break it, though he tried very hard. At last I cracked the shell, and in the morning the shell was empty, so I think he must have eaten it. He is left at liberty all night, but is always found coiled up in his basket in the morning. There are a great many cockroaches in the kitchen, and he is wonderfully quick after them. Sometimes I look to see what he is doing in the middle of the night, and he is darting about after the beetles. He drinks a lot of water; sometimes takes it in preference to milk. It is very curious if he takes a drink of milk in the morning now it makes him sick. We must get another young hedgehog next year for you to study."

"August 25th.—Peter is very fond of sweet cake and fruit, plums especially. The other day a spice loaf had been put on to the pantry floor to cool, and Master Peter was found with his fore feet upon it, and a hole eaten in the loaf. He is a great epicure and very tame. Knows me from anyone else, but so he

should, I have attended upon him so constantly. There can be no doubt hedgehogs are partially fruit eaters. I should think they eat any fallen fruit they come upon; there is no doubt about Peter's taste for it. Did you know they have a very keen scent? If I see where a beetle has run across and pick him up and set him on the spot, he takes up the scent at once, and follows the track of the beetle. I can hear him snuffing quite distinctly. The beetle has very little chance of escape, he runs so fast. He uses his fore-feet for scratching a great deal; always scratches at the slugs before eating them. If I offer him one on my finger he always pulls it off with his hand and gives it a few scratches before he bites it. He shows a decided preference for nocturnal insects. Daddy-long-legs are an especial dainty; though he is very fond of moths. Twice when I have been cruel enough to catch him a fine fresh white butterfly he has *not* eaten it, but it may be he is only not hungry in the daytime now. You should see him attack an egg! but he has not accomplished breaking one for himself yet. He can curl quite round now, but never sets up his bristles to me, though he does to the others sometimes, and he has a little temper of his own. I vexed him once and he gave such a scream! not a squeak but a scream. A day or two ago I took him up in the daytime, and in a few minutes he fell sound asleep on my hand. Just turned over on his side, shut his eyes, and gradually, very gradually, closed up till I could just see the soles of his little hind feet. Sometimes he goes on the kitchen hearth and makes himself as flat as a flounder. He evidently likes to feel the warmth. He can flatten himself out till quite a hollow comes in his back; his bones must be very supple. I still take him into the garden every evening for about an hour. On damp evenings there are a lot of huge worms lying along the grass; Peter seizes hold of one end, but they generally manage to shrink back into their holes. Sometimes, however, he gets one out, and runs off with it to a quiet corner. It is always dark when this takes place, so I cannot see him eating them, but I hear a great chewing going on, and if I lift him up he still keeps hold of the worm."

On the 3rd of Sept. the hedgehog was taken to Newcastle,

where it remained ten days at St. Mary's Terrace. Miss Abbs returned to Oatlands on the 13th; of course bringing Peter with her. Travelling did not disconcert him at all, as he would come out of his basket when the train was going at express speed, take a drink of milk from a saucer carried for him, and then creep back into his basket. At Oatlands a nest was made for him in the grounds, where he now roams at perfect liberty, no doubt astonishing his own species, of which there are a large number in the garden, with accounts of his travels and adventures. For two or three weeks he was pleased to occupy the nest provided for him, but now he has found more congenial quarters, and only returns every evening to eat his supper of bread, milk, and fruit, which is regularly put ready for him.

VI.—*Miscellanea.*

Note on a curious proceeding of a Bullfinch.—On the 7th of July, 1888, at eight o'clock A.M., as Miss Abbs (our visitor and friend) was on her way to the Lodge she observed one small bird busy with another small bird, killing it. She went and took up the dead one, which was a young well-fledged Chaffinch, and brought it in to me, and told the story. My first impression was it must have been the work of a Shrike. The head of the Chaffinch was the only part injured; the brain was protruding from the skull, which was broken. As Miss Abbs did not know what the bird was that had done the work, I proposed at once that we should take the dead Chaffinch (which was still warm) out and lay it down just where it had been killed, and probably the destroyer would come to it again, which it did in less time than I can describe it. A male Bullfinch, sure enough, came, and carried off the dead Chaffinch by the neck. This last act left no doubt in our minds who the culprit was.—*John Hancock, Oatlands, Surrey.*

On Two Wild Hybrids recently captured in Northumberland.—

1. Wild Hybrid between the Yellow Bunting and the Reed

Bunting. It shews the markings of the Reed Bunting on the head, neck and back. The rest of the plumage approaches that of the Yellow Bunting. This bird was caught on Whitley Bents by Mr. Wardle, in January, 1886, and lived in confinement in the Museum until June 11th, 1887, having moulted once during the time of its confinement. The dead specimen was sent to me at Oatlands, and was stuffed there. It is placed in a case near the Buntings in the Museum collection.

facts

2. Wild Hybrid between the Greenfinch and Brown Linnet. It has the wings, tail, and beak of a Greenfinch, and the back and red breast of the male Brown Linnet. This very interesting specimen was caught by Mr. Wardle near to Kenton, and was brought to me on Saturday, 24th December, 1887. At my request it was purchased for the Museum, and after living in confinement in the Museum for several months it unfortunately died before moulting. It is now exhibited in a case near the Finches and Linnets, and is well worthy the examination of those interested in the occurrence of hybrids in a wild state—a phenomenon very rarely observed by systematical ornithologists.

facts

—John Hancock, Oatlands, Surrey.

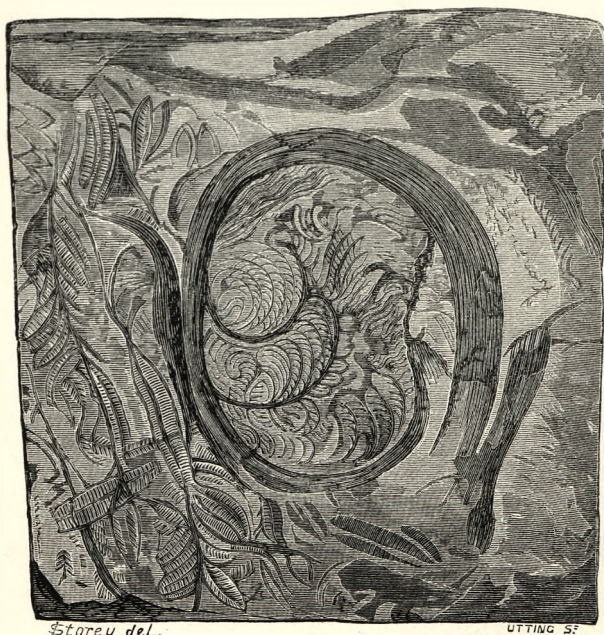
very indeed

who is Mr Wardle?

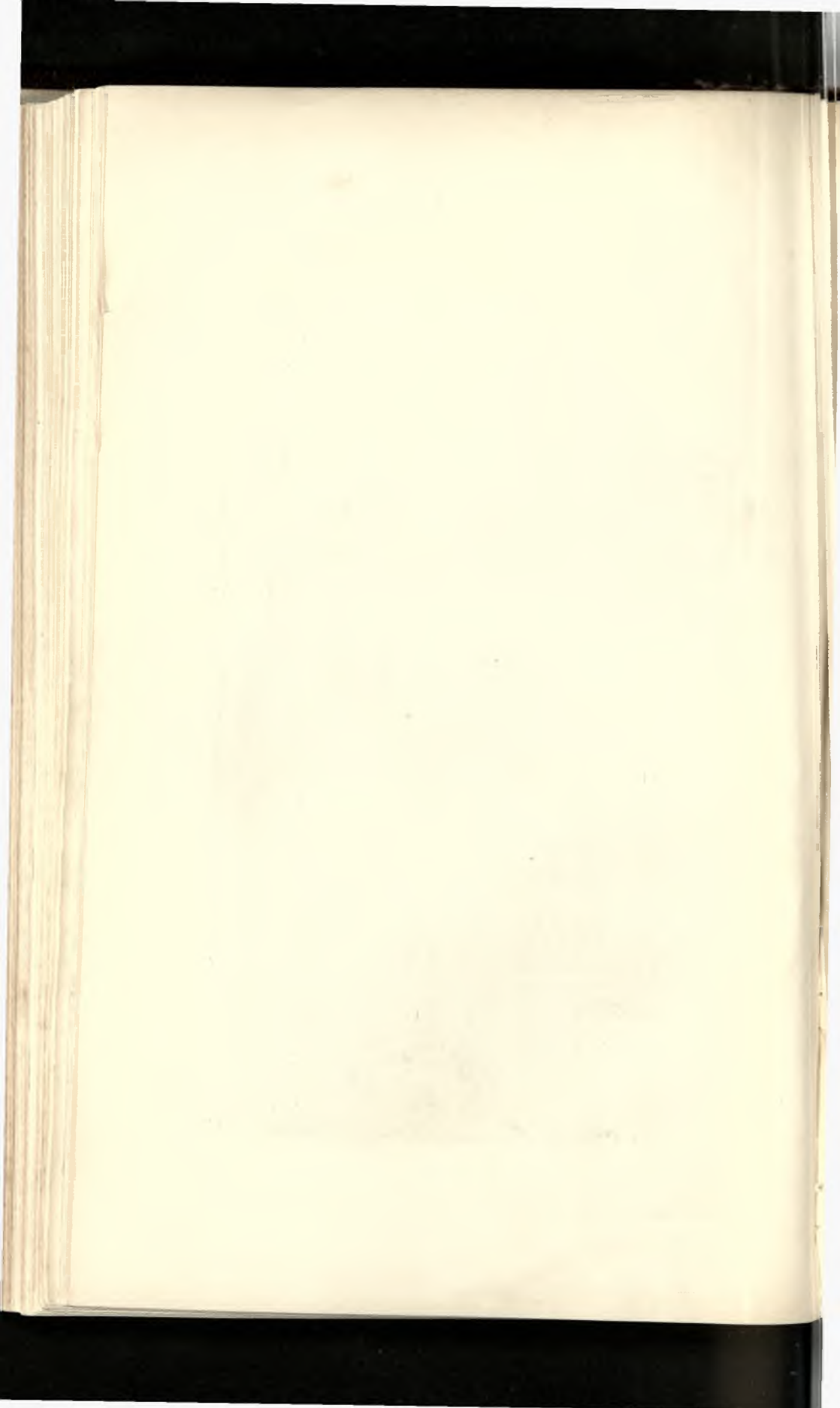




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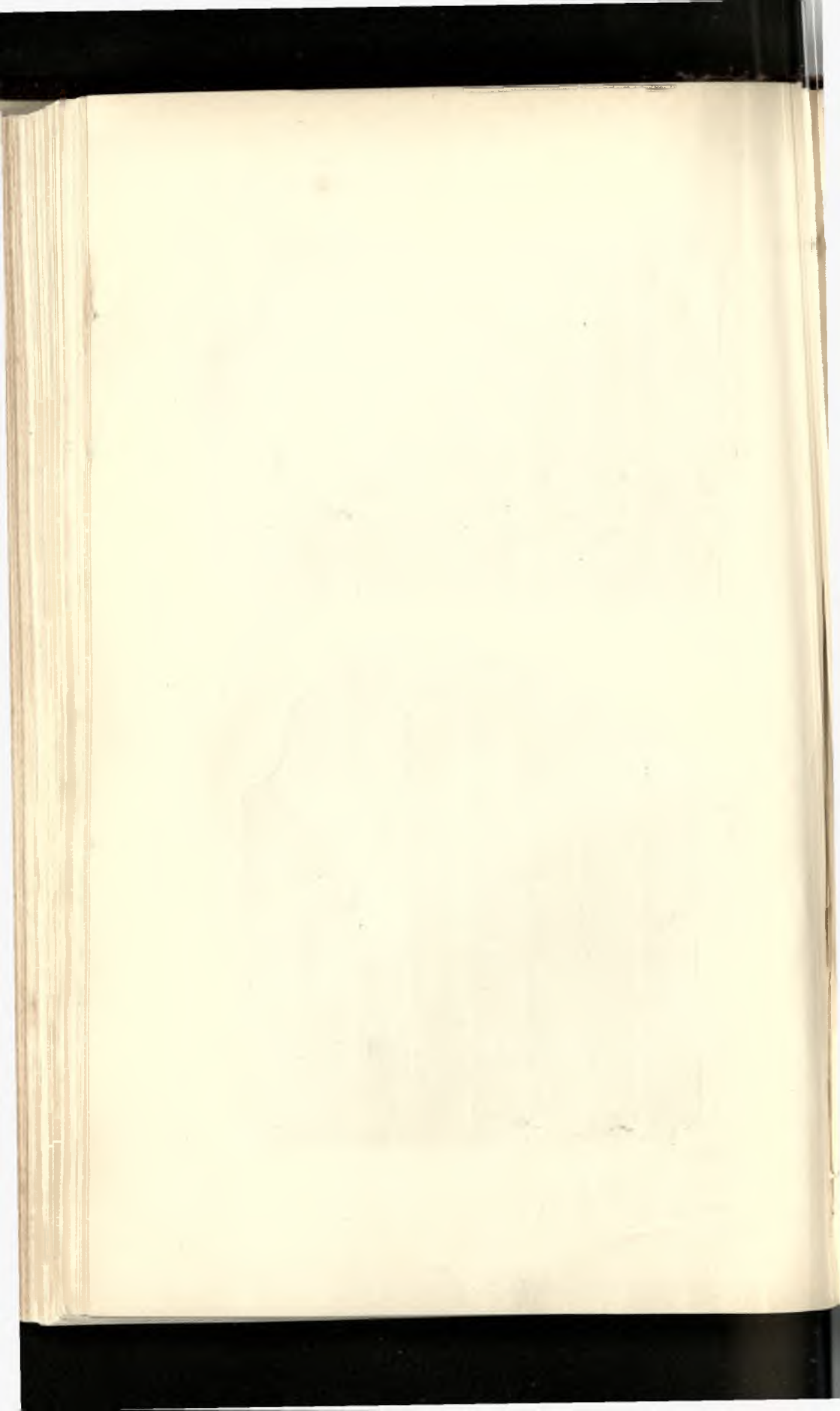




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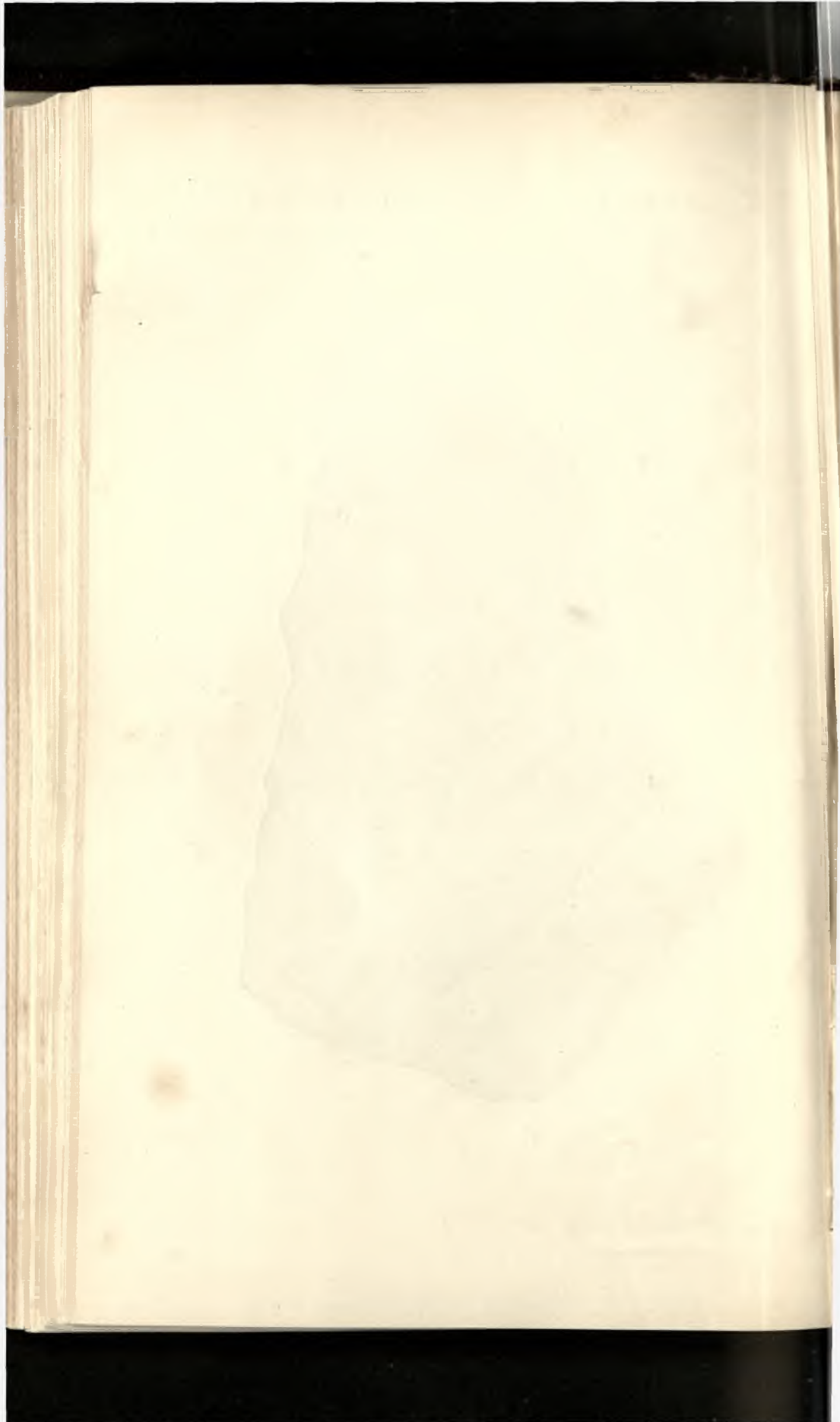


1.



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—*John Hancock, Oatlands, Surrey.*

VII.—*Note on the South Durham Salt Borings, with remarks on the Fossils found in the Magnesian-Limestone Cores, and the Geological position of the Salt.* By R. HOWSE.

THE chief thing I have in view in this note is to express an opinion on the geological position of the Rock Salt found in the South of Durham, and to make a few remarks on the Fossils found in the Magnesian-limestone cores; but especially to prove the identity of the Upper Limestone in the Salt-borings in South Durham with the Brotherton beds in South Yorkshire, and the identity of both these with the Plattendolomit of Germany, and the Permian position of the lowest deposit of Rock Salt.

Many years ago (1854), the late John Williamson, of South Shields, said, in the course of conversation:—Why do not Geologists shew us where we may find Salt in this neighbourhood? In reply to this it was stated that if ever it should be found in Durham it would be on the banks of the Tees, in the South of the county. This reply was explanatory and not prophetic, for it was well known to the older geologists that the New Red Sandstone, as it was then called, existed under the thick covering of drift in the South-East of this county, as was shewn by the sections at Seaton Carew, Preston, and Coatham Stobs, and at Barwick, on the Yorkshire side, where extensive quarries were worked in the Sandstone and the Cockfield dyke.

Also the short account given by Winch in the "Trans. Geol. Soc.," 1814, on the Red Marl and Sandstone, with the interesting sections of the strata passed through in the borings near Dinsdale in search of coal, pointed out the nature of the strata on the banks of the Tees near Darlington, and shewed their relationship to the New Red Sandstone or Trias deposits of the Midland counties. Dr. Young, of Whitby, had also recorded the existence of deposits of Gypsum near Redcar, so that it was generally recognised by geologists that these beds belonged to the Salt-bearing series of rocks. But the discovery of Salt was not made by science but by blind chance, and the desire to obtain fresh water led to the discovery of Rock Salt.

It is necessary to mention that this first discovery of salt on the Tees was made known to the scientific world by Mr. John Marley at the last meeting of the British Association in Newcastle in 1863.

At present I am not able, and do not intend, to refer to all the accounts which have been given of the search for Salt in the Middlesbrough district, but I cannot very well pass by without some reference, the somewhat detailed and excellent paper by Mr. Edward Wilson, published in the "Quarterly Journal of the Geological Society for November, 1888," (of which paper he has kindly favoured me with a copy) as it contains some opinions which, so far as I have been able to examine the cores, are not borne out by the cores themselves, and the occurrences of Salt in other parts of Europe, especially in Germany, where Rock Salt has been found in strata which so entirely corresponds to the beds in Durham, that it seems to me impossible to come to any other conclusion than that they have been formed under similar physical conditions, and are found upon identically the same geological horizon. It has always appeared to me a great mistake to compare the formations on the North-East coast of England with deposits in the West and Midland counties of England, and to try and square everything to these old, and, it may be, imperfect standards.

POSITION OF THE SALT.

Through the kindness of the Messrs. Bell Brothers I had an opportunity, which I have not forgotten, of examining their first trial bore shortly after it was made. The part most interesting to me was the Limestone with Marl and Salt below it of that section. I came to the conclusion, after carefully examining that part of the section, that this Limestone and Marl were identical with the "Upper Limestone" and "Red Marl" of Sedgwick, the Brotherton Beds and Red Marl of Kirkby, as exposed at Knottingley, Brotherton, and other places in the South of Yorkshire; and that it was also identical with the "Plattendolomit" of Geinitz, as seen near Gera, in the outskirts of the Thuringerwald, and many other parts of Germany. And it consequently follows, if this identification of strata be

correct, as I think it is, and seems to be proved, that the Salt below this Limestone is of Permian age, and would be so considered by every one acquainted with the German Permians.

It may be mentioned here that Rock Salt is found in Germany in the Middle Zechstein as well as in the Upper, in the Bunter, and also in connection with the Muschelkalk, Wellenkalk, and even in the Keuper.

We will now compare the lower portion of Messrs. Bell Brothers' section, as recorded in Mr. Wilson's paper, with one from Karsten's "Salinenkunde" and Dr. Geinitz' "Dyas," and with sections of the Upper Magnesian Limestone and Red Marl of South Yorkshire, by Prof. Sedgwick and Mr. Kirkby.

SALTHOLME TRIAL BORE.

Beginning with one or two beds above the Limestone we have,

	ft.		
Rock salt, marl, and gypsum	35	} Plattendolomit.	TRIAS.
Shale, very soft, and gypsum	8		
Gypsum (I take this to be the lowest bed of the Trias)	13		
Gypsum and limestone	12		
Limestone (with much gas)	45	} Red Marl.	PERMIAN.
Grey limestone.....	9		
Grey limestone and gypsum	11		
Gypsum	2		
Gypsum containing salt.....	1		
Rock salt	14		
Marl containing salt	2		
Marl and gypsum	1		
Impure salt	1		

Borehole near Gera, from Karsten's "Salinenkunde," (p. 286) and Geinitz' "Dyas," (p. 234).

	ft.	in.	
Bunter {	7	4	rothe Letten.
Sandstein. {	73	8	Bunte Schieferletten.
	45	7	Oberer Zechstein = PLATTENDOLOMIT.
	24	9	blauer Thon und Gyps.
Zechstein {	119	2	Gyps nud Thon.
formation. {	8	6	fester, Schwarzlicher Gyps.
	10	3	lichtblauer Thon mit Gyps.
	28	2	Steinsalz.

Now let us compare this small section of the Upper Zechstein of Germany with Sedgwick's sections of the "Lower Red Marl and Gypsum" and the "Upper thin-bedded Limestone" of the South of Yorkshire. (*Sections in the ascending order.*)

"Lower Red Marl and Gypsum."

	Thickness.
1.—Plaster-pit Hill, near Ferry Bridge.	
— Beds of gypseous marl resting on yellow limestone.....	not seen
— Blue, red, and variegated marl, with much fibrous gypsum	15 0
— An irregular bed of red marl, with strings and nodules of gypsum	6 0
— Hard, chocolate brown marl, with eight or ten thin beds of fibrous gypsum.....	18 0
— Red and blue marl beds, contorted, and passing into diluvial covering	8 10
2.—Section in Cut for the Canal below Knottingley.	
— Red marl and fibrous gypsum at bottom of section. Part visible.....	about 6 0
— Impure yellowish clay	1 0
3. Yellow indurated marl	0 4
4. Stiff blue clay	2 0
5. Meagre calcareous yellow marl	1 0
6. Impure earthy limestone	3 0

Over these came the regular beds of the superior limestone.

Quarries near Askerne.

	Thickness
1. Unctuous, red marl and fibrous gypsum; top part exposed	not seen
2. Meagre blue and red clay	2 0
3. Striped, red and yellow sandy beds	3 0
4. Red marl, mixed with incoherent yellow sand	3 0
5. Grey, impure, sandy limestone, with dendritic impressions	0 4

Over these came the regular beds of the Upper Limestone.

These sections are in ascending order, and the two last represent the highest part of the Lower Red Marl and Gypsum."

"Upper thin-bedded Limestone." = (Plattendolomit.)

Brotherton, near Ferry Bridge, beginning with the lowest.

1. Red marl and gypsum, with a few feet of blue clay above	
2. Soft, yellow, earthy limestone.....	3 0
3. Irregular bed or congeries of thin beds, imperfectly concretionary; partly earthy, partly compact, etc.	3 0

4. Thin greyish beds, with layers of bluish or ash-coloured marls	ft. in.
5. Soft, yellow, earthy limestone, like No. 2.....	6 0
6. Many thin shattery beds, with marl partings; porous or cellular. Colours—grey, yellowish grey, or brown, in cloudy spots or stripes	1 0
	20 0

At the top are some very thin beds resembling marl-slate.

“At Knottingley, in the cut for the canal, the bottom earthy beds (No. 2 of the above section) are laid bare. Near the centre of the system were some remarkable contortions (l. c., Plate VII., f. 6). At this locality the top beds exhibit the junction of the deposit to the ‘Upper Red Marl,’ but the contortions of the beds make the phenomena less instructive than might have been anticipated.

“The same deposit, with modifications in the thickness and colour of the limestones, are seen near Tickhill and Askerne village. Some of these beds contain a very large percentage of Magnesia.”—See Geol. Trans., 2nd ser., Vol. III., pp. 101–106.

“*Upper Limestone*” or *Brotherton Beds*, and “*Lower Red Marl*”
of *Sedgwick and Kirkby*.

The Brotherton Beds are a series of thin, flaggy limestones, usually hard and compact, and of a yellow or grey colour. The surface-planes are generally a little apart, and are often coated with red, green, or purple clays or marls; bands of marls similarly coloured are occasionally met with among the limestones.

In certain localities some of the beds contain casts of *Axinus dubius* and *Myalina Hausmanni*, together with some obscure remains that seem referable to Algæ = *Chondrites virgatus*.*

The Lower Red Marl and Gypsum immediately underlie the preceding beds. They consist of beds of red variously coloured marls with bands of gypsum, are apparently unfossiliferous, and are rarely seen in section.

“The Brotherton Beds are well exposed at Knottingley, Womersley, Hexthorpe, Wadworth, and many other localities.”

* From the description given of this Algæ I am able to identify it with specimens observed in the Chemical Company's boring, near the Tees.

Mr. James Kirkby places these Brotherton Beds on the same horizon as the Yellow Concretionary and Crystalline limestones of Marsden, Fulwell, Roker, Hartlepool, etc.; but I think they are much higher, are the top beds of the Upper Magnesian-limestone, and that they are the exact equivalents of the Plattendolomit of Germany, and have never been seen at the surface in Durham or North Yorkshire; they form, in fact, the uppermost series of beds of the Magnesian-limestone both in England and Germany, and the uppermost limit of the Permian. See Quart. Journ. Geol. Soc., Vol. XVII., pt. 1, p. 287 *et seq.*

FOSSILS.

Some years since, now, I spent a summer's day in company with Mr. Howell and Dr. Veitch, in visiting and examining the cores from the bore-holes in the South of Durham.

At the Newcastle Chemical Works bore-hole No. 1, I soon detected on a dark ash-coloured limestone core distinct impressions of *Chondrites virgatus*, Münst., and subsequently a specimen of *Axinus dubius*, Schloth., the latter very small and dwarfed in size. Since that time Dr. Veitch has found a few more examples in the same bed of limestone, and also very minute specimens of *Myalina Hausmanni*, and traces of another species of bivalve shell. Many of the cores at this place are quite oolitic in structure, and agree well with a bed of limestone which I have seen in situ only in the cliffs at Hartlepool, where it is, however, of a more yellow colour. The cores containing the *Axinus* and *Chondrites* closely resemble a deposit on the coast near the mouth of Castle Eden Dene, but the cores from the bore-hole are more crystalline and of greater density.

As the cores at this place were not in order, but much thrown about, it would be difficult, perhaps, to identify them with any particular part of the section, but they belong, without doubt, to the Upper-series of the Magnesian-limestone, and high up in that series.

SEATON CAREW BORE HOLE.

A few weeks since I had an opportunity of visiting Seaton Carew, and spent a few hours in carefully examining such of

the cores as are left there. All the Carboniferous cores had been removed for safety, and the Triassic cores had fallen to pieces, and are fast being reduced to dust. In a core of very fine, white, compact limestone I found a few small specimens of *Productus horridus*, which is a very characteristic fossil of our Lower and Middle limestone series. One of the specimens shews the hinge line with its row of long spines, and associated with these was a specimen of *Axinus dubius*, Schloth., of medium size, and part of an unknown organism which I have not been able to identify or to determine its affinity. These fossils evidently belong to the Lower-limestone series. The only stratum I can call to mind like this is a thick bed formerly worked near Hartley's Glass Works, Deptford, near Bishopwearmouth, out of which Mr. Jas. Kirkby procured some very similar specimens of *Productus*. This low-seated bed of limestone from the bore-hole is, however, much denser and more crystalline, and also contains small globular deposits of Gypsum or Anhydrite.

Most geologists will, no doubt, be inclined to conclude from a comparison of the beds in the sections quoted above that the Upper-limestones found in the Salt borings on the Tees are identical with the Yorkshire Brotherton beds, and also with the Plattendolomit of Germany. And as the three fossils found in the Plattendolomit are species identical with those found in the Brotherton beds and also in the limestone-cores of one of the Teesside borings, and as these fossils are well-known Upper Magnesian-limestone species, it seems safe enough to conclude that these Upper beds of limestone, with the Rock Salt below them, are of undoubted Permian age; at least this was the conclusion I came to after a first examination of the Saltholme trial boring.

VIII.—*Catalogue of the Local Fossils in the Museum of the Natural History Society.* By RICHARD HOWSE.

The rock formations or Strata of Northumberland and Durham are included under the following heads:—

RECENT AND TERTIARY PERIOD.

RECENT AND HISTORIC.

Deposits of Estuarine Silts, Sand-Dunes, Calcareous Tufa. Kitchen middens of Roman and other camps and the more recent Cave Remains.

PRÆHISTORIC.

Accumulations of Peat in old lake beds and marshes. Peat deposited under brick-clay and the older Estuarine Silts, old forest beds at mouth of estuaries, or on the coast.

LATEST GLACIAL.

The later gravels, sands, clays, and the newer, reconstructed drifts. Shap-granite boulders in bed of the Tees and some of its tributaries (Lune, etc.), and in the Gaunless, a tributary of the Wear, in newer drift clay. Newer raised beaches.

SCANDINAVIAN DRIFT.

Stiff blue clay with angular chalk-flints, rounded quartz-pebbles, and fragments of different porphyritic rocks. *Cyprina Islandica*, *Tellina proxima* in gravel under thick bed of clay at the Trou Rocks, near South Shields. Older raised beaches.

OLDEST GLACIAL MORAINÉ = BOULDER CLAY.

The old Moraine Boulder Clay filling up all the deep old præglacial valleys, and best seen on the coast line.

SECONDARY OR MESOZOIC PERIOD.

TRIAS OR NEW-RED SANDSTONE.

Visible in the scar off West Hartlepool, near Seaton Carew, Preston Junction, and at Coatham Stobs, and proved to be of great thickness in the recent borings for Salt in South Durham.

PRIMARY OR PALÆOZOIC PERIOD.

PERMIAN.

Magnesian-limestone and Marl-Slate resting on the Yellow-Sand or on the denuded edges of the Coal-measures.

CARBONIFEROUS.

Coal-Measures, Gannister beds, Millstone-Grit, Yoredale-series, Scar-limestone series, and Tuedian or Calciferous-sandstone series.

DEVONIAN.

Old red conglomerates on the South-eastern flanks of the Cheviot porphyry in Roddam Dene and elsewhere.

SILURIAN.

Small patches of Silurian shales on the Eastern flank of the Pennine range and the Cheviots.

TERTIARY.

RECENT AND HISTORIC.

The Fossils found in the Recent deposits are arranged in the Geological Room, Side Cases No. 2, 3.

The fossils of this period are accumulations of marine or fresh-water shells deposited either in estuarine silts, as *Scrobicularia piperata*, or layers of Entomostraca or Lymnæas, etc., in old Lake beds, intercalated among beds of brick clay. Remains of the Red Deer, Roebuck, Elk, and Wild Boar dredged up with river silt, or found in the newest cave deposits with bones of man, as the Great Auk, Wolf, Northern Lynx, and other animals now extinct in these counties. The bones thrown out in excavations of Roman Camps, also include the Dog, Goat, Horse, etc. See Trans. Tyneside N. F. Club, Vol. V., p. 111, and Nat. Hist. Trans. N., D., and NC., Vol. VII., p. 361, *et seq.*

are these extinct
if not, why not? 2

Cervus Elaphus, Linn. RED DEER.

Loc.—In Silt (18 ft.), Jarrow Dock and Coble Dene Dock—in Silt of the Tyne and numerous other places.

Cervus Capreolus, Linn. ROEBUCK.

Loc.—Chiefly in Roman Stations.

Cervus Alces, Linn. ELK.

Loc.—Under Peat in Chirdon Burn, North Tyne. T. N. F. C., Vol. V., Pl. 5.

Bos primigenius, Bojanus. The "Urus."

Loc.—In Silt at Jarrow Dock, the bed of the Tyne, and under Peat.

Sus scrofa, Linn. WILD BOAR.

Loc.—In Silt of Wear and in Roman Stations.

Alca impennis, Linn. GREAT AUK.

Loc.—In cave deposits at Marsden, with remains of Man, Badger, Fox, etc.—See Nat. Hist. Trans., Vol. VII., p. 363.

PRÆHISTORIC.

Megaceros Hibernicus, Owen. IRISH ELK.

In Peat under a thick deposit of brick clay at South Shields, and in the forest-bed at the mouth of the Tees. T. N. F. C., V., p. 114, Pl. 4.

Elephas primigenius, Blum. MAMMOTH.

The only trace of this in our district is a small portion of a tusk five inches round, which was found in the excavation of the West Hartlepool Docks, and which is, or was, preserved in the Athenæum at West Hartlepool. T. N. F. C., Vol. V., p. 111.

SCANDINAVIAN DRIFT.

Cyprina Islandica (Linn.).

A glaciated portion of the hinge of this shell, together with a specimen of *Tellina* and broken portions of a crab, were found in a bed of gravel under this clay at the Trou Rocks, South Shields, and is in my possession.

GLACIAL MORAINÉ = BOULDER CLAY.

No fossils that I am aware of have been found in this deposit, the occurrence of which could not be expected from the conditions under which it was accumulated or thrown down at the termination or foot of the great Ice-sheet that covered the

interior of the country during the submergence of the land after the commencement of the Glacial period.

SECONDARY OR MESOZOIC PERIOD.

TRIAS.

No trace of a fossil that I am aware of has been detected in this formation in the South of Durham. In most of the bore-holes the presence of a thick deposit of Rock-Salt occurs at the base of the formation, the beds of which seem to rest on and to pass gradually down and without any physical break into the upper beds of limestone of the underlying Permian. It seems impossible, from an examination of the cores of these bore-holes, to divide the Trias of the South of Durham into an upper and lower series, or to correlate it with beds of the same formation further South in the Midland Counties, or West as in Lancashire. Neither is it possible to correlate it with the divisions of the German Trias. Formerly it was customary to assign the lower part of this formation in Durham and Yorkshire to the Bunter, but the more intimate knowledge afforded by an examination of the numerous cores of the borings recently made in the South-east of Durham gives no support to this conjectured relationship. It seems better to conclude that the red-shales and sandstones at the mouth of the Tees represent a peculiar and local development of the Trias than attempt to split it up into divisions that have no exact representatives either in England or on the Continent.

PRIMARY OR PALÆOZOIC.

PERMIAN = MAGNESIAN-LIMESTONE.

The student is referred to the following works for information on the Local Permian Fossils:—

Catalogue of the Fossils of the Permian System, by R. Howse.
Trans. Tynes. Nat. Field Club, Vol. 1.

Notes on the Permian System of Northumberland and Durham.
Trans. Tynes. Nat. Field Club, Vol. 3.

Monograph of Permian Fossils, by Wm. King, Pal. Soc., 1850.

Mon. Brit. Perm. Erach., Pal. Soc., by Dr. Davidson.

Dyas, by Dr. H. B. Geinitz. Leipzig, 1861.

The discovery of the upper members of this group of strata in the South Durham, enables one to correlate it more exactly with the same beds in Yorkshire and in Germany, especially with the latter, where it has for a long time been known to contain deposits of Rock-Salt. The following divisions of the Magnesian-limestone were proposed by myself in 1857, and have been adopted by Mr. James Kirkby, Dr. Geinitz, Dr. Davison, Robt. Etheridge, and others.—See Ann. Nat. Hist., 1857, and Trans. Tyneside Nat. F. Club, Vol. 3, p. 235, 1858.

Upper Series of Magnesian-limestone Beds.

1. BROTHERTON BEDS of Yorkshire = Plattendolomit of Germany.

These beds have only recently been discovered in the borings for salt in the South of Durham, and known only by the section shewn in the cores. There is no difficulty in identifying this thin upper limestone with the Brotherton and Knottingley beds of Yorkshire and the Plattendolomit of Germany.

Fossils.—The characteristic fossils of this bed in Yorkshire and Germany are—

Myalina Hausmanni, Goldf., Perm. Foss., Pl. 14, f. 1-14.

Axinus dubius, (Schloth.) Perm. Foss., Pl. 15, f. 23-32.

Chondrites virgatus, Münster, Dyas, Pl. 24, f. 5; Pl. 28, f. 6.

I cannot say with certainty that any fossils have been found or have been searched for in the cores of this uppermost limestone in South Durham, but in the boring on the side of Tees, put down by the Newcastle Chemical Company, the three species above enumerated have been found by myself and Dr. Veitch. The cores of this boring had been so much disordered that the exact position of the fossils could not be satisfactorily determined. That they were in the higher beds of limestone there could be no doubt, as beds of oolitic structure, identical with some beds near Hartlepool, were arranged with the fossiliferous cores. The very diminished and dwarfed size of the shells proves that they existed, in the bed of the then Permian sea, under conditions inimical to Molluscan life, and were fast being deprived of the power of existence.

shells?

rather
fine fossils

2. RED MARL = The Lower-red Marl of Yorkshire.

This deposit, in some of the Tees-side Salt-borings, contains a thick deposit of Rock-Salt of Permian age.

3. UPPER, THIN-BEDDED LIMESTONE.

Beds of yellow, earthy, friable limestone in thin beds, with occasionally beds of a compact, hard, and crystalline structure, and more rarely beds of oolitic structure.

Localities.—On the coast at Roker, South Dock at Sunderland, where it formerly formed a low cliff under the Town moor, now obscured by buildings, and in the cliffs at Hartlepool.

Fossils.—The characteristic fossils are—

Chondrites virgatus, Münstr., Dyas, Pl. 24, f. 5.

Axius dubius, Schloth., Perm. Foss., Pl. 15, f. 23-32.

Pleurophorus costatus, Brown, Perm. Foss., Pl. 15, f. 13-20.

4. BOTRYOIDAL, CONGLOBATED OR BALL-LIMESTONE.

The beds of this series consist chiefly of coralloid, sphæroidal, botryoidal forms of limestone, with other associated beds of a mammillated or stalactital structure, and with highly crystalline, close-bedded, compact layers interstratified with others which are nearly friable and pulverulent.

Locality.—The best sections of these beds are seen on the coast from the middle of Marsden bay to Roker, near the mouth of the Wear—Cleadon Hills, Fulwell Hill, and Building Hill near Sunderland. Several patches occur between Hendon and Ryhope, and at Black Halls, on the coast south of Castle Eden Dene.

Fossils.—The characteristic fossils of this series are given fully in the list below, but it may be remarked that no Brachiopod occurs in the original beds of the upper series above enumerated, and the fishes that have been found are peculiar to it, and limited to the lower members of the series. These little Palæo-niscoid fishes (*Acentrophori*, Traquair) have in all probability been carried by floods along with the plant-remains that occur with them out into the Permian sea, and were there entombed between the layers of marl that were then being thrown down.

Note.—There is no reason to think that any of the Permian or older Palæozoic fishes were of marine origin or lived in salt-water, as all the recent *Ganoids*, *Dipnoi*, and even some of the *Selachii* are of fresh-water habits.

The Fossils found in the Magnesian-limestone and Marl-slate are arranged in the Geological Room, Side Cases No. 25, 26, 27, 28, and in the "Kirkby Permian Collection" in the Gallery.

PLANTÆ.

Name and Locality.	Reference.
<i>Chondrites virgatus</i> , <i>Minster</i> , Loc.—Black Halls, near Castle Eden.	Dyas, Pl. 24, f. 5. <i>Polysiphonia Sternbergiana</i> , King. Perm. Foss., Pl. 1, f. 2. ? <i>Filograna Permiana</i> , King.
<i>Calamites Wakei</i> , n. s., Loc.—Fulwell Hill.	<i>Calamites arenaceus</i> , Brongt., Kirkby. Nat. Hist. Trans., Vol. 1, p. 81.
<i>Ulmannia selaginoides</i> , (<i>Sternb.</i>) Loc.—Fulwell Hill.	Perm. Foss., Pl. 1, f. 3; Dyas, Pl. 31, f. 17–20.

ANIMALIA.

FORAMINIFERA.

<i>Dentalina Permiana</i> , <i>Jones</i> , Loc.—Byer's Quarry.	Perm. Foss., p. 17, Pl. 6, f. 1.
<i>Dentalina Kingii</i> , <i>Jones</i> , Loc.—Byer's Quarry.	Perm. Foss., p. 17, Pl. 6, f. 2, 3.
„ sp. ? <i>Jones</i> , Loc.—Byer's Quarry.	Perm. Foss., p. 17, Pl. 6, f. 4.
<i>Textularia Triticum</i> , <i>Jones</i> , Loc.—Byer's Quarry.	Perm. Foss., p. 18, Pl. 6, f. 5.
<i>Textularia cuneiformis</i> , <i>Jones</i> , Loc.—Byer's Quarry.	Perm. Foss., p. 18, Pl. 6, f. 6.
<i>Trochammina pusilla</i> , <i>Geinitz</i> , Loc.—Byer's Quarry.	Perm. Foss., Pl. 6, f. 7–9; Pl. 18, f. 13.

ANNELIDA.

<i>Spirorbis Permianus</i> , <i>King</i> , Loc.—Byer's Quarry.	Perm. Foss., p. 55, Pl. 6, f. 12, 13.
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CRUSTACEA.

Name and Locality.	Reference.
<i>Cythere subelongata</i> , <i>Geinitz</i> , Loc.—Byer's Quarry.	Perm. Foss., Pl. 18, f. 5. <i>C. elongata</i> , Münster.
<i>Cythere curta</i> , <i>M' Coy</i> , Loc.—Byer's Quarry.	Perm. Foss., p. 61, Pl. 17, f. 21, 22; Pl. 18, f. 3, a, b, c.
<i>Cythere biplicata</i> , <i>Jones</i> , Loc.—Byer's Quarry.	Perm. Foss., Pl. 18, f. 8.
<i>Cythere Kutorgana</i> , <i>Jones</i> , Loc.—Byer's Quarry.	Perm. Foss., Pl. 18, f. 6; T.N.F.C., Vol. 4, Pl. 11, f. 3.
<i>Cythere acuta</i> , <i>Jones</i> , Loc.—Byer's Quarry.	Perm. Foss., Pl. 18, f. 10; T.N.F.C. Vol. 4, Pl. 11, f. 16.
<i>Cythere gracilis</i> , <i>M' Coy</i> . Loc.—Byer's Quarry.	Perm. Foss., Pl. 18, f. 7.
<i>Cythere brevicauda</i> , <i>Jones</i> , Loc.—Byer's Quarry.	Tyneside N. F. C., Vol. 4, Pl. 11, f. 9.
<i>Cythere plebeia</i> , <i>Reuss</i> , Loc.—Byer's Quarry.	Tyneside N. F. C., Vol. 4, p. 141.
<i>Cythere Tyronica</i> , <i>Jones</i> , Loc.—Byer's Quarry.	Perm. Foss., Pl. 18, f. 9. <i>C. inornata</i> , Jones.
<i>Kirkbya Permiana</i> , <i>Jones</i> , Loc.—Byer's Quarry.	Perm. Foss., Pl. 18, f. 1.

MOLLUSCA.

<i>Gervillia antiqua</i> , (<i>Münster</i>) Loc.—Near Whitburn.	Perm. Foss., Pl. 14, f. 28–34.
<i>Myalina Hausmanni</i> , <i>Goldf.</i> , Loc.—Quarries near Marsden, Byer's Quarry, Souter Point, Roker, Black Halls.	Perm. Foss., Pl. 14, f. 1–7. <i>M. squamosus</i> , Sowerby. <i>M. septifer</i> , King.
<i>Leda speluncaria</i> , <i>Geinitz</i> , Loc.—Byer's Quarry, and nearer Marsden.	Dyas. Perm. Foss., Pl. 15, f. 21, 22. <i>Leda Vinti</i> , King.
<i>Pleurophorus costatus</i> , <i>Brown</i> , Loc.—Byer's Quarry, etc.	Perm. Foss., Pl. 15, f. 13–20.

Name and Locality.	Reference.
Axinus dubius , (Schloth.) var.,	Perm. Foss., Pl. 15, f. 23-32.
Loc.—Quarries near Marsden,	Min. Conch., Pl. 314.
Byer's Quarry, Roker,	
Black Halls, etc.	
Turbo Permianus , <i>King</i> ,	Perm. Foss., Pl. 16, f. 16.
Loc.—Coast near Byer's	
Quarry.	

PISCES. FISHES.

Acentrophorus varians , (<i>Kirkby</i> .)	Nat. Hist. Trans., Vol. 1,
Loc.—Marsden Bay; Fulwell Hill.	p. 76, Pl. 9, f. 2.
Acentrophorus altus , (<i>Kirkby</i> .)	Nat. Hist. Trans., Vol. 1,
Loc.—Fulwell Hill.	p. 80, Pl. 9, f. 1.
Acentrophorus Abbsii , (<i>Kirkby</i> .)	Nat. Hist. Trans., Vol. 1,
Loc.—Fulwell Hill.	p. 78, Pl. 9, f. 3a, 3b.
Acrolepis Kirkbii , <i>Howse</i> ,	Nat. Hist. Trans., Vol. 7,
Loc.—Marsden Bay and	p. 131. <i>Acrolepis Sedg-</i>
Fulwell Hill.	<i>wicki</i> , Kirkby.

Middle Series.

CONCRETIONARY, CELLULAR, AND SHELL-LIMESTONE.

German equivalents:—*Rauchwacke*.

Beds of an amorphous, irregular structure, with often a false brecciated appearance, caused by the breaking up of the original laminated marly beds, and the cementing together or replacement of the marl by the infiltration and permeation through the broken up stratum of highly crystalline or saccharine limestone: sections occasionally shew numerous, small, irregular cavities, partially or entirely filled with a fine, earthy, yellowish, powdery marl; other parts presenting the appearance of being formed of shapeless fragments of compact limestone imbedded in a completely investing matrix, without taking the form of a true breccia. Occasionally, however, large angular masses of finely laminated limestone are imbedded in it, especially towards its upper surface, where it also becomes more

earthy, and in some localities regularly bedded and oolitic. The upper beds, in some localities, are oftentimes strongly undulated and much broken up, and the fissures filled with masses of breccia derived from strata or beds belonging to the Upper series. The only trace of fossil that I have seen from the Concretionary portion of this series was obtained from some laminated marly beds which were enclosed and isolated in the extensive and thick stratum of Concretionary rock which was worked or quarried extensively at the Trou Rocks, near South Shields, for the pier works at the mouth of the Tyne. This fossil was a fragment of *Caulerpites selaginoides*, a coniferous plant, which occurs in the Marl-slate and in the Limestone of the Upper series in England, and in the Keupferscheifer of Germany.

Locality.—It occurs in the outlier on the top of the cliff at Tynemouth, also in Whitley Quarry and Cullercoats Bay, Northumberland, where the Magnesian-limestone and the Marl-slate are brought in by the "Ninety-fathom Dyke," or fault. It occupies in great thickness the top of the cliff from the Trou Rocks, at North Point, two miles south of the mouth of the Tyne (where it rests for half a mile on the disturbed and denuded surface of the Lower compact limestone) to the North end of Marsden Bay, where its upper surface is broken up, fissured, and filled in with breccia derived from the lower beds of the Upper series, under which, in a disturbed, confused, and broken up state, it disappears.

SHELL-LIMESTONE.

German equivalents:—*Zechstein-dolomit*.

The Shell-limestone is upon the same horizon, and forms the westernmost or baseting portion of the preceding deposit. It is an irregular amorphous mass, without any signs of stratification, of highly crystalline limestone, in some parts exceedingly hard and fine-grained, and in others friable, earthy, and rubbly, and consisting of broken pieces of polyzoæ and shells. It contains an assemblage of the most characteristic fossils of the system. When seen in section, it rests on the upper, often

disturbed beds of the Lower Compact Limestone; but at Claxheugh, on the Wear, it rests also on the bed of Incoherent Sand, the compact limestone being denuded or entirely absent.

Localities.—At Down Hill near West Boldon, near Hylton Castle, and at Claxheugh (these places are all on the escarpment), High Barns, Humbleton Hill, Elstobs, Tunstall Hill near Sunderland, Ryhope Field House, Dalton-le-Dale, Castle Eden Dene. These places are situated in the middle portions of the Magnesian limestone, as developed in the East of the county of Durham. Near Castle Eden Dene it occurs in the form of a conglomerate. See section "Geol. Trans.," II. ser., Vol. III., pl. 7, f. 5, D.

PLANTÆ, PLANTS.

Name and Locality.	ALGÆ.	Reference.
<i>Palæophycus insignis</i> , <i>Geinitz</i> , Loc.—Tunstall Hill.		Dyas, Pl. 24, f. 4.

ANIMALIA.

FORAMINIFERA.

<i>Trochammina pusilla</i> , <i>Geinitz</i> , Loc.—Humbleton Hill.	Perm. Foss., Pl. 6, f. 7; Pl. 18, f. 13.
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SPONGIA.

<i>Eudea tuberculata</i> , <i>King</i> , Loc.—Humbleton Hill and Dalton-le- dale.	Perm. Foss., Pl. 2, f. 1, 2.
<i>Mammillopora mammillaris</i> , <i>King</i> , Loc.—Humbleton Hill.	Perm. Foss., Pl. 2, f. 3, 4.
<i>Bothroconis plana</i> , <i>King</i> , Loc.—Tunstall Hill.	Perm. Foss., Pl. 2, f. 7.
<i>Tragos Tunstallensis</i> , <i>King</i> , Loc.—Tunstall Hill.	Perm. Foss., Pl. 2, f. 5.

ZOOPHYTA.

Name and Locality.	Reference.
<i>Polycoelia profunda</i> , (<i>Germer</i>)	Perm. Foss., Pl. 3, f. 1, 2.
<i>Stenopora columnaris</i> , (<i>Schloth.</i>)	Perm. Foss., Pl. 3, f. 3-6; Pl. 3, f. 7-9.

ANNELIDA.

<i>Spirorbis Planorbites</i> , (<i>Münster.</i>)	Perm. Foss., Pl. 6, f. 10-13.
Loc.—Humbleton Hill.	

ECHINODERMATA.

<i>Eocidaris Keyserlingi</i> , <i>Geinitz</i> ,	Mon. Perm. Foss.,
Loc.—Tunstall and Humbleton Hills.	Pl. 6, f. 22-24.
<i>Cyathocrinus ramosus</i> , (<i>Schlotheim</i>)	Mon. Perm. Foss.,
Loc.—Humbleton Hill.	Pl. 6, f. 15-20.

CRUSTACEA.

<i>Prosoponiscus paradoxus</i> , (<i>Schloth.</i>)	Trans. T. N. F. C.,
Loc.—Humbleton and Tunstall Hills;	Vol. 3, p. 286, Pl. 12,
Ryhope Field House.	f. 1-7.
<i>Cythere subreniformis</i> , <i>Kirkby</i> ,	Trans. T. N. F. C.,
Loc.—Tunstall Hill.	Vol. 4, Pl. 9, f. 13.
<i>Cythere Geinitziana</i> , <i>Jones</i> ,	Trans. T. N. F. C.,
Loc.—Tunstall Hill.	Pl. 11, f. 4a, b, c.
<i>Cythere subgracilis</i> , <i>Geinitz</i> ,	Mon. Perm. Foss.,
Loc.—Tunstall Hill.	Pl. 18, f. 7.
<i>Cythere Kingii</i> , <i>Reuss</i> ,	Trans. T. N. F. C.,
Loc.—Tunstall Hill.	Vol. 4, Pl. 9, f. 8.
<i>Cythere Morrisiana</i> , <i>Jones</i> ,	Trans. T. N. F. C.,
Loc.—Humbleton Hill.	Vol. 4, Pl. 11, f. 1a, b, c.
<i>Cythere plebeia</i> , <i>Reuss</i> ,	Trans. T. N. F. C.,
Loc.—Humbleton Hill.	Vol. 4, Pl. 9, f. 1-12.
<i>Cythere Schauerothiana</i> , <i>Kirkby</i> ,	Trans. T. N. F. C.,
Loc.—Tunstall Hill.	Vol. 4, Pl. 9, f. 14.
<i>Cythere Berniciensis</i> , <i>Kirkby</i> ,	Trans. T. N. F. C.,
Loc.—Tunstall Hill.	Vol. 4, Pl. 9, f. 15.

Name and Locality.	Reference.
<i>Cythere rhomboidea</i> , <i>Kirkby</i> , Loc.—Tunstall Hill.	Trans. T. N. F. C., Vol. 4, Pl. 10, f. 3.
<i>Cythere amputata</i> , <i>Kirkby</i> , Loc.—Tunstall Hill.	Trans. T. N. F. C., Vol. 4, Pl. 10, f. 4.
<i>Cythere Jonesiana</i> , <i>Kirkby</i> , Loc.—Tunstall Hill.	Trans. T. N. F. C., Vol. 4, Pl. 10, f. 1, 2.
<i>Cythere acuta</i> , <i>Jones</i> , Loc.—Tunstall Hill?	Trans. T. N. F. C., Vol. 4, Pl. 11, f. 16.
<i>Kirkbya Permiana</i> , <i>Jones</i> , Loc.—Humbleton and Tunstall Hills.	Trans. T. N. F. C., Vol. 4, Pl. 8, f. 1-9.

POLYZOA.

<i>Fenestella retiformis</i> , (<i>Schlotheim</i>) Loc.—Tunstall and Humbleton Hills, etc.	Mon. Perm. Foss., Pl. 2, f. 8-19.
<i>Phyllopora Ehrenbergi</i> , (<i>Geinitz</i>) Loc.—Tunstall and Humbleton Hills.	Mon. Perm. Foss., Pl. 5, f. 1-6.
<i>Phyllopora multipora</i> , <i>Strubsole</i> ,	Quart. Journ. Geol. Soc., No. 151.
<i>Synocladia virgulacea</i> , (<i>Phillips</i>) Loc.—Tunstall and Humbleton Hills, etc.	Mon. Perm. Foss., Pl. 4, f. 1-8.
<i>Acanthocladia dubia</i> , (<i>Schlotheim</i>) Loc.—Tunstall and Humbleton Hills, etc.	Mon. Perm. Foss., Pl. 5, f. 7-12.
<i>Acanthocladia anceps</i> , (<i>Schlotheim</i>) Loc.—Tunstall and Humbleton Hills, etc.	Mon. Perm. Foss., Pl. 5, f. 13-18.
<i>Hippothoa Voigtiana</i> , (<i>King</i>). Loc.—Tunstall and Humbleton Hills.	Mon. Perm. Foss., Pl. 3, f. 13.

MOLLUSCA.

BRACHIOPODA.

<i>Discina nitida</i> , <i>Phillips</i> , Loc.—Tunstall and Humbleton Hills.	Mon. B. P. B., Pl. 4, f. 27-29.
<i>Crania Kirkbyi</i> , <i>Davidson</i> , Loc.—Tunstall Hill.	Mon. B. P. B., p. 49.

Name and Locality.	Reference.
<i>Productus horridus</i> , <i>Sow.</i> , Loc.—Tunstall and Humbleton Hills, etc.	Mon. B. P. B., Pl. 4, f. 13-26.
<i>Productus latirostratus</i> , <i>Howse</i> , Loc.—Dalton-le-dale, Tunstall Hill, etc.	Mon. B. P. B., Pl. 4, f. 1-12; T. N. F. C., 3, Pl. 11, f. 1, 2.
<i>Strophalosia Goldfussi</i> , <i>Munst.</i> , Loc.—Tunstall and Humbleton Hills, etc.	Mon. B. P. B., Pl. 3, f. 1-23.
<i>Strophalosia lamellosa</i> , <i>Geinitz</i> , Loc.—Humbleton and Tunstall Hills, etc.	Mon. B. P. B., Pl. 3, f. 24-41.
<i>Streptorhyncus pelargonatus</i> , <i>Schloth.</i> Loc.—Dalton-le-dale, Humbleton and Tunstall Hills, etc.	Mon. B. P. B., Pl. 2 f. 32-42.
<i>Camarophoria crumena</i> , (<i>Martini.</i>) Loc.—Humbleton and Tunstall Hills, etc.	Mon. B. P. B., Pl. 2, f. 16-27.
<i>Camarophoria globulina</i> , <i>Phill.</i> , Loc.—Humbleton and Tunstall Hills, etc.	Mon. B. P. B., Pl. 2, f. 28-31.
<i>Camarophoria Humbletonensis</i> , Loc.—Humbleton Hill.	Mon. B. P. B., Pl. 2, <i>Howse</i> , f. 9-15; T. N. F. C., 3, Pl. 11, f. 3, 4.
<i>Athyris Roissii</i> , (<i>Léveillé</i>) Loc.—Humbleton and Tunstall Hills.	Mon. B. P. B., Pl. 1, f. 50-56; Pl. 2, f. 1-5.
<i>Martinia Clannyana</i> , <i>King</i> , Loc.—Tunstall; Ryhope Field House.	Mon. B. P. B., Pl. 1, f. 47-49.
<i>Spiriferina cristata</i> , (<i>Schloth.</i>) Loc.—Humbleton and Tunstall Hills.	Mon. B. P. B., Pl. 1, 37-40, etc.
<i>Spiriferina multiplicata</i> , (<i>Sow.</i>) Loc.—Humbleton and Tunstall Hills, etc.	Mon. B. P. B., Pl. 1, f. 41-44.
<i>Spirifera alata</i> , (<i>Schloth.</i>) Loc.—Humbleton and Tunstall Hills.	Mon. B. P. B., Pl. 1, f. 23-26.
<i>Terebratula elongata</i> , (<i>Schloth.</i>) Loc.—Humbleton and Tunstall Hills, etc.	Mon. B. P. B., Pl. 1 f. 5-7, etc.

LAMELLIBRANCHIATA.

Name and Locality.	Reference.
<i>Pecten pusillus</i> , (<i>Schloth.</i>)	Mon. Perm. Foss.,
Loc.—Tunstall and Humbleton Hills, etc.	Pl. 13, f. 1-3.
<i>Pinn prisca</i> , <i>Münst.</i> ,	Dyas, Pl. 14, f. 1-4.
Loc.—Tunstall Hill.	
<i>Lima Permiana</i> , <i>King</i> ,	Mon. Perm. Foss.,
Loc.—Tunstall and Humbleton Hills.	Pl. 13, f. 4.
<i>Monotis speluncaria</i> , (<i>Schloth.</i>)	Mon. Perm. Foss.,
Loc.—Tunstall and Humbleton Hills, etc.	Pl. 13, f. 5-25.
<i>Myalina Hausmanni</i> , <i>Goldf.</i> ,	Mon. Perm. Foss.,
Loc.—Tunstall and Humbleton Hills, etc.	Pl. 14, f. 1-13.
<i>Gervillia antiqua</i> , (<i>Münster</i>)	Mon. Perm. Foss.,
Loc.—Tunstall and Humbleton Hills, etc.	Pl. 14, f. 28-37.
<i>Gervillia ceratophaga</i> , (<i>Schloth.</i>)	Mon. Perm. Foss.,
Loc.—Tunstall and Humbleton Hills, etc.	Pl. 14, f. 24-27; var. f. 41, 42; f. 38-40.
<i>Macrodon striata</i> , (<i>Schloth.</i>)	Mon. Perm. Foss.,
Loc.—Tunstall and Humbleton Hills, etc.	Pl. 15, f. 1-9; var. f. 10-12.
<i>Nucula Beyrichi</i> , <i>v. Schaueroth</i> ,	Dyas, Pl. 13, f. 22-24.
Loc.—Tunstall and Humbleton Hills.	
<i>Leda speluncaria</i> , <i>Geinitz</i> ,	Mon. Perm. Foss.,
Loc.—Tunstall Hill.	Pl. 21, 22.
<i>Cardiomorpha Pallasi</i> , <i>de Verneuil</i> ,	Mon. Perm. Foss.,
Loc.—Tunstall and Humbleton Hills.	Pl. 14, f. 18-23.
<i>Pleurophorus costatus</i> , (<i>Brown</i>)	Mon. Perm. Foss.,
Loc.—Tunstall and Humbleton Hills, etc.	Pl. 15, f. 13-20.
<i>Axinus dubius</i> , (<i>Schloth.</i>)	Mon. Perm. Foss.,
Loc.—Tunstall and Humbleton Hills, etc.	Pl. 15, f. 23-32.
<i>Edmondia elongata</i> , <i>Howse</i> ,	Trans. T. N. F. C.,
Loc.—Tunstall and Humbleton Hills.	Vol. 3, Pl. 11, f. 10-13. Mon. Perm. Foss., Pl. 14, f. 14-17.

Name and Locality.	Reference.
? <i>Astarte Tunstallensis</i> , <i>King</i> , Loc.—Tunstall Hill.	Mon. Perm. Foss., Pl. 16, f. 2.
<i>Myacites lunulata</i> , (<i>Keyserling</i>) Loc.—Tunstall and Humbleton Hills.	Mon. Perm. Foss., Pl. 16, f. 3-5, 7.
<i>Tellina</i> ? <i>Dunelmensis</i> , <i>Howse</i> . Loc.—Tunstall and Humbleton Hills.	Trans. T. N. F. C., Vol. 3, Pl. 11, f. 14, 15.
<i>Solemya biarmica</i> , <i>de Vern.</i> , Loc.—Tunstall and Humbleton Hills.	Trans. T. N. F. C., Vol. 3, Pl. 11, f. 8, 9.
<i>Solemya normalis</i> , <i>Howse</i> , Loc.—Tunstall and Humbleton Hills.	Trans. T. N. F. C., Vol. 3, Pl. 11, f. 7.

BRANCHIO-GASTEROPODA.

<i>Turbo helycinus</i> , (<i>Schloth.</i>) Loc.—Tunstall and Humbleton Hills, etc.	Mon. Perm. Foss., Pl. 16, f. 19-26. Dyas, Pl. 12, f. 3, 4.
? <i>Turbo Permianus</i> , <i>King</i> , Loc.—Silksworth.	Mon. Perm. Foss., Pl. 16, f. 16.
<i>Natica Hercynica</i> , <i>Geinitz</i> , Loc.—Tunstall Hill, Silksworth, etc.	Mon. Perm. Foss., Pl. 16, f. 27, 28.
<i>Euomphalus</i> ? <i>Permianus</i> , <i>King</i> , Loc.—Tunstall Hill.	Mon. Perm. Foss., Pl. 17, f. 10-12.
<i>Chemnitzia Roessleri</i> , <i>Geinitz</i> , Loc.—Tunstall and Humbleton Hills.	Trans. T. N. F. C., Vol. 3, Pl. 12, f. 8.
<i>Machroceilus symmetricus</i> , <i>King</i> , Loc.—Tunstall and Humbleton Hills.	Mon. Perm. Foss., Pl. 16, f. 32, 33.
<i>Loxonema</i> ? <i>Phillipsi</i> , <i>Howse</i> , Loc.—Humbleton and Tunstall Hills.	Trans. T. N. F. C., Pl. 11, f. 18. Mon. Perm. Foss., Pl. 16, f. 30.
<i>Pleurotomaria antrina</i> , <i>Schloth.</i> , Loc.—Tunstall and Humbleton Hills.	Mon. Perm. Foss., Pl. 17, f. 1-6.
<i>Pleurotomaria Verneuili</i> , <i>Geinitz</i> , Loc.—Tunstall and Humbleton Hills.	Mon. Perm. Foss., Pl. 17, f. 9.

Name and Locality.	Reference.
Chiton Loftusianus , <i>King</i> , Loc.—Humbleton and Tunstall Hills.	Mon. Perm. Foss., Pl. 16, f. 9-14. Trans. T. N. F. C., Vol. 4, Pl. 13, f. 31-41.
Chiton Howseanus , <i>Kirkby</i> , Loc.—Tunstall and Humbleton Hills.	Trans. T. N. F. C., Vol. 3, Pl. 12, f. 10-13, Vol. 4, Pl. 13, f. 42-53.
Chiton cordatus , <i>Kirkby</i> , Loc.—Tunstall Hill.	Trans. T. N. F. C., Vol. 4, Pl. 13, f. 24-26.
Chitonellus antiquus , (<i>Howse</i>) Loc.—Tunstall Hill.	Trans. T. N. F. C., Vol. 4, Pl. 13, f. 15-23.
Chitonellus Hancockianus , <i>Kirkby</i> , Loc.—Tunstall Hill.	Trans. T. N. F. C., Vol. 4, Pl. 13, f. 1-13.
Chitonellus distortus , <i>Kirkby</i> , Loc.—Tunstall Hill.	Trans. T. N. F. C., Vol. 4, Pl. 13, f. 28-30.
Dentalium Sorbyi , <i>King</i> , Loc.—Tunstall Hill.	Perm. Foss., p. 218. <i>D. Speyeri</i> , Gein., Dyas, Pl. 12, f. 11-13.
Theca Kirkbyi , <i>Howse</i> , Loc.—Tunstall Hill.	Trans. T. N. F. C., Vol. 3, Pl. 11, f. 27.
Nautilus Frieslebeni , <i>Geinitz</i> , Loc.—Tunstall and Humbleton Hills, etc.	Mon. Perm. Foss., Pl. 17, f. 13-20.

LOWER LIMESTONE (*Compact Limestone of Sedgwick and others*).

Germ. equiv.—*Unterer and Oberer compacter Zechstein*.

The Compact-Limestone forms, in most places along the Permian Escarpment, as it ranges from near South Shields through the county of Durham nearly to Pierce Bridge, an elevated plateau of considerable height and importance. The beds of limestone are thin-bedded, compact bluish-grey or mottled, becoming occasionally brown, earthy, cellular, and with thicker beds towards the top. When exposed and quarried near the outcrop, the beds are thin, hard, and knobby, and the entire thickness of the beds is fissured and intersected with numerous perpendicular fissures

or backs. Replacement to a very great degree has taken place in these beds, so that layers of fine marly partings are intercalated with the limestone. Fossils have been found chiefly in the lower layers of the limestone, but they also occur higher up in this stratum. The first examples of fish remains were discovered in the lower layers of this limestone at Pallion, on the Wear, and were described by the late Dr. Clanny, of Sunderland, as a *Chætodon*. This fine specimen of *Platysomus striatus* is still preserved in the Free Museum at Sunderland.

Locality.—In the outlier at Whitley; and on the coast it forms a little basin in Cullercoats Bay, north of the Ninety-fathom dyke. In the Cliff at Tynemouth, where it has been broken up and formed into a conglomerate, previous to the deposition of the upper concretionary bed upon it. It forms the base of the cliff from North Point or Trou Rocks to Man Haven, north of Marsden Bay. It forms the base of the Escarpment at Westoe, Harton, Down Hill near West Boldon, at Claxheugh, Pallion, and Millfield. It is seen in Humbleton Quarry, Tunstall Hope, Painslaw Hill, Houghton-le-Spring, Pitlington—and most other parts of the Escarpment to Pierce Bridge, on the Tees.

The following list includes nearly all the species that are stated by Mr. Kirkby and others to have been observed in the Lower Compact Limestone, many of which are in the Collection, in Side Cabinet No. 26 and in the Gallery:—

PLANTÆ. PLANTS.

Name and Locality.	Reference.
<i>Chondrites virgatus</i> , <i>Münster</i> , Loc.—Thickley Quarry, Claxheugh, etc.	Dyas, Pt. 2, Pl. 24, f. 5.
<i>Palæophycus insignis</i> , <i>Geinitz</i> , Loc.—Thickley Quarry.	Dyas, Pt. 2, Pl. 24, f. 4.

ANIMALIA.

<i>Dentalina Permiana</i> , <i>Jones</i> , Loc.—Thickley Quarry, Westoe.	Mon. Perm. Foss., Pl. 6, f. 1.
<i>Trochammina pusilla</i> , (<i>Geinitz</i>) Loc.—Thickley Quarry, Westoe.	Perm. Foss., Pl. 6, f. 7–9; Pl. 18, f. 13a–d.

Name and Locality.	Reference.
<i>Cythere nuciformis</i> , Jones, Loc.—Westoe.	Mon. Perm. Foss., Pl. 6, f. 1.
<i>Cythere plebeia</i> , Reuss, Loc.—Westoe.	T. N. F. C., 4, p. 141, Pl. 9, f. 1–12.
<i>Kirkbya Permiana</i> , Jones, Loc.—Westoe.	Mon. Perm. Foss., Pl. 18, f. 1, 12.
<i>Cyathocrinus ramosus</i> , (Schloth.) Loc.—Whitley Quarry, Tynemouth Cliff.	Mon. Perm. Foss., Pl. 6, f. 15–21.
<i>Phyllopora Ehrenbergi</i> , Geinitz, Loc.—Thickley Quarry.	Mon. Perm. Foss., Pl. 5, f. 1–6.
<i>Acanthocladia anceps</i> , (Schloth.) Loc.—Thickley Quarry.	Mon. Perm. Foss., Pl. 5, f. 13–18.
<i>Fenestella retiformis</i> , (Schloth.) Loc.—Thickley Quarry, Tynemouth Cliff.	Mon. Perm. Foss., Pl. 2, f. 8–19.
<i>Stenopora columnaris</i> , Schloth., Loc.—Whitley Quarry, Westoe.	Mon. Perm. Foss., Pl. 3, f. 3–12.
<i>Synocladia virgulacea</i> , King, Loc.—Whitley Quarry.	Mon. Perm. Foss., Pl. 4, f. 1–8.
<i>Lingula mytiloides</i> , Sow., Loc.—Thickley Quarry.	Mon. Perm. Foss., Pl. 6, f. 25–27.
<i>Discina nitida</i> , Phill., Loc.—Thickley Quarry.	Mon. Perm. Foss., Pl. 6, f. 28, 29.
<i>Productus horridus</i> , Loc.—Thickley Quarry, Tynemouth Cliff, etc.	Mon. Perm. Foss., Pl. 10, f. 29–31; Pl. 11, f. 1–13.
<i>Chonetes Davidsoni</i> , Schauroth, Loc.—Sunderland, Claxheugh.	Sup. Brit. Perm. Brach. Pl. 30, f. 1, 2.
<i>Strophalosia lamellosa</i> , Loc.—Thickley Quarry, Whitley Quarry.	Mon. Perm. Foss., Pl. 12, f. 18–32.
<i>Strophalosia Goldfussi</i> , Loc.—Near Sunderland.	Mon. Perm. Foss., Pl. 12, f. 1–17.
<i>Streptorhynchus pelargonatus</i> , Loc.—Thickley Quarry, Tynemouth Cliff.	Mon. Perm. Foss., Pl. 10, f. 18–28.

Name and Locality.	Reference.
<i>Spirifer alatus</i> , (<i>Schloth.</i>) Loc.—Thickley Quarry, Tynemouth Cliff.	Mon. Perm. Foss., Pl. 9, f. 1-24.
<i>Spirifera Urii</i> , Loc.—Westoe, near South Shields.	Mon. Perm. Foss., Pl. 10, f. 11-16.
<i>Spiriferina cristata</i> , (<i>Schloth.</i>) Loc.—Tynemouth Cliff.	Mon. Perm. Foss., Pl. 8, f. 9-14.
<i>Camarophoria crumena</i> , (<i>Martin</i>) Loc.—Thickley Quarry, Whitley Quarry.	Mon. Perm. Foss., Pl. 7, f. 10-21.
<i>Camarophoria globulina</i> , (<i>Phill.</i>) Loc.—Tynemouth Cliff.	Mon. Perm. Foss., Pl. 7, f. 22-25.
<i>Terebratula elongata</i> , (<i>Schloth.</i>) Loc.—Westoe.	Mon. Perm. Foss., Pl. 6, f. 30-45; Pl. 7, f. 1-9.
<i>Athyris Rolssii</i> , (<i>Léveillé</i>) Loc.—Tynemouth Cliff.	Mon. Perm. Foss., Pl. 10, f. 1-10.
<i>Pecten pusillus</i> , <i>Schloth.</i> , Loc.—Tynemouth Cliff.	Mon. Perm. Foss., Pl. 13, f. 1-3.
<i>Monotis speluncaria</i> , (<i>Schloth.</i>) Loc.—Tynemouth Cliff.	Mon. Perm. Foss., Pl. 13, f. 5-25.
<i>Gervillia antiqua</i> , (<i>Munster</i>) Loc.—Whitley Quarry.	Mon. Perm. Foss., Pl. 14, f. 28-37.
<i>Axinus dubius</i> , (<i>Schloth.</i>) Loc.—Hartley's Quarry, Sunderland.	Mon. Perm. Foss., Pl. 15, f. 23-32.
<i>Pleurophorus costatus</i> , (<i>Brown</i>) Loc.—Tynemouth Cliff.	Mon. Perm. Foss., Pl. 15, f. 13-20.
<i>Leda speluncaria</i> , <i>Geinitz</i> , Loc.—Whitley Quarry.	Mon. Perm. Foss., Pl. 15, f. 21, 22.
<i>Astarte</i> ? <i>Valisneriana</i> , <i>King</i> , Loc.—Whitley Quarry, Hartley Quarry, Sunderland.	Mon. Perm. Foss., Pl. 16, f. 1.
<i>Astarte</i> ? <i>Tunstallensis</i> , <i>King</i> , Loc.—Tunstall Hill.	Mon. Perm. Foss., Pl. 16, f. 2.

MOLLUSCA.

Name and Locality.	Reference.
<i>Solemya biarmica</i> , <i>de Vern.</i> , Loc.—Westoe near South Shields, near Sunderland.	Trans. T. N. F. C., Vol. 3, Pl. 11, f. 8.
<i>Solemya normalis</i> , <i>Howse</i> .	Trans. T. N. F. C., Vol. 3, Pl. 11, f. 7.
<i>Myacites lunulata</i> , (<i>Keyserling</i>) Loc.—Whitley Quarry.	Mon. Perm. Foss., Pl. 16, f. 3-5.
<i>Pleurotomaria antrina</i> , (<i>Schloth.</i>) Loc.—Tynemouth Cliff.	Mon. Perm. Foss., Pl. 17, f. 1-8.
<i>Turbo helycinus</i> , (<i>Schloth.</i>) Loc.—Westoe near South Shields.	Mon. Perm. Foss., Pl. 16, f. 19-26.
<i>Chemnitzia Rossleri</i> , <i>Geinitz</i> . Loc.—Hartley Quarry, near Sunderland.	Dyas., Pl. 11, f. 9, 10.
<i>Nautilus Frieslebeni</i> , <i>Geinitz</i> , Loc.—Whitley Quarry.	Mon. Perm. Foss., Pl. 17, f. 13-20.

PISCES.

<i>Palæoniscus Frieslebeni</i> , Loc.—Down Hill near Boldon, Hough- ton-le-Spring.	<i>P. comptus</i> , Ag., Perm. Foss., Pl. 21, f. 1.
<i>Platysomus striatus</i> , <i>Ag.</i> , Loc.—Pallion Quarry, near Sunderland.	Mon. Perm. Foss., Pl. 27; Pl. 28, f. 1.

AMPHIBIA.

<i>Lepidotosaurus Duffi</i> , <i>Han. et Howse</i> , Nat. Hist. Trans., Loc.—In lowest limestone, Midderidge.	Vol. 4, p. 219, Pl. 8.
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MARL-SLATE.

German equivalent:—*Kupferschiefer*.

The Marl-slate is a very thin and comparatively a local deposit, as it is not always present in natural sections or in coal sinkings through the limestone, and it thins out and disappears in the South of Durham. It seldom exceeds a yard in thickness, and is, when well protected, of a dark grey colour approaching

to black, but when weathered is yellowish and finely laminated. It is not fossiliferous in all the known sections, but generally it is so, containing the remains of Plants, Mollusca, Fishes, and Reptiles.

It is probably a littoral deposit, spread over low-lying estuaries, into which the remains of Freshwater Fishes and Land Reptiles (*Proterosaurus*), with remains of Plants, have been swept out by rivers and deposited, with a few marine shells, such as *Lingula*, *Discina*, and *Myalina* living on the coast, and the shells of *Nautilus* washed in upon the shore. The Fishes seem to be more numerous deposited along a central line of the Marl-slate than spread through the entire thickness. On one or two occasions stems of trees or fossil wood, 14 or 15 feet in length, have been found in the Marl-slate, but so completely carbonized and imperfectly preserved that no structure could be made out. The following organisms have been found in our own district, in the Counties of Northumberland and Durham:—

PLANTÆ. PLANTS.

Name and Locality.	Reference.
<i>Chondrites virgatus</i> , <i>Munster</i> . Loc.—Westoe, near South Shields.	Dyas Pl. 24, f. 5.
<i>Zonarites digitatus</i> , <i>Brongt.</i> Loc.—Midderidge, near Bp. Auckland.	Dyas, Pl. 26, f. 1–3. Hist. Veg. Foss., Pl. 9, f. 1.
<i>Zonarites</i> , var. <i>elegans</i> . <i>M.S.</i> Loc.—Midderidge.	
<i>Calamites</i> , sp. (stem) Loc.—Cullercoats.	cf. <i>C. Cistii</i> , <i>Brongt.</i>
<i>Calamites</i> , sp. (foliage) Loc.—Cullercoats.	cf. <i>Asteroph. spicata</i> , <i>Gutb.</i>
<i>Tæniopteris Duffiana</i> , n.s. Loc.—Midderidge.	cf. <i>T. Eckardti</i> , <i>Germar.</i>
<i>Ctenis Permiana</i> , n.s. Loc.—Midderidge.	cf. with <i>Ctenis falcata</i> .

Name and Locality.	Reference.
Ullmannia selaginoides, (<i>Brongt.</i>) Dyas, Pl. 31, f. 17-20; Loc.—Cullercoats, Midderidge, etc.	Pl. 32. Perm. Foss., Pl. i, f. 3, 3a.
Ullmannia Bronni, (<i>Göpp.</i>) Loc.—Midderidge, etc.	Dyas, Pl. 30, f. 2a; Pl. 31, f. 21-30. <i>Neuropteris</i> <i>Huttoniana</i> , Perm. Foss., Pl. 1, f. 4.
Fossil Wood, sp. indet. Loc.—Cullercoats, Midderidge, etc.	

ANIMALIA.

? Microconchus carbonarius, <i>Murch.</i> Sil. Syst. p. 84. Loc.—Cullercoats, on fossil wood.	
Lingula mytiloides, <i>Sow.</i> Loc.—Ferry Hill, Midderidge.	Perm. Foss. Pl. 6, f. 25-27.
Myalina Hausmanni, <i>Goldf.</i> Loc.—Midderidge.	Perm. Foss., Pl. 14, f. 1-13.
Nautilus Frieslebeni, <i>Gein.</i> Loc.—Midderidge.	Perm. Foss., Pl. 17, f. 13-20.

PISCES. FISHES.

ORD. CHONDROPTERYGII.

A. SELACHOIDEI, SHARKS.

FAM. CESTRACIONTIDÆ.

Woodnika striatula, <i>Münster</i> , Loc.—Thickley Quarry, Cullercoats Bay.	Dyas, Pl. 5, f. 5-7.
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B. BATOIDEI, RAYS.

FAM. PETALODONTIDÆ.

Janassa bituminosa, (<i>Schloth.</i>) Loc.—Midderidge, Cullercoats Bay.	Dyas, Pl. 4, f. 5; Pl. 5, f. 1-4. Nat. Hist. Trans., Vol. 3, Pl. 10, 11.
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ORD. GANOIDEI.

FAM. PALÆONISCIDÆ.

Name and Locality.	Reference.
<i>Palæoniscus Frieslebeni</i> , (<i>Blainv.</i>) Loc.—Midderidge, Cullercoats.	Poiss.Foss.II.,Pl.11, 12; Pl.10b, f.1-3. Perm. Foss, Pl. 21.
<i>Palæoniscus elegans</i> , (<i>Sedgwick</i>) Loc.—Midderidge, Cullercoats.	Poiss. Foss. II., Pl. 10b, f. 4, 5. Perm.Foss.,Pl.22,f.1
<i>Palæoniscus longissimus</i> , <i>Agassiz</i> , Loc.—Ferryhill, Midderidge.	Poiss. Foss. II., Pl. 10c, f. 4. Perm.Foss.,Pl.21,f.2
<i>Palæoniscus macrophthalmus</i> , <i>Ag.</i> Loc.—Midderidge, Cullercoats.	Poiss. Foss. II., Pl. 10c, f. 3. Perm.Foss.,Pl.22,f.2
<i>Acentrophorus glaphyrus</i> , <i>Ag.</i> Loc.—Midderidge, Cullercoats.	Poiss. Foss. II., Pl. 10, f.1,4-6; Perm. Foss., Pl. 22, f.3,4.
<i>Pygopterus mandibularis</i> , <i>Ag.</i> Loc.—Midderidge, Cullercoats.	Poiss.Foss.II.,Pl.53, 53a; Perm. Foss., Pl. 23, f. 1; Pl. 24.
<i>Acrolepis exculptus</i> , <i>Germar</i> , Loc.—Fulwell Waterworks, Midderidge.	Verst. Mansf. Kupf., f. 6-8.
<i>Acrolepis Sedgwicki</i> , <i>Agassiz</i> , Loc.—Midderidge, etc.	Poiss.Foss.II.,Pl.52; Pl. 25, f. 1; Perm. Foss., Pl. 25.

FAM. PLATYSOMIDÆ.

<i>Platysomus striatus</i> , <i>Agassiz</i> , Loc.—Midderidge, Cullercoats.	Poiss.Foss.II.,Pl.12, f.3,4; Perm.Foss., Pl. 27; Pl.28,f. 1.
<i>Globulodus macrurus</i> , (<i>Agassiz</i>) Loc.—Midderidge, Ferryhill.	Poiss.Foss.II.,Pl.18, f.1.2; Perm.Foss., Pl. 26, f. 1a.

Name and Locality.	Reference.
<i>Dorypterus Hoffmanni</i> , <i>German</i> , Loc.—Midderidge.	Münster, Beitr. V., Pl. 14, f. 4. Nat. Hist. Trans., Vol. 4, p. 243, Pl. 9, 10.

FAM. CŒLACANTHIDÆ.

<i>Cœlacanthus granulatus</i> , <i>Ag.</i> , Loc.—Midderidge.	Poiss. Foss. II., Pl. 62. Perm. Foss., p. 235, Pl. 28*.
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REPTILIA.

ORD. RHYNCHOCEPHALIA.

<i>Proterosaurus Speneri</i> , <i>H. v. Meyer</i> , Loc.—In Marl-slate at Midderidge, near Bishop Auckland.	Geinitz, Verst. Zech- stein, p. 3, Pl. 1. Nat. Hist. Trans., Vol. 4, p. 233, Pl. 6.
<i>Proterosaurus Huxleyi</i> , <i>Han. et Howse</i> , Loc.—In Marl-slate at Midderidge, near Bishop Auckland.	Nat. Hist. Trans., Vol. 4, p. 237, Pl. 7.

Remarks.—The foregoing beds—the Marl-slate and beds of Magnesian-limestone—are all the rocks in these counties that can be referred to the Permian Group upon palæontological evidence. The Yellow Sand that lies immediately under the Marl-slate, when the latter is present, is a local deposit, and of very variable thickness and limited area. In some sinkings for coal it forms—or has formed—a most formidable hindrance to the success of the undertaking, and much time and money have been spent in penetrating through it. In other sinkings it has not been observed, and that within no great distances from places where it is known to be of great thickness and saturated with a copious supply of water. It disappears entirely in the South of Durham, where the Marl-slate is seen to rest on the denuded edges of the lower strata of the Coal-measures. In structure this bed is composed of coarse gritty sand, incoherent in many places, and strongly false-bedded, especially as seen in the remarkable section

at Ferryhill Station. It cannot be used for building purposes, and no fossil could be preserved or expected to be preserved in it. It has been deposited on the disturbed and denuded edges of the Coal-measures, and may have been an Eolian accumulation of sand on the shores of the old Carboniferous Sea before the Magnesian-limestone began to be thrown down. It may be the English equivalent of the German *Weissliegende*, which is also an anomalous deposit, and, if so, must be admitted to be Permian, as the *Weissliegende*, in some parts of Germany, contains characteristic and well-known Magnesian-limestone or Permian species. There is no *Rothliegende* in these counties, the beds so classified are merely the disturbed denuded edges of the true Coal-measures.

CARBONIFEROUS.

The Carboniferous rocks of Durham and Northumberland may be grouped under the following heads, viz. :—

Coal Measures.—Beds of sandstone, grits, and shales, with Stigmarian-clays and thick beds of coal. Bands of clay ironstone and shell-bands filled with *Anthracosia*.

Gannister series.—Thin bedded sandstones or flagstones and shales, with thin seams of coal and hard, crystalline, siliceous beds (*gannister*) full of rootlets of *Stigmaria*.

Millstone Grit.—Flagstones and shales, with coarse grits full of quartz pebbles and a few thin seams of coal.

Yoredale series.—Thick or thin beds of Mountain-limestone, with thick beds of shale and fine or coarse sandstone, sometimes highly crystalline.

Scar-limestone or Carbonaceous series.—Beds of thick limestone in the south, with beds of crystalline sandstone (*Hazle*) and shale (*Plate*). In Northumberland the beds of limestone become thin and subordinate, as they extend North, to thick beds of grit, sandstone, and shale.

Calcareous sandstone or Tuedian.—Numerous beds of grey, greenish, and lilac shales, sandstones, slaty and calcareous sandstones, thin beds of argillaceous limestone and chert, and a few buff-coloured beds of magnesian limestones.—George Tate.

COAL MEASURES.—This properly includes all the strata from the base of the Marl slate to the lowest seam of workable coal, called in this district the Brockwell. It consists of numerous beds of fine or coarse-grained sandstone (*post*) and occasional beds of grit with quartz pebbles, of variable thickness, interstratified with beds of arenaceous, micaceous, or pure shale (metal). Among these, and most thickly developed in the lower part of the series, though by no means confined to that portion, are the valuable workable seams of coal. These seams of coal vary greatly in thickness and quality, and as they split or are divided occasionally into two seams, and receive different names in different districts, their identification is sometimes difficult, and has not hitherto been perfectly accomplished. This desirable result could however be successfully attained by running close traverses across the coal-field from east to west, the numerous collieries working in the district and the registered sections of many others affording excellent and reliable material for such a purpose. For easy reference to the principal coal-seams the late Mr. Buddle's excellent "Synopsis of the Seams in the Newcastle District" is appended.*

The majority of the specimens in the Museum Collection were obtained from the Roof-shale of the Bensham-seam at the Old Jarrow Coal-pit and from the Roof-shale of the Low-Main-seam at the Felling Colliery.

* Nat. Hist. Soc. Trans. vol. i. p. 215.

SYNOPSIS OF THE COAL SEAMS IN THE NEWCASTLE-ON-TYNE DISTRICT.

	EAST OF NEWCASTLE.	Thickness of Coal.		WEST OF NEWCASTLE.	Thickness of Coal.	
		Depth from Surface.	Ft. In.		Depth from Surface.	Ft. In.
1	Monkton and Hebburn Fell Seam.....	Feet.	2 10	Cropped out.....	Feet.	.....
2	Three-quarter Coal.....	612	1 2	Do. ....	.....	.....
3	HIGH-MAIN SEAM	792	6 0	Do. ....	.....	.....
4	Metal Coal Seam	834	3 0	Do. ....	.....	.....
5	Stone Coal Seam	876	0 8	Do. ....	.....	.....
6	Yard Coal Seam	936	3 0	Do. ....	.....	.....
7	BENSHAM SEAM	1008	4 8	Do. ....	.....	.....
8	Six-quarter Seam Coal	1098	2 6	Do. ....	.....	.....
9	Five-quarter Seam Coal	1122	2 8	Do. ....	.....	.....
10	LOW-MAIN COAL	1158	6 0	Grand Lease Main Coal.....	66	6 6
11	Crow Coal.....	1218	0 10	Crow Coal	129	2 3
12	Ryton Five-quarter Coal	1275	0 5	Five-quarter.. ..	150	3 8
13	Ryton Ruler Coal.....	1299	5 0	Ruler Coal	183	1 8
14	Beaumont Seam	1410	3 5	Townley Main, Upper Main, or Barlow Field	282	3 10
15	Not yet found .....	.....	.....	Stone Coal, Five-quarter Seam, or Main Coal Seam ..	372	2 9
16	Do. ....	.....	.....	Under Five-quarter Seam or Six-quarter Seam ...	393	3 4
17	Do. ....	.....	.....	Three-quarter Seam or Yard Seam	417	2 6
18	Do. ....	.....	.....	Brockwell, Horsley Wood, or Splint Coal Seam...	471	3 3

The boundaries of the Northumberland and Durham coal-field may be indicated on the west by an undulating line running from the mouth of the Coquet to Ovingham on the Tyne, and thence by Witton on the Wear to the Cockfield dyke, south of which very few workings occur. It passes under the magnesian limestone in the east of Durham, and is extended beyond the line of the sea coast. Through the influence of the 90-fathom dyke a small strip of the Coal Measures runs parallel with the Tyne valley to nearly the edge of the Pennine fault. Along this line are the Stublick, Conewood, and Hartley Burn coal-fields.

If the Gannister beds be taken as the Lower Coal-measures, then without a doubt the Northumberland and Durham Coal-measures belong to the Middle series. It must be borne in mind that this Coal-field was excessively faulted and denuded, especially in the south and south-east, before the Magnesian-limestone was deposited, and there is no clue left to ascertain whether the Higher Coal-measures were deposited over this area, but the probabilities are that they were not. There is no proof that this Coal-field was ever connected with the Yorkshire Coal-field on the same meridians.

Note.—The following books on the Fossil Plants of the Coal Measures may be consulted:—

Histoire des Végétaux Fossiles, Brongniart, 1828-37.

Fossil Flora of Great Britain, by Lindley and Hutton, 1831-1837.

Catalogue of Palaeozoic Plants in the British Museum, by R. Kidston, 1886.

Catalogue of the Fossil Plants in the Hutton Collection in the Museum of the Nat. Hist. Society, Newcastle-upon-Tyne, by Richard Howse.

The Fossils occurring in the Coal Measures and Millstone Grit are arranged in the Side Cabinets Nos. 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, and in the Side Cases in the Gallery of the Geological Room. Reference may also be made to the Hutton Collection in the adjoining Floor-cases.

PLANTÆ.

ORDER. EUISETACEÆ.

EUISETIDES, Schimper.

Equisetides gigantea (Lindley et Hutton).

STEM.

Hippurites gigantea, L. et H., Foss. Flora, pl. 114. *Type.**Cycocladia major*, L. et H., Foss. Flora, pl. 130.*Calamitis verticillatus*, L. et H., Foss. Flora, pl. 139.

BRANCHES, BRANCHLETS, AND LEAVES.

Asterophyllites comosa, L. et H., Foss. Flora, pl. 108.,, *longifolia*, L. et H., Foss. Flora, pl. 18.,, *grandis*, L. et H., Foss. Flora, pl. 17; pl. 19, f. 2.

Loc.—Roof-shale, Bensham Seam, Jarrow; Low Main, Felling, etc.

CALAMITES.

Calamites (?) *Cistii*, Brongniart.*Calamites Cistii*, Brongt., Hist. Vég. Foss., pl. 20. *Type.**Asterophyllites jubata*, L. et H., Foss. Flora, pl. 133.

Loc.—Roof-shale, B. S., Jarrow; L. M., Felling, etc.

Calamites Suckowii, Brongniart.

STEM.

Calamites Suckowii, Brongt., Hist. Vég. Foss., pl. 14, f. 6;
pl. 15, f. 1; pl. 16, f. 1, 2. *Type.*

,, (base of stem) L. et H., Foss. Fl. pl. 96.

,, *nodosus*, Foss. Flora, pl. 15 (stem).,, *decoratus*, Artis., Anted. Phyt., pl. 24.

BRANCHES AND BRANCHLETS WITH FOLIAGE.

Bechera grandis, Sternb., L. et H., Foss. Flora, pl. 173.

FRUCTIFICATION—FERTILE CONES OR SPIKES.

Calamites nodosus, L. et H., Foss. Flora, pl. 15, 16.*Volkmannia polystachia*, Sternb., Vers. I., pl. 51, f. 1.

CREEPING RHIZOME OR ROOTSTOCK.

Calamites approximatus, L. et H., Foss. Flora, pl. 216.

ROOTS AND ROOTLETS.

Myriophyllites gracilis, Artis, in part,

Loc.—Roof-shale, B. S., Jarrow; L. M., Felling, etc.

Calamites cannæformis, Schlotheim.

STEM.

- Calamites cannæformis*, Schloth., Petrif., pl. 20, f. 1. *Type*.
 " " Brongt., Hist. Vég. Foss., p. 21, f. 1-4.
 " " L. et H., Foss. Flora, pl. 79.
 " *ramosus*, Artis, Anted. Phyt., pl. 2.

BRANCHES AND FOLIAGE.

- Asterophyllites foliosa*, L. et H., Foss. Flora, pl. 25, f. 1.
 ? " *galioides*, L. et H., Foss. Flora, pl. 25, f. 2.
 " *radiatus*, Brongt., Class. Vég. Foss., pl. 2, f. 7.

FRUCTIFICATION.

- Asterophyllites tuberculata*, L. et H., Foss. Flora, pls. 14, 180.
 Loc.—Roof-shale, B. S., Jarrow; L. M., Felling, etc.

ROOTSTOCK OR RHIZOMA OF CALAMITES.

•*Calamites approximatus*, Artis.

- Calamites approximatus*, Artis, Ant. Phyt., pl. 4. *Type*.
 " " Brongt., Hist. Vég. Foss., pl. 15, f. 7, 8.
 " " L. et H., Foss. Flora, pl. 77.

Loc.—Roof-shale, B. S., Jarrow, etc.

ROOTS OF CALAMITES.

Myriophyllites gracilis, Artis.

- Myriophyllites gracilis*, Artis, Ant. Phyt., pl. 12. *Type*.
 { A Fossil aquatic Root, } L. et H., Foss. Flora, p. 110.
 { *Myriophyllites gracilis*, }
Pinnularia capillacea, L. et H. Foss. Flora, pl. 111.

Loc.—Roof-shale, B. S., Jarrow; L. M., Felling.

PLANTÆ INCERTÆ SEDIS.

ANNULARIA, Sternberg.

Annularia stellata, Schlotheim sp.

- Casuarinites stellatus*, Schloth., Flor. Vor., pl. 1, f. 4. *Type*.
Asterophyllites equisetiformis, L. et H., Foss. Flora, pl. 124.
Annularia fertilis, Sternb., Vers. I., pl. 51, f. 2.

Loc.—Somersetshire Coal-field.

SPHENOPHYLLUM, Brongniart.

Sphenophyllum cuneifolium, Sternberg sp.

- Rotularia cuneifolia*, Sternb., Vers. I., pl. 26, f. 4 a, b. *Type*.
Sphenophyllum erosum, L. et H., Foss. Flora, pl. 13 (foliage).
Bechera grandis, E. et H., Foss. Flora, p. 19, f. 1 (stem).

Loc.—Roof-shale, B. S., Jarrow; L. M., Felling.

Sphenophyllum Saxifragæfolium, Sternberg.*Rotularia saxifragæfolia*, Sternb., Vers. I., pl. 55, f. 4 (stem and leaves). *Type*.*Bowmanites Cambrensis*, Binney, Obs. on the Struct. Foss. Plants, tab. 12 (fertile spike).

Loc.—Roof-shale, B. S., Jarrow.

ORDER. FILICACEÆ.

FILICES INCERTÆ SEDIS.

SCHIZOPTERIS, Brongniart.

Schizopteris anomala, Brongniart.*Schizopteris anomala*, Brongt., Hist. Végét. Foss., pl. 135. *Type*.

Loc.—Roof-shale, B. S., Jarrow.

Schizopteris crispa, Gutbier sp.*Fucoides crispus*, Gutb., Vers. Zwick. Schwarzk., pl. 1, f. 11;Loc.—Roof-shale, B. S., Jarrow. pl. 6, f. 18. *Type*.

? RHODEA, Presl.

Rhodea Kirkbyi, n. s.*Algæ or Rootlets*, Binney et Kirkby, Q. J. Geol. Soc. Lond., Aug., 1882, Vol. 38, p. 251, pl. 6. *Type*.

Loc.—Roof-shale, Jarrow.

SPHENOPTERIDEÆ.

SPHENOPTERIS, Brongniart.

Sphenopteris Artemisiæfolia, Sternberg.*Sphenopteris Artemisiæfolia*, Sternb., Vers. I., pl. 55, f. 1. *Type*.

" " Brongt., Hist. Végét. Foss., pl. 46, 47.

" *stricta*, Sternb., Vers. I., pl. 56, f. 3." *Crithmifolia*, L. et H., Foss. Flora, pl. 46.SPORE-CASE, OR *Sporangium*.*Cardiocarpon acutum*, L. et H., Foss. Flora, pl. 76.Loc.—Roof-shale of High Main Seam, Fawdon Old Pit and Gosforth; var. *S. Crithmifolia* and *stricta*, B. S., Jarrow.**Sphenopteris tenella**, Brongniart.*Sphenopteris tenella*, Brongt., Hist. Vég. Foss., pl. 49, f. 1. *Type*." *delicatula*, Brongt., Hist. Vég. Foss., pl. 58, f. 4." *multifida*, L. et H., Foss. Flora, pl. 123.

Loc.—Roof-shale, High Main Seam Gosforth; B. S., Jarrow.

Sphenopteris furcata, Brongniart.

- Sphenopteris furcata*, Brongt., Hist. Vég. Foss., pl. 49, f. 4, 5.
 „ *furcata*, L. et H., Foss. Flora, pl. 181.
 „ *dissecta*, Brongt., Hist. Vég. Foss., pl. 49, f. 2, 3.
 „ *trichomanoides*, Brongt., Hist. Vég. Foss., pl. 48, f. 3.
 „ *alata*, Brongt., Hist. Vég. Foss., pl. 48, f. 4.
 „ *laxa*, Stern., Vers. I., pl. 31, f. 3.

Loc.—Roof-shale, H. M. S., Gosforth; B. S., Jarrow; Brockwell Seam, Benwell, etc.

Sphenopteris Hoeninghausi, Brongniart.

- Sphenopteris Hoeninghausi*, Brongt. Hist. Vég. Foss., pl. 52.
 „ „ Andræ, Vorw. Pflanz., pls. 4, 5.

Loc.—Roof-shale, H. M. S., Gosferth, and in the lower seams of the Auckland district.

Sphenopteris adiantoides, Lindley et Hutton.

- Sphenopteris adiantoides*, L. et H., Foss. Flora, p. 115. *Type*.

Loc.—Roof-shale, B. S., Jarrow.

Sphenopteris trifoliata, Artis sp.

- Filicites trifoliata*, Artis., Ant. Phyt., pl. 11. *Type*.
Sphenopteris trifoliata, Brongt., Hist. Vég. Foss., pl. 53, f. 3.
 „ *obtusiloba*, Brongt., Hist. Vég. Foss., pl. 53, f. 2.
 „ *irregularis*, Sternb., Vers. I., pl. 17, f. 4.
 „ *latifolia*, L. et H., Foss. Flora, pls. 156, 178.
 „ *dilatata*, L. et H., Foss. Flora, pl. 47.

Loc.—Roof-shale, B. S., Jarrow, etc.

TRIBE. NEUROPTERIDEÆ.

ODONTOPTERIS, Brongniart.**? Odonopteris Schlotheimii**, Brongniart.

- Odonopteris Schlotheimii*, Brongt., Hist. Vég. Foss., pl. 78,
 f. 5. *Type*.
Filicites osmundæformis, Schloth., Flor. d. Vorw., t. 5, f. 5, 6.

Loc.—Roof-shale, B. S., Jarrow.

NEUROPTERIS, Brongniart.

Neuropteris Loshii, Brongniart.

- Neuropteris Loshii*, Brongt., Hist. Vég. Foss., pl. 72, f. 1;
 pl. 73. *Type.*
 „ *heterophylla*, Brongt., Class. Veg. Foss., pl. 2, f. 6.
 „ „ Brongt., Hist. Veg. Foss., pls. 71;
 „ „ L. et H., Foss. Flora, pl. 200. [72, f. 2.
 „ *Loshii*, L. et H., Foss. Flora, pl. 49.
Pecopteris adiantoides, L. et H., Foss. Flora, pl. 37.
Neuropteris Soretti, L. et H., Foss. Flora, pl. 50.
 Loc.—Roof-shale, B. S., Jarrow; L. M. S., Felling.

Neuropteris gigantea, (Sternberg.)

- Osmunda gigantea*, Sternb., Vers. I., pl. 22. *Type.*
Lithosmunda minor, Luid., Lith. Brit., pl. 4, f. 189.
Phytolithus Osmundæ regalis, Martin, Petr. Derb., pl. 19, f. 2.
Filicites linyuensis, Schloth., Flor. Vorw., pl. 2, f. 25.
Neuropteris gigantea, Brongt., Hist. Vég. Foss., pl. 69.
 „ „ L. et H., Foss. Flora, pl. 52.
 Loc.—Roof-shale, B. S., Jarrow. One of the commonest ferns
 in this coal-field.

Neuropteris flexuosa, Brongniart.

- Neuropteris flexuosa*, Brongt., Hist. Vég. Foss., pl. 65, f. 2, 3;
 pl. 68, f. 2. *Type.*
Osmunda gigantea, var. B., Sternb., Vers. I., pl. 32, f. 2.
Neuropteris heterophylla, L. et H., Foss. Flora, pl. 197.
 Loc.—Ironstone shale, Whitley.

Neuropteris auriculata, Brongniart.

- Neuropteris auriculata*, Brongt., Hist. Veg. Foss., pl. 66. *Type.*
Filicites osmundæ, Artis., Anted. Phyt., pl. 7.
Neuropteris ingens, L. et H., Foss. Flora, pl. 91A.
 „ *Villiersii*, Brongt., Hist. Vég. Foss., pl. 64, f. 1.
 „ *heterophylla*, L. et H., Foss. Flora, pl. 183.

Loc.—Roof shale, B. S., Jarrow, and in the shales of the lower
 coal-seams.

NEUROPTERIS.—RACHIAL PINNÆ.

- Cyclopteris trichomanoides*, Brongt., Hist. Vég. Foss., pl. 71, f. 4.
 „ *dilatata*, L. et H., Foss. Flor., pl. 91B.
 „ *obliqua*, L. et H., Foss. Flora, pl. 90.
 „ *oblata*, L. et H., Foss. Flora, pl. 217.
 „ *orbicularis*, Beongt., Hist. Vég. Foss., pl. 61, f. 2.

Loc.—Roof shale, B. S., Jarrow; L. M. S., Felling, etc.

TRIBE. PECOPTERIDEÆ.

ALETHOPTERIS, Sternberg.

Alethopteris lonchitica, Schlotheim sp.*Filicites lonchiticus*, Schloth., Flor. d. Vorw., pl. 11, f. 22. *Type.**Pecopteris lonchitica*, L. et H., Foss. Flora, pl. 153.,, *Mantelli*, L. et H., Foss. Flora, pl. 145.

,, ,, Brongt., Hist. Vég. Foss., pl. 83, f. 3, 4.

,, *urophylla*, Brongt., Hist. Vég. Foss., pl. 86.,, *heterophylla*, L. et H., Foss. Flora, pl. 38.

Loc.—Roof-shale, B. S., Jarrow; L. M. S., Felling, etc. One of the commoner Ferns of this Coal-field.

Alethopteris Serlii, (Brongniart.)*Pecopteris Serlii*, Brongt., Hist. Vég. Foss., pl. 85. *Type.*

,, ,, L. et H., Foss. Flora, pl. 202.

Loc.—In shales of the lower Coals, Auckland district.

PTERIDOPSIS, nov. gen.

Pteridopsis plumosa, nov. spec.*Pteridopsis plumosa*, nov. gen. et spec., Ill. Foss. Plts., pls. 44,Loc.—Roof-shale, B. S., Jarrow. 63. *Type.*

PECOPTERIS.

Pecopteris muricata (Schlotheim sp.).*Filicites muricatus*, Schloth., Flor. d. Vorw., pl. 12, f. 21, 23.*Pecopteris muricata*, Brongt., Hist. Vég. Foss., pl. 95, f. 3, 4; pl. 97.,, *laciniata*, L. et H., Foss. Flora, pl. 122.,, *nervosa*, Brongt., Hist. Vég. Foss., pls. 94, 95, f. 1, 2.

,, ,, L. et H., Foss. Flora, pl. 94.

Loc.—Roof-shale, B. S., Jarrow; L. M. S., Felling. Occurs in all the roof-shales, and is one of the commoner ferns.

Pecopteris Pluckenetii (Schlotheim sp.).*Filicites Pluckenetii*, Schloth., Flor. d. Vorw., pl. 10, f. 19. *Type.**Sphenopteris rapanda*, L. et H., Foss. Flora, pl. 84.*Pecopteris Pluckenetii*, Brongt., Hist. Vég. Foss., pl. 107, f. 1-3.

Loc.—Roof-shale, B. S., Jarrow. The specimen in the Hutton Collection is the only one known from this Coal-field.

Pecopteris plumosa (Artis sp.).

- Filicites plumosa*, Artis, Anted. Phyt., pl. 17. *Type.*
Pecopteris plumosa, Brongt., Hist. Vég. Foss., pls. 121, 122.
 „ *dentata*, Brongt., Hist. Vég. Foss., pls. 123, 124.
 „ *acuta*, Brongt., Hist. Vég. Foss., pl. 119, f. 3.
 „ *delicatula*, Brongt. Hist. Vég. Foss., pl. 116, f. 6.
 „ *dentata*, L. et H., Foss. Flora, pl. 154.
 „ *serra*, L. et H., Foss. Flora, pl. 107.
Sphenopteris caudata, L. et H., Foss. Flora, pls. 48 and 138.
 „ *crenata*, L. et H., Foss. Flora, pls. 39, 100, 101.

Loc.—Roof-shale, B. S., Jarrow; and in other parts of Coal-field.

MEGAPHYTON, Artis.

Megaphyton frondosum, Artis.

- Megaphyton frondosum*, Artis, Anted. Phyt., pl. 20. *Type.*
 „ *approximatum*, L. et H., Foss. Flora, pl. 116.
 „ *distans*, L. et H., Foss. Flora, p. 117.

Loc.—Roof-shale, L. M. S., Felling; cast in sandstone, Etherley (Duff. Coll.).

LYCOPODIACEÆ.

LEPIDODENDRON.

Lepidodendron Sternbergii, Brongniart.

LEAF-SCARS, STEMS, BRANCHES, AND FOLIAGE.

- Lepidodendron Sternbergii*, Brongt., Prod., p. 85. *Type.*
 „ „ L. et H., Foss. Flora, pl. 4; pl. 112, f. C; pl. 203.
 „ *obovatum*, L. et H., Foss. Flora, pl. 19 bis.
 „ *elegans*, L. et H., Foss. Flora, pls. 118, 199.
 „ *dilatatum*, L. et H., Foss. Flora, pl. 7, f. 2.
 „ *gracile*, L. et H., Foss. Flora, pl. 9.
 „ *plumarium*, L. et H., Foss. Flora, pl. 207.

FRUCTIFICATION.

Lepidostrobus variabilis, L. et H., Foss. Flora, pl. 10, f. 2, 3.

ROOT AND ROOTLETS.

Stigmaria ficoides, L. et H., Foss. Flora, pls. 31–34; excl. 35, 36.

Loc.—Roof-shale, B. S., Jarrow; L. M. S., Felling, and in other parts of the Coal-field.

Lepidodendron Anglicum, Presl.*Lepidodendron Anglicum*, Sternb., Vers. I., pl. 29, f. 3. *Type*.*Aspidiaria Anglicum*, Sternb., Vers. II., pl. 29.*Lepidodendron* „ Presl, Vers. II., pl. 68, f. 11.

Loc.—Roof-shale of Bensham, Low Main at Newsham, and other seams.

Lepidodendron selaginoides, Sternberg.

STEM.

Lepidodendron selaginoides, Sternb., Vers., pl. 16, f. 3; pl. 17, f. 1. *Type*.

FRUCTIFICATION.

Lepidostrobus variabilis, L. et H., Foss. Flora, pl. 10, f. 1; pl. 11.? *Lepidodendron ocephalum*, L. et Foss. Flora, pl. 206.

Loc.—In roof-shale, B. S., Jarrow; L. M. S., Felling; and in some of the lower seams of the Auckland district (Duff. Coll.).

ULODENDRON, Lindley et Hutton.**Ulodendron majus**, Lindley et Hutton.*Ulodendron majus*, L. et H., Foss. Flora, pl. 5. *Type*.*Bothrodendron punctatum*, L. et H., Foss. Flora, pls. 80, 81.*Ulodendron Lindleyanum*, Sternb., Vers. II., pl. 45, f. 4.

Loc.—In roof-shale, B. S., Jarrow; H. M. S., South Shields; Hutton Seam, Hetton, etc.

LEPIDOPHLOIOS, Sternberg.**Lepidophloios laricinus**, Sternberg.*Lepidodendron laricinum*, Sternb., Vers., pl. 11, f. 2, 3, 4. *Type*.*Lepidostrobus pinaster*, L. et H., Foss. Flora, pl. 198.*Pinus anthracina*, L. et H., Foss. Flora, pl. 164.*Halonis gracilis*, L. et H., Foss. Flora, pl. 86.

Loc.—Roof-shale, B. S., Jarrow, and many other parts of Coal-field.

KNORRIA, Sternberg.

Knorria Volkmannianum (Sternberg, sp.).

STEM.

Lepidodendron Volkmannianum, Sternb., Vers. I., pl. 53, f. 3. *Type.*

Lepidolepis imbricata, Sternb., Vers. I., pl. 27.

Knorria " Sternb., Vers. I., pl. 38.

" *Sellonii*, Sternb., Vers., pl. 57.

" " L. et H., Foss. Flora, pl. 97.

Lepidodendron Volkmannianum, Stur, Culm Flora, Heft II., taf. 18, f. 4; taf. 23, f. 2, 4, 5 only.

FOLIAGE.

Lepidodendron longifolium, L. et H., Foss. Flora, pl. 161.

? " *dichotoma*, Sternb., Vers. I., pl. 3.

Loc.—Roof-shale, L. M. S., Felling.

SIGILLARIA, Brongniart.

Sigillaria scutellata, Brongniart.

Sigillaria scutellata, Brongt., Class. Vég. Foss., pl. 1, f. 4. *Type.*

" " Brongt., Hist. Vég. Foss., pl. 150, f. 2, 3; pl. 163, f. 3.

" *pachyderma*, Brongt., Hist. Vég. Foss., pl. 150, f. 1.

" " L. et H., Foss. Flora, pl. 55 (excl. 54).

Loc.—Roof-shale, B. S., Jarrow; L. M. S., Killingworth, Cramlington, and many other parts of the Coal-field.

Sigillaria reniformis, Brongniart.

STEM AND LEAF-SCARS.

Sigillaria reniformis, Brongt., Hist. Vég. Foss., pls. 142, 160.

" *Saulii*, Brongt., Hist. Vég. Foss., pl. 151.

" *reniformis*, L. et H., Foss. Flor., pls. 57, 71.

" *alternans*, L. et H., Foss. Flora, pl. 56.

" *catenulata*, L. et H., Foss. Flora, p. 58.

" *monostachya*, L. et H., Foss. Flora, pl. 72.

" *flexuosa*, L. et H., Foss. Flora, pl. 205.

? " *Murchisoni*, L. et H., Foss. Flora, pl. 149.

" *oculata*, L. et H., Foss. Flora, pl. 59.

" *organum*, L. et H., Foss. Flora, pl. 70.

PITIL.

Endogenites striata, L. et H., Foss. Flora, pl. 227a.

Loc.—Roof-shale, B. S., Jarrow; L. M. S., Cramlington, Killingworth, and in most parts of this Coal-field. A common and characteristic species.

Sub. gen. FAVULARIA, Sternberg.

Favularia tessellata (Steinhauer).*Phytolithus tessellatus*, Trans. Amer. Phil. Soc., Vol. 1, pl. 7, f. 2.*Favularia tessellata*, L. et H., Foss. Flora, pls. 73, 74, 75.,, *nodosa*, L. et H., Foss. Flora, pl. 192.*Sigillaria tessellata*, Brongt., Hist. Vég. Foss., pl. 156, f. 1;
pl. 162, f. 1, 2, 3, 4.

Loc.—Roof-shale, B. S., Jarrow, and in many other parts of the Coal-field.

ROOTS OF LEPIDODENDRON, ETC.

STIGMARIA, Brongniart.

Stigmaria ficoides, Brongniart.

ROOTS.

Stigmaria ficoides, Brongt., Class. Vég. Foss., pl. 1, f. 7. *Type*.

,, ,, L. et H., Foss. Flora, pls. 31, 34.

,, ,, Williamson, Mon. Stigmaria.

CYLINDER AND PITH-CAVITY.

Caulopteris gracilis, L. et H., Foss. Flora, pl. 141.*Stigmaria ficoides*, L. et H., Foss. Flor., pl. 166.

Loc.—In most of the under-clays and shales of the Coal-field.

PLANTÆ INCERTÆ SEDIS.

PSYGMOPHYLLUM, Schimper.

Psygmodiphyllum flabellatum (Lindley et Hutton sp.).*Negerrathia flabellata*, L. et H., Foss. Flora, pl. 28, 29. *Type*.

Loc.—Roof-shale of B. S., Jarrow.

CORDAITES.

Cordaitea regularis (Sternberg sp.).*Calamites regularis*, Sternb., Vers. I., pl. 59. *Type*.

Loc.—Roof-shale of B. S., Jarrow.

Cordaitea taxina, Lindley et Hutton.*Knorria taxina*, L. et H., Foss. Flora, pl. 95. *Type*.*Fern Stem*, Lebour, Foss. Plts, pls. 48 and 49.

Loc.—Roof-shale of B. S., Jarrow. Specimen in Hutton Collection.

Cordaitea principalis (German sp.).*Flabellaria principalis*, Germar, Vers. v., Wett. u. Löbej., pl. 23.*Cordaitea principalis*, Geinitz, Vers. Steinkf. Sachs., pl. 21, f. 2.

Loc.—In roof-shale, B. S., Jarrow.

Cordaitea Huttoni, nov. spec.*Cordaitea Huttoni*, nov. spec.

Small flag-shaped leaf, imperfect at base and top, between five and six inches long and from half an inch to five-eighths broad, increasing in width from the base to the middle of the leaf, and tapering gradually towards the top. The surface ornamented with very fine and nearly parallel nerves, neatly and regularly arranged with bifurcations, being more crowded at the base and top. This appears to be a different species from the above.

Loc.—Roof-shale, B. S., Jarrow.

INFLORESCENCE AND FRUIT.

Cardiocarpon ? Lindleyi, Carruthers).*Antholithes Pitcairniæ*, L. et H., Foss. Flora, pl. 82. *Type*.

FRUIT.

Carpolithes morchellaformis, Sternb., Vers. I., pl. 7, f. 5.,, *acuminatus*, Sternb., Vers. I., pl. 7, f. 4.,, *corculum*, Sternb., Vers. I., pl. 7, f. 6.,, *contractus*, Sternb., Vers. I., pl. 7, f. 7.*Cardiocarpon Lindleyi*, Carruth., Geol. Mag., Vol. 9, p. 56.,, *apiculatum*, Schimp., Traité Pal. Veg., Vol. 2, p. 224.

Loc.—Roof-shale, B. S., Jarrow; L. M. S., Felling. Appears to be not rare in some of the lower seams of the Auckland district.

STERNBERGIA, Artis.

Sternbergia approximata, Brongniart.*Sternbergia approximata*, L. et H., pl. 224, 225. *Type*.

,, ,, Brongt., Prod. p. 137.

,, *transversa*, Artis, Anted. Phyt., pl. 8.*Artisia* ,, Sternb., Vers. II., pl. 53, f. 7-9.

Loc.—Found in most parts of the Coal-field in sandstone, and compressed, in shale.

FOSSIL WOOD (*Coniferous*).**Araucarioxylon** ——— ?*Pinites* ——— ?

Loc.—In some of the thicker beds of sandstone, as the High Main Post and Seventy-fathom post.

RHYTIDODENDRON, N. Boulay.? **Rhytidodendron minutifolium**, N. Boulay.

STEM.

Rhytidodendron minutifolium, N. Boulay, Le Terr. Houil. de la France, pl. 3, f. 1, 1 bis. *Type*.

Loc.—Roof-shale, B. S., Jarrow.

TRIGNOCARPUM, Brongniart.**Trigonocarpum Parkinsonis**, Brongniart.

Trigonocarpum Parkinsonis, Brongt., Prod., p. 137. *Type*.

” ” Parkin., Org. Rem., pl. 7, f. 6–8.

” *Noeggerathi*, L. et H., Foss. Flora, pl. 142c;
pl. 193B, f. 1–4; pl. 222, f. 2, 4.

? ” *olivæforme*, L. et H., Foss. Flora, pl. 222, f. 1, 3.

” *oblongum*, L. et H., Foss. Flora, pl. 193c.

Carpolithes alatus, L. et H., Foss. Flora, pl. 87; pl. 210B.

Loc.—Roof-shale, B. S., Jarrow, compressed. The “nuts” occur occasionally in the beds of thick sandstone—as the High Main Post, etc.

Stem with Roots.

Loc.—Roof-shale, B. S., Jarrow.

ANIMALIA.

ANNELIDA ?

Name and Locality.

Reference.

Microconchus carbonarius, *Murch.* Sil. Syst., p. 84.

Loc.—On *Anthracosia* and Coal-measure plants. Common.

CRUSTACEA.

Beyrichia arcuata, *Bean*,

Ann. Mag. N. H.,

Loc.—Prestwick and many other places. Vol. 9, p. 377, f. 55.

Common.

INSECTA.

Name and Locality.	Reference.
<i>Etoblattina mantidioides</i> , <i>Goldenb.</i> , Loc.—In Ironstone, North Hylton, on the Wear.	Geol. Mag., Vol. 4, pl. 17, f. 6.
<i>Lithomylacris Kirkbyi</i> , <i>H. Woodw.</i> , Loc.—In Ironstone, North Hylton, on the Wear.	Geol. Mag., Dec. 3rd, Vol. 4, pl. 2, f. 4.

MOLLUSCA.

<i>Anthracosia acuta</i> , <i>Sow.</i> , Loc.—Whitley, and many other places in Ironstone bands and shales.	Min. Conch., Vol. 1, pl. 23, f. 5-7.
<i>Anthracosia robusta</i> , <i>Sow.</i> , Loc.—Wylam and Horsley Collieries, etc.	Geol. Trans., 2nd ser. Vol. 5, pl. 39, f. 14.
<i>Anthracosia phaseola</i> , <i>Sow.</i> ,	Geol. Trans., 2nd ser. Vol. 5, pl. 39, f. 11.
? <i>Anthracosia nuciformis</i> , <i>Hibbert</i> , Loc.—In shale, Cowpen Colliery.	Trans. Roy. Soc. Ed., Vol. 13, p. 243.
<i>Anthracomya modiolaris</i> , <i>Sow.</i> , Loc.—Whitley, Cowpen, etc.	Geol. Trans., 2nd ser. Vol. 5, pl. 39, f. 10.
<i>Anthracoptera carinata</i> , <i>Sow.</i> ,	Geol. Trans., 2nd ser. Vol. 5, pl. 39, f. 15.

COAL-MEASURES.

Most of the Fish-remains in this List were found in the Black Shale above the Low Main Seam at Newsham Colliery, and are in the Atthey Collection in the Geological Room.

Note.—This unique collection, made by the late Thomas Atthey, F.L.S., was presented by Lady Armstrong.

FISHES.

ORD. GANOIDEI.

FAM. PALÆONISCIDÆ.

<i>Elonichthys</i> (Pal.) <i>Egertoni</i> , (<i>Ag.</i>) Loc.—Black shale above Low Main Seam, Newsham Colliery.	Geol. Journ., Vol. 6, pl. 1, f. 2; N. H. Tr., Vol. 3, p. 96.
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- | Name and Locality. | Reference. |
|---|--|
| Elonichthys (Pal.) Hancocki, (<i>Att.</i>) | Nat. Hist. Trans., |
| Loc.—Black shale above Low Main | Vol. 5, p. 228. |
| Seam, Newsham Colliery. | |
| Elonichthys (Pal.) semistriatus, | Pal. Soc., 1877, Gan. |
| | <i>Traq.</i> , Fishes, pl. 3, f. 9-12, |
| Loc.—Black shale above Low Main | pl. 4. |
| Seam, Newsham Colliery. | |
| Acrolepis (Gyrolepis) Rankinii, (<i>Ag.</i>) | Poiss. Foss. 2, p. 303. |
| Loc.—Black shale above Low Main | |
| Seam, Newsham Colliery. | |

FAM. PLATYSOMIDÆ.

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|--|--------------------------|
| Platysomus parvulus, <i>Agassiz</i>, | Poiss. Foss. 2., p. 303. |
| Loc.—Black shale above Low Main | |
| Seam, Newsham Colliery. | |
| Platysomus rotundus, <i>Han. et Att.</i>, | N. H. Tr. N. D. & N' C., |
| Loc.—Black shale above Low Main | Vol. 4, p. 411, pl. 15, |
| Seam, Newsham Colliery. | f. 2. |
| Platysomus Forsteri, <i>Han. et Att.</i>, | N. H. Tr. N. D. & N' C., |
| Loc.—Black shale above Low Main | Vol. 4, p. 413, pl. 15, |
| Seam, Newsham Colliery. | f. 3. |
| Amphicentrum striatum, <i>Han. et Att.</i>, | N. H. Tr. N. D. & N' C., |
| Loc.—Black shale above Low Main | Vol. 4, p. 414. |
| Seam, Newsham Colliery. | |

FAM. COELACANTHIDÆ.

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|---|-------------------------|
| Coelacanthus lepturus, <i>Agassiz</i>, | Poiss. Foss. 2, p. 173; |
| Loc.—Black shale above Low Main | N. H. Trans., Vol. 4, |
| Seam, Newsham Colliery. | p. 416. |

FAM. RHIZODONTIDÆ.

- | | |
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| Rhizodopsis sauroides, <i>Williamson</i>, | Phil. Trans. 1849, |
| Loc.—Black shale above Low Main | pl. 42, f. 21-23. |
| Seam, Newsham Colliery. | |

Name and Locality.	Reference.
<i>Archichthys sulcidens</i> , <i>Han. et Att.</i> , Nat. Hist. Trans.,	
Loc.—Black shale above Low Main	Vol. 4, p. 199.
Seam, Newsham Colliery.	
<i>Strepsodus sauroides</i> , <i>Huxley</i> .	Q. Journ. Geol. Soc.,
Loc.—Black shale above Low Main	Vol. 22, p. 602.
Seam, Newsham Colliery.	

? FAM. SAURODIPTERIDÆ.

<i>Megalichthys Hibberti</i> , <i>Agassiz</i> ,	Poiss. Foss., 2, pl. 2 ;
Loc.—Black shale above Low Main	pl. 63, 63a, 64.
Seam, Newsham Colliery.	Trans. Roy. Soc. Ed.,
	13, pl. 10, f. 11.
<i>Megalichthys coccolepis</i> , <i>J. Young</i> .	
Loc.—Black shale above Low Main	
Seam, Newsham Colliery.	

INCERTÆ SEDIS.

<i>Acanthodopsis Egertoni</i> , <i>Han. et Att.</i> , Nat. Hist. Trans.,	
Loc.—Black shale above Low Main	Vol. 3, p. 107.
Seam, Newsham Colliery.	
<i>Acanthodopsis Wardii</i> , <i>Egerton</i> ,	Q. J. Geol. Soc., Vol. 22,
Loc.—Black shale above Low Main	pl. 23, f. 1, 2 ; Nat.
Seam, Newsham Colliery.	Hist. Tr. Vol. 3, p. 103.

ORD. CHONDROPTERYGII.

A. SELACHOIDEI, SHARKS.

FAM. CESTRACIONTIDÆ.

<i>Pleuroodus Rankinii</i> , <i>Agassiz</i> ,	Nat. Hist. Trans. N. D.
Loc.—Black shale above Low Main	& N'C., Vol. 4, pl. 15,
Seam, Newsham Colliery.	f. 1.
<i>Pœcilodus</i> sp.	
<i>Helodus simplex</i> , <i>Agassiz</i> ,	Poiss. Foss., 3, pl. 19,
Loc.—Prestwick, Northumberland.	f. 8-10 ; Nat. Hist.
	Trans., Vol. 4, p. 422.

Name and Locality.	Reference.
Diplodus gibbosus , <i>Agassiz</i> , Loc.—Black shale above Low Main Seam, Newsham Colliery.	Poiss. Foss., 3, p. 204. Nat. Hist. Trans., Vol. 3, p. 111.
<i>Note</i> .—This form of tooth is now known to belong to <i>Pleuracanthus lævissimus</i> , <i>Agassiz</i> .	
Pleuracanthus lævissimus , <i>Ag.</i> , Loc.—Black shale above Low Main Seam, Newsham Colliery.	Poiss. Foss. 3, pl. 45, f. 4, 5. <i>Diplodus gib-</i> <i>bosus</i> , <i>Ag.</i> , P. F., 3, p. 204 (teeth).
Orthacanthus cylindricus , <i>Agassiz</i> , Loc.—Black shale above Low Main Seam, Newsham Colliery.	Poiss. Foss. 3, p. 177.
? Cladodus mirabilis , <i>Agassiz</i> , Loc.—Black shale above Low Main Seam, Newsham Colliery.	Poiss. Foss. 3, p. 197.
Ctenacanthus hybodontoides , <i>Egerton</i> , Q. J. Geol. Soc., Vol. 9, Loc.—Black shale above Low Main Seam, Newsham Colliery.	pl. 12.
Ctenoptychius pectinatus , <i>Agassiz</i> , Poiss. Foss. 3, pl. 19, Loc.—Black shale above Low Main Seam, Newsham Colliery.	f. 2-4.
Gyracanthus tuberculatus , <i>Agassiz</i> , Poiss. Foss. 3, pl. 1a, Loc.—Black shale above Low Main Seam, Newsham Colliery.	f. 1-7, & f. 8; pl. 5, f. 2-8.

B. BATOIDEI, RAYS.

FAM. PETALODONTIDÆ.

Janassa linguæformis , <i>Han. et Att.</i>	Nat. Hist. Trans.,
Loc.—Black shale above Low Main Seam, Newsham Colliery.	Vol. 3, pl. 9.

ORD. DIPNOI.

Ctenodus cristatus , <i>Agassiz</i> ,	Poiss. Foss. 3, pl. 19,
Loc.—Black shale above Low Main Seam, Newsham Colliery.	f. 16.

Name and Locality.	Reference.
<i>Ctenodus tuberculatus</i> , <i>Han. et Att.</i> , Nat. Hist. Trans., Loc.—Black shale above Low Main Seam, Newsham Colliery.	Vol. 3, p. 61.
<i>Ctenodus corrugatus</i> , <i>Han. et Att.</i> , Nat. Hist. Trans., Loc.—Black shale above Low Main Seam, Newsham Colliery.	Vol. 3, p. 62.
<i>Ctenodus imbricatus</i> , <i>Han. et Att.</i> , Nat. Hist. Trans., Loc.—Black shale above Low Main Seam, Newsham Colliery.	Vol. 3, p. 65.
<i>Ctenodus ellipticus</i> , <i>Han. et Att.</i> , Nat. Hist. Trans., Loc.—Black shale above Low Main Seam, Newsham Colliery.	Vol. 3, p. 66.
<i>Ctenodus obliquus</i> , <i>Han. et Atthey</i> , Nat. Hist. Trans., Loc.—Black shale above Low Main Seam, Newsham Colliery.	Vol. 3, p. 63.
<i>Ctenodus elegans</i> , <i>Han. et Atthey</i> , Nat. Hist. Trans., Loc.—Black shale above Low Main Seam, Newsham Colliery.	Vol. 3, p. 64.

BATRACHIA = AMPHIBIA.

<i>Anthracosaurus Russelli</i> , <i>Huxley</i> , Q.J.Geol.Soc., Vol. 19, Loc.—Black shale above Low Main Seam, Newsham Colliery.	p. 56; Nat. Hist. Tr., Vol. 5, pls. 6–9.
<i>Pteroplax cornuta</i> , <i>Hancock et Atthey</i> , Nat. Hist. Trans., Loc.—Black shale above Low Main Seam, Newsham Colliery.	Vol. 3, p. 67, pl. 1, f. 1, 2; pl. 2, f. 1.
<i>Loxomma Allmanni</i> , <i>Huxley</i> , Quart. Jour. Geol. Soc., Loc.—Black shale above Low Main Seam, Newsham Colliery.	Vol. 18, pl. 11, f. 1, 2. Nat. Hist. Trans., Vol. 5, pl. 1–4.
<i>Ophiderpeton nanum</i> , <i>Han. et Att.</i> , Nat. Hist. Trans., Loc.—Black shale above Low Main Seam, Newsham Colliery.	Vol. 3, p. 79.

Name and Locality.	Reference.
<i>Urocordylus reticulatus</i> , <i>Han. et Att.</i> , Nat. Hist. Trans., Loc.—Black shale above Low Main Seam, Newsham Colliery.	Vol. 3, p. 310.
<i>Batrachiderpeton lineatum</i> , <i>Hancock et Atthey</i> , Nat. Hist. Trans., Vol. 4, p. 208, pl. 4.	
Loc.—Black shale above Low Main Seam, Newsham Colliery.	

GANNISTER BEDS.—These consist of strata of thin-bedded sandstones and shales, with thin seams of Coal and beds of hard, crystalline, siliceous rock (Gannister), full of rootlets of a *Stigmaria*. Very feebly developed in Northumberland, but becoming thicker in some parts of Durham. *Aviculopecten papyraceus* is the most characteristic fossil.

The fossils of this series are not well known. *Stigmaria stellata* seems to be peculiar to it, and in the beds of the Gannister series Prof. Lebour has found specimens of *Aviculopecten papyraceus*, a marine bivalve characteristic of this portion of the Carboniferous rocks in Yorkshire and in coal-fields further south. The same fossil has also been obtained from the same series of beds in the south of the county of Durham. *Lingula mytiloides* of considerable size has been found in shale in the neighbourhood of Ovingham in connection with a small working for Coal.

<i>Stigmaria stellata</i> , Goepp.	Gatt. Foss., pl. 9, f. 12.
<i>Lingula mytiloides</i> , Sow.	Sow. M.C., t. 19, f. 1, 2.
<i>Aviculopecten papyraceus</i> , Goldf.	Pet., t. 116, f. 5.

MILLSTONE GRIT.—In this division is included the series of grits, sandstones, and subordinate shales between the Gannister beds and the uppermost bed of carboniferous limestone, which is locally termed the Fell Top limestone, from its usual position near the top of the fell. It is chiefly composed of sandstones and grits, some of which are very coarse, enclosing large angular pieces of quartz. The beds of this division are of variable thickness, being more strongly represented in the South than in the North.

Fragments of plants of species allied to or identical with those of the preceding division. A few of the beds in the lower portion, containing remains of *Orthis*, *Spirifera*, and other brachiopods, appear to be of marine origin.

This division crops out conformably beneath the Coal Measures to the west, and forms a narrow belt running across the two counties from the sea-coast between the mouths of the Coquet and Aln to Stocksfield and Riding Mill on the Tyne; thence it follows the outcrop of the Coal Measures to the Wear and Tees. It also caps the higher portions of the fells further to the west, and forms the summit of the highest elevation of the Pennine range—Cross Fell. In all the geological maps hitherto published, too great an area has been assigned to this division of the Carboniferous rocks in our district. The following section will give a tolerably accurate idea of the nature of this series as it occurs on the Derwent:—

	Fms. ft.		Fms. ft.
Slate sill	2 3	Grey beds (layers of slate clay and sandstone alternating)	1 0
Plate	3 3	Sandstone	7 0
Girdle beds	2 0	Plate	1 0
Plate	2 3	Hazle and slate	2 3
Sandstone, fine-grained	7 0	Plate or Famp	2 0
Hazle, coarse	1 3	Hazle and plate	2 3
Plate and Blue whin	1 0	Plate ..	2 0
Plate and Grey beds	0 2	Hazle or slate	1 3
Sandstone and whin	1 2	Plate and Grey beds	1 3
Plate and whin	1 5	Grey beds	15 0
Plate	2 3	Low grit	5 0
Millstone grit	5 0	Pebbles	0 0
Plate	4 3	Plate	2 5
Hazle.....	2 3		
			82 0

YOREDALE ROCKS.—In this series we include all the strata from the Fell-top limestone inclusive to the Great Whin Sill. It is composed, as the appended section will show, of an assemblage of blue-coloured beds of carboniferous or encrinital limestone separated by extensive layers of indurated sandstone (HAZLE), bituminous shale (PLATE), thin seams occasionally of

impure coal with accompanying thin underclays. In the Alston Moor and Weardale districts, where this series is typically or most highly developed, there are nine distinctly defined beds of encrinital limestone, varying from two or three to sixty feet in thickness (Great limestone). These are very uniformly distributed over the above districts, and also in the adjoining valleys of the Tees, South Tyne, West Allen, and Derwent, where they occupy, with variations in thickness, the same relative position in the series. In the east and west veins traversing these limestone beds are deposited the strings and flats of galena which constitute their chief mineral importance. The sandstones of this division denominated "hazles" have a highly crystalline and metamorphic appearance. The majority of these beds are of marine origin.

In some of the sandstones and shales the usual plants of the Carboniferous rocks are discovered; but others are characterized by marine shells and corals. The limestones without exception contain marine shells and corals, and for the most part are formed of minute portions of the decomposed stems of the encrinite. The species most conspicuous are the large cockle of the miners, *Producta gigantea*, which is universally distributed, *Orthis resupinata*, *Spirifera*, and a few other brachiopods, *Orthoceras*, *Encrinites*, and a few Corals, as *Lithostrotion*. Trilobites have very rarely been detected. The partings of the shaly sandstones are covered with the burrowings of some, as yet, unknown crustaceans. The fossils of the southern portion of this district have not yet been assiduously collected, but in part of Northumberland the late Mr. George Tate, of Alnwick, carefully collected and preserved the fossils of this division.

It covers the whole of the western portion of the county of Durham, from the outcrop of the lowest members of the Millstone grit series, and the adjoining portions of Westmoreland, Cumberland, and Northumberland, to the Pennine ridge, down the Western slope of which it extends to the Great Whin Sill. It stretches through the county of Northumberland, occupying the line of the sea-coast, from the mouth of the Aln nearly to the Tweed. The upper parts of the valleys of the Tees, the

South Tyne, Wear, and Derwent; the valleys of the east and west Allen; the lower part of North Tyne, Wansbeck, Coquet, and Aln are cut out of this series. In the valleys of the Tyne, Wear, and Tees, the whole series may be observed from the Fell Top limestone to the Great Whin Sill. The following section from Westgarth Forster shows the order of succession of these beds in the Alston Moor district, and applies also to Wear-dale and Teesdale:—

	Fms. ft.		Fms. ft.
LIMESTONE (<i>Fell Top</i>)	1 0	Limestone post (calcareous sandstone)	0 4
Crow Coal occasionally,		Quarry Hazle	4 0
Hazle, or Upper Coal sill.	1 0	Plate	5 0
Plate (Shale)	8 0	Great Girdle bed	1 0
Hazle (indurated sandstone)	1 4	LIMESTONE (<i>Four-fathoms</i>) ..	4 0
Plate	2 3	Quarry Hazle (<i>Nattrass Gill</i>) ..	4 0
Hazle.....	2 2	Plate	6 0
Plate	1 0	LIMESTONE & LITTLE WHIN	
Upper Slate Sill	4 0	SILL (three yds. Wear-dale) ..	2 0
Plate	5 2	Plate	2 0
Whetstone sill (fine-grained sandstone)	1 3	Hazle (Arthur's Pit quarry sill, six-fathom Hazle) ...	4 0
Plate	2 0	Plate	1 4
Ironstone (with coal).....	1 1	LIMESTONE (five yards Wear-dale)	1 2
Freestone (with iron pyrites) ..	5 3	Hazle	2 0
Plate	6 1	Plate	1 3
Girdle beds	0 5	LIMESTONE (<i>Scar</i>)	9 0
Plate	3 3	Plate ..	0 3
Hazle (Pattison's sill)	1 3	Grey beds (coal occasionally) ..	2 1
Plate	3 0	Plate	1 2
LITTLE LIMESTONE	1 4	LIMESTONE (Cockle - shell, <i>Producta gigantea</i>)	0 1½
Little Hazle	0 5	Hazle.....	2 3
Plate }	2 0	Plate	0 4
Coal }	1 4	LIMESTONE	0 4½
High coal sill	1 4	Plate	4 3
Plate }	1 0	LIMESTONE (Tyne-bottom)..	3 4
Coal }	2 0	Whetstone.....	0 4½
Low coal sill	2 0	WHIN SILL (Igneous)	variable.
Plate	3 2		
GREAT LIMESTONE	10 4		
Tuft	1 2		
Plate	2 1		

SCAR LIMESTONE SERIES.—From the position of the Great Whin Sill in the Alston Moor district to the lowest bed of Carboniferous limestone. It is composed, like the former series, of several beds of encrinital limestone, some of which are locally of great thickness (Melmerby Scar limestone is sometimes 120 feet), interstratified with beds of crystalline sandstone and shale, and a bed or two of coal. Between the North Tyne and the Tweed, in the lower part of this series, the beds of coal become more frequent, thicker, and of better quality than in the Pennine escarpment, and the limestones are thinner, impure, and deteriorated, and thick beds of grit and sandstone predominate. In the lower part of this series the Plashetts and Scremerston coal beds are situated.

Some of the land plants are perhaps identical with species belonging to the above division, with others quite distinct. Most of the marine fossils are also identical, but several of those in the following list are unknown in the higher beds:—

It crops out along the base of the Pennine range in its extension northwards till the escarpment of the latter is thrown down by the Stublick dyke. Thence it occupies the western part of Northumberland from the outcrop of the Yoredale beds nearly to the foot of the Cheviot range. Good sections may be seen in the burns and smaller valleys of the North Tyne and Coquet, and at the base of the Pennine escarpment as near Dufton in Westmoreland, where the following sections of this series may be observed:—

	Fms. ft.		Fms. ft.
GREAT WHIN SILL	10 0	Great hazle	10 0
Plate	3 0	Plate	4 0
Hazle.....	2 0	LIMESTONE (Smiddy).....	4 1
Plate	2 0	Hazle.....	1 0
Hazle.....	3 0	LIMESTONE	4 1
Plate	1 1	Hazle.....	1 0
LIMESTONE (Jew)	3 0	LIMESTONE	3 0
Plate	1 0	Plate	1 1
Hazle.....	5 0	LIMESTONE	1 1
Plate	1 1	Plate	1 1
LIMESTONE (Little)	1 0	GREAT LIMESTONE (Robin-	
Hazle.....	1 1	son's)	14 0

	Fms. ft.		Fms. ft.
Hazle.....	1 1	Plate	1 0
Plate	0 1	Sandstone.....	1 1
LIMESTONE (Melmerby Scar)	21 0	Plate	1 0
Plate	2 0	LIMESTONE	2 0
Sandstone.....	1 0	Hard sandstone	2 0
Plate and Coal (thin).....	1 0	Plate and Coal (7 in.).....	8 0
LIMESTONE	4 0	Sandstone.....	26 0
Sandstone.....	18 0	Girdle bed	2 0
Plate	1 1	LIMESTONE	3 0
Sandstone.....	1 1	Sandstone.....	30 0
Plate	2 0	Plate	10 0
Sandstone.....	1 1		

Note.—The student may refer to the following Works on Carboniferous Fossils :—

Geology of Yorkshire, Part II., by John Phillips, 1836.

Carboniferous Fossils of Ireland, by M'Coy, 1844.

Petrificata Derbiensis, 1809.

British Palaeozoic Fossils, by M'Coy.

The Carboniferous-limestone Fossils are arranged in the Side Cases, No. 38, 39, and in the Cases in the North Side of the Gallery.

PLANTÆ.

Name and Locality.	Reference.
Calamites scrobiculatus, (<i>Schloth.</i>) Loc.—Newton near Chillingham, etc.	Petrefact., pl. 20, f. 4.
? Lepidodendron Anglicum, <i>Presl.</i> Loc.—In shale, at Shilbottle near Alnwick.	Sternb., Verst. 7, 8. pl. 68, f. 11.
Ulodendron Veltheimianum, (<i>Sternb.</i>) Vers., Loc.—In sandstone, Alnwick Moor, Woodburn, etc.	pl. 68, f. 14.
Knorria (Lep.) Volkmannianum, (<i>Sternb.</i>) Vers. I., Loc.—In sandstone, Woodburn.	pl. 53, f. 3.
Stigmaria sp. Loc.—In sandstone, and in shales below coal.	

Note.—Two or three species of Ferns and several species of Coniferæ are recorded by Mr. George Tate in Dr. George Johnston's Natural History of the Eastern Borders; but it must be

admitted that the plants of this series in Northumberland have neither been collected nor studied sufficiently well to form a correct idea of the number of species or their distribution.

ANIMALIA.

Name and Locality.	Reference.
<i>Saccamina Carteri</i> , <i>H. Brady</i> , Loc.—Weardale, South Tyne district; Elf Hill, near Wallington Hall.	Nat. Hist. Trans., Vol. 4, pl. 11.
<i>Monticulipora tumida</i> , (<i>Phill.</i>) Loc.—In Redesdale Ironstone shale.	Geol. Yks., pt. 2, pl. 1, f. 49–57.
<i>Stenopora Howsei</i> , <i>Nicholson</i> , Loc.—In Redesdale Ironstone shale.	Ann. Nat. Hist., 5th ser., 12, p. 285.
<i>Fistulipora minor</i> , <i>M^cCoy</i> , Loc.—In Redesdale Ironstone shale.	Brit. Pal. Foss., pl. 3B, f. 12.
<i>Lithostrotion junceum</i> , (<i>Flem.</i>) Loc.—In limestone, Stanhope, etc.	Geol. Yks., pt. 2, pl. 2, f. 11–13.
<i>Lithostrotion irregulare</i> , <i>Phill.</i> , Loc.—Stanhope in Weardale.	Geol. Yks., pt. 2, pl. 2, f. 14–15.
<i>Lithostrotion affine</i> , <i>Flem.</i> , Loc.—In limestone.	Geol. Yks., pt. 2, pl. 2, f. 18.
<i>Lithostrotion aranea</i> , <i>M^cCoy</i> , Loc.—Near Cambo.	Mon. Brit. Foss. Corals, pl. 39, f. 1.
<i>Lithostrotion basaltiforme</i> , <i>Con.-Phill.</i> Loc.—Stanhope in Weardale.	Geol. Yks., pt. 2, pl. 2, f. 21, 22.
<i>Lonsdaleia floriformis</i> , <i>Mart.</i> , Loc.—Near Cambo.	Petrif. Derb., pl. 43, f. 3, 4.
<i>Cyathophyllum regium</i> , <i>Phill.</i> , Loc.—Bamburgh.	Geol. Yks., pt. 2, pl. 2, f. 25, 26.
<i>Cyclophyllum fungites</i> , (<i>Flem.</i>) Loc.—Stanhope in Weardale.	Geol. Yks., pt. 2, pl. 2, f. 23.
<i>Syringopora ramulosa</i> , <i>Goldf.</i> , Loc.—Otterburn.	Geol. Yks., pt. 2, pl. 2, f. 2.
<i>Alveolites septosa</i> , (<i>Flem.</i>) Loc.—Weardale, etc.	Geol. Yks., pt. 2, pl. 2, f. 6–8.

Name and Locality.	Reference.
Archæocidaris Urei , (<i>Flem.</i>) Loc.—In ironstone shale, Redesdale.	Carb. Foss., pl. 27, f. 1.
Archæocidaris , sp. indet. Loc.—In Fell-top limestone, Dilston.	
Fenestella plebeia , <i>M' Coy</i> . Loc.—In Redesdale ironstone shale.	Carb. Foss., pl. 29,

BRACHIOPODA.

Lingula mytiloides , <i>Sowerby</i> , Loc.—In ironstone, Redesdale, etc.	M. C., p. 19, f. 1, 2. Geol. Yks., pt. 2, pl. 11, f. 15-18.
Lingula squamiformis , <i>Phill.</i> Loc.—In ironstone, Redesdale, etc.	Geol. Yks., pt. 2, pl. 11, f. 14.
Lingula Scotica , <i>Davidson</i> , Loc.—In ironstone, Redesdale.	Carb. Mon., pl. 48, f. 27, 29; Supp., pl. 30, f. 5-8.
Discina nitida , <i>Phill.</i> , Loc.—In ironstone, Redesdale, etc.	Geol. Yks., pt. 2, pl. 11, f. 10-13.
Productus giganteus , (<i>Mart.</i>) Loc.—Redesdale limestone, etc.	Geol. Yks., pt. 2, pl. 8, f. 5; M. C., pl. 320.
Productus semireticulatus , (<i>Mart.</i>) Loc.—In ironstone, Redesdale, etc.	Geol. Yks., pt. 2, pl. 7, f. 3; M. C., pl. 317.
Productus punctatus , (<i>Martin</i>) Loc.—In ironstone, Redesdale, etc.	Geol. Yks., pl. 2, pl. 8, f. 10; M. C., pl. 323.
Productus Cora , <i>D' Orb</i> , Loc.—In ironstone, Redesdale.	M' Coy, Carb. Foss. pl. 20, f. 13.
? Productus costatus , <i>Sow.</i> , Loc.—In Redesdale ironstone.	M. C., pl. 560; Geol. Yks., pt. 2, pl. 7, f. 2.

Name and Locality.	Reference.
Chonetes Laguessiana , <i>De Koninck</i> , Loc.—In ironstone, Redesdale and Hartburn, etc.	Dav., Carb. Mon., pl. 47, f. 12–18 & 25; Supp., pl. 34, f. 18.
Chonetes Buchiana , <i>De Koninck</i> , Loc.—In Redesdale ironstone.	Mon. Carb. Brach. Scot., pl. 61.
? Orthis papilionacea . Loc.—Near Otterburn.	Geol. Yks., pt. 2, pl. 11, f. 6.
Orthis resupinata , (<i>Martin</i>) Loc.—In ironstone, Redesdale, rare, etc.	Geol. Yks., pt. 2, pl. 11, f. 1; M.C., pl. 325.
Orthis Michelini , <i>Léveillé</i> , Loc.—Redesdale ironstone, and in Upper limestone shales.	Geol. Yks., pt. 2, pl. 11, f. 3. <i>S.</i> <i>filiaria</i> .
Streptorhynchus crenistria , (<i>Phill.</i>) Loc.—In sandstones and Upper- limestones.	Geol. Yks. pt. 2, pl. 9, f. 6.
Strophomena analoga , (<i>Phill.</i>) Loc.—Abundant in ironstone bands, Redesdale.	Geol. Yks., pt. 2, pl. 7, f. 10.
Rhynchonella pleurodon , (<i>Phill.</i>) Loc.—In shale near Falstone, N. Tyne.	Geol. Yks., pl. 12, f. 25–30.
Camarophoria crumena , (<i>Mart.</i>) Loc.—In ironstone, Redesdale, etc.	Pet. Derb., pl. 36, f. 4; M.C., pl. 83, f. 3.
Spirifera trigonalis , (<i>Mart.</i>) Loc.—Kirkwhelpington, etc.	Pet. Derb. pl. 36, f. 1; M.C., pl. 265.
Spiriferina cristata , (<i>Schloth.</i>) Loc.—In Redesdale ironstone shale.	Mon. Carb. Brach., pl. 7, f. 37–47.
Athyris ambigua , <i>Sowerby</i> , Loc.—Plentiful in Redesdale ironstone.	Phill., Geol. Yks., pt. 2, pl. 11., f. 21.
Terebratula sacculus , (<i>Martin</i>) Loc.—Weardale, in Upper-limestones.	Phill., Geol. Yks., pl. 12, f. 2.

LAMELLIBRANCHIATA.

Name and Locality.	Reference.
Myalina crassa , (<i>Flem.</i>)	Ed. Phil. Journ,
Loc.—Redesdale in ironstone shale.	vol. 12, pl. 9, f. 3.
Aviculopecten , sp. indet.	
Posidonomya Becheri , <i>Goldf.</i> ,	Petr. pl. 113, f. 6.
Loc.—In shale Budle Bay, G. Tate.	Carb. Foss. pl. 12, f. 2.
Leda attenuata , <i>Fleming</i> ,	Geol. Yks., pt. 2,
Loc.—In Redesdale ironstone shale.	pl. 5, f. 17.
Nucula gibbosa , <i>Flem.</i> ,	Geol. Yks., pt. 2.
Loc.—In Redesdale ironstone shale.	pl. 5, f. 15.
Axinus axiniformis , (<i>Phill.</i>),	Geol. Yks., pt. 2,
Loc.—In Redesdale ironstone shale.	pl. 5, f. 13.
Axinus carbonarius , (<i>Sow.</i>)	Geol. Trs., 2nd ser.,
Loc.—In Redesdale ironstone shale.	Vol. 5, pl. 39, f. 2.
Anthracosia ? acuta , (<i>Sow.</i>)	Mem. Geol. Sur.,
Loc.—In freshwater shale near Woodburn Station.	Iron Ores, pt. 2, pl. 2, f. 20, 21.
Conocardium minax , <i>Phill.</i> ,	Geol. Yks., pt. 2,
Loc.—In limestone near Tone Hall.	pl. 5, f. 27, 28.
Conocardium armatum , <i>Phill.</i> ,	Geol. Yks., pt. 2,
Loc.—In limestone near Tone Hall.	pl. 5, f. 29.
Edmondia sulcata , <i>Phill.</i> ,	Geol. Yks., pt. 2,
Loc.—Lowick.	pl. 5, f. 5.
Edmondia arcuata , <i>Phill.</i> ,	Geol. Yks., pt. 2,
Loc.—In ironstone shale Redesdale.	pl. 5, f. 4.
Solenomya primæva , <i>Phill.</i> ,	Geol. Yks., pt. 2,
Loc.—In limestone near Tone Hall.	pl. 5, f. 6.
Myacites sulcata , <i>Flem.</i> ,	Perm. Foss., pl. 20,
Loc.—In Redesdale ironstone.	f. 5, 6. Geol. Trs., pt. 5, pl. 39, f. 6,

Name and Locality.	Reference.
Myacites Ansticei , <i>Sow</i> , Loc.—In Redesdale ironstone.	Geol. Trans., pt. 5, pl. 39, f. 7; Perm. Foss., pl. 20, p. 163.
Myacites variabilis , <i>M' Coy</i> ,	Brit. Pal. Foss., pl. 3F, f. 6-8.
Sanguinolites iridinoides , <i>M' Coy</i> , Loc.—Lowick, Redesdale.	Brit. Pal. Foss., pl. 3F, f. 11.
BRANCHIO-GASTERPODA.	
Naticopsis plicistriata , <i>Phill.</i> , Loc.—Otterburn, etc.	Geol. Yks., pt. 2, p. 14, f. 25.
Naticopsis ampliata , <i>Phill.</i> , Loc.—Otterburn.	Geol. Yks., pt. 2, pl. 14, f. 21, 24a.
Naticopsis elongata , <i>Phill.</i> , Loc.—Otterburn.	Geol. Yks., pt. 2, - pl. 14, f. 28.
Naticopsis elliptica , <i>Phill.</i> , Loc.—Bellingham.	Geol. Yks., pt. 2, pl. 14, f. 23.
Murchisonia angulata , <i>Phill.</i> , Loc.—Lowick.	Geol. Yks., pt. 2, pl. 16, f. 16.
Loxonema rugifera , <i>Phill.</i> , Loc.—Otterburn.	Geol. Yks., pt. 2, pl. 16, f. 26.
Loxonema tenuistriata , <i>Phill.</i> , Loc.—Lowick.	Geol. Yks., pt. 2, pl. 16, 4, 5, 6.
Macrocheilus acutus , <i>Sow</i> , Loc.—Redewater district.	Geol. Yks., pt. 2, pl. 16, f. 11, 21.
Macrocheilus imbricatus , (<i>Sow.</i>)	M. C., pl. 566, f. 2; Geol. Yks., pt. 2, pl. 16, f. 9.
? Pleurotomaria carinata , <i>Phill.</i> , Loc.—Otterburn.	Geol. Yks., pt. 2, pl. 15, f. 1, 2.
? Pleurotomaria helicoides , <i>Sow</i> , Loc.—Weardale.	Geol. Yks., pt. 2, pl. 15, f. 26.
Euomphalus pentangulatus , <i>Sow</i> , Loc.—Near Horsley on the Rede.	Geol. Yks., pt. 2, pl. 13, f. 13.

PTEROPODA.

Name and Locality.	Reference.
<i>Bellerophon Urei</i> , <i>Fleming</i> , Loc.—In ironstone shale, Redesdale	Geol. Yks., pt. 2, pl. 17, f. 11, 12.
<i>Bellerophon decussata</i> , <i>Fleming</i> , Loc.—Redesdale ironstone shale.	Geol. Yks., pt. 2, pl. 17, f. 13.
<i>Bellerophon cornu arietis</i> , <i>Sow.</i> , Loc.—In limestone, near Otterburn.	Geol. Yks., pl. 17, f. 16.
<i>Conularia quadrisulcata</i> , <i>Sow.</i> , Loc.—In ironstone shale, Redesdale and Bellingham.	Min. Conch. pl. 260, f. 5, 6; Geol. Tr., 2nd ser., pl. 40, f. 2.

CEPHALOPODA.

<i>Discites subsulcatus</i> , <i>Phill.</i> , Loc.—Bellingham.	Geol. Yks., pt. 1, pl. 17, f. 18, 25.
<i>Discites tetragonus</i> , <i>Phill.</i> , Loc.—Redesdale.	Geol. Yks., pt. 2, pl. 17, f. 24.
<i>Discites sulcatus</i> , <i>Sowerby</i> , Loc.—Bellingham.	Geol. Yks., pt. 2, pl. 22, f. 31.
<i>Goniatites obtusus</i> , <i>Phill.</i> Loc.—Redesdale ironstone shale.	Geol. Yks., pt. 2, pl. 19, f. 10–13.
<i>Goniatites sphæricus</i> , <i>Martin</i> , Loc.—Redesdale ironstone shale.	Geol. Yks., pt. 2, pl. 19, f. 4–6.
<i>Goniatites truncatus</i> , <i>Phill.</i> Loc.—Redesdale ironstone shale.	Geol. Yks., pt. 2, pl. 18, f. 20–21.
<i>Orthoceras attenuatum</i> , <i>Flem.</i> Loc.—Redesdale ironstone shale.	Ann. Phil., Vol. 5, pl. 31, f. 3.
<i>Orthoceras cylindraceum</i> , <i>Flem.</i> Loc.—Redesdale ironstone shale.	Ann. Phil., Vol. 5, pl. 39, f. 4.
<i>Orthoceras Breynii</i> , (<i>Martin</i>) Loc.—Redesdale.	Pet. Derb., pl. 39, f. 4.
<i>Orthoceras annulatum</i> , <i>Sowerby</i> , Loc.—Otterburn.	Geol. Yks., pt. 2, pl. 21, f. 9, 10.

Name and Locality.	Reference.
Cyrtoceras Gesneri , (<i>Martin</i>) Loc.—Redesdale, Bellingham.	Petr. Derb., pl. 38, f. 2; Geol. Yks., pt. 2, pl. 21, f. 6 ? 12.
Actinoceras giganteum , <i>Sowerby</i> , Loc.—Stanhope in Weardale, Holy Island, etc.	Min. Conch., p. 246, Geol. Yks., pt. 2, pl. 21, f. 3.

Carboniferous Limestone :—Upper Series.

PISCES, FISHES.

Petalodus acuminatus , <i>Agassiz</i> , Loc.—Whorlton-on-Tees; Corbridge (<i>W. D.</i>).	Poiss. Foss., Vol. 3, pl. 19, f. 11, 13.
Chomatodus cinctus , (<i>Agassiz</i>) Loc.—Belsay (<i>M' Coy</i>).	Poiss. Foss., Vol. 3, pl. 15, f. 13–21.
Cladodus sp. indet. Loc.—Corbridge (<i>W. D.</i>)	
Gyracanthus tuberculatus , <i>Agassiz</i> , Loc.—In the Great-limestone, Stanhope- in-Weardale.	Poiss. Foss., Vol. 3, pl. 1a, f. 1–7.

Carboniferous Limestone :—Lower Series.

Rhizodus Hibberti , (<i>Agassiz</i>) Loc.—Redesdale ironstone; Scremerston.	Roy. Soc. Ed., Vol. 13, pl. 9.
Cochliodus contortus , <i>Agassiz</i> , Loc.—Near Cambo, in Drift.	Poiss. Foss., Vol. 3, pl. 14, f. 16–33; pl. 19, f. 14.
Cochliodus (<i>Pseph.</i>) magnus , <i>Agassiz</i> , Loc.—Lowick (<i>M' Coy</i>).	Brit. Pal. Foss., pl. 3 I., f. 22–15.
Cochliodus (<i>Xystrod.</i>) striatus , <i>Ag.</i> , Loc.—Otterburn; Lowick (<i>M. D.</i>).	Brit. Pal. Foss., pl. 3 I., f. 27.
Psammodus rugosus , var. porosus , <i>Ag.</i> Loc.—Lowick (<i>M' Coy</i>), etc.	Poiss. Foss., Vol. 3, pl. 13, f. 1–18.
Oracanthus minor , <i>Agassiz</i> , Loc.—In ironstone shale, Bellingham.	Poiss. Foss., Vol. 3, pl. 3, f. 5, 6.

Name and Locality.	Reference.
Leptacanthus Jenkinsoni , <i>M' Coy</i> , Loc.—Lowick.	Brit. Pal. Foss., pl. 35, f. 14–16.
? Leptacanthus , sp. Loc.—In ironstone shale, Redesdale.	
Cladodus , sp. indet. Loc.—In ironstone shale, Redesdale.	
Gyracanthus tuberculatus , <i>Agassiz</i> , Poiss. Foss., Vol. 3, Loc.—In ironstone shale, Redesdale, etc.	pl. 1a, f. 1–7.

Calceiferous Sandstone Series.

Rhizodus Hibberti , <i>Agassiz</i> , Loc.—Norham-on-Tweed, etc. (<i>Geo. Tate</i>).	Roy. Soc. Ed., Vol. 13, pl. 9.
Ctenodus , sp. Loc.—Norham-on-Tweed (<i>Geo. Tate</i>).	
Ctenoptychius pectinatus , <i>Agassiz</i> , Poiss. Foss. Vol. 3, Loc.—Norham-on-Tweed, etc. (<i>Geo. Tate</i>).	pl. 19, f. 2–4.

TUEDIAN GROUP (*Tate*).—This name has been applied by Mr. George Tate to a large series of beds, lying beneath the Carboniferous limestone of the last division, which are extensively developed on the banks of the Tweed, and in Berwickshire, in the neighbourhood of Edinburgh, and in Fife. “It is composed of numerous beds of grey, greenish, and lilac shales, sandstones, slaty and calcareous sandstones, thin beds of argillaceous limestone and chert, and a few buff-coloured magnesian limestones. It forms a well-marked transitional series, intercalated between the Scar limestone series and the Old Red Sandstone.” On the banks of the Whiteadder gypsum may be seen among the sandstones of this series.

“This group occupies a considerable area in the north of Berwickshire. There are good sections on the Tweed and Whiteadder. In Northumberland there are sections of it in Garmitage Bank and Crawley Dene, which are from six to nine miles west of Alnwick; and the same group is tilted up against

the Cheviot porphyry in Biddleston Burn, and in the Coquet below Linn Brig."—*Tate*.

Stigmaria, *Lepidodendra*, Coniferous trees, and other plants occur in some parts of the group. There are no workable beds of coal. The Fauna consists chiefly of fish-remains, *Modiolæ* and Entomostraca. In one bed on the Tweed, Orthocerata and Pleurotomariæ are associated with coniferous wood. The whole group is specially distinguished by the absence of Brachiopods, which are abundant in the overlying series. Generally fresh-water and lacustrine conditions are indicated; and when marine remains do occur, they are accompanied with plants which appear to have been swept into the shallow estuary."

The local fossils of this series are represented in the collection by one or two species collected at Norham by Mr. Geo. Tate, and are mentioned in the preceding list. A fuller list may be found in the Memoirs of the Geological Survey.

The Fossils illustrating this series from the neighbourhood of Edinburgh are arranged in Side-case 40.

DEVONIAN.

"In Northumberland we find it in Roddam Dene, on the flanks of the Cheviot porphyry, where it contains rolled pebbles, and blocks of this porphyry, showing that the Cheviots had been protruded previously to the deposition of the Old Red Conglomerate. In Berwickshire, where this formation occupies a considerable area, there is no physical break between the Old Red Sandstone and the Carboniferous formation; but the limits of the former are nearly marked by the occurrence of *Holoptychius nobilissimus* and *Pterichthys major*, which are characteristic of the upper beds of the Old Red Sandstone."—*Geo. Tate*.

SILURIAN.

"Small portions of this formation occur in the westernmost part of Northumberland, where it is seen on the flanks of the porphyry of the Cheviots, on the Coquet, above Philip, and again in a similar position at Whitelee on the Reed, near to Carter Fell."

A patch of Silurian rocks "occupy two or three square miles of ground at the head of Redesdale. They occur in a forked patch shaped like a barbed spear head. These old rocks consist of shales, of a kind at one time used by school children for slate pencils, and bands of greywacke. Certain finely grained and delicately striped-looking varieties contain remains of graptolites, but these fossils are seldom well preserved."—*Hugh Miller*.

Two species of *Monograptus* and two species of *Orthoceras* have been recorded in the Memoirs of the Geological Survey, Quarter-sheet, New Ser. No. 8.

ADDENDA.

COAL-MEASURE FUNGI.

(Omitted on page 267.)

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| Archagaricon | bulbosum, <i>Han. et Att.</i> , | Nat. Hist. Trans.
N., D., & N'C.,
Vol. 3, p. 327,
pl. 7, 8. |
| ————— | globuliferum, <i>H. et A.</i> , | Nat. Hist. Trans.
N., D., & N'C.,
Vol. 3, p. 328. |
| ————— | radiatum, <i>H. et A.</i> , | Nat. Hist. Trans.
N., D., & N'C.,
Vol. 3, p. 328. |
| ————— | dendriticum, <i>H. et A.</i> , | Nat. Hist. Trans.
N., D., & N'C.,
Vol. 3, p. 329. |
| ————— | conglomeratum, <i>H. et A.</i> , | Nat. Hist. Trans.
N., D., & N'C.,
Vol. 3, p. 329. |

CARBONIFEROUS LIMESTONE.

(Omitted on page 282.)

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| Archanodon | (Anodonta) <i>Jukesii</i> , <i>Forbes</i> , | Nat. Hist. Trans.
N., D., & N'C.,
Vol. 7, p. 173,
pl. 14. |
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NATURAL HISTORY SOCIETY
OF
NORTHUMBERLAND, DURHAM, AND NEWCASTLE-
UPON-TYNE.

ANNUAL MEETING, 12TH JULY, 1889.

REPORT, 1888—1889.

IN reviewing the work of the past eleven months, and presenting to the members a report of their labours and proceedings, the Committee wish to draw attention to the following particulars, premising that the affairs of the Society, as was to be expected after the novelty of the first opening of the New Building had passed off, have gone in a progressive way; much attention having been given to the improving and perfecting the arrangement of the different collections, in keeping the Building in an efficient state of repair, and in endeavouring to provide a Maintenance Fund, that will enable the Committee to complete the furnishing and arrangement of the Museum, by the purchase of cases and specimens of groups of animals not represented at present in the collections.

It was mentioned in the last Report that the requirement of additional funds for carrying out the objects of the Society would be best secured by the promotion of a Maintenance Fund, and the increase of the number of members or subscribers through the influence of the present members. A Maintenance Fund was accordingly established, and several very handsome donations have been given to this fund, but it is to be regretted that the number of contributors during the latter part of the

financial year have been very few. The sums which have been subscribed to this fund, together with several sums formerly bequeathed to form a Maintenance Fund, together with monies from Capital Account, have been invested by your Committee to the amount of five hundred pounds (£500) in River Wear Commissioners Bonds, so that an additional sum of £20 per annum has been added to the permanent income of the Society during the past year. But the Committee earnestly desire to point out that the increase in the number of members has been comparatively small, and barely sufficient to fill up the gaps caused by death and resignations. It is most desirable that the aid of individual members should be enlisted to increase the number of annual subscribers, but your Committee would also point out that the comparatively small income from annual subscribers shews more than any other argument the necessity of obtaining a permanent income, for the proper preservation of the collections, the general work of the Museum, and for maintaining the whole in an efficient and progressive condition.

At the meeting of the British Association in Bath last year it was decided that the next year's meeting (1889) should be held in Newcastle-upon-Tyne, under the presidency of Professor Flower. Shortly after, your Committee were requested to appoint six members of this Society to represent it on the General Local Committee appointed to arrange for the meeting in Newcastle. The following gentlemen were appointed, and have obligingly undertaken this duty, viz., Sir Lowthian Bell, Bart., Rev. Dr. Norman, Dr. Embleton, John Hancock, C. M. Adamson, and E. I. J. Browell. Application for the use of the Museum Rooms during the visit of the British Association in September next was made by the Local Secretaries, and was readily granted. It has now been decided by the Entertainment Committee that two Conversazioni shall be held in the Museum Rooms during the week of the Meeting.

The important question in connection with the Meetings of the British Association is as to the manner in which the Museum Rooms are to be illuminated, and whether in a temporary or permanent manner. Your Committee are now engaged in discussing

this question, and they hope they may be able to obtain if possible permanent fittings for the electric lighting of the rooms.

In connection with the future lighting of the Museum the Committee wish to mention that the use of the rooms was granted to the Incorporated Law Society for a Soiree in October last (1888), when they had an opportunity of judging the effect of a certain plan of electric lighting. The following report of this experiment will furnish the details, and give the results obtained on this occasion.

Report.—Electric Lighting.—Incorporated Law Society.

At the Soiree held in the Rooms of the Museum by the Incorporated Law Society the effect of lighting the Museum was fully shewn.

The three large rooms, the Upper and Lower West Corridors, the Library, the Ladies' Room, the Committee Room, three Staircases, and the Entrance Hall were lighted with electric lamps.

Messrs. Nichols and Jennings, London, were the contractors, and the electric power was obtained from two Dynamos, driven by two portable Steam Engines, all placed on the North side of the Work Rooms.

The three large rooms were each lighted with two 500-candle sunbeam lamps.

The Upper and Lower West Corridors, the Library, and the Entrance Hall each with forty-five 5-candle lamps, arranged in five rows across the rooms.

The Ladies' Room and the Committee Room and the three Staircases were lighted each with fifteen 5-candle lamps, and the Upper West Wing with nine 5-candle lamps.

The three large rooms were not sufficiently lighted, and the shadows were very strong. It was thought there should have been four lamps in each of the large rooms instead of two. In other parts of the building the lighting was satisfactory.

In the front of the Museum were two 500-candle lamps, and the gas lamps on each side the steps and the front gates, which gave sufficient and satisfactory lighting.

Lighted oil lamps were placed in all the large rooms, in case the electric light should fail.

The President of the North of England Microscopical Society which numbers about seventy members, laid a request before the Committee for permission for the officers of that Society to deposit their books and specimens in some part of the Museum, and expressed a desire that the Microscopical Society might be able to obtain the use of rooms for holding their evening meetings in the Museum. The Committee have cordially granted this request, so far as the depositing of books and specimens is concerned during their pleasure; but as the question of lighting the Museum is still under discussion, the latter request for holding meetings in the Museum was left open.

It became necessary during the year to examine the state of the roof of the Building, when it was found that the woodwork required repainting, the glass fresh putty, and the slates slight repairs. Estimates were obtained and accepted, the painting and glazing £42 : 4 : 0, and for slater's work £5 : 9 : 3, making a total of £47 : 13 : 3. These are the largest incidental expenses your Committee have been called upon to meet during the year.

Considerable improvement has been effected in the Hancock Bird Room, by the removal of the groups of Foreign Birds to the cases reserved for a typical collection of Birds in the Gallery of the same room. It is hoped, as soon as funds can be raised to procure cases, that this important part of the Bird Collection will be proceeded with, and made somewhat more complete and instructive.

General labels have been placed on all the mineral and palæontological cases in the Geological Room, so that students and others interested in geology can now more readily refer to the specimens.

The Committee have also decided to give free access during Museum hours to the Professors and Students of the Durham Physical College, many of whom have availed themselves of this privilege.

DONATIONS, ETC.

The exchanges and donations of Books and Transactions have continued much the same as in former years. About eighty volumes and parts of Transactions have been received. There has been a slight diminution in the number of specimens presented to the Society compared with previous years. But among those received are some which, from their great value, should be specially mentioned in this Report. Mrs. Mountain, ever desirous of benefiting this Society, has generously presented a fine engraving of Leslie's picture of the "Queen receiving the Sacrament at the Coronation," and five engravings by Andran, from pictures by Le Brun, representing scenes in the life of Alexander the Great. These engravings were found in a box, which had belonged to the last Earl of Derwentwater.

Mr. John Hancock has still further increased the Bird Collection and the indebtedness of the Society to him, by presenting a collection of 1659 carefully selected skins of rare and interesting birds, the contents of his Bird Cabinet, and 44 skins of mammals.

Edmund J. Garwood, Esq., B.A., Camb., has made a most acceptable addition to the Palæontological Collection of a series of Fossils collected by himself, consisting of Trilobites, etc., from the Cambrians of North Wales; of Graptolithes, from the Coniston Mudstones, and other Silurian fossils. Also specimens from the St. Cassian beds of Italy and from the Atherstone Clay.

Some exceedingly interesting additions to the Coal Measure Plants have been made by T. W. Embleton, Esq., Methley, Leeds. These consist of several fine examples of *Sphenopteris Artemisiæfolia*, collected many years since at Fawdon Old Colliery; and remains of Fishes, etc., from the Yorkshire Coalfield, with specimens of Fluid Bitumen and *Middletonite*, from Middleton, near Leeds.

Joseph Crawhall and J. W. Barnes, Esqs., the executors of the late Miss Isabella Bewick, having made a request that an extract from Miss Isabella Bewick's will, which relates to the

prints and drawings presented by them to this Society should be printed in the next volume of the Transactions, the Committee have thought it desirable to include in this Report a copy of Messrs. Crawhall and Barnes' schedule of the drawings and prints, and also their letter to Mr. John Hancock presenting these prints and drawings through him to the Society, and containing also the extract of the will above referred to.

*Copy of letter sent by Messrs. Joseph Crawhall and J. W. Barnes
with the annexed Schedule to John Hancock.*

“NEWCASTLE-UPON-TYNE,

“MARCH 14TH, 1884.

“DEAR MR. HANCOCK,

“By the will of the late Miss Isabella Bewick, of Gateshead, who died on the 8th June last year, we were appointed Executors, and entrusted with the following bequest :—

“‘I give and bequeath all my Paintings, Water Colours, Prints, and Engravings, in and about my dwelling house, and the cast of the bust of my late father, with its pedestal, to my said Executors absolutely, in the belief and confidence that they will present and dispose of the same to such institution or institutions which, in their uncontrolled discretion, they think will best perpetuate and keep alive the memory of my late father, Thomas Bewick, and his ability.’

“In carrying out this direction of the Testatrix, we have regarded the claims of Newcastle-upon-Tyne as paramount, and have therefore selected the articles enumerated in the schedule annexed, and now beg to offer them as a gift to the Newcastle-upon-Tyne Natural History Society.

“May we add that the great interest you take in the New Museum, your keen sympathy with Bewick's work, and your long friendship with his family, afford us additional pleasure in making this offer at your hands.

“We remain,

“Yours very truly,

(Signed)

“JOSEPH CRAWHALL.

“J. W. BARNES.

“To John Hancock, Esq.,

“St. Mary's Terrace.”

*Schedule of Oil Paintings, Water Colour Drawings, Prints, etc.,
presented by the Executors of Isabella Bewick, deceased, to the
Museum of the Natural History Society of Northumberland,
Durham, and Newcastle-upon-Tyne.*

Portrait of Thomas Bewick, by J. Ramsay, oil painting.

Do. do. by T. S. Good, do.

Do. do. miniature, by Miss Kirkley.

Do. do. do. by Murphy.

Do. do. do. by Plymer.

Do. miniature of Moses Griffith, friend of Pennant.

Do. of John Bewick, by Geo. Gray? crayon.

Do. of Robert E. Bewick when a boy, by John Bell, oil painting.

DRAWINGS.

Twelve small coloured drawings of Foreign Birds, unmounted.

Sketch of Horse, in crayons, by John Bewick.

Eighty-nine coloured drawings of Wycliffe Birds, nearly all foreign,
mounted on ten sheets, and numbered 1, 2, 3, 5, 7, 8, 10, 11, 12.

Twelve coloured drawings of Birds, mounted on six sheets, by Rev. —
Kingsley:

Roller, Nutcracker, Great Spotted Woodpecker, Chough, Red-breasted
Shrike, Cuckoo, Bunting, Ptarmigan, Jackdaw, Hooded Crow,
Turtle Dove, and Pied Flycatcher.

Two drawings, mounted by Ruskin, on one sheet:

Wren, coloured, and vignette in pencil.

Forty-six drawings of Water Birds, mounted on four sheets, numbered
3, 5, 6, 7:

Sheet 3.—Olivaceous Gallinule, Water Hen, Head of Razorbill,
Little Grebe, Great Crested Grebe, Great Auk, Do. Do., Selavonian
Grebe, Red-throated Diver, Black Guillemot, Great Northern
Diver, all coloured.

Sheet 5.—Goosander, Merganser, Sinew, Red-breasted Goose, Eider
Duck, Brent Goose, Bean Goose, Eider Duck (coloured), and
Gooseander, Wild Swan, Mute Swan, Do. Do. (in pencil).

Sheet 6.—Wigeon, Golden-Eye, Sheldrake, Cormorant, Longtailed
Duck, Tufted-Duck, Golden-Eye, Gargany, Gannet (coloured),
and Pintail and Castaneous Duck (in pencil).

Sheet 7.—Scoter (coloured), and Cormorant (young), Gannet, Oli-
vaceous Gallinule, and eight portions of Birds (in pencil).

Thirty-five drawings, mounted on nine sheets, A to I inclusive:

Sheet A.—Great Plover, Greenshank (coloured), and Goshawk (in
pencil).

Sheet B.—Crossbill (red plumage), Whinchat, Yellow Wagtail (coloured), and Little Stint (in pencil).

Sheet C.—Capercaillie, Night Heron, and two Vignettes (coloured).

Sheet D.—Foreign Lark, Green Woodpecker, a Spotted Crake, Nightingale (coloured).

Sheet E.—Redwing, Great Blackbacked Gull (young), Blackheaded Gull (immature), Rednecked Phalarope (coloured).

Sheet F.—Reed Fauvette, Ash-coloured Sandpiper, Wryneck, Snipe (coloured).

Sheet G.—Dunlin, Longtailed Tit, Goldfinch (coloured), and Jacana-like Bird and Peacock (in pencil).

Sheet H.—Four vignettes, coloured.

Sheet I.—Three do. do.

Sixty-eight drawings, in pencil, mounted on three sheets, numbered 10, 11, 12 :

Sheet 10.—Bernicle Goose, Spurwinged Goose, Gadwall, Wild Duck, Brent Goose, Egyptian Goose, Muscovy Duck, King Duck, Cravat Goose, Shoveller, Whitefronted Goose, Scaup Duck, Gargany, Egyptian Goose, Harlequin Duck, Bimaculated Duck.

Sheet 11.—Twenty-three vignettes, in pencil.

Sheet 12.—Twenty-nine do. do.

Twenty-five sketches, in pencil, mounted on three sheets of tinted paper, numbered 13, 14, 15 :

Sheet 13 contains nine sketches.

Sheet 14 „ eight do.

Sheet 15 „ eight do.

Fourteen slight sketches of Animals, in pencil.

Ten do. do. do. do.

Fourteen drawings of Birds, in colour :

Great Bittern, Sparrow Hawk, Rednecked Grebe, Magpie, Pennant's Parrot, Red Wagtail, Common Fowl, Waxwing, Kestrel, Golden Plover, Red Phalarope, Dipper, Redthroated Diver, Nightjar.

Drawing, Whitley Ox.

Slight pencil sketch, called Chillingham Bull.

Pidcock's Elephant, in pencil.

Sketch of Sheep, in pencil.

Horse and Groom, in pencil.

Whitley Ox, in Indian ink.

Spotted Hyæna, in pencil.

Two hundred and fifty-five slight drawings, by Thomas, John, and Robert Bewick.

A set of the Cuts of the Quadrupeds coloured by Bewick for his children, bound.

Eleven engraved portraits of Thomas Bewick.

Four vignettes, in frame, water colours :

Man with Leister, Rock with Stone Monument, Man and Dog at
Park Gates, Men carrying large Tub.

Four vignettes, in frame, water colours :

Cottage in Winter, Wreck of Boat lying on Shore, Monumental Stone
and Figures, Dog and Hen and Chickens.

Framed, Pennant's Short-eared Owl, water colour.

Do. Spearman's Kylee Ox, do.

Do. Ox Grazing, do.

Do. Chillingham Bull, proof on vellum, border in first state.

Do. Trotting Horse, lithograph by Thomas Bewick.

Do. Waiting for Death, proof on vellum.

Do. Lion done for Gilbert Pidcock.

Do. Elephant do.

Do. Whitley Ox, drawn and engraved on copper by Thomas Bewick,
1789.

Do. Old Horse, small copperplate, by T. Bewick.

Do. Huntsman and Hound, woodcut

Do. Ramsay's portrait of T. B., engraved by Burnet.

WOOD ENGRAVINGS.

Prints of Quadrupeds, Land and Water Birds, Foreign Birds, British Fishes,
Vignettes, Prints for Æsop's Fables, Select Fables, etc., etc., amounting
to about 2,445 examples.

Bailey's Bust of Bewick, in plaster, and pedestal.

The remainder of the donations to the Society are contained
in the usual List of Donations appended to this Report.

In summer the Museum is kept open till six o'clock, and the
Committee wish to point out and emphasize the fact, that on
the Saturday, when the working men are most at liberty, very
few avail themselves of the opportunity to visit the Museum.
It was the same during the last year, when the Committee tried
the experiment of keeping it open till eight o'clock. So few
availed themselves of the opportunity, that your Committee
again recommended that the Museum should not be kept open
later than six p.m. at the present time.

The thanks of the Society are due to Mr. Ald. Barkas, F.G.S.,
who has on several occasions announced his intention of giving
an explanation of the contents of the Museum. At such times

a better attendance has been obtained, and much interest has been shewn by those present.

The Committee have given a free invitation to all the Charitable Institutions of the town to bring the children to the Museum at any time that may be arranged with the Secretaries, and many of these institutions have availed themselves of this offer. The children from the Ragged School have paid frequent visits, as also the children from the Northern Counties' Orphanages, and the Prudhoe Street Mission School, etc.

But the visitor most interested in the Museum during the year has been the Rev. H. H. Higgins, M.A., of Liverpool, whose name and work is so well known in connection with the Free Museum of that town. This gentleman walked through this Museum in an ecstasy of delightful approval and appreciation—the approval of one most competent to judge as well as to enjoy, and it is a regret that more were not present to hear the encomiums bestowed on the work he was, above most men, most able to appreciate. The following words of his, written some time since, should be well pondered by all those interested in Museum management. He says, “*The most important function of a Museum is not so much to instruct, as to win and encourage minds to get themselves instructed through habits of observation.*”

Some months since your Committee passed a resolution that the Annual Accounts should be made up to the end of June each year, in order that the Annual Meeting of the Society might be held in July, in conformity with Rule III. It will thus be seen that the Honorary Treasurer's Balance Sheet covers a period of only eleven months, *i.e.*, from August 4th, 1888, to June 30th, 1889. The Balance Sheet of the Honorary Treasurer for this period shews a balance of £106 : 18 : 10, in comparison with £110 : 5 : 9, the balance in hand in August last. It will be evident to all by a reference to the Balance Sheet that the affairs of the Society have been carried on with the strictest economy.

The Society has lost eleven Members by resignations and deaths, and twenty-seven new Members have been elected during the financial year, making the total number of members at the present time about 310.

The following ladies and gentlemen have been elected members during the year, August, 1888 to July 1st, 1889 :—

Adamson, Lawrence, Whitley.
 Anne, Major Ernest, Burgwallis Hall, Doncaster.
 Barnes, Mrs., Whitburn.
 Beck, W. E., 45, Eldon Street.
 Bedson, Prof. P. P., 18, Moor View.
 Blackett, William, 6, Windsor Crescent.
 Bowden, Thomas, 22, Mosley Street.
 Brewis, G. R., Ellesmere Villa East.
 Cooke, Thomas, 24, Grainger Street.
 Dickinson, John, Park House, Sunderland.
 Dixon, John Arch., West Street, Gateshead.
 Glendinning, William, 39, Jesmond Road.
 Handysides, William, Framlington Place.
 Hobbs, Philip, 1, Otterburn Villas.
 Leech, Charles C., Seghill Colliery.
 Lilburn, Charles, Glenside, Sunderland.
 Logan, James, 5, Osborne Villas.
 Lawson, Rowland, 3, Sydenham Terrace.
 Newton, Edward, Grainger Street.
 Noble, Miss, Jesmond Dene House.
 Patterson, William, 12, Bolton Terrace.
 Pelegrin, Mannel Jose, 3, Jesmond High Terrace.
 Potts, Joseph, 35, Jesmond Road.
 Richardson, Arthur, 34, Burdon Terrace.
 Ross, Andrew, Dean Street.
 Sanderson, Thomas, Osborne Villas.
 Thompson, Miss Jessica, Winlaton.

ABSTRACT OF MINUTES.

The Hon. Secretary read the Committee's Report.

After some remarks by Mr. John Philipson, Prof. Lebour moved, and Mr. Martin seconded :—

“That the Report now read be adopted.”

The Report of the Hon. Treasurer was presented. Mr. John Philipson proposed, and Mr. Walker seconded :—

“That the Hon. Treasurer's Report be adopted.”

Resolved that the thanks of the members be sent to Mr. J. W. Swan, for his most kind offer to present the lamps required for the electric lighting of the Museum.

On the motion of the Chairman, A. S. Stevenson, seconded by Mr. Sopwith, a vote of thanks was passed to the Auditors, Committee, Hon. Treasurer, and Secretaries, for their labours in conducting the affairs of the Society.

THE HONORARY TREASURER IN ACCOUNT

CURRENT ACCOUNT FROM 4TH AUGUST,

1888.	RECEIPTS.	£	s.	d.
Aug. 4.	To Balance from last Account	110	5	9
1889.				
July 1.	„ Members' Subscriptions.....	303	6	0
	„ Admissions to Museum.....	165	18	3
	„ Guides to Museum sold.....	6	2	1
	„ One Year's Interest on £2000 Newcastle Corporation Stock, less Income Tax.....	68	5	0
	„ Discount	0	3	5

£654 0 6

July 1. To Balance forward..... £106 18 10

WITH THE NATURAL HISTORY SOCIETY.

1888, TO JULY 1ST, 1889.

1889.	PAYMENTS.	£	s.	d.
July 1.	By Curator's Salary, 11 months.....	183	6	8
	„ Keeper's „ „	82	10	0
	„ Assistants' „ 47 weeks	129	5	0
	„ Sundries, per J. Wright	15	14	1
	„ Coal, Coke, Gas, and Water	31	16	9
	„ Tradesmen's Accounts	19	16	3
	„ Insurances	15	4	0
	„ Taxes	1	8	6
	„ Advertisements	1	7	8
	„ John Bell, Printing	18	14	6
	„ G. G. Laidler, Painting Roof	42	4	0
	„ Sanderson & Co., Slates	5	9	3
	„ Cheque Book	0	5	0
	„ Balance	106	18	10
		<u>£654</u>	<u>0</u>	<u>6</u>

I. G. DICKINSON,

HON. TREASURER.

Examined and found correct,

JNO. D. SCOTT,	} AUDITORS.
E. O. REID,	

THE HONORARY TREASURER IN ACCOUNT
MAINTENANCE FUND,

1889.	£	s.	d.
July 1. To Subscriptions to Maintenance Fund from June 14, 1888, to June 30, 1889.....	218	19	0
„ Miss Alder's Legacy, with Interest thereon drawn from Savings Bank	23	16	5
„ Deposit Receipt and Interest, Miss Isabella Bewick's Legacy	256	17	3
„ Deposit Account and Interest at Messrs. Lambton & Co.'s.....	70	2	3
	<u>£569 14 11</u>		

July 1. To Balance forward £10 4 2

WITH THE NATURAL HISTORY SOCIETY.

1st JULY, 1889.

		£	s.	d.
1889.				
Jan. 29.	By Invested in River Wear Commissioners' Bonds at $4\frac{1}{2}$ per cent. Premium and Brokerage.....	559	10	9
July 1.	„ Balance in Bank	10	4	2
		<hr/> <hr/> £569 14 11 <hr/> <hr/>		

I. G. DICKINSON,
HON. TREASURER.

Examined and found correct,

JNO. D. SCOTT, }
E. O. REID, } AUDITORS.

THE HONORARY TREASURER IN ACCOUNT
CAPITAL ACCOUNT,

1889.	£	s.	d.
July 1. To Legacy bequeathed by the late Miss Alder, and Bank Interest thereon to January, 1889	23	16	5
„ Legacy bequeathed by the late Miss Isabella Bewick, and Bank Interest thereon to January, 1889.....	256	17	3
„ Invested in Newcastle $3\frac{1}{2}$ per cent. Corporation Stock, as per last Capital Account.....	2000	0	0
„ To Donations to the Maintenance Fund to June, 1889.....	218	19	0
„ Deposit Receipt and Bank Interest thereon, Messrs. Lambton & Co.....	70	2	3
	<u>£2569 14 11</u>		

July 1. To Balance, as per Maintenance Fund Account £10 4 2

WITH THE NATURAL HISTORY SOCIETY.

1st JULY, 1889.

1889.	£	s.	d.
July 1. By Invested in Newcastle Corporation $3\frac{1}{2}$ per cent.			
Stock	2000	0	0
,, Invested in River Wear Commissioners $4\frac{1}{2}$ per cent.			
Stock, £500, with Premium and Brokerage ...	559	10	9
,, Balance, as per Maintenance Fund Account	10	4	2
	<hr/>		
	£2569 14 11		
	<hr/>		

I. G. DICKINSON,

HON. TREASURER.

Examined and found correct,

JNO. D. SCOTT,

E. O. REID,

} AUDITORS.

OFFICERS OF THE NATURAL HISTORY SOCIETY, 1889-90.

PATRONS.

His Grace the Duke of Northumberland, K.G.
The Rt. Honorable Lord Armstrong, C.B., F.R.S.

PRESIDENT.

The Lord Bishop of Durham.

VICE-PRESIDENTS.

<p>The Lord Bishop of Newcastle. The Rt. Hon. the Earl Ravensworth. The Rt. Hon. the Earl of Tankerville. Sir Lowthian Bell, Bart., F.R.S. The Worshipful the Mayor of Newcastle. Lieut.-Col. Addison Potter, C.B. John Clayton, Esq. John Hancock, Esq. D. Embleton, Esq., M.D., F.R.C.P. John A. Woods, Esq.</p>	<p>George Hare Philipson, Esq., M.D., F.R.C.P., M.A., D.C.L. Thomas Bell, Esq. John Daglish, Esq. John Rogerson, Esq. J. W. Swan, Esq. Capt. A. Noble, C.B. Joseph Blacklock, Esq. John Coppin, Esq. D. O. Drewett, Esq.</p>
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TREASURER.

I. G. Dickinson, Esq.

SECRETARIES.

Wm. Dinning.	A. H. Dickinson.
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COMMITTEE.

<p>Mr. C. M. Adamson. Mr. H. T. Archer. Mr. E. I. J. Browell. Mr. John Glover. Mr. R. Y. Green. Mr. Wm. Maling.</p>	<p>Mr. N. H. Martin. Mr. H. N. Middleton. Rev. A. M. Norman, M.A., D.C.L. Mr. John Pattinson. Mr. A. S. Stevenson. Mr. Thos. Thompson.</p>
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AUDITORS.

John D. Scott.	E. O. Reid.
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HONORARY CURATORS,

1889-90.

ZOOLOGY.

VERTEBRATA.

John Hancock.
D. Embleton, M.D.

Samuel Graham.
Thos. Thompson.

INVERTEBRATA.

Rev. A. M. Norman.
John Hancock.
C. M. Adamson.
Wm. Maling.
N. H. Martin.

W. Dinning.
Prof. Jayme Batalha-Reis.
M. W. Henderson.
George Sisson.

BOTANY.

Rev. Henry Fox, Durham.
Rev. Wm. Johnson, So. Shields.

C. E. Stuart.

GEOLOGY.

E. I. J. Browell.
J. Daglish.
W. Dinning.
E. J. Garwood.

J. W. Kirkby.
Prof. Lebour.
Jno. Pattinson.

CURATOR.

Richard Howse.

KEEPER OF THE MUSEUM.

Joseph Wright.

LIST OF EXCHANGES AND DONATIONS TO THE MUSEUM AND LIBRARY

OF

THE NATURAL HISTORY SOCIETY,
FROM AUGUST 10TH, 1888, TO JULY 1ST, 1889.

AMERICAN SOCIETIES.

Boston :—Society of Natural History.

Proceedings, Vol. 23, Parts 3, 4.

The Society.

Boston :—American Academy of Arts and Sciences.

Proceedings, Vol. 15, New Series, Part 1, 1887-88.

Memoirs, Centennial, Vol. 11, Parts 5, 6, 1887-88.

The Academy.

Cambridge, Mass., Museum of Comparative Zoology, Harvard College.

Bulletin, Vol. 13, No. 10.

„ „ 16, Nos. 2, 3, 4.

„ „ 17, „ 1, 2, 3.

Annual Report, 1887-8.

Prof. Alex. Agassiz.

New York :—Academy of Sciences.

Annals, Vol. 4, Nos. 5, 6, 7, 8. 1888.

The Academy.

Philadelphia :—Academy of Natural Sciences.

Proceedings, Parts 2, 3. 1888.

The Academy.

Philadelphia :—American Philosophical Society.

Transactions, Vol. 16, N. S., Part 2.

Proceedings, Vol. 25, No. 128.

The Society.

St. Louis :—Academy of Science.

Transactions, Vol. 5, Nos. 1, 2. 1886-88.

The Academy.

Washington :—Smithsonian Institution.

Smithsonian Miscellaneous Collections, Vols 32, 33.

The Institution.

Washington :—United States Geological Survey.

Emmon's Geology and Mining Industry of Leadville.

Monograph 12, with Atlas.

Bulletin, 40-47. 1887-88.

Mineral Resources of the U.S., Day. 1887.

The Director of Geol. Survey.

South America.

Anales del Museo Nacional Republica de Costa Rica, Tom 1. 1887.

The Museum.

COLONIAL SOCIETIES.

Canada.

Montreal—The Canadian Record of Science, Vol. 3, Nos. 4, 5, 6.

Natural History Society of Montreal.

Ontario—Geological and Natural History Survey of Canada, Vol. 2,
1886, and Maps 1, 3, 4, 5, 6, 6a, 7.

Catalogue of Canadian Plants, Part 4, Endogens. 1888.

The Survey, per A. R. C. Selwyn, Director.

Sydney, N.S.W. :—Australian Museum.

Report of Trustees, 1887.

Catalogue of Fishes, Part 1, Palæichthyan Fishes.

„ Sponges, by R. von Lendenfeld.

„ Medusæ, by „ Ph.D, F.L.S.

Trustees of Australian Museum, Sydney.

Sydney, N.S.W. :—Royal Society.

Journal and Proceedings, Vol. 22, Part 1. 1888.

The Society.

Victoria.

Melbourne—Prodromus of Zoology of Victoria Decades, 16, 17.

The Government of Victoria.

EUROPEAN SOCIETIES.

Bergen.

Museums Aarsberetning, 1887.

The Director of the Museum.

Bohemia.

Archiv de Naturwissenschaft Landesdurchforschung von Böhmen :

Band 6, No. 2, 1887 ; No. 4, 1887 ; No. 6, 1888. *The Society.*

Brussels :—Société Royale Malacologique de Belgique.

Annales, Tome 22 (4 ser., t. 2).

Proces-verbaux, January to June, 1888.

The Society.

Christiania :—Royal Norske University.

Viridarium Norvegicum III., 2nd Bd., 2nd Heft, for 1887.

The University.

Copenhagen.

Videnskabelige Meddeleser fra Naturhistorisk Forening in Kjøbenhavn,
for Aaret 1888.

The Society.

Dresden:—Isis Natural History Society.

July—Dec., 1886.

Jan.—June, 1888.

,, ,, 1887.

July—Dec., 1888. *The Society.**Hungary.*Transactions of the Natural History Society of Trensín, 10th year.
1887. *The Society.**Lisbon.*Ornithologie D'Angola par J. V. Barboza der Bocage, 1881.
*Prof Jayme Batalha-Reis.**Russia—Kieff.*Memoires de la Société des Naturalists de Kiew, Tom 9, Parts 1, 2;
Tom 10, Part 1. *The Society.**Vienna.*Verhandlungen der K. K. Zool-Botanical Gesellschaft in Wein:
Jahrgang, 1888; Band 38, Quartal 3, 4. *The Society.*

BRITISH SOCIETIES.

Berwickshire:—Naturalists' Field Club.

Proceedings, Vol. 12, No. 1.

*The Club.**Cardiff:—Naturalists' Society.*

Transactions, Vol. 20, Parts 1, 2.

*The Society.**Dublin:—Royal Society.*

Transactions (Series 2), Vol. 3, Part 14; Vol. 4, Part 1.

Proceedings (New Series), Vol. 7, Parts 7, 8; Vol. 6, Part 1.

*The Society.**Edinburgh:—Geological Society.*

Transactions, Vol. 5, Part 4.

*The Society.**Edinburgh:—Scottish Meteorological Society.*

Journal, 3rd Series, No. 5, 1887.

*The Society.**Essex:—Field Club.*

Essex Naturalist, Vol. 2, Nos. 7, 8, 9, 10, 11, 12.

*The Club.**Glasgow:—Geological Society.*

Transactions, Vol. 8, Part 2.

*The Society.**Glasgow:—Natural History Society.*

Proceedings and Transactions, Vol. 2 (New Series), Part 1, 1886-87.

Greenwich:—Royal Observatory.

Results of Magnetical and Meteorological Observations, 1886.

Liverpool:—Naturalists' Field Club.

Proceedings, 1887-88.

*The Club.**London:—Geologists' Association.*

Proceedings, Vol. 10, Nos. 7, 8, 9.

,, ,, 11, No. 1.

*The Association.**London:—Quekett Microscopical Club.*

Journal, Series 2, Vol. 3, Nos. 23, 24.

*The Club.**London:—Zoological Society.*

Proceedings, Parts 3, 4, 1888; Part 1, 1889.

*The Society.**Manchester:—Field Naturalists' Society.*

Report and Proceedings, 1887.

*The Society**Manchester:—Lit. and Phil. Society.*

Memoirs and Proceedings, 4th Series, Vol. 1.

*The Society.**Newcastle-upon-Tyne:—North of England Institute of Mining and Mechanical Engineers.*

Vol. 37, Parts 5, 6; Vol. 38, Parts 1, 2.

*The Institute.**Plymouth Institution and Devon and Cornwall Nat. Hist. Society.*

Transactions, Vol. 10, Part 1, 1887-88.

*The Institution.**Yorkshire:—Philosophical Society.*

Annual Report, 1888.

The Society.

BOOKS, DRAWINGS, ETC.

Pamphlets on the History, Laws, etc., of Siam, viz.:

3 History, 3 Laws, 1 Bangkok Centennial, and 1 Siamese Directory.

Four Photographs of Royal Family and three of Palace and Temple.

Com. A. J. Loftus, F.R.G.S., per James Radford, Esq.

Pamphlet by James Bennie: The Redemption of Sandstone Quarries.

The Author.

Catalogue of Butterflies collected in Burmah, by Major C. H. E. Adamson.

*The Author, per C. M. Adamson, Esq.*Portrait of Thomas Bewick, by W. Nicholson, engraved by Thos. Ranson, 1816. *Mrs. Joshua T. Naylor, 12, Northumberland Ter., Tynemouth.*

Five fine Engravings by Andran, from pictures by Le Brun, of scenes in the life of Alexander the Great, found in a box belonging the Earl of Derwentwater; also one by Cousins, from the picture by Leslie, of the Queen receiving the Sacrament at the Coronation.

Mrs. Mountain, St. Mary's Terrace.

Rhopalocera Exotica, Parts 6, 7, 8.

Purchased.

MAMMALS.

1888.
Nov. Common Squirrel, *Sciurus vulgaris*, from Cotherstone.
Miss E. Tweedale, Mistletoe Road.
- Dec. Skeleton of Rat with abnormal growth of teeth, taken at Carr's Hill, Whitfield, West Allen. *Mr. J. Merryweather.*
1889.
Jan. A very large specimen of the Brown Rat, from Callerton.
Mr. E. O. Reid.
- June. Two Skulls of Wapiti, *Cervus Wapiti*, var. of *Cervus elaphus*, and Lower Jaw of Caribou. *Mr. Wm. Charlton.*

BIRDS.

1888.
Aug. Young Cuckoo. *Miss Robson, Byrness, Redewater.*
- " Two cases of Gallinaceous Birds, from India.
H. B. Riddell, Esq., Whitefield House, Rothbury.
- " Manx Shearwater (first plumage), from Island of Eigg.
Mr. Thos. Thompson, Winlaton.
- Sept. Common Sandpiper, *Totanus hypoleucos*, shot on the Leazes.
Mr. H. A. Innes.
- Oct. Hooded Crow, *Corvus cornix*, from Nunnykiuk. *Mrs. Noble.*
- " Group of Bullfinches (male and female), killed against window at Oatlands. *Mr. John Hancock.*
- " Common Gull, *Larus canus* (first plumage).
Black-headed Gull, *L. ridibundus* (bird of the year), from Hebburn Reservoir. *Mr. James S. Forster.*
- Nov. Portion of Skeleton of Sandgrouse, killed in 1863.
" " " killed at Craggside, 1888.
" " Red Grouse and Breastbone of Common Partridge. Skeleton of Ring Dotterel. *Mr. John Hancock.*
- " A live Hobby, *Falco subbuteo*, and Kestrel, *Falco tinnunculus* (female), caught in the Red Sea. *Capt. N. R. Sayers.*
- " Pied Blackbird, shot at the Felling, Nov., 1888.
Rev. E. Haythornthwaite.
- Dec. Two cases of specimens. One case containing Cardinal Grosbeak, Whimbrel, Green Paroquet, Squirrel, and Four-horned Cottus, stuffed by R. R. Wingate, for John Hancock, before 1825; and one containing Merlin, from which Bewick's figure of his Stone Falcon was made (see edition 1826), Rosehill Paraquet, Trunk Fish, Land Rail, Hawfinch, and Knot, stuffed by John Hancock about 1826-27. *Mr. John Hancock.*
- " Gentoo Penguin, from the Falkland Islands. *Mr. Philip Hobbs.*
- " Specimen of Willow Grouse (summer plumage), mottled variety, said to be from Thurso, but locality not verified. *Exchange.*

- Dec. 1 Bonaparte's Gull (adult), 2 Sooty Terns, 1 Lesser Sooty Tern, 2 Noddy Terns, 4 Whiskered Terns, 2 White-winged Black Terns, 4 Caspian Terns, 2 *Sterna Sinensis*, the Chinese representative of our *Sterna minuta*; 18 specimens.
Mr. Howard Saunders, 7, Radnor Place, Hyde Park.
- „ 12 Bird Skins, viz.:—1 Ruff, 1 Swift, 1 Pied Wagtail, 1 Stonechat, 2 Tree Sparrows, 2 Common Sandpipers, 1 Long-tailed Tit, 1 Wood Wren, 1 Rock Pipit, 1 Barbet. *Mr. E. Bold, Longbenton.*
- „ Three Dunlins, *Tringa alpina*, shot at Holy Island.
Mr. J. D. Walker.
- „ Red-throated Diver, *Colymbus septentrionalis*, shot at Holy Island.
Mr. H. C. Swan.
- „ Pheasant, a very fine specimen, from Longhirst.
James Joicey, Esq., M.P., Longhirst Hall.
- 1889.
- Jan. Australian Thick-knee Plover. *Mr. J. Manuel.*
- „ Teal (mature male). *Mr. James Joicey, Urpeth.*
- „ Pomarine Skua (almost mature), shot at Prestwick Car, about 1867.
Mr. W. E. Beck.
- „ Common Pheasant, shot at Urpeth. Very nearly in the plumage of the old Brown Pheasant. *Jas. J. Joicey, Esq., Urpeth Lodge.*
- „ Five Hawfinches, shot at Beaufront.
Mr. A. Robson, Beaufront Kennels.
- „ Two specimens of the Wavy or Blue-winged Goose, *Anser caerulescens*, Linn., from Hudson's Bay Territory.
John Rae, Esq., M.D., LL.D., F.R.S.
- Feb. Tree Creeper, *Certhia familiaris*, shot at Woodburn.
Mr. Edward Newton.
- „ Young Shag (in first plumage). *Purchased.*
- „ Australian, or New Holland Goose, *Cereopsis Novæ-Hollandiæ*, from the Leazes Park. *The Corporation of Newcastle.*
- „ Bahama Duck, *Dafila Bahamensis*, Linn. (female).
Mrs. Noble, Jesmond Dene House.
- Mar. Young Curlew, Young Wren, Young Pheasant.
Mr. Wm. Yellowley, Jun., So. Shields.
- „ Red-throated Diver, shot at Holy Island.
- „ Two Crossbills, shot at Winlaton. *Mr. Thos. Thompson, Winlaton.*
- „ A large collection of British, European, and Indian Bird Skins: 1659 in cabinet and 457 in bags; and 44 Mammalian Skins in cabinet.
Mr. John Hancock.
- „ Two Green Woodpeckers, from Hampshire. *Mr. S. Graham.*
- May. Pheasant, Hybrid between the Common and Golden Pheasant, bred at the Leazes Park. *The Corporation of Newcastle.*

- June. Two Eggs laid by Captain Salvin's trained Goshawk. First egg laid April 24th, second, April 27th, 1889. One egg laid by same bird received last year.
 Egg of a small Horned Owl, laid in captivity. *Capt. F. H. Salvin.*
 „ Head of Albatross, shot off the Cape of Good Hope, 1887.
Armourer-Sergt. Lister, Peterborough St., Gateshead.
 „ Eleven Skins of New Zealand Birds, from North Island, sent in spirits to Mr. J. Hancock. In the same jar were two Huias, a Blue-wattled Crow, and New Zealand Quail, which are stuffed, and in the collection. *Mr. G. H. Swan.*

FISHES, ETC.

1888.
 Aug. Lesser Spotted Dogfish, taken at Redcar. *Mr. John A. Mather.*
 „ Australian Snake, from Queensland.
Mr. G. S. Potter, Heaton Hall.
 1889.
 May. Two Natterjack Toads, *Bufo calamita*. *Mr. Doubleday, Gateshead.*
 „ Three Eggs of Crocodile, from McCarthy's Island, River Gambia, West Africa. *Capt. M. C. Balls, Ryton-on-Tyne.*
 June. Common Viper, black var., taken in Northumberland about 1884.
Mr. John Hancock.
 „ Two Eggs of Sea Turtle, from Island of Corfu.
Mr. Thos. Thompson, Winlaton.

INSECTS.

1888.
 Sept. Sawfly, *Sirex gigas*, from Easingwold.
Mr. W. E. Adams, Chronicle Office.
 1889.
 Mar. A small collection of Australian Insects: Coleoptera, Lepidoptera, Orthoptera, Neuroptera, and Arachnida, including a fine specimen of *Ornithoptera Priamus*. *Mr. R. N. Redmayne, Gosforth Grove.*
 May. Three Cocoons of *Saturnia Cecropia*, from North America.
Mr. Adams, Brandling Village.

MOLLUSCA, ETC.

1889.
 June. A collection of Invertebrata, etc., in spirits, forming part of the collections of the late Mr. Albany Hancock, consisting of Ascidians, Nudibranchs, and other Mollusca, with a few specimens of Fishes and Reptiles. *Mr. John Hancock.*
 „ A fine specimen of Madrepora, and one of Meandrina.
Mr. J. D. Milburn, West Jesmond House.
 „ Specimens of Gorgonia, from Queensland.
Mr. Saml. Thompson, Clapham, London.

BOTANY.

1888. Ivory Nut. *Mr. Thos. Thompson, Winlaton.*
 Dec. 1889. Fruit of a species of Gum Tree, *Eucalyptus.*
 Mar. *Mr. Wm. Henderson, Moor View.*
 „ Fir Cones, from Hexham. *Master Chas. Faraday Spence.*

FOSSILS AND MINERALS.

1888. Volcanic Stones and Mud, thrown up during the eruption of Tara-
 Aug. wera, from Wairo, New Zealand.
 Incrustations from the Hot Springs at Waka-rewa-rewa, Ohine-
 munta, New Zealand. *Miss Chaytor, Marshlands, New Zealand.*
 „ Large Bone (of Ox), dug out of surface covering clay at Marsden.
Mr. John Daglish.
 „ Sixteen Carboniferous (Scar-Limestone) Corals, from Quarry to
 south of Pateley Bridge, Nidderdale. *Mr. Wm. Dinning.*
 Sept. Slabs of Stone containing fossils, *Rhynchonella pleurodon*, and worm-
 track like fossil, from North Tyne. *John Coppin, Esq., Bingfield.*
 Oct. Specimens of Calc-Spar and two specimens of *Axinus dubius*, Schl.,
 from Farthingslake Quarry, Marsden. *Mr. John Daglish.*
 „ Two specimens of Sulphate of Strontia, from the neighbourhood of
 Yate, Mangotsfield. (The bed or lumps are found resting on
 Millstone Grit, and perhaps on New Red Sandstone also.)
Mr. G. C. Greenwell, Duffield, Derby.
 Nov. Specimen of Salt (Stalagmite), from Boldon Colliery.
Mr. Thos. Routledge.
 1889. Specimen of Calc-Spar, finely crystallized, from Dentedale, York-
 Jan. shire. *Per Mr. Ald. T. P. Barkas, F.G.S.*
 Feb. Small box of Garnets, from Almeria, Spain. *Mr. M. J. Pelegrin.*
 „ Specimens of Yttrotitanite, from Arendahl, Norway.
Mr. John Pattinson.
 „ Specimen of Heavy Spar, from the Busty Seam, Pelton Colliery.
Mr. John James, Pelton Fell.
 „ Calamites and other Fossils, from the Maudlin Seam, Silksworth
 Colliery. *Mr. Surtees Hutchinson.*
 Mar. A large slab of Itacolumite, from India.
Mr. Edwd. Bidwell, Twickenham.
 „ Small slab of Silver Lead (110 ounces to the ton).
 Specimens of Nickel Ochre, Arseniate of Nickel, Asbestos, and
 Actinolite, from Almeria, Spain. *Mr. M. J. Pelegrin.*
 April. A collection Fossils, from the Cambrian and Silurian Strata of
 North Wales and Cumberland; Lower Greensand, Atherfield, Isle

- of Wight; St. Cassian beds of Italy; and sundry other fossils and rock specimens, including three fishes, from Lias.
Mr. E. J. Garwood.
- „ Ozocerite, or Mineral Bitumen, from Wrenforth Colliery, near Wakefield. Found in driving a drift through a fault from the Heighmoor coal to win the same seam on the low side of the fault. Depth of seam, 184 yards, and the drift went down about 60 yards. *Mr. Thos. W. Embleton, The Cedars, Methley, Leeds.*
- „ Specimens of Gold Quartz and Conglomerate of Quartz Pebbles, from Johannesburg, Transvaal, South Africa.
Mr. John Charlton, Johannesburg.
- „ Terebratulæ, from Oolite and Chalk.
Master Faber, Tankerville Terrace.
- May. Two large Shark's Teeth, from Phosphate beds, South Carolina.
Mr. Thos. Thompson, Winlaton.
- „ Footprints in Sandstone, from Corncockle Moor, Dumfries-shire.
Mr. Wm. Neill, Deaf and Dumb Institution.
- „ Fossil Fish (*Dipterus*), from Caithness Flagstone Quarries.
Mr. P. M. Crow, Lovaine Crescent.
- „ Fine specimens of *Sphenopteris Artemisiæfolia*, Stern., from Fawdon Old Pit; and a collection of Fish remains, from Middleton, Yorkshire, including tooth of *Loxomma Allmanni*, *Strepsodus sauroides*. *Mr. Thos. W. Embleton, The Cedars, Methley, Leeds.*
- „ Upper part of Skull of large Wild Boar, from the bed of the Wear, near Deptford Salt Grass, in silt 12 feet below low water mark.
Mr. Henry H. Wake, C.E.
- June. Several specimens of Middletonite, from the Main Coal at the West Riding Colliery, near Normanton. This mineral was first discovered at Middleton, Yorkshire, by Mr. Embleton, and described by Prof. Johnson, of Durham.
Thos. W. Embleton, Esq., The Cedars, Methley, Leeds.
- „ Several specimens of *Producteus giganteus* and Hippurites.
Mr. John Hancock.

ETHNOLOGY.

- 1888.
- Aug. Nine specimens of Native Weapons (stone), from Cloudy Bay, New Zealand.
Miss Chaytor, Marshlands, New Zealand.
- Nov. A pair of Moccasins.
Miss Green, Lovaine Crescent.
- „ „ „ *Mr. R. Y. Green, „*
- Dec. Japanese Toy, model of human skeleton. *Mr. J. S. Forster.*
- „ Two Japanese Toys, models of crabs. *Mr. John Henry Hancock.*
- „ A piece of Chinese Ink (very old). *Miss M. J. Hancock.*

1889.

- Jan. Twelve Chinese Coins. *Mr. R. Y. Green.*
 April. Chinese Flag, large Saw, and Knife. *Mr. Joseph Peal.*
 „ Two Bases of Pillars, from the White Friars' Monastery. *Mr. Geo. Irving.*

A large Aviary or Cage for the Condor.

Presented by the following subscribers:—

Lady Armstrong	£5	0	0	Mr. Wm. Dinning ...	1	1	0
Miss Noble	5	0	0	Mr. Thos. Thompson..	1	0	0
Miss Green	0	10	0	Mr. J. S. Forster	1	0	0
Mr. John Pattinson...	3	0	0	Mr. Jos. Blacklock ...	0	10	0
Mr. R. Y. Green	1	6	0	Mr. J. D. Scott.....	0	10	0
Mr. John Hancock ...	1	1	0	Mr. Geo. Irving	0	5	0
Mr. I. G. Dickinson...	1	1	0	Dr. R. S. Watson	0	4	0

LIST OF MEMBERS
OF
THE NATURAL HISTORY SOCIETY,
1st JANUARY, 1890.

Elected.

1881	Abbs, Henry C.	Cleadon House, Sunderland.
1876	Adamson, Chas. M.....	Cragg Hall, Jesmond, Newcastle.
1889	Adamson, Lawrence W.	Whitley.
1884	Alden, W. R.....	Akenside Villa, Newcastle.
1884	Allhusen, Wilton	Victoria Square, Newcastle.
1884	Amyot, W. H	Jesmond Gardens, Newcastle.
1884	Angus, George	Low Gosforth, Newcastle.
1884	Angus, Lt.-Col. W. M.	Fenham Hall, Newcastle.
1884	Anderson, Wm. L.....	Queen Square, Newcastle.
1888	Anne, Major Ernest	Hardriding, Bardon Mill.
1882	Archer, H. T.	22, Claremont Place, Newcastle.
1846	Armstrong, Right Hon. Lord ...	Cragside, Rothbury.
1863	Armstrong, Lady.....	Cragside, Rothbury.
1884	Armstrong, George.....	The Elms, Gosforth, Newcastle.
1887	Armstrong, T. J.	14, Hawthorn Terrace, Newcastle.
1889	Armstrong, W. Watson	Cragside, Rothbury.
1889	Armstrong, Mrs. Watson	Cragside, Rothbury.
1884	Atkinson, John ..	10, Fernwood Road, Newcastle.
1884	Bailes, Thomas	Jesmond Gardens, Newcastle.
1885	Bainbridge, E. M.....	Eshott Hall, Felton.
1884	Bainbridge, George B.....	Claremont House, Newcastle.
1884	Bainbridge, Thomas H.....	Holmwood, Jesmond, Newcastle.
1884	Barkas, Alderman T. P., F.G.S....	28, Lovaine Place, Newcastle.
1884	Barkus, Benjamin, M.D.	Jesmond Terrace, Newcastle.
1888	Barnes, Mrs.	Whitburn, Sunderland.
1889	Beck, W. E.	45, Eldon Street, Newcastle.
1888	Bedson, Prof. P. P.....	18, Moor View, Newcastle.
1889	Bell, Charles Robert	Tankerville House, Newcastle.
1883	Bell, Sir Lowthian, Bart., F.R.S.	Rounton Grange, Northallerton.
1884	Bell, John	The Cedars, Oosborne Road, N/C.
1888	Bell, John	68, Holly Avenue, Newcastle.

Elected.

- 1833 Bell, Thomas
 1884 Bell, Thomas 23, Windsor Terrace, Newcastle.
 1877 Benson, T. W. Allerswash, Hexham.
 1877 Berkley, Cuthbert Marley Hill, Gateshead.
 1888 Black, William 1, Lovaine Place, Newcastle.
 1889 Blackett, William 6, Windsor Crescent, Newcastle.
 1846 Blacklock, Joseph Summerhill Terrace, Newcastle.
 1888 Bowden, Thomas 22, Mosley Street, Newcastle.
 1884 Brady, Thomas Jarrow Hall, Jarrow-on-Tyne.
 1884 Brooks, J. C. 14, Lovaine Place, Newcastle.
 1877 Browell, E. I. J. East Boldon, by Newcastle.
 1889 Brewis, G. R. Ellesmere Villa (East), Granville Road, Newcastle.
 1889 Blair, Hunter 2, Fernwood Road, Newcastle.
 1858 Brown, Ralph Benwell Grange, Newcastle.
 1876 Browne, Sir B. C. Westacres, Benwell, Newcastle.
 1884 Bruce, Rev. Dr., F.S.A., D.C.L. 2, Framlington Place, Newcastle.
 1887 Bulmer, W. J. Rose Villa, Bentineck, Newcastle.
 1885 Burt, Thomas, M.P. .. Lovaine Crescent, Newcastle.
 1884 Burnup, John, Jun. 2, Devonshire Terrace, Newcastle.
 1884 Cargill, Miss 15, Lovaine Place, Newcastle.
 1884 Carse, Adam 13, Granville Road, Newcastle.
 1884 Chapman, Abel Roker Terrace, Roker, Sunderland.
 1888 Charlton, W. L. The Reenes, Bellingham.
 1884 Clay, William Abbotsford Terrace, Newcastle.
 1832 Clayton, John The Chesters, Chollerford.
 1874 Clayton, N. G. West Denton, Newcastle.
 1887 Clephan, R. C. White House, Birtley, Chester-le-Street.
 1884 Cooke, R. W. 15, Claremont Place, Newcastle.
 1889 Cook, Thomas 24, Grainger Street West, N/C.
 1874 Cookson, N. C. Wylam Oakwood, Wylam.
 1864 Coppin, John Bingfield, Corbridge-on-Tyne.
 1884 Cochrane, William Oakfield, Gosforth, Newcastle.
 1884 Corder, F. H. Suffolk House, Osborne Road, N/C.
 1885 Cowen, Lt.-Col. J. A. Blaydon Burn, Blaydon.
 1884 Craggs, Joseph 61, Eldon Street, Newcastle.
 1884 Crawford Thomas Haldane Terrace, Newcastle.
 1883 Crawhall, G. E. 38, Eldon Street, Newcastle.
 1864 Cruddas, W. D. Elswick, Newcastle.
 1877 Daglish, John Marsden Cottage, South Shields.
 1884 Dale, John Brodrick Cleadon Meadows, Sunderland.

Elected.

1884	Dale, Mrs. S.	12, Windsor Crescent, Newcastle.
1889	Dawson, William J.	Westoe, South Shields.
1850	Dees, Robert R.	Wallsend Hall, Newcastle.
1885	Dent, John	3, Osborne Avenue, Newcastle.
1884	Dickenson, Robert.....	Gosforth, Newcastle.
1884	Dick, J.	11, Osborne Avenue, Newcastle.
1884	Dickinson, A. H.	6, The Grove, Gosforth, Newcastle.
1877	Dickinson, I. G.	Portland House, Jesmond Road, Newcastle.
1888	Dickinson, John.....	Park House, Sunderland.
1874	Dinning, William	41, Eldon Street, Newcastle.
1888	Dixon, John A.	14, West Street, Gateshead.
1863	Drewett, D. Ormond	Riding Mill-on-Tyne.
1866	Drewett, Mrs.	East House, Middleton Tyas, Rich- mond, Yorkshire.
1884	Dodds, Edwin.....	Church Rd., Low Fell, Gateshead.
1888	Dunn, Archibald M.....	Castle Hill, Wylam-on-Tyne.
1884	Dunn, Nathaniel	12, Lovaine Place, Newcastle.
	Durham, Bishop of.....	Auckland Castle, Bp. Auckland.
1884	Ellison, Captain Carr.....	Hedgeley, Alnwick.
1842	Embleton, D., M.D.	Claremont Place, Newcastle.
1830	Embleton, Thomas William	The Cedars, Methley, Leeds.
1888	Emley, Alfred.....	16, Ellison Place, Newcastle.
1889	Emley, Fred	7, Ellison Place, Newcastle.
1885	Faber, J. V.	1, Tankerville Terrace, Newcastle.
1883	Fairley, F. B.	Bank of Eng., Grey Street, N/C.
1884	Fenwick, G. A.	Messrs. Lambton & Co., Grey St., Newcastle.
1884	Fenwick, Hugh	Messrs. Lambton & Co., Grey St., Newcastle.
1884	Fenwick, John G.	Moorlands, Gosforth, Newcastle.
1884	Fenwick, Mark	Messrs. Lambton & Co., Grey St., Newcastle.
1885	Ferguson, John	The Cliff, Whitley.
1884	Fleming, John	Gresham Place, Newcastle.
1875	Forster, George Baker	Lesbury.
1884	Forster, Charles Frank	3, Windsor Terrace, Newcastle.
1875	Forster, James S.	Plawsworth, Chester-le-Street.
1884	Forster, John James	Woodslea, Clayton Park Road, N/C.
1863	Foster, Robert.....	The Quarries, Clifton Road, N/C.
1863	Freeman, George	5, Claremont Place, Newcastle.

Elected.

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| 1888 | Garwood, Edmund J. | St. Mary's Place, Newcastle. |
| 1862 | Gibb, C. J., M.D. | Sandyford Park, Newcastle. |
| 1884 | Gibson, Rev. Marsden | Magdalene Lodge, Newcastle. |
| 1880 | Gibson, T. G. | Eslington Road, Newcastle. |
| 1877 | Gibson, W. M. | Gladstone Terrace, Gateshead. |
| 1889 | Glendenning, William..... | 39, Jesmond Road, Newcastle. |
| 1865 | Glover, John | 20, Holly Avenue, Newcastle. |
| 1884 | Granville, Charles S. | 12, Sydenham Terrace, Newcastle. |
| 1883 | Goddard, F. R. | 19, Victoria Square, Newcastle. |
| 1881 | Grace, William Percy | Fellside House, Whickham. |
| 1884 | Graham, Calvert..... | 6, South Parade, Newcastle. |
| 1885 | Graham, Samuel..... | 107, High Park Road, Newcastle. |
| 1888 | Grant, William | Anster Villa, Grainger Park Road,
Newcastle. |
| 1884 | Green, Miss A. I. | 11, Lovaine Crescent, Newcastle. |
| 1877 | Green, Robert Y. | 11, Lovaine Crescent, Newcastle. |
| 1884 | Hall, James | 9, Prior's Terrace, Tynemouth. |
| 1882 | Hall, John | Ellison Place, Newcastle. |
| 1859 | Hancock, John | St. Mary's Terrace, Newcastle. |
| 1884 | Hancock, Miss M. J. | St. Mary's Terrace, Newcastle. |
| 1884 | Hancock, T. A. | |
| 1888 | Handysides, William..... | 15, Framlington Place, Newcastle. |
| 1884 | Harrison, A. P. | Corbridge. |
| 1886 | Harrison, Charles | 57, Osborne Road, Newcastle. |
| 1882 | Harrison, William | Haldane Villa, Newcastle. |
| 1884 | Harvey, John | Leazes Terrace, Newcastle. |
| 1884 | Harvey, Miss..... | Rose Cottage, Archbold Terrace,
Newcastle. |
| 1882 | Havelock, Michael..... | 14, Akenside Hill, Newcastle. |
| 1885 | Hedley, Armorer..... | Mayfield, Gosforth, Newcastle. |
| 1863 | Hedley, Thomas | Fenham Terrace, Newcastle. |
| 1886 | Henderson, George E. | 16, Framlington Place, Newcastle. |
| 1884 | Henderson, Thomas Hood..... | Farnley Grove, Corbridge. |
| 1884 | Henderson, W. F. | Moorfield, Claremont, Newcastle. |
| 1884 | Hoare, Robert Gurney | Jesmond Park, Newcastle. |
| 1885 | Hodgkin, Thomas, D.C.L. | Benwell Dene, Newcastle. |
| 1885 | Hodgson, John G. | Northern Counties Club, Newcastle. |
| 1889 | Hobbs, Philip..... | 1 Otterburn Villas, Newcastle. |
| 1884 | Hume, G.H., M.D. | Ellison Place, Newcastle. |
| 1884 | Hunter, J. J. | Whickham Grange, Gateshead. |
| 1884 | Hunter, Mountain | Victoria Square, Newcastle. |
| 1884 | Hutton, John | Eden Vale, Castle Eden. |

Elected.	
1887	Irving, George..... 1, Portland Terrace, Newcastle.
1888	Jackson, Joseph..... 25, Leazes Terrace, Newcastle.
1884	Jenkins, George..... 1, Claremont Place, Newcastle.
1884	Johnson, Alfred W. Elysium Place, Gateshead.
1888	Joicey, James, M.P. Longhirst, Morpeth.
1884	Knothe, Rudolph Jesmond High Terrace, Newcastle.
1884	Laidler, G. G. Eslington Terrace, Newcastle.
1884	Lamb, John 2, Lovaine Row, Newcastle.
1877	Lamb, Robert O. The Lawn, Ryton-on-Tyne.
1884	Laws, P. M. Claremont Place, Newcastle.
1889	Leach, R. E., M.A., F.G.S. 23, Regent Street, Hartlepool.
1884	Lebour, Prof. G. A. College of Physical Science, N/C.
1889	Leech, Charles C. Seghill Colliery, Newcastle.
1882	Liddell, Charles Benwell Hall, Newcastle.
1888	Lilburn, Charles..... Glenside, Sunderland.
1884	Logan, J. C., M.A. Royal Grammar School, N'castle.
1888	Logan, James..... 5, Osborne Villas, Newcastle.
1887	Lord, Riley..... Highfield House, Gosforth, N/C.
1884	Luckley, Richard 9, Nesham Street, Newcastle.
1889	Lloyd, Rev. Canon, D.D..... The Vicarage, Newcastle.
1889	Laycock, J. F. Wiseton, Bawtry, Notts.
1863	Maling, C. T. Ellison Place, Newcastle.
1870	Maling, William..... Ellesmere Villa, Granville Road, Newcastle.
1887	Marshall, Frank..... 32, Grainger Street West, N'castle.
1882	Martin, N. H..... 85, Osborne Road, Newcastle.
	Mawson, Mrs..... Ashfield, Gateshead.
1888	Mawson, Rowland..... 3, Sydenham Terrace, Newcastle.
1882	McIntyre, John The Tower, Ryton.
1883	McIntyre, John, Jun. 3, Abbotsford Terrace, Newcastle.
1858	Mennell, Henry Tuke St. Dunstan's Buildings, London.
1884	Middleton, Sir Arthur, Bart. ... Belsay, Newcastle.
1884	Middleton, H. N. Messrs. Lambton & Co, Grey St., Newcastle.
1889	Milburn, Edward..... 6, Windsor Terrace, Newcastle.
1884	Milburn, John D. Carlton House, Newcastle.
1862	Mitchell, Charles..... Jesmond Towers, Newcastle.
1884	Mitchell, C. W. Jesmond Towers, Newcastle.
1884	Mitchell, Mrs..... Jesmond Towers, Newcastle.
1884	Mitford, Col. J. P. O. Mitford, Morpeth.

Elected.

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|------|-----------------------------------|--|
| 1889 | Moore, Joseph M. | Harton, South Shields. |
| 1884 | Morgan, Thomas | Hartford Bridge, Cramlington. |
| 1884 | Motum, Hill | Helensville, Grainger Park Road,
Newcastle. |
| 1884 | Mountain, Mrs. | St. Mary's Terrace, Newcastle. |
| 1884 | Nelson, Thomas | Windsor Crescent, Newcastle. |
| 1884 | Newcastle, Bishop of..... | Benwell Tower, Newcastle. |
| 1889 | Newton, Edward | St. Mary's Place, Newcastle. |
| 1887 | Nicholson, John | 40, Eldon Street, Newcastle. |
| 1876 | Noble, Captain, C.B., F.R.S..... | Jesmond Dene House, Newcastle. |
| 1885 | Noble, Benjamin..... | Gloucester House, Newcastle. |
| 1877 | Noble, George | Jesmond Dene House, Newcastle. |
| 1881 | Noble, S. W. A. | Jesmond Dene House, Newcastle. |
| 1889 | Noble, Miss..... | Jesmond Dene House, Newcastle. |
| 1878 | Norman, Rev. A. M., D.C.L. | Burnmoor Rectory, Fence Houses. |
| | Northbourne, Right Hon. Lord... | Whitehall Gardens. London. |
| | Northumberland, Duke of..... | Alnwick Castle, Alnwick. |
| 1889 | Oliver, Prof. Thomas, M.D..... | Eldon Square, Newcastle. |
| | Ord, Mrs. Blackett..... | Whitfield Hall, Haydon Bridge. |
| 1884 | Page, Fred, M.D. | Saville Place, Newcastle. |
| 1864 | Palmer, Sir C. M., Bart., M.P.... | Grinkle Park, Whitby. |
| 1888 | Patterson, William | 12, Bolton Terrace, Newcastle. |
| 1871 | Pattinson, John | Shipcote House, Gateshead. |
| 1862 | Pease, J. W. | Pendower, Benwell, Newcastle. |
| 1889 | Pelegirin, M. J. | 3, Jesmond High Terrace, N/C. |
| 1877 | Percy, Right Hon. Earl..... | Alnwick Castle, Alnwick. |
| 1863 | Philipson, G. H., M.D..... | Eldon Square, Newcastle. |
| 1884 | Philipson, John | Victoria Square, Newcastle. |
| 1882 | Philipson, Joseph A. | 4, Jesmond High Terrace, N/C. |
| 1884 | Philipson, William... .. | Victoria Square, Newcastle. |
| 1884 | Potter, Lt.-Col., C.B. | Heaton Hall, Newcastle. |
| 1888 | Potts, Joseph | 35, Jesmond Road, Newcastle. |
| 1887 | Price, John..... | Osborne Villas, Newcastle. |
| 1877 | Proctor, Barnard S. | 36, Fern Avenue, Newcastle. |
| 1868 | Pumphrey, Thomas | Summerhill Grove, Newcastle. |
| 1884 | Pybus, W. M. | 38, Bewick Road, Gateshead. |
| 1889 | Perkins, Charles | Saville Place, Newcastle. |
| | Ravensworth, Right Hon. Earl... | Ravensworth Castle, Gateshead. |
| 1882 | Reid, Edwin O. | North Terrace, Newcastle. |

Elected.

1882	Reid, William B.	Cross House, Upper Claremont, Newcastle.
1886	Reis, Senyor Jayme Batalha....	14, Otterburn Terrace, Newcastle.
1885	Rhagg, Adamson	8, Haldane Terrace, Newcastle.
1883	Rich, Frank W.	Jesmond Gardens, Newcastle.
1889	Richardson, Arthur	24, Burdon Terrace, Newcastle.
1864	Richardson, James.....	South Ashfield, Newcastle.
1882	Richardson, John Hunter.....	Kensington Terrace, Newcastle.
1882	Richardson, Miss S. A.....	Summerhill Grove, Newcastle.
1885	Richardson, Thomas	7, Windsor Terrace Newcastle.
1888	Ridley, J. M.	Walwick Hall, Humshaugh.
1877	Ridley, Sir M. W., Bart., M.P..	Blagdon, Cramlington.
1887	Ritson, U. A.	Jesmond Gardens, Newcastle.
1889	Robinson, John	Etal Villa, North Shields.
1887	Robson, John S.....	Claremont Gardens, Newcastle.
1884	Robson, Robert	48, Eldon Street, Newcastle.
1884	Robson, Robert	6, Brandling Park, Newcastle.
1848	Rogerson, John	Croxdale Park, Durham.
1880	Rogerson, John E.	Croxdale Park, Durham.
1884	Rose, Hugh.....	9, Haldane Terrace, Newcastle.
1889	Ross, Andrew.....	168, Portland Road.
1884	Ryott, W. H.	6, Sydenham Terrace, Newcastle.
1888	Sanderson, Thomas	Osborne Villas, Newcastle.
1889	Sanderson, W. J.	14, Claremont Place, Newcastle.
1888	Sayers, Nevill R.	19, Leazes Terrace, Newcastle.
1884	Schaeffer, A. G.....	4, Benton Terrace, Newcastle.
1885	Schmitger, F.	20, Leazes Terrace, Newcastle.
1887	Scorfield, Edward S. ...	Osborne Terrace, Newcastle.
1884	Scott, F. G.....	1, St. Thomas Place, Newcastle.
1883	Scott, John D.	Osborne Terrace, Newcastle.
1884	Scott, Alderman J. O.	Benwell Cottage, Benwell.
1883	Sharp, John G.	Fernwood Road, Newcastle.
1883	Sharp, William	Eslington Terrace, Newcastle.
1884	Shaw, Miss Mary	17, Lovaine Place, Newcastle.
1887	Simpson, Thomas	12, Haldane Terrace, Newcastle.
1884	Singers, Miss	Carlton Villa West, Newcastle.
1885	Sisson, George, Jun.....	Washington, Co. Durham.
1884	Smith, George	Grove Villa, South Gosforth.
1882	Sopwith, Henry T.....	Tankerville Terrace, Newcastle.
1884	Spain, George.....	10, Victoria Square, Newcastle.
1884	Spence, Faraday.....	67, Grey Street, Newcastle.
1884	Spence, John Foster	Chirton Cottage, North Shields.

Elected.

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| 1865 | Spence, Robert | 4, Rosella Place, North Shields. |
| 1865 | Stevenson, A. S. | Tynemouth. |
| 1885 | Strachan, John | 33, Percy Gardens, Tynemouth. |
| 1888 | Straker, F. | Stagshaw House, Corbridge. |
| 1885 | Straker, Joseph H. | Stagshaw House, Corbridge. |
| 1884 | Sutherland, B. J. | Thurso House, Osborne Rd., N/C. |
| 1884 | Sunderland, James | 78, Osborne Road, Newcastle. |
| 1886 | Sutherland, Miss Jane | 32, Burdon Terrace, Newcastle. |
| 1881 | Swan, Henry Charles..... | Moor View, Newcastle. |
| 1875 | Swan, H. F. | North Jesmond, Newcastle. |
| 1883 | Swan, J. Cameron..... | 3, Osborne Terrace, Newcastle. |
| 1875 | Swan, John G. | Upsall Hall, Middlesbro'. |
| 1867 | Swan, Joseph W. | Bromley, Kent. |
| 1864 | Swinburne, Sir John, Bart., M.P. | Capheaton. Tewcastle. |
| 1864 | Taylor, John | Lovaine Place, Newcastle. |
| 1884 | Temperley, Nicholas | 4, Carlton Ter., Low Fell, Gatesh'd. |
| 1884 | Thiedemann, C. R. F..... | The Cedars, Low Fell, Gateshead. |
| 1884 | Thompson, H. O. | 48, Jesmond Road, Newcastle. |
| 1889 | Thompson, Miss Jessica | Winlaton. |
| 1862 | Thompson, Thomas | Orchard House, Winlaton. |
| 1883 | Usher, Robert T. J..... | Orchard House, Fenwick Terrace,
Newcastle. |
| 1888 | Walker, John D. | 15, Grosvenor Place, Newcastle. |
| 1886 | Walker, John G..... | 13, Haldane Terrace, Newcastle. |
| 1886 | Wallace, Henry | Trench Hall, Gateshead. |
| 1884 | Watson, Henry B. | Millfield House, Newcastle. |
| 1887 | Watson, H. W. | Burnopfield. |
| 1884 | Watson, John S..... | 7, Kensington Terrace, Newcastle. |
| 1884 | Watson, Mrs. | 64, Eldon Street, Newcastle. |
| 1869 | Watson, Robert S., LL.D..... | Bensham, Gateshead. |
| 1883 | Watson, John..... | 81, Jesmond Road, Newcastle. |
| 1886 | Watson, Thomas Carrick | 83, Osborne Road, Newcastle. |
| 1889 | Weeks, John George | Bedlington. |
| 1886 | Welford, Richard | Gosforth. |
| 1884 | West, Captain R. N. | Jesmond Gardens, Newcastle. |
| 1884 | Westmacott, Percy G. | Benwell Hall, Newcastle. |
| 1888 | White, George | Claremont Street, Newcastle. |
| 1884 | Willkinson, George..... | 8, Windsor Crescent, Newcastle. |
| 1884 | Williamson, Rev. R. H. | Whickham, Gateshead. |
| 1884 | Willis, James | 14, Portland Terrace, Newcastle. |
| 1884 | Wilson, Edward | 12, Pilgrim Street, Newcastle. |

Elected.

1884	Wilson, H. B.....	7, Osborne Villas, Newcastle.
1886	Wilson, John	74, Jesmond Road, Newcastle.
1887	Wilson, William.....	6, Osborne Terrace, Newcastle.
1886	Winter, Thomas B.....	3, Brandling Park, Newcastle.
1875	Wood, Lindsay.....	South Hill, Chester-le-Street.
1882	Woods, John A.	Benton Hall, Newcastle.
1863	Woods, Lt.-Col. M. C.	Holeyn Hall, Wylam.
1886	Woods, W. G.....	Pigdon, Morpeth.
1889	Wright, Alfred.....	8, Bentinck Crescent, Newcastle.
1884	Youll, John G.	91, Jesmond Road, Newcastle.
1884	Young, Charles G.....	Corbridge.
1883	Young, Col. J. R.	Windsor Terrace, Newcastle.

HONORARY MEMBERS.

Barnes, J. W.....	Durham.
Collinson, Captain R. E.	
Crawhall, Joseph	Newcastle.
Dawson, Charles H., Esq.....	Boyd's Hall, Yorkshire.
Emmett, Lt.-Col. R. E.	
Henslow, Rev. George, M.A.	Dayton House, Ealing, London.
Hincks, Rev. Thomas, B.A.	Leigh Woods, Clifton, Bristol.
Hooker, Sir J. D., F.R.S., F.L.....	The Camp, Sunningdale, Berks.
Jones, Prof. T. Rupert, F.G.S.....	10, Uverdale Road, King's Road, Chelsea, London.
Oliver, Prof., F.R.S., F.L.S.	Kew, London.
Pryor, M. R., Esq.....	Weston Stevenage.
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X.—*Catalogue of the Fishes of the Rivers and Coast of Northumberland and Durham and the adjacent Sea.* By RICHARD HOWSE.

HITHERTO, no systematic List or Catalogue of the Fishes found on the Coast and in the Rivers of Northumberland and Durham has been published. In 1769, a List of the Fishes of Northumberland and those parts of Durham lying north of the Tyne was included by Wallis in his *Natural History and Antiquities of Northumberland*. Forty-six species, chiefly of the commoner kinds, are enumerated, including all that were likely to be noticed by ordinary observers, if we except the Bass, which is a rare Northumbrian fish, and the Pogge. The next lists published for our district are those included in Sir Cuthbert Sharpe's *History of Hartlepool*, 1816, and John Hogg's *Natural History of Stockton-on-Tees* appended to Brewster's *History of Stockton*, 1827. In these lists a few of the rarer kinds are mentioned which are specially referred to in this Catalogue. Dr. George Johnston gave a list of the Fishes of Berwickshire in the *History of the Berwickshire Naturalists' Club* in 1838. Eighty-eight species are recorded in it, including some of the rarer stragglers to the East Coast. About the same time a very elaborate *Essay on the Fishes of the Frith of Forth*, by Dr. Rd. Parnell, was published by the *Wernerian Natural History Society of Edinburgh*. This important list enumerates one hundred and twenty-five species from the Forth district, about forty of which were added to the Forth fauna by Dr. Parnell, and six of these had not been previously known as British. Being so near to our own coast and sea this list affords a very reliable guide to the Fishes of our own district.¹ In 1844, a list of the Fishes of the Yorkshire Coast was prepared by Mr. T. Meynell,

¹ Wallis's *Natural History and Antiquities of Northumberland* (Fishes, Vol. I., pp. 376—392). 1769.

Sir Cuthbert Sharpe's *History of Hartlepool* (Fishes). 1816.

Brewster's *History of Stockton-on-Tees* (Fishes). 1827.

R. Parnell's *The Natural History of the Fishes of the Frith of Forth*. 1838.

Dr. Geo. Johnston—*Fishes of Berwickshire*, in the *History of the Berwickshire Naturalists' Club*, Vol. I. 1838.

an abstract of which is given in the Report of the British Association for the York Meeting, 1844.¹ One hundred and forty species are stated in this list to occur on the Yorkshire Coast, or rather more than one-half of the Fish-fauna of the British Islands. About the same number are admitted into the Yorkshire Vertebrate-fauna by Messrs. W. E. Clarke and W. D. Roebuck, in their Handbook of the Vertebrate Fauna of Yorkshire, 1881. These authors exclude, however, the Atherine, the Four-horned Bullhead, the Starry Ray, and the Large-spotted Dogfish, which are most of them recorded from the Forth by Dr. Parnell, and some of which have already occurred on our own coast; and two or three others, which undoubtedly require further confirmation, though they are species very likely to have occurred as stragglers to the East Coast.

For our own particular district the only records we have since the date of Dr. G. Johnston's list are such as have been recorded in the volumes of the Berwickshire Transactions and the Tyneside Naturalists' Field Club and Natural History Transactions of Northumberland, Durham, and Newcastle-upon-Tyne, and such as have been observed by Mr. John Hancock and a few other naturalists in our more immediate neighbourhood; and the specimens which from time to time have been presented to the Museum or acquired for it by purchase. Among these are some of the rarest species that have been found on the British Coasts, as the Maigre, and that splendid fish the Opah, preserved and presented to the Museum by Mr. John Hancock, and a few others, all of which will be found duly recorded in the Catalogue; a specimen of the Black-fish, caught at Cullercoats, presented by Mr. Joshua Alder; the Banks' Oar-fish, presented by Mr. E. Whitfield; the large Sun-fish, presented by W. J. Forster, Esq.,

¹ T. Meynell—List of Fishes of Yorkshire Coast. Brit. Assoc. Report, 1844.

Ferguson—The Natural History of Redcar. 1860.

Clarke and Roebuck—Handbook of Yorkshire Vertebrata. 1881.

History of the Berwickshire Naturalists' Field Club, Vols. I.—XII. 1831—89.

Transactions of the Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne, Vols. I., II., 1831—1838, and Reports, 1829—1889.

Transactions of the Tyneside Naturalists' Field Club, 1846—1864, Vols. I.—VI.

Natural History Transactions of Northumberland, Durham, and Newcastle-upon-Tyne, Vols. I.—X., 1865—1890.

of Tynemouth; the Fox Shark, presented by Mr. J. Woodger; and that rare species the Deal-fish, the Spinous Shark, and the Greenland Shark, acquired by purchase, with a few others more or less rare.

In the following Catalogue the arrangement adopted by Dr. Günther in the British Museum Catalogue of Fishes, and in his more popular work, *The Study of Fishes*, is, for the most part, followed, commencing with the TELEOSTEI, or Bony-fishes.

The Bony-fishes are arranged in six orders, all of which have representatives among our local fishes.

The first order, *ACANTHOPTERYGII*, or Spiny-rayed Fishes, is represented by about fifty species, distributed into sixteen or more families, which include many fishes that are merely stragglers to this coast, and occur so seldom as to be noted only for their rarity and beauty; and others which, from their frequent occurrence, are better known, and when occurring in any abundance are of considerable commercial importance; but, with only few exceptions, the members of this division play a more important part in the Fish-fauna of more southern latitudes than with us, and none of them visit this coast in sufficient numbers and regularity to induce fishermen to devote themselves to their special capture. Even the Common Mackerel, which sometimes occurs in large shoals off this coast, is not expected with the same periodic regularity or fished for with the same avidity as in the Channel. The rarest stragglers of this large group that have visited these shores are the Bass, the Red Mullet, the Gilthead, the Maigre, the Tunny, the Sword-fish, the Opah, the Black-fish, the Dory, Banks' Oar-fish, and the Deal-fish, with a few others. The permanent residents are one or two of the Sea-Breams, the Weevers, the Gobies, Lumpsuckers, Fishing-frog and Blennies, and the Sticklebacks; interesting fishes, but not sought after for food.

The second order, *PHARYNGOGNATHI*, that is Acanthopterygian fishes, with the lower pharyngeal bones united, is represented in our sea by one family only, the *Labridæ*, or Wrasses—for the most part gaudy-coloured fishes living in warmer seas; but three or four species occur occasionally, but not in great abundance,

in the North Sea, and are more objects of curiosity, even among the fishermen themselves, than articles of trade. For many years there was to be seen a Ballan Wrasse, painted green, hanging suspended by a string, along with a Sea Bream, a Dory, and other "uncouth fishes," in a fisherman's shop window at Cullercoats, a sure sign of the rarity of these fishes at that fishing village.

The order *ANACANTHINI*, Spineless-rayed fishes, is the most important, both as regards the number of species and individuals, and also as they constitute the bulk of those fishes which afford abundant and wholesome as well as in some instances delicious food for man, and consequently their capture becomes the chief business in life of thousands of our bravest and boldest countrymen, who supply not only the coast towns but the interior of the kingdom with, in most instances, the least expensive sort of animal food. The chief families in this order are the Gadidæ, or Cod-fishes, and the Pleuronectidæ, or Flat-fishes, all the species of which are without exception valued as articles of food in a fresh and also the former in a dried state. The North temperate and colder parts of the ocean seem to be the home of this numerous tribe. In our district only two of this group are found in fresh water, the one the Burbolt, living constantly and only in rivers, and the other the Flounder, ascending rivers as far and even beyond the limits of the tidal-flow. About thirty species of fishes belonging to this order are enumerated in this list, most of which are residents; such fishes as the Hake being a straggler from the South, and the Tusk or Torsk a visitor from the more Northern coasts of the British Islands. It is among the Flat-fishes that new additional species are most likely to occur on our coast.

The fourth order, *PHYSOSTOMI*, or Bony-fishes with all the fin-rays articulated, is a most heterogeneous assemblage, which will some day require revision. Those families which chiefly concern the British fauna are the Cyprinidæ, or Carps, which are all fresh water forms, living in rivers, lakes, and ponds, and many of which have been introduced into Britain as colonists in early times, and are now thoroughly acclimatized. The

Salmonidæ, or Trout family, truly indigenous, and the most valued of river fishes. The Esocidæ, or Pike family, of which that voracious tyrant the Pike is the well-known British representative, a colonist that could well have been spared from our lakes and streams. The Sea-Pikes or Garfishes, *Scombresocidæ*, including the Flying-fishes of tropical seas, are of no great commercial value, and are perhaps the best representatives of the pelagic type of fishes that visit our shores. The Herring family, *Clupeidæ*, belong also to this group, the only member of which the Common Herring is next to the White fish (Cod, Haddock, and Ling) the most valuable of the fishes that swarm annually upon our coast, affording the cheapest kind of food in a fresh or dried state that can be procured; and its fry, the Sprat, is a delicious food, which, though abounding in winter at the mouths of most of the estuaries of our larger rivers, seems to be almost neglected as an article of food; and what are caught by the fishermen are generally sold for manure or bait, and the rest are left in the sea for gannets, gulls, and fishes to regale themselves on. There seems to be a culpable neglect on some parts of the English coast of the valuable supply of food which is provided in such abundance, but remains unused, a few miles only or less from our own shore. The Eel family, *Murænidæ*, though so widely different in habit and shape to the preceding, are ranged in the same group. The Conger, a fish of great commercial value on the South Coast, is rare in the North Sea, and not much prized when caught; and as for the Freshwater Eel, it seems to be thought too uncanny a fish either to be caught or eaten, and only a few persons in the North who have overcome the prejudices against it are able to enjoy an epicurean dish of stewed eels for breakfast. It should be remembered that in the streams further south hundreds of persons obtain a competent livelihood by the capture of eels alone, and epicures have in all ages attested, in the most conclusive manner possible, to the culinary qualities of this locally-despised fish. But it should be added that the eel, though common enough in Northumberland, is by no means so abundant as further south, and besides when crawling among the grass it has a very "Atthery-like" look. The

Hand
by whom
rather not
what is this?

value of the Eels imported into London from Holland amounts some years to more than £130,000.

The next order, *LOPHOBRANCHII*, or "Bony-fishes in which the gills are not laminated but composed of rounded lobes attached to the branchial arches," contains only two families, one of which, the *Syngnathidae*, or Pipe-fishes, is well represented on our coast, though from their small size they are often unobserved. Besides they are not of value as an article of food, and serve only to amuse the curious and interest the naturalist.

The huge Sun-fish represents the order *PLECTOGNATHI* in our sea. This order contains two families, *Sclerodermi*, fishes with a hard bony skin, and the *Gymnodontes*, fishes with the "bones of the upper and lower jaws confluent, forming a beak with a cutting edge, without teeth." The Sun-fish belongs to the latter family, and it is, without exception, the most singular of all the fishes captured in the North Sea.

As it occurs occasionally on this coast, that remarkable fish the Anglesea Morris, a long, thin, transparent, ribbon-like fish, should be mentioned here. It has been recorded but once, that I am aware of, from the East Coast. By Dr. Günther and others these obscure fishes the *LEPTOCEPHALI* are considered immature, and whose development was arrested at an early stage, a theory that scarcely seems to veil our ignorance of their real affinity, and which unfortunately their rarity prevents at present from being satisfactorily worked out.

The Cartilaginous fishes, *PALÆICHTHYES*, include two orders, the Cartilaginous fishes proper, *CHONDROPTERYGII*, or Sharks and Skates, and the *GANOIDEI*, represented on the East Coast and in recent times by the Sturgeon; but the most typical representatives of this last order are found fossil in Mesozoic and Palæozoic strata. Of the Sharks the rarest species captured immediately on our own coast are the Fox-Shark or Thresher and the Spinous Shark. The Blue Shark and the Basking Shark, the largest of all the Northern Sharks, have been stated to occur in the North Sea, but further and more reliable evidence is required to substantiate their presence on our coast, and both could only be considered as occasional visitors, even if they did occur, in the

North Sea. The Greenland, or, as it is called, the Ground-Shark, seems to be a resident, and has been captured of a large size, sometimes in the trawl-net sometimes on the fishermen's lines, having either taken the bait or the fish caught on the lines. The Common Shark on this coast is the Porbeagle, which is always present during the herring season; and of the smaller species the Spiny Dogfish is the most abundant and most injurious to fishermen.

The Skates do not appear to be so numerous in species as in the Channel, but it may be that so much attention has not been paid to this group here as it deserves, and probably many species are still unrecorded. The prettily-ornamented Starry Ray, the Eagle Ray, and the Electric Ray are apparently the rarest forms. In late years, judging from wholesale prices, the Common Skate appears to be more in demand now as an article of food than formerly.

The class CYCLOSTOMATA contains but one order, including the Lampreys and the Myxine or Hag-fish. Most of the British species appear to be present in our rivers, but in not so great abundance as in the Trent and in the rivers further south, and generally they pass among the uninitiated as eels. Formerly much esteemed as an article of food they are now chiefly caught in rivers further South to be used by Dutch fishermen for bait.

There is another little fish-like creature found sometimes plentifully on the South Coast, and whose residence on the East Coast requires further verification, which should, from its singularity and the chance of its discovery on our own shores, be mentioned here, the little Lancelet, *Branchiostoma lanceolatum*, or, as it is named by some, *Amphioxus*. It represents almost by itself an entire sub-class of fishes, LEPTOCARDII, only another allied form, and that occurs at the Antipodes, being at present known.

Synoptical Table, shewing the Scientific arrangement of the
Fishes of Northumberland and Durham :—

Sub-Class. TELEOSTEI. BONY-FISHES.

Order. ACANTHOPTERYGII.

		Div. PERCIFORMES.	Species.
Fam.	<i>Percidæ</i> ,	Perch Family	2
	<i>Mullidæ</i> ,	Red Mulletts.....	2
	<i>Sparidæ</i> ,	Sea-Breams	3
	<i>Scorpenidæ</i> ,	Sea-Perches	1
		Div. SCIENIFORMES.	
	<i>Scienidæ</i> ,	Maigre Family.....	1
		Div. XIPHIIFORMES.	
	<i>Xiphiidæ</i> ,	Sword-Fishes	1
		Div. COTTO-SCOMBRIFORMES.	
	<i>Carangidæ</i> ,	Horse-Mackerels	1
	<i>Cyttidæ</i> ,	Dories	1
	<i>Stromateidæ</i> ,	Black-fish Family.....	1
	<i>Coryphænidæ</i> ,	"Dolphins" of Sailors.....	2
	<i>Scombridæ</i> ,	Mackerels and Tunnies.....	3
	<i>Trachinidæ</i> ,	Weevers	2
	<i>Lophiidæ</i> ,	} Fishing-Frogs	1
	<i>Pediculati</i> ,		
	<i>Cottidæ</i> ,	Bullheads and Gurnards	8
	<i>Cataphractidæ</i> ,	} Pogge Family.....	1
	<i>Cataphracti</i> ,		
		Div. GOBIIFORMES.	
	<i>Cyclopteridæ</i> ,	} Lumpsuckers	1
	<i>Discoboli</i> ,		
	<i>Gobiidæ</i> ,	Gobies	4
		Div. BLENNIIFORMES.	
	<i>Blennidæ</i> ,	Blennies	6
	<i>Atherinidæ</i> ,	Sand Smelt	1?
		Div. MUGILIFORMES.	
	<i>Mugilidæ</i> ,	Grey Mulletts	2
		Div. GASTROSTEIFORMES.	
	<i>Gasterosteidæ</i> ,	Sticklebacks	3
		Div. TÆNIIFORMES.	
	<i>Trachypteridæ</i> ,	Ribbon Fishes	2

Order. ACANTHOPTERYGII PHARYNGOGNATHI.

Fam.	<i>Labridæ</i> ,	Wrasses.....	4
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Order. ANACANTHINI.

	Div. GADOIDEI.	Species.
Fam. <i>Gadidae</i> ,	Codfish Family	13
<i>Ophidiidae</i> ,	Sand-Eels	2
	Div. PLEURONECTOIDEI.	
<i>Pleuronectidae</i> ,	Flat-Fishes	15

Order. PHYSOSTOMI.

Fam. <i>Cyprinidae</i> ,	Carp.	2
<i>Leuciscidae</i> ,	Dace Family	6
<i>Abramidae</i> ,	Breams	1
<i>Cobitidae</i> ,	Loaches	1
<i>Scombresocidae</i> ,	Garpikes	2
<i>Esocidae</i> ,	Pikes	1
<i>Sternoptychidae</i> ,	Argentine	1
<i>Salmonidae</i> ,	Salmones	6
<i>Clupeidae</i> ,	Herrings	5
<i>Murenidae</i> ,	Eels	3

Order. ? LEPTOCEPHALI.

<i>Leptocephalus Morrisii</i> ,	Anglesea Morris	1
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Order. LOPHOBRANCHII.

Fam. <i>Syngnathidae</i> ,	Pipe-fishes	5
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Order. PLECTOGNATHI.

Fam. <i>Orthogoriscidae</i> ,	Sun Fishes	1
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Sub-Class. PALÆICHTHYES. CARTILAGINOUS FISHES.

Order. CHONDROPTERYGII.

A. SELACHOIDEI, SHARKS.

Fam. <i>Carchariidae</i> ,	Sharks and Hounds	2
<i>Lamnidae</i> ,	Porbeagles	2
<i>Scylliidae</i> ,	Dog-fishes	2
<i>Spinacidae</i> ,	Spiny Dog-fishes	3
<i>Rhinidae</i> ,	Monk Fishes	1

B. BATOIDEI, RAYS OR SKATES.

Fam. <i>Torpedinidae</i> ,	Torpedo Ray	1
<i>Raiidae</i> ,	Skates or Rays	5?
<i>Trygonidae</i> ,	Sting Ray	1?
<i>Myliobatidae</i> ,	Eagle Ray	1

Order. CHONDROSTEL.

Fam. <i>Acipenseridae</i> ,	Sturgeons	1
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Sub-Class. CYCLOSTOMATA.

		Species.
Fam. <i>Petromyzontidæ</i> ,	Lampreys.....	3
<i>Myzinidæ</i> ,	Hag-fishes.....	1

Sub-Class. LEPTOCARDII.

Fam. <i>Branchiostomidæ</i> ,	Lancelets.....	1 ?
Total.....		142

In former years the use of the trawl-net was quite unknown on the East Coast of the Northern part of the British Islands, and only line fishing was practised, and those fishes chiefly were captured and brought on shore which were of marketable value; but since the introduction of trawls, and their increased use, many rare fishes and other creatures which were before accounted rare, and many which were unknown as inhabitants of the North Sea are now found to be some of them abundant, with others which are quite new to this part of the British Coast.

In mentioning the use of the trawl-net it is by no means certain that it will be a permanent benefit to the East Coast fishermen, especially to those who are and have been long located in the different villages along the coast. In some cases already the injury done to the ground frequented by the coast fishermen has been much complained of, and the great destruction caused to the best feeding grounds or fishing banks by this cumbersome and destructive implement, and the multitudes of small immature fishes captured in its capacious net, the destruction of ova, etc., are injuries done to the regular fishing grounds that are not easily restored or renovated; and the shoals of fishes are driven to seek other feeding grounds further off and in less accessible localities. Excepting the flat fishes, the fishes caught in the trawl are of much less marketable value than those caught by hook and line. This is proved by the prices given in the reports of the fish-markets; and the question of trawl-fishing regulations is a matter that most concerns fishermen themselves.

It was stated above that no one has attempted a systematic Catalogue of our local Fishes, or, indeed, to form a special Collection of them. This remark applies more particularly to the

Shore-fishes, or those that live chiefly in the rock-pools between high and low water-marks, such as the Gobies and Blennies, and other small fishes which are not likely to be captured by fishermen, and are only occasionally thrown up on the shore after severe gales. Most naturalists who have searched our coasts in former years for Mollusca, Zoophytes, or Algæ, could not very well help noticing some of these smaller fishes which have by accident come in their way when thus engaged, but no attempt has been made to collect and record these, and thus the small shore-fishes are those in which our Museum Collection and this list are most defective; and it is among these rock-dwelling species that the discovery of new additions to our Fish-fauna is most likely to be made by anyone who should take up this subject for special investigation.

In preparing this Catalogue the following works have, in addition to those mentioned above, been carefully consulted. The systematic arrangement and nomenclature, with but few exceptions, is that given by Dr. Günther in *The Study of Fishes*, published in 1881.

Willughby's Historia Piscium, 1686.

John Ray's Synopsis Piscium, 1713.

Linnaeus' Systema Naturæ, Vol. I., 13th edition, 1767.

Donovan's Natural History of British Fishes, 1802—8.

Fleming's History of British Animals, 1828.

Yarrell's History of British Fishes, 2nd edition.

Couch's History of the Fishes of the British Islmds, 1862—1865.

Günther's Study of Fishes, 1881.

Pennell's Angler Naturalist, 1863.

F. Buckland's Natural History of British Fishes, 1880.

The references to species and figures have been given to Yarrell and Couch whose works will be for many years yet the chief books of reference for British Fishes; and it must not be forgotten that it is to these authors chiefly that we are most indebted for what we at present know of the occurrence of and the distribution of the Fishes of these Islands. The two last-named works are perhaps more popular, and contain, the one, a detailed and trustworthy account of our Freshwater Fishes, which should be placed early in the hands of every youth and

in every angler's wallet, and the other, equally interesting, and full of the genial humour and unlimited goodnature of the lamented author, whose early death all good men must mourn, should be placed in the hands of every child who is able to read the English language, especially those children who have to spend many weeks annually, without any rational employment or amusement, on some part or other of our sea-coast, which everywhere presents objects of attraction in Natural History which should be a source of pleasure to young and old.

In the following Catalogue the Mediæval letters R., M., S., and C., indicate whether the fishes are Residents, Migrants, Stragglers, or Colonists, thus:—

R. Resident; truly native, and indigenous to the Coast or the adjacent Sea, or to the Burns and Rivers.

M. Migrant; approaching the Coast or ascending Rivers periodically from deep-water to spawn.

known
S. Straggler; occurring occasionally on the Coast, a wanderer from the North or South, but not resident.

C. Colonist; introduced artificially, that is by human agency, at an earlier or later period into rivers, lakes, and ponds, and now fully acclimatized.

See
The above grouping of our local Fishes must be considered as only approximately correct. Increased knowledge and information respecting the habits of many little-known Fishes may considerably modify the opinion expressed in the above divisions, especially with that group which are now thought to be Stragglers.

CATALOGUE.

The Asterisk (*) indicates that a local specimen is in the Museum-Collection of Fishes.

CLASS. PISCES. FISHES.

SUB-CLASS. TELEOSTEI. BONY FISHES.

ORDER. ACANTHOPTERYGII.

Div. PERCIFORMES.

FAM. PERCIDÆ. PERCH FAMILY.

Perca fluviatilis, Linn. PERCH.

Perca fluviatilis, Linn. Yarr., Brit. Fish., Vol. 1, p. 1.

" " " Couch, Brit. Fish., Vol. 1, p. 185, pl. 39.

In Sweethope Lough and artificial Lakes, large ponds, and other suitable places. Probably introduced into this district. In the still parts of the Tweed, descending to about two miles from the mouth of that river.—*Dr. G. Johnston*. Wallis says that "in the Bramish and Till the Perch is often taken from twelve to sixteen inches." "In the becks at Norton."—*J. Hogg*. C.

Labrax lupus, Cuv. BASS.*

Labrax lupus, Cuv. Yarr., Brit. Fish., Vol. 1, p. 8.

" " " Couch, Brit. Fish., Vol. 1, p. 189, pl. 40.

Taken in the Tyne.—*J. Hancock*, 1838. In the salmon nets at the mouth of the Tweed.—*Dr. G. Johnston*, 1838. Cresswell.—*Wallis*, 1769. S.

The *Dentex vulgaris*, or Four-toothed Sparus, has been recorded from the Yorkshire coast by Mr. T. Meynell. The *Sparus Dentex* reported to have been captured near Blyth in 1833 (*Sykes' Local Record*), and measuring five feet three inches, is no doubt the same fish as the *Sciæna aquila* mentioned below, p. 341.

FAM. MULLIDÆ. RED MULLET.

Mullus surmuletus, Linn. SURMULLET.**Mullus surmuletus*, L. Yarr., Brit. Fish., Vol. 1, p. 30.

" " Couch, Brit. Fish., Vol. 1., p. 209, pl. 47.

Taken in the herring nets, Sunderland.—*R. Howse*, 1849.
Newbiggin-by-the-Sea.—*J. Hancock*, Oct., 1870. S.**Mullus barbatus**, Willughby. PLAIN RED MULLET.*Mullus barbatus*, Yarr., Brit. Fish., Vol. 1, p. 36.

" " Couch, Brit. Fish., Vol. 1, p. 217, pl. 48.

A specimen taken on our coast in the Autumn of 1836.—*Dr. G. Johnston*. Another specimen is recorded from Coldingham by *James Hardy*, 1859.

This species approaches so close to the preceding, that some doubt may be entertained whether both species of Red Mullet have occurred on our coast. Additional specimens and observations are required to clear away all doubt; but even then these fishes are only stragglers to the East coast. Red Mullets have been rarely captured, and generally solitary examples only in the herring nets in autumn. S.

FAM. SPARIDÆ. SEA BREAMS.

Cantharus lineatus (Fleming). OLD WIFE OR BLACK SEA-BREAM.*Cantharus griseus*, Yarr., Brit. Fish., Vol. 1, p. 130." *lineatus*, Couch, Brit. Fish., Vol. 1, p. 222, pl. 49.This species is recorded from Hartlepool by Sir Cuthbert Sharpe. Occasionally brought in by the trawlers to North Shields.—*J. F. Spence*. The occurrence of this fish requires to be verified. S.**Pagellus centrodontus**, Cuv. COMMON SEA BREAM.**Pagellus centrodontus*, Cuv. Yarr., Brit. Fish., Vol. 1, p. 123." " " Couch, Brit. Fish., Vol. 1, p. 237,
pl. 55.Coast of Northumberland, *H. Hewitson*, 1836, *J. Hancock*,
and occasionally brought in by fishermen and trawlers. Not

common on this coast, *R. Howse*. Not uncommon at Berwick, *Dr. G. Johnston*.

The few specimens caught by our fishermen are generally seen dangling in front of the fishmongers' shops, hung up by the head or tail for curiosities, and blown about by the wind till they are dry enough to be thrown away, yet when fresh they are delicious and wholesome food.¹ S.

Chrysophrys aurata, (Linn.) GILTHEAD.

Chrysophrys aurata, Yarr., Brit. Fish., Vol. 1, p. 111.

„ „ Couch, Brit. Fish., Vol. 1, p. 243, pl. 57.

Occasionally taken during the summer at the mouth of the Tweed.—*Dr. G. Johnston*. Whitburn? Rare. S.

Following Donovan many observers refer the Sea-Bream to this species. There can be no doubt the Gilthead is very rare on this coast, even if it ever has been taken.

FAM. SCORPENIDÆ.

Sebastes Norvegicus, Cuv. BERGYLT or NORWAY HADDOCK.*

Sebastes Norvegicus, Cuv. Yarr., Brit. Fish., Vol. 1, p. 87.

Scorpena „ „ Couch, Brit. Fish., Vol. 2, p. 3, pl. 58.

In Berwick Bay, *Dr. G. Johnston*, 1832; Cullercoats, *Dr. D. Embleton*, 1844. Three or four from trawlers, *R. Howse*, 1889. Yorkshire coast, *T. Meynell*. S.

Div. SCIÆNIFORMES.

FAM. SCIÆNIDÆ. MAIGRE FAMILY.

Sciæna aquila, Cuv. MAIGRE.*

Sciæna aquila, Cuv. Yarr., Br. F., Vol. 1, p. 104.

„ „ „ Couch, Br. F., Vol. 2, p. 54; Vol. 4, p. 423, pl. 76, 76*.

Taken at Blyth, Nov., 1833, *J. Hancock*; Jarrow Slake, on the Tyne, 1838; at Redcar, 1849, *Rudd*; Sunderland, *R. Howse*. Rare. S.

Two of the local specimens in the Museum are more than five feet in length.

¹ It is, I think, of this fish that John Ray speaks in the following words—"Carne est laudabili, et satis tum palato grata, tum stomacho seu ventriculo commoda et salubri."—Synop. meth. Piscium, p. 132. 1713.

Div. XIPHIIFORMES.

FAM. XIPHIIDÆ. SWORD-FISHES.

Xiphias gladius, Linn. SWORDFISH.**Xiphias gladius*, Linn. Yarr., Brit. Fish., Vol. 1, p. 164.

" " " Couch, Brit. Fish., Vol. 2, p. 145, pl. 97.

A specimen brought in by trawlers, North Shields.—*W. S. Corder*. At Redcar, 1874, *Nelson*, and other parts of Yorkshire coast.—*Clarke and Roebuck*, Yorksh. Verteb.

The upper portion of the head of this specimen, which is the only part preserved, has been presented to the Museum by *W. S. Corder* of North Shields. The præmaxillæ or "Sword" is about two feet in length, which would indicate the fish to have been about seven feet in total length.

"A specimen of the Swordfish was caught in Filey Bay in 1808, measuring eleven feet in length and weighing twenty-three stones. It has likewise occurred, I believe, at Scarborough and Whitby."—*T. Meynell*. S.

Div. COTTO-SCOMBRIFORMES.

FAM. CARANGIDÆ. HORSE MACKERELS OR SCADS.

Caranx trachurus (Willughby, Linn.). SCAD.**Trachurus vulgaris*, Yarr., Brit. Fish., Vol. 1, p. 175.

" " Couch, Brit. Fish., Vol. 2, p. 136, pl. 94.

Newcastle fish-market, *J. Hancock*, 1830. "Of occasional occurrence during the Herring season," *Dr. G. Johnston*. Frequently caught in the Herring nets, *J. F. Spence*. M.

The Boar-fish, *Capros aper*, is recorded as having occurred in the Salmon nets at Redcar.—*Ferguson*.

FAM. CYTTIDÆ. DORIES.

Zeus faber (Willughby), Linn. JOHN DORY.**Zeus faber*, Linn. Yarr., Brit. Fish., Vol. 1, p. 183.

" " " Couch, Brit. Fish., Vol. 2, p. 118, pl. 89.

Small specimens are occasionally caught by the fishermen, and it is also rarely thrown up on the coast. Cullercoats, Whitburn, Hartlepool sands, *R. Howse*. Berwick Bay, rare, *Dr. G. Johnston*. Redcar, *T. Meynell*.

A fine specimen of the Dory, twenty-one inches in length, was caught off the Tyne, February, 1890, and presented to the Museum by W. Spouse of North Shields. S.

FAM. STROMATEIDÆ. BLACK-FISH FAMILY.

Centrolophus pompilus (Linn.) BLACK-FISH.*

Coryphæna morio, Yarr., Brit. Fish., Vol. 1, p. 179.

Centrolophus pompilus (L.), Couch, Brit. Fish., Vol. 2, p. 123, pl. 90.

One specimen only has been recorded from our coast, which was obtained from a fisherman, at Cullercoats, in the year 1849-50, by Mr. Joshua Alder, by whom it was presented to the Museum. Another specimen is recorded from Redcar.—*Rudd*, in *Zoologist*, 1852. S.

FAM. CORYPHÆNIDÆ. "DOLPHINS" OF SAILORS.

Brama Raii (Bloch). RAY'S BREEM.*

Brama Raii, Yarr., Brit. Fish., Vol. 1, p. 133.

„ „ Couch, Brit. Fish., Vol. 2, p. 129, pl. 92.

Mouth of Tees. Communicated to John Ray by his friend J. Johnson—"In palude Middelburgensi propè Tesæ fluminis ostium æstu maris delatus, undis recedentibus destitutus repertus est. Sept. 18, 1681."—*J. Ray*.

"I have seen two specimens cast on shore after a storm."—*Dr. Geo. Johnston*. Northumberland and Durham coasts occasionally.—*Sunderland*, *Prof. Geo. Brady*, 1870.

"Ray's Bream is found plentifully in some years at Redcar, generally left upon the shore by the receding tide, as many as twelve having been found in a morning; it only, however, occurs between October and December."—*T. Meynell*.

Redcar, at the Mouth of the Tees, seems to be the most noted locality for this fish, as more specimens have been found there than in all other parts of the British Coasts put together. S.

Lampris luna (Gmelin). ОРАХ.*

Lampris luna, Yarr., Brit. Fish., Vol. 1, p. 194.

„ „ Couch, Brit. Fish., Vol. 2, p. 133, pl. 93.

A specimen of this rare and handsome fish was found at Newbiggin-by-the-Sea in 1840 by Mr. John Hancock, by whom it was preserved, and has recently (1884) been presented by him to the Museum. It is the most gorgeously-coloured fish taken in our seas, and one of the rarest.¹ Mr. Hancock has often pointed out to me the inaccurate way in which the pectoral fin of the Opah is represented in the figures given by Donovan, Yarrell, and Couch, and the same remark applies to the equally inaccurate figures in Dr. Günther's *Study of Fishes* and Frank Buckland's *History of British Fishes*. In the Opah the very strong, sub-falcate or rather billhook-shaped, pectoral fins are placed quite perpendicular to the axis of the body, that is, to a line drawn from the mouth to the centre of the caudal fin, and not obliquely as in the figures given by the above authors. The pectoral fins could, in fact, move only from the side of the body outwards, and they served perhaps as outriggers, and enabled this very thin, flat-sided fish to balance and maintain its body in a vertical position. The pectoral fin of the Madeiran Opah is correctly figured by Lowe in the *Fishes of Madeira*, but in this species (for it appears to be specifically distinct) the pectoral fin is much smaller and of rather different shape. Also in Mr. Hancock's specimen the large tongue, which is still preserved, was quite smooth, and destitute of papillæ or sharp points as described by Donovan and Yarrell and other writers, who seem to have copied their description of the tongue of the Opah from Dr. Mortimer's in *Phil. Trans.*, 1750.

"The Opah is occasionally taken on the (Yorkshire) coast. One taken at Burlington (1842) weighed fifty-seven pounds, and was two feet ten inches long and one foot seven inches broad."—*T. Meynell*. Twelve specimens are recorded from the Yorkshire

¹ Naturalists almost run into raptures in attempting to describe this fish. Mr. Pennant says of a specimen caught in Torbay, 1772—"This fish weighed a hundred and forty pounds. The length was four feet and a half; the breadth two feet and a quarter; the greatest thickness only four inches. Its general colour was a vivid transparent scarlet varnish over burnished gold, bespangled with oval silver spots of various sizes. The flesh looked and tasted like beef."

Mr. Bosc, a French naturalist, uses the following words: "C'est un magnifique poisson. Des reflets d'azur, de vert clair, d'argent, se jouent sur un fond d'or, au milieu d'un grand nombre de taches couleur de perle ou de saphir." Etc.

coast by Messrs. Clarke and Roebuck. A specimen was thrown ashore in Budle Bay.—Berwick. Trans., Vol. VI., p. 97.

The first recorded British specimen of this fish was taken in the Frith of Forth, 1750. "In the year 1769 another specimen was taken at Blyth, near Newcastle, and an account of it was given by Mr. Robert Harrison of that place." About the same time another was taken in Filey Bay. Near the end of the last century four more specimens were obtained in the neighbourhood of the Forth. The greatest number of this rare fish have been taken on the N.E. coast of Britain. S.

FAM. SCOMBRIDÆ. MACKERELS AND TUNNIES.

Scomber scomber (Linn.). MACKEREL.

Scomber vulgaris, Flem. Yarr., Brit. Fish., Vol. 1, p. 137.

" " " Couch, Brit. Fish., Vol. 2, p. 67, pl. 79.

Off Berwick, Dr. G. Johnston, 1836. Off the Tyne occasionally, R. Howe.

Shoals of Mackerel so rarely visit this coast, that fishing for them is not a regular employment or industry with our fishermen. But occasionally large shoals do approach the Mouth of the Tyne, and afford an exciting amusement to amateur sea-fishers. On one fine summer's evening, 1860, fishing with a friend, in a foy-boat, off the Mouth of the Tyne, we soon became aware of the presence of a shoal of Mackerel, and so ready were they to be captured that in a short time we had landed in the boat two hundred or more, the only bait used being a small narrow piece of parchment about an inch long. No idea can be given in words of the beauty of this fish when first caught.

About the same time (1860) a large shoal of Mackerel entered the Tyne with the flowing tide, and were caught in great abundance, with rod and line, from the shore; a small piece of white rag being used for a bait. M.

Thynnus thynnus (Linn.). TUNNY.*

Scomber thynnus, Linn. Donovan, pl. 5.

" " Günther. Couch, Br. Fish., Vol. 2, p. 86, pl. 82.

Off Cullercoats, 1884. Frenchman's Bay in salmon nets.—Mr. Clift, South Shields, August, 1885.

In June, 1884, Mr. Clark, of North Shields, kindly informed me of the visit of a shoal of small Tunnies to the coast near Cullercoats. Many of these about thirty inches in length were caught in the salmon nets, but as they were unknown to any of the fishermen they were considered of no value, and thrown back into the sea. A few were kept and sent to market, where they were retailed at sixpence per pound. For an account of the large Tunny, nine feet in length, caught at Frenchman's Bay, and presented to the Nat. Hist. Museum by Mr. Wm. Clift, see Nat. Hist. Trans., Vol. VIII., p. 223. A very large Tunny was caught about the same time in the Frith of Forth, and another large specimen, seven or eight feet long, was washed ashore at Burlington, Yorkshire. Another large Tunny, about 480 lbs. weight, was stranded near the mouth of the Tees, 1853-4.—*J. Hogg*. S.

Thynnus Pelamys (Linn.). BONITO.

Thynnus Pelamys, Linn. Yarr., Brit. Fish., Vol. 1, p. 157.

„ „ „ Couch, Brit. Fish., Vol. 2, p. 97, pl. 83.

A straggler caught on the coast off Sunderland.—*Prof. G. Brady*, 1870. Nat. Hist. Trans., Vol. III., p. 381.

Prof. Brady states that he purchased a Bonito in a fish shop at Sunderland, and that he found it such good eating that he regretted that Bonitos did not visit us more frequently. The Bonito has been taken in the Forth. S.

FAM. TRACHINIDÆ. WEEVERS.

Trachinus draco, Linn. GREATER WEEVER.*

Trachinus draco, Linn. Yarr., Brit. Fish., Vol. 1, p. 24.

„ „ „ Couch, Brit. Fish., Vol. 2, p. 43, pl. 73.

“A few specimens are taken annually in Berwick Bay during the summer.”—*Dr. Geo. Johnston*. Whitburn occasionally.—*R. Howse*. Cullercoats.—*J. Hancock*. R.

Trachinus vipera, Cuv. LESSER WEEVER.*

Trachinus vipera, Cuv. Yarr., Brit. Fish., Vol. 1, p. 29.

„ „ „ Couch, Brit. Fish., Vol. 2, p. 48, pl. 74.

Very common on the sandy parts of our coast. Often thrown up after storms. The fishermen consider the wound inflicted by the dorsal spines of this little fish dangerous, and bathers are often injured in the foot by treading on the raised spine of the fish lying buried in the sand.—“Stanger or Stang-fish.” R.

FAM. LOPHIIDÆ = PEDICULATI. FISHING FROGS.

Lophius piscatorius, Linn. FISHING FROG, ANGLER.*

Lophius piscatorius, Linn. Yarr., Brit. Fish., Vol. 1, p. 305.
 „ „ „ Couch, Brit. Fish., Vol. 2, p. 204,
 pl. 110.

Not uncommon.—*Dr. G. Johnston*. Frequently caught by the fishermen, and occasionally washed ashore. Sometimes five feet in length. The Torpedo Rays mentioned by F. Buckland as having been found at Tees mouth probably were only specimens of this fish.—Refer to Torpedo. R.

FAM. COTTIDÆ, Linn. BULL-HEADS OR MILLER'S THUMBS.

Cottus gobio, Linn. MILLER'S THUMB.

Cottus gobio, Yarr., Brit. Fish., Vol. 1, p. 71.
 „ „ Couch, Brit. Fish., Vol. 2, p. 6, pl. 59.

In the Skerne.—*Surtees*. Hist. Durham, Vol. III., p. 22.
 In most brooks; common.—*J. Hogg*. Nat. Hist. of Stockton, 1827.

I have not heard of the capture of this little freshwater fish in any of our Northumbrian streams, but as it is so generally distributed, and has been taken in the Irthing by Mr. Thomas Thompson, at a short distance only from our Western boundary, it is very likely to be found in some of our more Northern streamlets and rivers. R.

Cottus scorpius, Linn. SEA SCORPION.

Cottus scorpius, Linn. Yarr., Brit. Fish., Vol. 1, p. 75.
 „ „ „ Couch, Brit. Fish., Vol. 2, p. 8, pl. 60.

Frequent in pools between tide-marks, and under stones at low water mark.—*Dr. G. Johnston*. It has been taken on our coast, but it is not so common as the next species. R.

Cottus bubalis, Cuv. FATHER LASHIER.*Cottus bubalis*, Cuv. Yarr., Brit. Fish., Vol. 1, p. 78.

" " " Couch, Brit. Fish., Vol. 2, p. 11, pl. 61.

Found in pools with the preceding species, with which it is often confounded.—*Dr. G. Johnston*. On this coast it is also more common. R.

Cottus Grænländicus, Cuv. et Val. GREENLAND COTTUS.**Cottus Grænländicus*, Yarr., Brit. Fish., 2nd Supp., p. 1.

" " Couch, Brit. Fish., Vol. 2, p. 12, pl. 62.

A specimen obtained and preserved by Mr. R. R. Wingate is preserved in the Museum. Living among the seaweeds in the tidal pools it is most likely often overlooked. This species is much larger than *C. scorpius* and *bubalis*. S.

Trigla cuculus, Linn. RED GURNARD.**Trigla cuculus*, Linn. Yarr., Brit. Fish., Vol. 1, p. 38.

" " Couch, Brit. Fish., Vol. 2, p. 19, pl. 64.

Under the name of *Trigla pini*, Bloch, *Dr. Johnston* records this species in the Berwick district. It occasionally occurs on the coast, and specimens are often seen in the fishmongers' shops. Cullercoats.—*Mr. J. F. Sidney*. S.

Trigla lineata, Gmelin. STREAKED GURNARD.**Trigla lineata*, Yarr., Brit. Fish., Vol. 1, p. 45.

" " Couch, Brit. Fish., Vol. 2, p. 25, pl. 67.

This Gurnard is occasionally taken on our coast, but seems to be rarer than the preceding. S.

Trigla hirundo, Linn. SAPPHIRINE GURNARD.**Trigla hirundo*, Linn. Yarr., Brit. Fish., Vol. 1., p. 47.

" " Couch, Brit. Fish., Vol. 2, p. 21, pl. 65.

Newton-by-the-Sea, *R. Embleton*; Cullercoats, *J. Hancock*, 1840; Yorkshire Coast, *T. Meynell*. Berwick Bay. Occasionally in the fishmongers' shops, but not common on the East coast. S.

Trigla gurnardus, Linn. GREY GURNARD.**Trigla gurnardus*, Yarr., Brit. Fish., Vol. 1, p. 53.

" " Couch, Brit. Fish., Vol. 2, p. 27, pl. 68.

This is the common Gurnard of the East Coast; occurring sometimes plentifully. R.

The Piper, *Trigla lyra*, Linn., probably occurs on our coast (though I find no record of it), as it has been occasionally taken at Redcar and other parts of the Yorkshire coast.—*Clarke and Roebuck*.

FAM. CATAPHRACTIDÆ.

Cataphractus Schoneveldii, Willughby. POGGE.**Aspidophorus cataphractus*, Yarr., Brit. Fish., Vol. 1, p. 85.

" " Couch, Brit. F., Vol. 2, p. 41, pl. 72.

"In Mari Dunelmensem Diœcesin, et Eboracensem comitatum alluente invenitur. Verùm proluxa descriptione ad hunc ab aliis piscibus discriminandum non est opus."—*John Ray*, 1713.

Cullercoats, *Mr. A. Adamson*, 1836-8; *W. Dinning*, 18—; *Dr. Embleton*. Frequent at the mouth of the Tweed.—*Dr. G. Johnston*. R.

The generic term *Agonus* adopted by Dr. Günther was applied to a very different fish by Ray and Willughby, and, besides, seems to be very inapplicable to this angular-shaped fish.

Div. GOBIIFORMES.

FAM. CYCLOPTERIDÆ = DISCOBOLI.

Cyclopterus lumpus, Linn. LUMPSUCKER.**Cyclopterus lumpus*, Linn. Yarr., Brit. Fish., Vol. 2, p. 365.

" " " Couch, Brit. Fish., Vol. 2, p. 183, pl. 105.

Frequently cast ashore, and also its mass of dark-red coloured spawn in the spring months, March and April. The young often found in pools between tide-mark. R.

Cyclopterus liparis and *Cyclopterus Montagu*i are included in Dr. Johnston's List of Berwick Fishes. These have not yet been recorded from our immediate neighbourhood, but have probably been overlooked, and are likely to be found in suitable rock-pools on our coast.

FAM. GOBIIDÆ. GOBIES.

Gobius Ruthensparri, Cuv. TWO-SPOTTED GOBY.*Gobius bipunctatus*, Yarr., Brit. Fish., Vol. 1, p. 285.

,, ,, Couch, Brit. Fish., Vol. 2, p. 162, pl. 100, f. 3.

“In pools left by the recess of the tide.”—*Dr. G. Johnston*.
According to Dr. A. Günther this is the *Gobius Ruthensparri*,
Cuvier. R.

Gobius unipunctatus, Parnell. ONE-SPOTTED GOBY.*Gobius unipunctatus*, Yarr., Brit. Fish., Vol. 1, p. 292.

,, ,, Couch, Brit. Fish., Vol. 3, p. 167, pl. 101, f. 3.

According to Mr. T. Meynell the One-spotted Goby is abundant
in the Salt marshes at Redcar, and will most likely be found in
the marshy ground on the Durham side of the Tees, and else-
where on our coast, as Dr. Parnell, who first described this
species, found it “in most of the sandy bays in the Frith of
Forth;” and it has been found as far North as the Moray Firth.
This is perhaps the same fish as the *G. minutus* of Pallas, Gmelin,
and Donovan’s Plate 38.

The Black Goby and several other species will most likely be
found on our coasts between tide-marks if diligently sought for,
as it is recorded at Redcar and other parts of the Yorkshire
coast. R.

Callionymus lyra, Linn. GENMEOUS DRAGONET.*Callionymus lyra*, Linn. Yarr., Brit. Fish., Vol. 1, p. 297.,, ,, Couch, Brit. Fish., Vol. 2, p. 173,
pl. 103.

Not uncommon on our coast.—*Dr. G. Johnston*, Whitburn,
1849. The “Gowdy” occurs occasionally in great plenty at
Cullercoats on the fishermen’s lines.—*R. Howse*, 1889. R.

Callionymus dracunculus, Linn. SORDID DRAGONET.*Callionymus dracunculus*, L. Yarr., Brit. Fish., Vol. 1, p. 302.,, ,, Couch, Brit. Fish., Vol. 2, p. 178,
pl. 104.

Less common than the preceding.—*Dr. G. Johnston*.

This species has no doubt been overlooked, as I find no record of it, and do not remember to have seen a specimen from this district. This fish is considered by some authors to be the female of the preceding species. R.

Dis. *BLENNIIFORMES.*

FAM. *BLENNIDÆ.* *BLENNIES.*

Anarrhichas lupus, Linn. WOLF FISH. SEA-CAT.

Anarrhichas lupus, Linn. Yarr., Brit. Fish., Vol. 1, p. 277.
 " " " Couch, Brit. Fish., Vol. 2, p. 242,
 pl. 117.

"In mari Eboracensi et Northumbrico capitur."—*Jno. Ray*, 1713. "An ugly fish to sight, and yet very delicat in eating, if it be kindlie dressed." It is truly a fish for an epicure.

Feeds on scallops and whelks, which its powerful jaws and teeth enable it to crush with ease. Common on the rocky parts of the coast. Always decapitated and skinned before it is exposed for sale in our markets, but reported by fishermen themselves to be excellent eating. R.

Blennius Gattorugine, Linn. GATTORUGINE.

Blennius Gattorugine, Yarr., Brit. Fish., Vol. 1, p. 256.
 " " Couch, Brit. Fish., Vol. 2, p. 219, pl. 111.

Included in Sir Cuthbert Sharp's List of Hartlepool Fishes. Lying concealed in pools among long seaweeds it is probably often overlooked, for the above is the only record for this species on our coast that I have been able to find. R. ?

Blennius pholis, Linn. SHANNY.

Blennius pholis, Linn. Yarr., Brit. Fish., Vol. 1, p. 260.
 " " Couch, Brit. Fish., Vol. 2, p. 226,
 pl. 113, f. 2.

"Common, lurking under stones between tide-marks."—*Dr. G. Johnston*. R. ?

Blenniops Yarrelli, Cuv. YARRELL'S BLENNY.

Blenniops Yarrelli, Cuv. Yarr., Brit. Fish., Vol. 1, p. 263.
 " " Couch, Brit. Fish., Vol. 2, p. 233,
 pl. 114.

"In pools between tide-marks. Jan. 27th, 1833, very rare."—*Dr. G. Johnston.*

Mr. Yarrell, in the first edition of his History of British Fishes, says, "I am indebted to the kindness of Dr. George Johnston, of Berwick-upon-Tweed, for the only specimen of this fish I have ever seen." It was at first referred to *B. palmicornis*, Cuv., and *B. galerita*, Linn. Dr. Günther, in Brit. Mus. Cat., refers it to *Blenniops Ascanii*. R.?

No doubt this fish has been, like the rest of the Blennies which frequent the rock-pools between tide-marks, overlooked or not much searched for. It is very desirable that some one residing on the sea-coast would undertake to investigate the fish-fauna to be found in the rock-pools on many parts of our coast, which have too long remained unexplored. The pleasure of such searching alone would amply repay the labour, and there is added the probable discovery of species before unknown or new to the coast.

Centronotus gunnellus (Linn.). BUTTER FISH.

Gunnellus vulgaris, Yarr., Brit. Fish., Vol. 1, p. 269.

Centronotus gunnellus, Couch, Brit. Fish., Vol. 2, p. 236, pl. 115.

Coasts of Northumberland and Durham and Berwick Bay. Common under stones between tide-marks.—*Dr. G. Johnston, R. Howse.* R.

Zoarces viviparus (Linn.). VIVIPAROUS BLENNY.*

Zoarces viviparus (Linn.). Yarr., Brit. Fish., Vol. 1, p. 273.

" " " Couch, Brit. Fish., Vol. 2, p. 239,
pl. 116.

Frequent in the Tweed near its mouth.—*Dr. G. Johnston.* Ascends the Tyne as far as Elswick.—*J. Alder, J. Stephenson.* R.

Div. MUGILIFORMES.

FAM. ATHERINIDÆ. SAND-SMELTS.

Atherina presbyter, Cuvier. ATHERINE or SAND-SMELT.

Atherina presbyter, Yarr., Brit. Fish., Vol. 1, p. 229.

" " Couch, Brit. Fish., Vol. 3, p. 1, pl. 121, f. 2.

This little fish has been found in the Frith of Forth by Dr. Parnell, and according to Mr. T. Meynell it is often taken at Burlington Quay by persons when fishing with a worm. It is a species, therefore, very likely to be found on our coast if sought for in suitable places, such as the mouths of the Tees and Tyne, Druridge Bay, Holy Island, and the mouth of the Tweed. R.?

FAM. MUGILIDÆ. GREY MULLET.

Mugil capito, Cuv. GREY MULLET.*

Mugil capito, Cuv. Yarr., Brit. Fish., Vol. 1, p. 234.

" " Couch, Brit. Fish., Vol. 3, p. 6, pl. 122.

In the Tyne.—*J. Hancock*. Yorkshire coast.—*T. Meynell*. S.

Mugil chelo, Jenyns. LESSER GREY MULLET.

Mugil chelo, Yarr., Brit. Fish., Vol. 1, p. 241.

" " Couch, Brit. Fish., Vol. 3, p. 15, pl. 123.

" *septentrionalis*, Günther, Brit. Mus. Cat.

Of frequent occurrence in Berwick Bay in autumn.—*Dr. G. Johnston*. Yorkshire coast.—*T. Meynell*. S.

Div. GASTROSTEIFORMES.

FAM. GASTEROSTEIDÆ. STICKLEBACKS.

Gasterosteus aculeatus, Linn. THREE-SPINED STICKLEBACK.*

Gasterosteus aculeatus, Donovan, Pl. 11.

" " Couch, Br. F., Vol. 1, p. 167, pl. 37, f. 1.

In ponds and lakes, and also in brackish waterpools on the sea coast at Newbiggin-by-the-Sea and elsewhere. Often caught with the herring-sprats in nets at the mouth of the Tees in the spring months. Authors have made numerous species out of *G. aculeatus*, *spinis dorsabilis tribus*, Linnæus, but the general opinion at the present time seems to be that they all belong to one common species. R.

We have not heard of the variety with four dorsal spines, *G. spinulosus*, Auct., having been found in our district.

A very interesting account is given of the nidification of this fish by the late Mr. Albany Hancock in the Transactions of the Tyneside Naturalists' Field Club, Vol. II., p. 311.

Gasterosteus pungitius, Linn. TEN-SPINED STICKLEBACK.*Gasterosteus pungitius*, Yarr., Brit. Fish., Vol. 1, p. 99." " Couch, Br. Fish., Vol. 1, p. 176, pl. 37,
f. 2.

The only record I can find of the existence of the "Tinker" or Ten-spined Stickleback in our district is in the list of fishes given in Sir Cuthbert Sharpe's History of Hartlepool. Local specimens of this species are much desired for the Museum, and there is no locality in the district in which it is more likely to be found than in the numerous "stells" and small streams in the south-east of Durham. R.

Gasterosteus spinachia, Linn. FIFTEEN-SPINED STICKLEBACK**Gasterosteus spinachia*, Linn. Yarr., Brit. Fish., Vol. 1, p. 101." " " Couch, Brit. Fish., Vol. 1, p. 180,
pl. 38.

Of not uncommon occurrence at the mouth of the Tweed and in Berwick Bay.—*Dr. G. Johnston*. In 1849 and—50 I found numerous specimens of this fish watching their nests, constructed of sea-weeds fastened together, in the higher and larger pools on the coast near Tynemouth. R.

Div. TENIIFORMES.

FAM. TRACHYPTERIDÆ. RIBBON FISHES.

Trachypterus arcticus (Brünnich). DEAL-FISH.**Vaagmür*, Yarr., Brit. Fish., Vol. 1, p. 210.*Trachypterus arcticus*, Couch, Brit. Fish., Vol. 2, p. 246, pl. 118.

Newbiggin-by-the-Sea, June, 1844. This fine specimen is preserved in the Museum of the Nat. Hist. Society. A specimen washed on shore at Spittal was exhibited in Berwick-upon-Tweed.—*G. Bolam*, Berwick Trans., Vol. VIII. S.

Regalecus Banksii, Cuv. et Val. BANKS' OAR-FISH.**Gymnetrus Banksii*, Hanc et Embleton, Trans. Tyneside F. C.,
Vol. 1, p. 288, pls. 1, 2.*Regalecus* " Couch, Brit. Fish., Vol. 2., p. 251, pl. 119.

The first example on record of this fish in England is said to have been obtained at Whitby, in January, 1759. Another

example was found by some women at Filey Bay, 1796. About the end of the century a similar fish was exhibited in Newcastle, and a drawing of it was made by Bewick, the celebrated wood-engraver, which has been lost. Two fishes of the same kind were captured in 1800, in a shallow pool at the outer Farne Islands, one of which is said to have been eighteen feet long. In 1796, one was got at Cullercoats, near Newcastle, and recorded by John Leech in 1849. In the year 1845 the Preventive Service men observed a fish of this kind in a pool near Alnmouth. This fish was stated by Mr. George Tate to be sixteen feet in length. A specimen was taken at Cullercoats, in March, 1849, and was exhibited in Newcastle and neighbouring towns, and afterwards in London. Eventually this specimen was presented by Mr. Whitfield to the Newcastle Museum, where it is still preserved. A long and interesting account of this rare fish is given in the Transactions of the Tyneside Nat. Field Club, Vol. I., p. 288, by Messrs. Hancock and Embleton. In 1850 another example was cast ashore on the Yorkshire coast, near Redcar. It was alive, but much mutilated, measured nearly twelve feet, and weighed sixty-six pounds. Another example was taken off the coast at Amble, opposite Coquet Island, on March 8th, 1876. An account of this fish is given by Mr. J. Wright in the Nat. Hist. Trans. N. D. & N'C., Vol. V., p. 340. It was alive when captured, and measured thirteen feet four and a half inches, and was nine inches and three-quarters in the deepest part. In this specimen the filaments in front of the dorsal fin, and the long ventrals with an oval leaf-like expansion at the end, were better preserved than usual.

From the instances of the occurrence of this fish on our coast and the adjacent parts of Yorkshire enumerated above, Banks' Oar-fish cannot be considered the rarest straggler to our coast; and they shew that its home is as much in the Northern seas as in those further South. A species very similar, if not really identical, has been observed on the East Coast of Australia. S.

ORDER. ACANTHOPTERYGII PHARYNGOGNATHI.

FAM. LABRIDÆ. WRASSES.

Labrus maculatus, Bloch. BALLAN WRASSE.*

Labrus maculatus, Bloch. Yarr., Brit. Fish., Vol. 1, p. 311.
 „ „ „ Couch, Brit. Fish., Vol. 14, p. 25,
 pl. 125.

Frequent; living near low water-mark in rocky places.—*Dr. G. Johnston*. Hartlepool, under the name *Labrus tinca*, or Old Wife.—*Sir C. Sharpe*. The Ballan Wrasse appears occasionally in immense shoals off Filey, the largest weighing about five pounds.—*T. Meynell*. !! Brought in by fishermen at North Shields, and known as the Common Wrasse.—*J. F. Spence*, North Sunderland. S.

The specimens referred to this species are only occasionally taken on our coast, and when exposed in the market are without the gaudy colours of living specimens.

Labrus lineatus (Donovan). GREEN OR STREAKED WRASSE.*

Labrus lineatus, Donovan, pl. 74.
 „ „ Yarr., Brit. Fish., Vol. 1, p. 315.
 „ „ Couch, Brit. Fish., Vol. 3, p. 30, pl. 126, f. 1.

A specimen of this doubtful species was got at Cullercoats many years since by Mr. J. Hancock, by whom it was identified with Donovan's figure. This specimen is ten inches long, and differs also from Donovan's description, in the number of the fin-rays, and in having the præoperculum strongly crenulated. It must be considered an uncertain species. In some characters it agrees with Couch's Green Wrasse, but it is much larger. The *L. lineatus* is probably only the younger form of the Ballan Wrasse. Couch's figure is probably from a young individual. S.

Labrus mixtus, Linn. COOK OR VARIEGATED WRASSE.

Labrus coquus, Yarr., Brit. Fish., Vol. 1, p. 317.
Cook, Couch, Brit. Fish., Vol. 3, p. 34, pl. 127.

The occurrence of this fish on our coast rests on the authority of the fishermen, and a fresh-caught specimen is much desired

for examination and verification. It has, however, been taken near Dunbar (Berwickshire Trans., Vol. VIII.), so that its occurrence as a straggler to our coast is very probable. S.

Ctenolabrus rupestris (Linn.). JAGO'S GOLDSINNY.*

Goldsinny, Yarr., Brit. Fish., Vol. 1, p. 333.

Ctenolabrus rupestris, Couch, Brit. Fish., Vol. 3, p. 47, pl. 133.

"After a severe storm in February, 1836, specimens of this pretty fish were thrown ashore. Our fishermen consider it the young of the Sea-Sow."—*Dr. G. Johnston*. Several specimens have been taken at Cullercoats by Mr. J. Hancock, which are now in our Museum. Four specimens of Jago's Goldsinny have been taken at Redcar.—*T. Meynell*.

These records seem to shew that this fish is not rare on our coast, though few are caught on the fishermen's lines. R. ?

ORDER. ANACANTHINI.

Div. GADOIDEI.

FAM. GADIDÆ. COD-FISH FAMILY.

Gadus morhua, Linn. CODFISH.

Morrhua vulgaris, Yarr., Brit. Fish., Vol. 2, p. 221.

" " Couch, Brit. Fish., Vol. 3, p. 53, pl. 135.

Common.

"There appears to be two well-marked varieties of the Common Cod; one with a sharp nose, elongated before the eye, and the body of a very dark brown colour, which is usually called the Dogger-bank Cod. The other variety has a round blunt nose, short and wide before the eyes, and the body of a light yellowish ash-green colour, and is frequently called the Scotch Cod."—*Yarrell*. Both these varieties are caught off this coast, and exposed for sale in our markets. Another variety has also been mentioned under the name of *Morrhua punctata*, the Speckled Cod, and reported by Mr. T. Meynell as occurring on the Yorkshire coast.

I am not aware that the Dorse or Variable Cod has been observed on this coast. Though distinguished by older authors,

and honoured with a specific name, *Gadus callarias*, L., and known as the Baltic Cod, more recent authors have been induced to consider it only a variety of the Common Cod; and as it is a northern form, its occurrence on this coast as a straggler is highly probable, and requires to be noted.

The Codfish is noted for its rapacity. Dr. G. Johnston narrates that a fisherman, on whose word he could rely, told him that he once caught a Codfish with a hare in its stomach; and in the stomach of another he found a white turnip. When on a dredging excursion on the inner edge of the Dogger Bank, in August, 1851, with Mr. McAndrew, one evening we lay to, to allow the men to fish for Cod. A great many were taken with the hand-lines in a short time, cold potatoes and other things being used for bait. Many of the fishes were split open by the men, and the backbone taken out, preparatory to drying the fish. I noticed the long backbone of one that was thrown overboard, as it was the last fish caught. We then sailed about six or seven miles, and began to fish again. Strange to say, the first fish hooked had in its stomach the backbone that had been thrown overboard six miles from the place where this fish was caught. But though a greedy feeder the Codfish does not always prefer "Ket." Hermit Crabs, Cuttlefish and that of great size, and many other dainties are its habitual food. I have seen the pen of a Cuttlefish nearly two feet long taken out of the stomach of a large Cod. R.

Gadus æglefinus (Willughby), Linn. HADDOCK.

Morrhua æglefinus, Linn. Yarr., Brit. Fish., Vol. 2, p. 233.
 " " " Couch, Brit. Fish., Vol. 3, p. 62,
 pl. 136.

"Taken in such abundance as to furnish all tables, and to reward the toil of the hardy fishermen."—*Wallis*, 1769. R.

Gadus luscus (Willughby), Linn. BIB or WHITING POOT.

Morrhua lusca (Linn.). Yarr., Brit. Fish., Vol. 2, p. 237.
 " " " Couch, Brit. Fish., Vol. 3, p. 70,
 pl. 138.

Not uncommon. R.

Merlangus merlangus (Linn.). WHITING.*Merlangus vulgaris*, Yarr., Brit. Fish., Vol. 2, p. 244.

" " Couch, Brit. Fish., Vol. 3, p. 74, pl. 140.

Common. R.

Merlangus pollachius (Linn.). POLLACK.*Merlangius pollachius* (Linn.), Yarr., Brit. Fish., Vol. 2, p. 253.

" " Couch, Brit. Fish., Vol. 3, p. 80,

Common. R. pl. 142.

Merlangus carbonarius (Linn.) COAL-FISH.*Merlangus carbonarius* (Linn.), Yarr., Brit. Fish., Vol. 2, p. 250.

" " Couch, Brit. Fish., Vol. 3, p. 84,

pl. 143.

Common. The *M. virens* (L.) has been taken at the mouth of the Tweed; but is not this merely the young of the Coal-fish? R.

Lota fluviatilis (Willughby et Ray). BURBOLT.*Lota vulgaris*, Yarr., Brit. Fish., Vol. 2, p. 267.

" " Couch, Brit. Fish., Vol. 3, p. 93, pl. 146.

In the Skerne, a Durham tributary of the Tees,¹ and also in the Yorkshire Wiske and Swale.

In the *Naturalist* (1888-9) it is stated that the Burbolt was taken on a fisherman's line off Huntcliff; but surely this is a case of wrong identification. R.

Lota molva (Linn.). LING.*Lota molva* (Linn.), Yarr., Brit. Fish., Vol. 2, p. 264.

" " Couch, Brit. Fish., Vol. 3, p. 89, pl. 145.

Common, but less so than the Cod. R.

Brosmius brosme (Müller). TORSK or TUSK.*Brosmius vulgaris*, Yarr., Brit. Fish., Vol. 2, p. 285; Don., pl. 70.

" " Couch, Brit. Fish., Vol. 3, p. 96, pl. 147..

Only stragglers taken on this coast. One taken near Coldingham is recorded in Vol. VI. of Berwickshire Transactions. S.

¹ Surtees' History of Durham, Vol. III., p. 22.

Merlucius merlucius (Willughby et Ray). HAKE.*Merlucius vulgaris*, Yarr., Brit. Fish., Vol. 2, p. 258.

,, ,, Couch, Brit. Fish., Vol. 3, p. 99, pl. 148.

Rare.—*Dr. G. Johnston*. The Hake is a rare species on the Yorkshire coast.—*T. Meynell*. Brought to our market more frequently now, than in former years, by the trawlers. S.

Motella vulgaris (Willughby). THREE-BEARDED ROCKLING.**Motella vulgaris*, Yarr., Brit. Fish., Vol. 2, p. 270.

,, ,, Couch, Brit. Fish., Vol. 3, p. 105, pl. 149.

Rare on our coast. A specimen caught off Tynemouth was presented to the Museum by Mr. C. H. Young, 1884. R.

Motella mustela (Linn.). FIVE-BEARDED ROCKLING.*Motella quinquedactylata*, Yarr., Brit. Fish., Vol. 2, p. 278.,, ,, Couch, Brit. Fish., Vol. 3, p. 108,
pl. 150, f. 1.

Not uncommon in rocky pools near low-water mark.—*Dr. G. Johnston*. Redcar, on the Yorkshire coast.—*T. Meynell*. R.

Raniceps trifurcatus (Turton). LESSER FORKBEARD.**Raniceps trifurcatus*, Yarr., Brit. Fish., Vol. 2, p. 292.

,, ,, Couch, Brit. Fish., Vol. 3, p. 212, pl. 152.

Rare.—*Dr. G. Johnston*. Cullercoats, *J. Hancock*, but not common. Redcar, on the Yorkshire coast.—*T. Meynell*. Trawlers, North Shields.—*E. H. Birchall*, 1890. R.

FAM. OPHIDIIDÆ. LAUNCES OR SAND-EELS.

Ammodytes lancea, Jenyns. LESSER SAND-EEL.*Ammodytes lancea*, Yarr., Brit. Fish., Vol. 2, p. 429.

,, ,, Couch, Brit. Fish., Vol. 3, p. 137, pl. 157, f. 1.

More common than the next species, from which it is not distinguished by our fishermen.—*Dr. G. Johnston*. R.

Ammodytes tobianus, Linn. GREATER SAND-EEL.*Ammodytes tobianus*, Yarr., Brit. Fish., Vol. 2, p. 424.,, ,, Couch, Brit. Fish., Vol. 3, p. 140, pl. 157,
f. 2.

On sandy parts of the coast, whence it is dug out with an old hook at low tide.—*Dr. G. Johnston.* R.

Sand-eels are caught at ebb tide on our sandy shores for bait by means of an iron hook, which is passed rapidly through the wet sand in which the fish lie buried.

Div. PLEURONECTOIDEI.

FAM. PLEURONECTIDÆ. FLAT-FISHES.

Eyes on the right side.

Pleuronectes hippoglossus, Linnæus. HALIBUT.

Hippoglossus vulgaris, Yarr., Brit. Fish., Vol. 2, p. 323.

„ „ Couch, Brit. Fish., Vol. 3, p. 149, pl. 159.

The Turbot of our market. Common.—*Dr. G. Johnston.*

This is the largest and most typical species of the family. I have seen a specimen caught on the Dogger-bank fully six feet long. R.

Platessa platessa (Linn.), Cuvier. PLAICE.

Platessa vulgaris, Yarr., Brit. Fish., Vol. 2, p. 297.

„ „ Couch, Brit. Fish., Vol. 3, p. 181, pl. 169.

Common.—*Dr. G. Johnston.* R.

This fish was in former years rarely caught on our coast, but now it is brought in by the trawlers in abundance.

Platessa flesus (Linn.). FLOUNDER.

Platessa flesus, Yarr., Brit. Fish., Vol. 2, p. 303.

„ „ Couch, Brit. Fish., Vol. 3, p. 195, pl. 175.

Ascends the Tweed as far as the Till, which river it also enters, and in our other burns which have a communication with the sea.—*Dr. G. Johnston.* Occurs in the Tyne at Blaydon, and in the Team at Ravensworth, and in all our rivers beyond the tidal flow.—*Thos. Thompson. John Hancock.* R.

Reversed varieties of this species are not uncommon. A fine example was lately presented to the Museum by Mr. W. Clift.

Platessa limanda (Linn.), Cuvier. DAB.*Platessa limanda*, Yarr., Brit. Fish., Vol. 2, p. 307.

,, ,, Couch, Brit. Fish., Vol. 3, p. 185, pl. 170.

Common. Its favourite food appears to be the pretty *Pecten obsoletus*.—*Dr. G. Johnston*. R.

Hippoglossoides limandoides (Bloch), Günther.

ROUGH DAB.*

Platessa limandoides, Yarr., Brit. Fish., Vol. 2, p. 313.

,, ,, Couch, Brit. Fish., Vol. 3, p. 153, pl. 160.

Not rare.—*Dr. G. Johnston*. In 1834 received two specimens from Dr. Johnson.—*Yarrell*. At Sunderland.—*Geo. T. Fox*. Cullercoats, 1872.

This was formerly a rare species in our district. Only two specimens have been presented to the Museum, both caught at Cullercoats in the spring of 1872. Presented by Mr. W. Lisle and Mr. Robt. Carr, per Rev. R. Wheeler. It is now frequently brought in by the trawlers, but not of large size. R.

Hippoglossoides? microcephalus (Don.). SMEAR DAB OR LEMON DAB.*Platessa microcephalus*, Yarr., Brit. Fish., Vol. 2, p. 309.

,, ,, Couch, Brit. Fish., Vol. 3, p. 187, pl. 171.

Not common.—*Dr. G. Johnston*. "I have received specimens from Dr. Johnston of Berwick."—*Yarrell*.

This is the Lemon Sole brought in by the trawlers, and sold by that name in the shops, but it is not the true Lemon Sole, *Solea aurantiaca*, a finer fish every way, and rarer. The Smear Dab seems to be abundant on the East Coast, and affords a supply of excellent food. R.

Hippoglossoides? cynoglossus (Linn.). CRAIG FLUKE.*Platessa pola*, Yarr., Brit. Fish., Vol. 2, p. 315.

Pole or Whiff, Couch, Brit. Fish., Vol. 3, p. 190, pl. 173.

Northumberland Coast.—*Mr. W. Clift*. Not uncommon in the Frith of Forth in April, May, and June.—*Dr. Parnell*.

Local specimens for the Museum of this fish are much desired, and no doubt careful examination of the trawlers' captures would soon enable any one to verify the existence of this northern species on our coast. Under the name of "Witch Sole" we have lately been favoured with a very fine specimen of this species, which appears not to be rare on the East Coast, by Mr. Wm. Clift. R.

Solea solea (Willughby). SOLE.

Solea vulgaris, Yarr., Brit. Fish., Vol. 2, p. 347.

" " Couch, Brit. Fish., Vol. 3, p. 200, pl. 176.

Not uncommon in this district, and attaining a large size. R.

Solea aurantiaca, Günther. LEMON SOLE.

Solea pegusa, Yarr., Brit. Fish., Vol. 2, p. 351; non Risso.

Lemon Sole, Couch, Brit. Fish., Vol. 3, p. 205, pl. 178.

Not satisfactorily known or recorded from our district, being often confounded with the Lemon Dab. It is recorded from the Yorkshire coast by Mr. T. Meynell, 1844, and will most likely, when enquiries are made, be found on our coast also.

Eyes on the left side.

Rhombus rhombus (Linn.). BRILL.

Rhombus vulgaris, Yarr., Brit. Fish., Vol. 2, p. 331; Don., pl. 95.

" " Couch, Brit. Fish., Vol. 3, p. 161, pl. 162.

Rare.—*Dr. G. Johnston*. Brought in by the trawlers. R.

Rhombus maximus (Linn.). TURBOT.*

Rhombus maximus, Yarr., Brit. Fish., Vol. 2, p. 324.

" " Couch, Brit. Fish., Vol. 3, p. 155, pl. 161.

By our fishermen called the Turbrat or Roddams. There is a fishery for this prized fish at Burnmouth; and it is occasionally taken on all parts of our coast.—*Dr. G. Johnston*. R.

Rhombus? megastoma (Donovan). WHIFF. SAIL FLUKE.

Pleuronectes megastoma, Donovan, pl. 51.

Rhombus megastoma, Yarr. Couch, Brit. Fish., Vol. 3, p. 167,
pl. 164.

I believe this is very rare. My specimen was named by Mr. Yarrell.—*D. G. Johnston*. This species appears to be more common on the East Coast than was formerly supposed. R.?

Phrynorhombus? punctatus (Bloch), Günther. BLOCH'S
TOPKNOT.*

Rhombus hirtus, Yarr., Brit. Fish., Vol. 2, p. 334.

Muller's Topknot, Couch, Brit. Fish., Vol. 3, p. 170, pl. 165.

Rare.—*Dr. G. Johnston*. I have received a specimen from Dr. G. Johnston, which was taken near Berwick Bay.—*Yarrell*.

A beautiful specimen of this rare fish was taken in Beadnell Bay last autumn, and is now in my possession. It agrees in every respect with the description given by Mr. Yarrell, Brit. Fish., 1st ed., Vol. II., p. 243. My specimen, however, is eight inches in length by five in breadth, being three inches longer than Mr. Yarrell's.—*Mr. Robt. Embleton*. Berwickshire Nat. Field Club, Vol. IV., page 155. This specimen was afterwards presented to our Museum by Mr. R. Embleton. It is reported to have been taken several times near Redcar.—*T. Meynell*. R.

Phrynorhombus unimaculatus (Risso), Günther.

MULLER'S TOP-KNOT.*

Rhombus punctatus, Yarr., Brit. Fish., Vol. 2, p. 338.

Bloch's Topknot, Couch, Brit. Fish., Vol. 3, p. 173, pl. 166.

I have referred to this species a small specimen picked up on the sands near Cullercoats, in 1830, by Mr. Albany Hancock, and lately presented to the Museum by Mr. J. Hancock, which seems to be quite distinct from the preceding species. The left side of the body has been covered with very small narrow scales with sharp-pointed spines, and the right side is covered with scales so minute as to be scarcely perceptible. Much doubt still remains with regard to the specific characters of the Topknots, and more specimens in a fresh state are required to determine the species satisfactorily. Said to have been taken near Redcar.—*Ferguson*. R.

Arnoglossus laterna (Willughby), Günther. MEGRIM OR
SCALDFISH.

Rhombus arnoglossus, Yarr., Brit. Fish., Vol. 2, p. 345.

Megrim, Couch, Brit. Fish., Vol. 3, p. 177, pl. 168.

The Smooth Sole or Megrim is taken on the Yorkshire coast, but rare.—*T. Meynell*, 1844. Brought into the Tyne by the trawlers.—*J. F. Spence*, 1890. A specimen of this fish is much desired for the Museum Collection. R. ?

ORDER. PHYSOSTOMI.

FAM. CYPRINIDÆ. CARP FAMILY.

Cyprinus carpio, Linn. CARP.*

Cyprinus carpio, Yarr., Brit. Fish., Vol. 1, p. 349.

„ „ Couch, Brit. Fish., Vol. 4, p. 180.

Introduced into ponds. I am not aware that the Carp is met with in any part of Berwickshire.—*Dr. G. Johnston*. Very large Carp formerly existed in a pond at Belsay Castle, and one of these was stuffed for and is still in the Museum. In becks near Stockton, escaped from Wynyard ponds.—*J. Hogg*. C.

Gobio fluviatilis, Willughby. GUDGEON.

Gobio fluviatilis, Yarr., Brit. Fish., Vol. 1, p. 371.

„ „ Couch, Brit. Fish., Vol. 4, p. 20, pl. 182.

In the Skerne.—*Surtees*. Not uncommon in the neighbourhood of Stockton-on-Tees.—*J. Hogg*. In the Alne at Alnwick.—*Wm. Lyall*. In the Wansbeck. Local specimens for verification much desired. R. ?

FAM. LUCISCIDÆ. ROACH OR DACE FAMILY.

Leuciscus rutilus (Linn.). ROACH.

Leuciscus rutilus, Yarr., Brit. Fish., Vol. 1, p. 399.

„ „ Couch, Brit. Fish., Vol. 4, p. 47, pl. 191.

Wallis states that the Roach is taken in some of our lakes from six to nine inches. Frequent near Stockton.—*J. Hogg*. In the Skerne.—*Surtees*. In the Tyne at Elswick.

Introduced occasionally into private ponds and pieces of artificial water. C.

Leuciscus cephalus (Linn.). CHUB.

Cyprinus cephalus, Yarr., Brit. Fish., Vol. 1, p. 409.

Leuciscus „ Couch, Brit. Fish., Vol. 4, p. 44, pl. 190.

The Chub is frequent in the River Tyne in large holes under the trunks of trees, where it grows to a good size.—*Wallis*, 1769. In the becks near Stockton.—*J. Hogg*, 1827. In the Skerne.—*Surtees*. C.

Though seemingly so well attested as a local species I have not seen one or been able to obtain a local specimen for the Museum.

Leuciscus erythrophthalmus (Linn.) RUDD or RED-EYE.

Leuciscus erythrophthalmus, Yarr., Brit. Fish., Vol. 1, p. 412.

„ „ Couch, Br. Fish., Vol. 4, p. 49, pl. 192.

Introduced into ponds, and often confounded with the Roach. Formerly in ponds near Marsden. C.

Leuciscus leuciscus (Linn.). DACE or DARE.

Leuciscus vulgaris, Yarr., Brit. Fish., Vol. 1, p. 404.

„ „ Couch, Brit. Fish., Vol. 4, p. 54, pl. 194.

Occurs in most of our rivers, where it attains its full size, and often annoys the angler by seizing his Trout-and even small Salmon-flies, and, though not so plucky as the Trout, shews a good deal of play. In former years boys might be seen on the Quayside, below bridge, fishing and catching “Dares” in the brackish water of the Tyne. Recorded by *Wallis*, *Surtees*, and *J. Hogg*. R.

Leuciscus phoxinus (Linn.). MINNOW.

Leuciscus phoxinus, Yarr., Brit. Fish., Vol. 1, p. 423.

„ „ Couch, Brit. Fish., Vol. 4, p. 64, pl. 199, f. 1.

Near Berwick-on-Tweed. Common.—*Dr. G. Johnston*. In streams near Stockton-on-Tees.—*J. Hogg*. In the Skerne.—

Surtees. In the Tyne and its branches in suitable pools. In the Ouseburn. Wallis seems to have overlooked this little fish. R.

Tinca tinca (Linn.). TENCH.

Tinca vulgaris, Yarr., Brit. Fish., Vol. 1, p. 375.

„ „ Couch, Brit. Fish., Vol. 4, p. 22, pl. 183.

Introduced in 18th century (1786) into Berwickshire.—*Dr. G. Johnston*. In ponds occasionally. No doubt introduced from the Netherlands and other parts of the Continent. C.

FAM. ABRAMIIDÆ. BREAM FAMILY.

Alburnus alburnus (Linn.). BLEAK.

Leuciscus alburnus, Yarr., Brit. Fish., Vol. 1, p. 419.

„ „ Couch, Brit. Fish., Vol. 4, p. 56, pl. 195.

The Bleak is stated by Yorkshire naturalists as occurring commonly in the lower waters of the Tees.—*Clarke and Roebuck*. This is a very northern locality for this little fish, and as it bears considerable resemblance to the Dace, it is very desirable to examine some fresh Tees-caught specimens for verification and confirmation. As the Bleak rises readily to the fly we hope some enthusiastic Durham angler will soon be able to confirm the existence of this southern and very locally-distributed fish in the Tees. C. ?

FAM. COBITIDÆ. LOACHES.

Nemachilus barbatulus (Willughby). LOACH.

Cobitis barbatula, Yarr., Brit. Fish., Vol. 1, p. 427.

„ „ Couch, Brit. Fish., Vol. 4, p. 69, pl. 199, f. 2.

In the Tweed and several of our burns.—*Dr. G. Johnston*. In every stream near Stockton.—*John Hogg*. In the Ouseburn, Dipton Burn, and most of the small burns in Northumberland and Durham. It seems strange that Wallis has overlooked the occurrence of this little fish, which is not rare even now in our district. I have not heard of the existence of the Armed Loach in these counties. R.

FAM. SCOMBRESOCIDÆ. GAR-FISH FAMILY.

Belone belone (Linn.). GARFISH.*Belone vulgaris*, Yarr., Brit. Fish., Vol. 1, p. 442.

,, ,, Couch, Brit. Fish., Vol. 4, p. 146, pl. 209.

A few specimens are annually taken during the Herring season.—*Dr. G. Johnston*. Taken in the autumn by men and boys fishing with rod and line from the rocks in Frenchman's Bay, on the Durham coast.—*R. Howse*.

This fish is known as the "King of the Herrings" by our amateur sea-fishers, by whom it is often caught in the Herring season with rod and line from rocks at low-water. "Green-bone" is another name, which it is well to know, as all the bones are of a green colour in the cooked fish, suggesting to the uninitiated the idea of poison. **M.**

Scomberesox saurus (Willughby), Cuv. SAURY OR SKIPPER.*Scomberesox saurus*, Yarr., Brit. Fish., Vol. 1, p. 446.

,, ,, Couch, Brit. Fish., Vol. 4, p. 141, pl. 208, f. 3.

Rare.—*Dr. G. Johnston*. This record of Dr. Johnston's is the only notice I can find of the existence of this fish on our coasts. But as it occurs in the Forth, and also in Yorkshire, it has probably been overlooked in our district. **M.**

FAM. ESOCIDÆ. PIKE FAMILY.

Esox lucius, Linn. PIKE.*Esox lucius*, Yarr., Brit. Fish., Vol. 1, p. 434.

,, ,, Couch, Brit. Fish., Vol. 4, p. 150, pl. 210.

In the Tweed.—*Dr. G. Johnston*. In the Tyne and some of its branches; in the Wansbeck and Sweethope Lake; but whether recently introduced or naturally distributed in all the localities where it is now found it is impossible to ascertain. With some of the other large freshwater fishes it was many centuries ago introduced into England. **C.**

FAM. STERNOPTYCHIDÆ.

Maurolicus borealis (Nilsson). ARGENTINE.*Scopelus borealis*, Yarr., Brit. Fish., Vol. 2, p. 164, 167.*Maurolicus* ,, Couch, Brit. Fish., Vol. 4, p. 301, pl. 233.

The Argentine (*Scopelus Humboldtii* = *M. borealis*) was met with at Redcar in 1841, 1843, and 1844, from the 23rd of January to May, but never later. When first taken they have the smell of cucumbers.—*T. Meynell*. In former years (1859–60) I frequently found this little fish washed up on the shore, at high-tide mark, on South Shields Sands, and in Marsden Bay during winter. It is easily recognised by the rows of beautiful light green dots on the lower parts of the side of the body.—*R. Howse*. Is not this the fry of some unknown pelagic fish? **M.**

FAM. SALMONIDÆ. SALMON FAMILY.

Salmo salar, Linn. SALMON.*Salmo salar*, Yarr., Brit. Fish., Vol. 2, p. 1.

,, ,, Couch, Brit. Fish., Vol. 4, p. 163, pl. 211.

“Cauda forcipata. Carne cocta rubra, tenera, pingui et delicata.”—*J. Ray*. In the Tweed and Tyne. It avoids the Coquet, Wear, Tees, and smaller streams. Mr. W. Pape, the lessee of the Fish-locks near Warkworth, at the mouth of the Coquet, has obligingly informed me that only two or three individuals of *Salmo salar* enter the fish-locks in the course of the year. **M.**

“It is recorded of an alderman at Newcastle, Francis Anderson, Esq., that dropping his gold seal-ring from his finger into the Tyne, as he was leaning over the bridge, it was found in the belly of a Salmon, bought in the market by one of his own servants.”—*Wallis*, from Bourne’s Hist. Newcastle.

Salmo eriox, Linn. GRAY OR BULL-TROUT.*Salmo eriox*, Linn., Syst. Nat., 13th ed., t. 1, p. 509, No. 2.

Yarr., Brit. Fish., 1st ed., Vol. 2, p. 31.

,, ,, *brachypoma*, Günther, Study of Fishes, p. 644, No. 7.

"Cauda æqualis est, non ut in Salmone forcipata. Caro delicatior quam Salmoni."—*J. Ray*. Occurs in all our rivers and rivulets connected with the open sea from the Tweed to the Tees, and further South in some of the Yorkshire becks. M.

Dr. Günther states, in *The Study of Fishes*, that "the names 'Bull-trout' and 'Peal' are not attributable to definite species. We have examined specimens of *S. salar*, *S. trutta*, *S. Cambricus*, and *S. fario*, to which the name Bull-trout had been given." But surely because mistakes have been made in sending fishes under a wrong name to Dr. Günther, that is no valid reason why *Salmo eriox*, the scientific name by which the Bull-trout or Grey was known to the older naturalists, and to recent authors also, should be cancelled, and a new name, *Salmo brachypoma*, substituted for it. "Peal" is a provincialism applied by fishermen very vaguely to the young of the Bull-trout, and often by mistake to other species of Salmonidæ. In Willughby and Ray's time the name Bull-trout was applied by their friend J. Johnson to the Salmon-trout in the Tees district, but at the present time the term Bull-trout is limited exclusively to the *Salmo eriox*, that is the Gray of Willughby, by all experienced fishermen and anglers.

A residence for a short time on the banks of the Coquet, and especially at the Fish-locks at Warkworth, would soon enable any naturalist to acknowledge the existence still of *Salmo eriox* as a native, and as a distinct and well-determined species. The fishermen and the fishwives also on this coast can tell a Bull-Trout from a Salmon-Trout or a Salmon at a glance. Indeed, Frank Buckland, who picked up much fish-lore from fisher-folk and anglers, tells us "that the fishwives occasionally clip the round tail of the Bull-trout quite square, and sell it for true Salmon;" and he adds, "The Bull-trout is certainly greatly inferior in flavour to the Salmon, his flesh being white and comparatively tasteless. In the Newcastle market it is worth some threepence a pound less than the Salmon proper."!! Also he remarks, "That the French people seem to prefer Bull-trout to Salmon, and that the Paris market will take any number of Bull-trout, especially at the back end of the year, and after the

English close time commences." It will be seen from this extract that the late Government Inspector of Fisheries was of the same opinion as the fishermen, fishwives, anglers, and other residents in Northumberland, that the Bull-trout or Grey is a species easily distinguished from the Salmon, as it is also from the Salmon-Trout.

At the present time full-grown Bull-trout, *Salmo eriox*, are sold in our fishmongers' shops often for and at the same price as the true *Salmo salar*. Salmon-trout and "grilse," that is the younger individuals of the Salmon and Bull-trout weighing below seven pounds, are, when plentiful, sold at a trifle less per pound than the full-grown fish; but difference in price depends greatly on the supply and not on any supposed difference in the quality. Sometimes in the spring the wholesale price of Salmon-trout is higher than for Salmon, but this also depends much on the supply and demand. Bull-trout are often in great demand for the Continental markets, and the French people shew their good taste in preferring Bull-trout to Salmon, for when in good condition, just before the spawning time, the Bull-trout is a delicious and dainty fish.

A remarkable and well-known character of the Bull-trout is that he seldom rises to the fly when a clean fish, so that the angler has no chance of hooking a Bull-trout except in the spring, when he is a "Kelt," or unclean fish. In the sportsman's opinion this is the very worst characteristic of the Bull-trout, but it marks him out strongly from the Salmon.

***Salmo trutta*, Linn. SEA-TROUT OR SALMON-TROUT.**

Salmo trutta, Yarr., Brit. Fish., Vol. 2, p. 36, 1st ed.

Sea-Trout, Couch, Vol. 4, pl. 214.

"A Salmone differt, quod cauda ei æqualis sit et minime forcipata. Caro non rubet ut in Salmone, estque hircosior, graveolentior et ingrator quam in Graia."—*J. Ray*. Ascends the Tweed, Coquet, Tyne, Wear, and Tees, and the becks of the Yorkshire coast. M.

Salmo fario, Linn. BURN- or RIVER-TROUT.**Salmo fario*, Yarr., Brit. Fish., Vol. 2, p. 85.

,, ,, Couch, Brit. Fish., Vol. 4, p. 225.

In all the rivers and burns from the Tweed to the Tees not polluted by lead-washings and other impurities. R.

Osmerus eperlanus, Linn. SMELT or SPARLING.*Osmerus eperlanus*, Yarr., Brit. Fish., Vol. 2, p. 129.

,, ,, Couch, Brit. Fish., Vol. 4, p. 276, pl. 227.

Very rare in the Tweed.—*Dr. G. Johnston*. Caught in the Tyne at Elswick.—*Mr. Thos. Thompson*. "That admired little fish, the Smelt, *Osmerus eperlanus*, is taken in great abundance in the Tyne, and in our other rivers towards the sea."—*Wallis*, Hist. Northd., 1779. Frequent in the Tees at certain seasons.—*J. Hogg*. The Smelt, *Osmerus eperlanus*, is taken in various rivers of Yorkshire, and was so abundant at Cawood, on the Ouse, in December, 1834, as to be sold in the Leeds market at twopence the pound.—*T. Meynell*. This fish is now, on account of the pollutions of the river, very rare in our district. M.

Thymallus thymallus (Linn.). GRAYLING.*Thymallus vulgaris*, Yarr., Brit. Fish., Vol. 2, p. 136.

,, ,, Couch, Brit. Fish., Vol. 4, p. 280.

In the Tweed above Berwick.—*W. Lyell*, 1888. It is not found in any of the rivers of Northumberland and Durham, but is said to occur in the Tees, and is found in the Swale, near Catterick Bridge. Introduced into the Derwent, a tributary of the Tyne, about six years ago.—*Rev. W. Featherstonhaugh*, May, 1890: introduced, and only recently, into the Teviot and Tweed and a few other Northern localities. C.

The Hebridal Argentine, *Argentina sphyrena*, Linn., has been taken at Redcar, and is therefore very likely to occur on the Durham coast.

FAM. CLUPEIDÆ. HERRING FAMILY.

Clupea harengus, Willughby. HERRING.*Clupea harengus*, Yarr., Brit. Fish., Vol. 2, p. 183.

,, ,, Crouch, Brit. Fish., Vol. 4, p. 95, pl. 202.

Visits Berwick Bay during the harvest months in great numbers. In Wallis' time enough for export were not taken 1769.—*Dr. G. Johnston*. In Thomas Bewick's copy of Pennant there is a note stating that on "July 28th, 1809, a Herring was caught in the Salmon nets, at the King's Meadow, near Newcastle. It weighed 13 oz., and measured 14 inches in length and 3 in. in depth." This was probably an Allice Shad.—See further on. M.

Clupea Leachii, Leach's Herring, a supposed species, but most probably only a variety of the common Herring, has been recorded from the Yorkshire coast by Mr. T. Meynell, 1844.

The Sprat, *Clupea sprattus*, Auct.,¹ occurs in the larger estuaries of the East Coast, from the Thames northward, and is considered by many authors a distinct species; in this Catalogue it is considered merely the young of the Herring. It is captured in the early spring months at the mouth of the Tees, and sold chiefly to the Redcar fishermen, at a low price per stone, for bait for their lines. It was formerly caught, but only in small quantities, at the mouth of the Tyne.

¹ John Ray, adopting the same opinion as Willughby, that the Sprat is only the young of the Herring and the Sparling the young of the Pilchard, declares that "nullam neque in figura, neque in partibus corporis internis aut externis præter magnitudinem, neque in sapore carnis differentiam invenire potui. Cui consonant tempus capiendi circa solstitium hybernium, diu post edita Harengorum ova, quo temporis spatio in eam magnitudinem facile possint excrecere; nec alto anni tempore inveniantur," etc. I am quite aware that many modern writers hold an opinion very different from Willughby and Ray, and that they advance many statements which, according to them, prove the Sprat to be a species; but by the same kind of arguments which they use the young of almost any animal might be proved to be distinct from the adult form. Frank Buckland adduces ten points, and calls to his aid taste and smell, to prove that the Sprat differs from the young of the Herring. Why the sense of sight is omitted is unknown, and where the young Herring were obtained from for comparison is not stated. Until naturalists are able to distinguish perfectly the fry of the Herring, Pilchard, and the two Shads from each other, during their early growth, they will have some difficulty in establishing the Sprat as a distinct species.

When fishing for Herring Sprats the Teesmouth fishermen often take great numbers of the Three-spined Stickleback in their nets. Young Herring are often washed ashore after storms in the winter months.

Clupea pilchardus (Willughby). PILCHARD.

Clupea pilchardus, Yarr., Brit. Fish., Vol. 2, p. 169.

„ „ Couch, Brit. Fish., Vol. 4, p. 79, pl. 201.

Rare; but a few specimens are taken during the Herring season.—*Dr. G. Johnston*. Occasionally taken in the Herring nets off the coast of Northumberland and Durham. M.

Fishermen determine the Pilchard by taking hold of it by the top of the dorsal fin. If it balances they know it to be a Pilchard. In this, they follow the old rule, “ab apice pinnæ dorsalis apprehensus pendant in æquilibrio.”—*Willughby*.

Clupea (Alosa) alosa, Cuv. ALLICE SHAD.*

Alosa vulgaris, Yarr., Brit. Fish., Vol. 2, p. 213.

„ „ Couch, Brit. Fish., Vol. 4, p. 117, pl. 204.

Frequently taken at the mouth of the Tweed in autumn, and sold in the market, but held in no estimation. The true Shad I have not found on this coast.—*Dr. G. Johnston*. Northumberland Coast.—*J. Hancock*. Mouth of Tyne.—*R. Howse*. M.

This Shad frequented the mouth and estuary of the Tyne in former years, and was often exposed for sale in fishmongers' shops in Shields and Newcastle.

Clupea (Alosa) finta, Cuv. TWAITE SHAD.

Alosa finta, Yarr., Brit. Fish., Vol. 2, p. 208.

„ „ Couch, Brit. Fish., Vol. 4, p. 122, pl. 205.

Mouth of Tees.—*J. Hogg*. Nat. Hist. Trs., Vol. 3, 1868. M.

The occurrence of this species requires verification.

Engraulis encrasicolus (Linn.). ANCHOVY.*

Engraulis encrasicolus, Yarr., Brit. Fish., Vol. 2, p. 217.

„ „ Couch, Brit. Fish., Vol. 4, p. 125,
pl. 206, f. 1.

A specimen of the Anchovy was obtained in the Newcastle Fish Market among some Sprats, 1840.—*J. Hancock*. S.

FAM. MURÆNIDÆ. EEL FAMILY.

Anguilla anguilla (Linn. et Auct.). EEL.*Anguilla acutirostris*, Yarr., Brit. Fish., 1st ed., Vol. 2, p. 284.

,, ,, Couch, Brit. Fish., Vol. 4, p. 326, pl. 234.

Common.—*Dr. G. Johnston*. In most of our burns and rivers. The Eel is rarely caught or used for food by the natives of the north-eastern counties. R.

Anguilla latirostris, Yarr. GRIG or GLUT.*Anguilla latirostris*, Brit. Fish., 1st ed., Vol. 2, p. 298.

,, ,, Couch, Brit. Fish., Vol. 4, p. 330, pl. 236.

Dr. Parnell gave me a small specimen taken in the Tweed, where, I believe, it is not uncommon.—*Dr. G. Johnston*. R.?

Conger conger (Linn.). CONGER EEL.*Conger vulgaris*, Yarr., Brit. Fish., Vol. 2, p. 402.

,, ,, Couch, Brit. Fish., Vol. 4, p. 340, pl. 238, f. 1.

Not uncommon, and attains a large size.—*Dr. G. Johnston*. Not common in our district. S.

ORDER? LEPTOCEPHALI.

Leptocephalus Morrisii, Jenyns. ANGLESEA *Morris*.**Leptocephalus Morrisii*, Yarr., Brit. Fish., Vol. 2, p. 409.

,, ,, Couch, Br. F., Vol. 4, p. 348, pl. 238, f. 2.

Taken off Whitburn, coast of Durham, by *William Hutchinson*, by whom it was presented to the Museum, Newcastle-on-Tyne. It is about seven inches in length. S.

ORDER. LOPHOBRANCHII.

FAM. SYNGNATHIDÆ. PIPE-FISHES.

Syngnathus acus, Linn. GREAT PIPE-FISH.**Syngnathus acus*, Yarr., Brit. Fish., Vol. 2, p. 433.

,, ,, Couch, Brit. Fish., Vol. 4, p. 351, pl. 239, f. 1.

Not common.—*Dr. G. Johnston*. This is the commonest species in our district. In former years it entered the Tyne. A male caught at St. Peter's, May 19th, 1890.—*Mr. J. S. Rea*. M.

Syngnathus pelagicus, Linn. PELAGIC PIPE-FISH.*

Syngnathus pelagicus, Linn., System Nat., t. 1, p. 416, 13th ed.
 „ „ Don., Brit. Fish., pl. 58.

Two or three specimens in the Museum are referable to this species, of which the exact locality is not known. M.

Nerophis æquoreus (Linn.). OCEAN PIPE-FISH.

Syngnathus æquoreus, Linn. Yarr., Brit. Fish., Vol. 2, p. 442.
 „ „ „ Couch, Brit. Fish., Vol. 4, p. 356,
 pl. 240, f. 1.

Taken in Berwick Bay and near Dunstanborough Castle.—
Dr. G. Johnston and R. Embleton. M.

Nerophis ophidion (Linn.). SNAKE PIPE-FISH.

Syngnathus ophidion, Yarr., Brit. Fish., Vol. 2, p. 445.
 „ „ Couch, Brit. Fish., Vol. 4, p. 359, pl. 241,
 f. 1.

I obtained this species in Embleton Bay during the summer.—
R. Embleton. M.

Nerophis lumbriciformis (Willughby). WORM PIPE-FISH.

Syngnathus lumbriciformis, Yarr., Brit. Fish., Vol. 2, p. 450.
 „ „ Couch, Brit. Fish., Vol. 4, p. 361,
 pl. 241, f. 2.

Apparently not rare, lurking among the coarser wracks (*Fuci*)
 between the tide-marks.—*Dr. G. Johnston.* M.

ORDER. PLECTOGNATHI.

FAM. GYMNOTIDÆ. GLOBE AND SUN-FISH FAMILY.

Orthogoriscus mola (Linn.). SUN-FISH.*

Orthogoriscus mola, Yarr., Brit. Fish., Vol. 2, p. 462.
 „ „ Couch, Brit. Fish., Vol. 4, p. 377, pl. 245.

Mr. W. Purvis, T. N. H. S., Vol. 2, 4to, p. 421, 1835-6.
 Berwick, 1851.—*Dr. G. Johnston.* Coldingham, 1858.—*James
 Hardy.* Off Whitby, 1863.—*W. J. Forster.* Cullercoats.—*Dr.
 Embleton*, 1849. Redcar, 1882. Craster, October, 1889. Lin-
 colnshire Coast, October, 1889.

The Whitby specimen, preserved by Mr. J. Hancock, is in our Museum. This and the Craster and Lincolnshire specimens, captured in 1889, are the largest recorded on the East Coast.—For an interesting account of this fish refer to Trans. T. N. Field Club, Vol. 2, p. 110. S.

SUB-CLASS. PALEICHTHYES.

ORDER. CHONDROPTERYGII-PLAGIOSTOMATA.

A. SELACHOIDEI. SHARKS.

FAM. CHARCARIIDÆ. TRUE SHARKS.

Galeus canis, Willughby. TOPE.

Galeus vulgaris, Yarr., Brit. Fish., Vol. 2, p. 509.

„ „ Couch, Brit. Fish., Vol. 1, p. 45, pl. 9.

Occasionally taken in Berwick Bay, five to six feet in length.

—Dr. G. Johnston. Cullercoats.—J. Hancock. Whitburn.—R. Howse. M.

The Blue Shark, *Carcharias glaucus*, has been recorded on the Yorkshire coast.—T. Meynell.

Mustelus lævis, Willughby. SMOOTH HOUND.

Mustelus lævis, Yarr., Brit. Fish., Vol. 2, p. 512.

„ „ Couch, Brit. Fish., Vol. 1, p. 47, pl. 10.

Not uncommon.—Dr. G. Johnston. The Smooth Hound, *Mustela lævis*, occurs on the Yorkshire coast.—T. Meynell. It is probably common on our coast, but has been hitherto overlooked. A local specimen for the Museum is much required. R.

FAM. LAMNIDÆ. PORBEAGLES.

Lamna Cornubica, Turton. PORBEAGLE.*

Lamna Cornubica, Yarr., Brit. Fish., Vol. 2, p. 515.

„ „ Couch, Brit. Fish., Vol. 1, p. 41, pl. 8.

I have seen several specimens of this Shark taken in our Bay from five to eight feet in length.—Dr. G. Johnston. The Porbeagle is the commonest of the large Sharks found on our coast

in summer, when it is often taken both in the Salmon and the Herring nets. M.

Alopias vulpes, Cuv. FOX SHARK.

Squalus vulpes, Yarr., Brit. Fish., Vol. 2, p. 522.

Alopias „ Couch, Brit. Fish., Vol. 1, p. 37, pl. 7.

On the 30th of July, 1846, a Long-tailed Shark was captured in our Bay.—*Dr. G. Johnston*. In Salmon nets, Frenchman's Bay, near the Tyne.—*Mr. Clift*, South Shields. The large specimen in the Museum was captured off Yarmouth, and presented by Mr. Woodger. M.

The Basking Shark, *Selache maxima*, is recorded from the Yorkshire coast by Mr. T. Meynell.

FAM. SCYLLIIDÆ. SEA-HOUNDS OR DOG-FISHES.

Scyllium catulus (Linn.). LESSER SPOTTED DOG-FISH,
ROUGH HOUND.*

Small Spotted Dog-fish, Yarr., Brit. Fish., 1st ed., Vol. 2, p. 487.

Rough Hound, Couch, Brit. Fish., Vol. 1, p. 14, pl. 2.

Rare.—*Dr. G. Johnston*. Cullercoats.—*Nat. Hist. Soc. Aberdeen*.—*J. Courage*. Redcar, on the Tees, 1888.—*John A. Mather*. Frequently caught by the trawlers.—*J. F. Spence*. R.

In the Aberdeen specimen, caught February, 1888, there was a fully-formed egg-pouch ready for exclusion. The other ovary was empty. Pennant is in error in stating that "this species breeds from nine to thirteen young at a time," as there are only two ovaria, and the young are developed in egg-pouches.

The Larger Spotted Dog-fish, *Scyllium canicula*, is recorded from the Yorkshire coast by Mr. T. Meynell, as also the Lesser, but rare.

FAM. SPINACIDÆ. SPINY DOG-FISHES.

Acanthias spinax, Willughby. SPINY DOG-FISH.

Common Dog-fish, Yarr., Brit. Fish., Vol. 2, p. 524.

Picked Dog, Couch, Brit. Fish., Vol. 1, p. 49, pl. 11.

This is the commonest and most troublesome Shark on our coast to the long-line fishermen, especially in the summer months when they go further out to sea. Frequently, I have seen a whole litter of young ones which were born after the mother had been landed in the bottom of the fishermen's boat.
R.

Læmargus borealis (Scoresby). GREENLAND SHARK.*

Scymnus borealis, Yarr., Brit. Fish., Vol. 2, p. 527.

Greenland Shark, Couch, Brit. Fish., Vol. 1, p. 57, pl. 13.

Newbiggin, 1868 and 1876. Beadnell Bay, 1862.—*R. Embleton*. Off Sunderland and the Tyne.

Occurs on the coast, and occasionally brought by the trawlers of great size. One caught on the fishermen's lines off the Frith of Forth measures about 15 feet. It had swallowed five or six large Cod-fishes, with the hooks and lines attached, for its breakfast. It required a strong rope and winch to lift it on board. This specimen has been stuffed for the Museum, and is fully fifteen feet in length. M.

Echinorhinus spinosus (Turton). SPINOUS SHARK.*

Echinorhinus spinosus, Yarr., Brit. Fish., Vol. 2, p. 534.

Scymnus spinosus, Couch, Brit. Fish., Vol. 1, p. 54, pl. 12,
figure incorrect.

One or two only of this species have been reported from this coast. The specimen in the Museum was purchased after it had been exhibited in the town for a few days. It had been caught in the Salmon nets, off the mouth of the Tyne, 1869. Another was caught in July, 1876.—*J. Wright*. M.

A specimen of the Spinous Shark, *Echinorhinus spinosus*, was taken off Burlington, 1838, and an account of it was read at the Newcastle Meeting of the British Association by Arthur Strickland, Esq.

FAM. RHINIDÆ. ANGEL-FISHES.

Rhina squatina (Auct.). ANGEL- or MONK-FISH.*

Squatina Angelus, Yarr., Brit. Fish., Vol. 2, p. 539.

Monk-fish, Couch, Brit. Fish., Vol. 1, p. 73, pl. 17.

I have been told by a fisherman that he has seen an Angel-fish which was taken in our bay many years ago.—*Dr G. Johnston*. Occasionally brought in by the trawlers and fishermen—sometimes three feet in length. R.

B. BATOIDEI. RAYS.

FAM. TORPEDINIDÆ. ELECTRIC RAYS.

Torpedo hebetans, Lowe. TORPEDO.

Raja Torpedo, Yarr., Brit. Fish., 1st ed., Vol. 2, p. 410.
Torpedo, Couch, Brit. Fish., Vol. 1, p. 119, pl. 30.

A specimen of that very rare fish *Torpedo vulgaris*, or Electric Ray, was taken in Embleton Bay, in the month of June last.—*R. Embleton*, Berwick Trans., Vol. 3, p. 231. There is some uncertainty as to which species the *Torpedo* taken in Embleton Bay really was.

In Land and Water, Vol. 7, p. 26, Jan. 9, 1869, Mr. Jeremiah Wilson, of Stockton-on-Tees, writes:—"I have taken two *Torpedoes* in the estuary of the Tees. You say the one you dissected had nothing in its stomach. I was curious enough to see what those I caught were living upon, so I put my knife into one, and took from it an eel 2 lbs. in weight and a flounder nearly a pound. The next one I opened also, and was astonished to find in him a salmon between 4 lb. and 5 lb. weight; and what I was more astonished at was that none of the fish had a blemish of any description, showing that your idea of the fish killing his prey with the electrical force is quite correct."—*Nat. Hist. of Brit. Fishes*, by Frank Buckland, p. 230.

Mr. Wilson's voracious *Torpedoes* from the estuary of the Tees are evidently a remarkable case of mistaken identity. There cannot be the least doubt that the two fishes found, and whose stomachs were examined so carefully by Mr. Wilson, were good-sized specimens of the Fishing-frog, which very much resembles in general outline the *Torpedo Skate*. The mouth of even large specimens of the *Torpedo* is very narrow, and armed with very fine-pointed teeth, and certainly not large and wide enough to swallow either a one-pound flounder or a small salmon; while,

on the other hand, the enormous mouth of a moderate-sized Fishing-frog is capacious enough to swallow even fishes larger than those mentioned. The specimens were unfortunately not sent to Frank Buckland, or this strange mistake would not have happened; but it was very fortunate that the contents of the stomachs were so accurately observed. The estuary of the Tees is a very likely place to meet with the Fishing-frog, but a most unlikely spot to meet with the Torpedo, one of the rarest fishes of the Eastern coast.

It is most desirable to have Mr. R. Embleton's observation strengthened by another record of this rare fish on our coast. S.

FAM. RAIIDÆ. SKATES OR RAYS.

Raia Batis, Willughby, Linn. COMMON SKATE OR RAY.

Raia Batis, Yarr., Brit. Fish., Vol. 2, p. 561.
 „ „ Couch, Brit. Fish., Vol. 1, p. 87, pl. 18.

Common. The egg-pouch or Skate-purse of this species is often washed ashore after winter storms. R.

Raia oxyrhynchus, Willughby, Linn. SHARP-NOSED RAY.

Raia oxyrhynchus, Yarr., Brit. Fish., Vol. 2, p. 556.
Sharp-nosed Skate, Couch, Brit. Fish., Vol. 1, p. 97, pl. 21.

Not uncommon, and attains a very large size. I have measured one which was seven feet nine inches in length, and eight feet three inches in breadth.—*Dr. G. Johnston*. R.

Raia clavata, Willughby, Linn. THORNBACK.

Raia clavata, Yarr., Brit. Fish., Vol. 2, p. 582.
 „ „ Couch, Brit. Fish., Vol. 1, p. 99, pl. 22.

Common.—*Dr. G. Johnston*. R.

Raia radiata, Donovan. STARRY RAY.*

Raia radiata, Yarr., Brit. Fish., Vol. 2, p. 585.
 „ „ Couch, Brit. Fish., Vol. 1, p. 103, pl. 23.

Not rare.—*Dr. G. Johnston*. Cullercoats.—*T. Thompson*. R.

The Rays have had no special attention paid to them in our district, so that it is very probable that other species are found

on our coast which have not yet been recorded, as the Sandy Ray, the Shagreen Ray, the Long-nosed Skate, and the Sting Ray, all of which have been found on the Yorkshire coast.

FAM. MYLIOBATIDÆ. EAGLE RAYS.

Myliobatis aquila, Willughby. EAGLE RAY.*

Myliobatis aquila, Yarr., Brit. Fish., Vol. 2, p. 591.

„ „ Couch, Brit. Fish., Vol. 1, p. 135, pl. 32.

Dr. G. Johnston records the occurrence of a specimen washed on shore at Spital, near the mouth of the Tweed, on Sept. 11th, 1839. Total length, 34½ inches; breadth, 21 inches.

A small specimen was taken at Cullercoats, November, 1875, and purchased for the Museum of the Natural History Society.

This species is only a straggler to our coast, attaining its full size in tropical seas. S.

ORDER. GANOIDEI-CHONDROSTEI.

FAM. ACIPENSERIDÆ. STURGEONS.

Acipenser sturio, Linn. COMMON STURGEON.

Acipenser sturio, Yarr., Brit. Fish., Vol. 2, p. 475.

„ „ Couch, Brit. Fish., Vol. 1, p. 157, pl. 35.

One or more specimens are almost annually taken in our bay or river. A Sturgeon was caught at the mouth of the Tweed, which was seven feet in length, and weighed 140 lbs.—*Dr. G. Johnston*, 1854. A small sturgeon was taken in the Tees this summer.—*J. Hogg*, *Sept.*, 1868. “Having seen an account in several papers of a Sturgeon caught in the Medway, seven feet and a half long, supposed to be the largest ever taken in England, I beg to state that one was caught last year (1867) in the Tees, and exhibited in Stockton, upwards of nine and a half feet long.”—*Naturalists' Notebook*, p. 158, *May*, 1868. *H. T. Archer*. I am informed by Mr. J. F. Spence that three or four Sturgeons are brought in annually by the trawlers at North Shields.

Although occasionally captured on this coast, as the above references shew, yet the Sturgeon must be considered a rare fish, as most of the individuals sold in our fishmongers' shops are

brought from the Solway and West Coast. The pollutions and continual dredgings in the Tyne in the present day effectually bar its progress up our river, and I am not aware of any record of its occurrence in former years. The long, deep, undisturbed, lower reaches of comparatively still water of the Tweed and Tees are more likely localities for this fish than any other of our Northern streams. S.

The Sharp-nosed Sturgeon, *A. sturio*, is occasionally taken off Redcar and in the Tees, and the Broad-nosed Sturgeon, *A. latirostris*, appears to be the variety peculiar to the Ouse, the former not being taken in that river.—*T. Meynell*.

CLASS. CYCLOSTOMATA.

FAM. PETROMYZONTIDÆ.

Petromyzon marinus, Linn. SEA LAMPREY.*

Petromyzon marinus, Yarr., Brit. Fish., Vol. 2, p. 598.

„ „ Couch, Br. Fish., Vol. 4, p. 385, pl. 247, f. 1.

Not uncommon.—*Dr. G. Johnston*. Ascends the Tyne as far as Bellingham on the North Tyne.—*Dr. E. Charlton*. Also taken in the Alne. At Cullercoats.—*Rev. R. F. Wheeler*. M.

Petromyzon fluviatilis, Linn. RIVER LAMPREY.*

Petromyzon fluviatilis, Yarr., Brit. Fish., Vol. 2, p. 604.

„ „ Couch, Br. F., Vol. 4, p. 395, pl. 247, f. 2.

I have seen two or three specimens which were taken in the Tweed.—*Dr. G. Johnston*. In the Tyne.—*J. Hancock*. Caught attached to a stone when "tickling for Trout" in Stanley Burn. At Ovingham and other parts of the Tyne.—*R. Howse*. R.

Petromyzon branchialis, Linn. BLIND LAMPREY.

Ammocætes branchialis, Yarr., Brit. Fish., Vol. 2, p. 609.

„ „ Couch, Br. F., Vol. 4, p. 404, pl. 248, f. 2.

The Pride, *Ammocætes branchialis*, was taken in a small brook near Richmond. This is considered by some to be the young of the next species.

Petromyzon Planeri, Cuv. PLANER'S LAMPREY.*Petromyzon Planeri*, Yarr. Brit. Fish., Vol. 2, p. 607.

,, ,, Couch, Br. F., Vol. 4, p. 402, pl. 248, f. 1.

I am indebted to Sir W. Jardine for two specimens of the young of this species, which were sent from the Tweed.—*Yarrell*. "The Fringe-Lipped Lamprey, *Petromyzon Planeri*, was twice taken in twenty fathoms water off Redcar."? M.?

FAM. MYXINIDÆ. HAG-FISHES.

Myxine glutinosa, Linn. GLUTINOUS HAG, BORER.**Gastrobranchus cæcus*, Yarr., Brit. Fish., Vol. 2, p. 612.

,, ,, Couch, Br. F., Vol. 4, p. 408, pl. 248, f. 3.

Not uncommon.—*Dr. G. Johnston*. Too common on our coast, and frequently taken on the fishermen's hooks. "It enters the mouths of fishes when on the hooks of lines that remain a tide under water, and totally devours the carcase, except skin and bones."—*Fleming*. The extreme abundance of the Myxine or Hag on the East Coast may be inferred from the fact that 123 specimens were taken out of one Codfish at Redcar last winter (1843).—*T. Meynell*. R.

SUB-CLASS. LEPTOCARDII.

The Lancelet, or *Amphioxus lanceolatus* (Pallas), *Branchiostoma lanceolatum*, Gray, is the only British or European representative of this sub-class. As it is widely distributed, it is a species very likely to occur on our coast, and it is very desirable that collectors and those interested in the pursuits of Science should be on the alert to secure a specimen for our Collection. It has been recorded as occurring once at Redcar, which may, as far as the distribution of Fishes is concerned, be regarded as in our own district.

INDEX.

Names in Italics are synonyms.

	PAGE		PAGE
Acanthias spinax.....	378	Blenniops Yarrelli	351
Acipenser sturio	382	——— <i>Ascanii</i>	352
Alburnus alburnus	367	Blennius Gattorugine.....	351
Allice Shad	374	——— pholis	351
Alopecias vulpes.....	378	Bonito	346
Alosa alosa	374	Borer or Hag-fish	384
——— finta ..	374	Brama Raii	343
<i>Ammocetes byanchialis</i>	383	Branchiostoma lanceolatum ..	384
Ammodytes lancea	360	Bream, Ray's	343
——— tobianus	360	———, Sea	340
<i>Amphioxus lanceolatus</i>	384	Brill	363
Anarrhichas lupus	351	Brosmius brosmè.....	359
Anchovy	374	Bull-heads	347
Angel-fish or <i>Monk-fish</i>	379	Bullhead, Greenland	348
Angler	347	Bull-Trout or <i>Gray</i>	369
Anguilla anguilla	375	Burbolt or Eel-pout	359
——— <i>acutirostris</i>	375	Butter Fish	352
——— <i>latirostris</i>	375		
Anglesea Morris	375	Callionymus dracunculus	350
Argentine	369	——— lyra.....	350
———, Hebridal	372	Cantharus lineatus	340
Argentina sphyræna.....	372	——— <i>griseus</i>	340
Arnoglossus laterna	365	Capros aper.....	342
<i>Aspidophorus cataphractus</i>	349	Caranx trachurus	342
Atherine or Sand Smelt	352	Carcharias glaucus	377
Atherina presbyter	352	Carp	365
		Cataphractus Schœneveldii ...	349
Banks' Oar-fish	354	Catfish	351
Bass	339	Centrolophus pompilus	343
Belone belone	368	Centronotus gunnellus	352
Bergylt.....	341	Chrysophrys aurata.....	341
Bib	358	Chub or <i>Chevin</i>	366
Black-fish.....	343	<i>Clupea alosa</i>	374
Bleak.....	367	——— <i>finta</i>	374
Blennies	351	——— harengus	373

	PAGE		PAGE
Clupea pilchardus	374	Fluke or Dab	362
—— <i>sprattus</i>	373	——, Craig.....	362
Coal-fish	359	——, Sail	363
Codfish	357	Forkbeard, Lesser	360
Conger conger	375	Fox Shark or <i>Thresher</i>	378
Cook or Variegated Wrasse....	356		
Cottus bubalis.....	348	Gadidæ.....	357
—— gobio.....	347	Gadus æglefinus	358
—— Grænlandicus.....	348	—— <i>callarias</i>	358
—— scorpius	347	—— luscus	358
Craig-Fluke.....	362	—— morrhua.....	357
Ctenolabrus rupestris	357	—— <i>punctata</i>	357
Cyprinus carpio	365	Galeus canis.....	377
Cyclopterus lumpus	349	—— <i>vulgaris</i>	377
		Garfish	368
Dab	362	Gasterosteus aculeatus	353
——, <i>Lemon</i>	362	—— <i>pungitius</i>	354
——, Long Rough	362	—— <i>spinachia</i>	354
——, Smear.....	362	—— <i>spinulosus</i>	353
Dace or <i>Dare</i>	366	<i>Gastrobranchus cæcus</i>	384
Deal-fish	354	Gattorugine	351
Dentex vulgaris	339	Gilthead	341
Dog-fish, Lesser Spotted	378	Gobio fluviatilis	365
——, Larger Spotted	378	<i>Gobius bipunctatus</i>	350
——, Spiny	378	—— <i>minutus</i>	350
"Dolphins" of Sailors	343	—— <i>Ruthensparri</i>	350
Dory, John	342	—— <i>unipunctatus</i>	350
<i>Dorse</i>	357	Goby, Black.....	350
Dragonet, Gemmeous	350	——, One-spotted	350
——, Sordid	350	——, Two-spotted	350
		Goldsinny, Jago's.....	357
Echinorhinus spinosus	379	" <i>Gowdy</i> ".....	350
Eel-pout or Burbolt	359	Grayling	372
Eel.....	375	Greenbone or Garfish	368
——, Broad-nosed	375	Greenland Cottus	348
Engraulis enchrasicolus	374	—— Shark	379
Esox lucius	368	Gudgeon	365
		<i>Gunnellus vulgaris</i>	352
Father-lasher.....	348	Gurnards	348
Fishing-Frog	347	Gurnard, Grey	349
Flat-fishes.....	361	——, Red	348
Flounder.....	361	——, Sapphirine	348

	PAGE		PAGE
Gurnard, Streaked.....	348	Lota fluviatilis.....	359
<i>Gymnetrus Banksii</i>	354	— molva	359
		Lumpsucker.....	349
Haddock	358		
Hag-fish.....	384	Mackerel	345
Hake	360	—, Horse.....	342
Halibut.....	361	Maigre.....	341
Herring.....	373	Maurolicus borealis.....	369
—, <i>Leach's</i>	375	Megrim.....	365
Hippoglossoides? cynoglossus..	362	Merlangus carbonarius.....	359
— limandoides...	362	— merlangus.....	359
— microcephalus	362	— pollachius.....	359
<i>Hippoglossus vulgaris</i>	361	— virens.....	359
Hound, Rough.....	378	Merlucius merlucius	360
—, Smooth.....	377	Miller's Thumb	347
		Minnow.....	366
Jago's Goldsinny.....	357	Monk-fish.....	379
John Dory.....	342	<i>Morrhua vulgaris</i>	357
		Morris, Anglesea.....	375
Labrax lupus.....	339	Motella mustela.....	360
Labrus lineatus	356	— vulgaris	360
— maculatus.....	356	Mugil capito.....	353
— mixtus	356	— chelo	353
Læmargus borealis	379	Mullets, Grey.....	353
Lamna Cornubica	377	—, Red.....	340
Lampreys.....	383	Mullus barbatus	340
Lamprey or Lampern	383	— surmuletus	340
—, Blind.....	383	Mustelus lævis.....	377
—, Planer's	384	Myliobatis aquila.....	382
—, Sea	383	Myxinè glutinosa.....	384
Lampris luna.....	343		
Lancelet	384	Nemachilus barbatulus.....	367
Launces or Sand-Eels.....	360	Neophrys æquoreus	376
Leptocephalus Morrisii	375	— lumbriciformis	376
Leuciscus cephalus	366	— ophidion.....	376
— erythrophthalmus.....	366	<i>Nine Eyes</i>	383
— leuciscus	366	Norway Haddock.....	341
— phoxinas	366	<i>Numbfish</i> or Torpedo	380
— rutilus.....	365		
Ling	359	Opah or King-fish	343
Loach	367	Orthogoriscus mola.....	376
Lophius piscatorius.....	347	Osmerus eperlanus	372

	PAGE		PAGE
Pagellus centrodontus.....	340	Regalecus Banksii	354
"Peal".....	370	Rhina squatina.....	379
Perca fluviatilis.....	339	Rhombus maximus	363
Perch	339	—— rhombus	363
Petromyzon branchialis.....	383	—— ? megastoma	363
—— fluviatilis.....	383	Ribbon-Fishes.....	354
—— marinus	383	River-Bullhead	347
—— Planeri.....	384	Roach.....	365
Phrynorhombus punctatus.....	364	Rockling, Five-bearded.....	360
—— unimaculatus	364	——, Three-bearded	360
Picked or Spiny Dog-fish	378	Rough Hound.....	378
Pike.....	368	Rudd	366
Pilchard.....	374	<i>Salmo brachypoma</i>	369
Pipe-fishes	375	<i>Salmo eriox</i>	369
Pipe-fish, Great	375	—— fario	372
——, Ocean	376	—— salar	369
——, Pelagic	376	—— trutta	371
——, Snake	376	Salmones	369
——, Worm.....	376	Salmon	369
Piper.....	349	Salmon-Trout	371
Plaice.....	361	Sand-eel, Lesser	360
Platessa flesus	361	——, Greater.....	360
—— limanda.....	362	Sapphirine Gurnard.....	348
—— platessa.....	361	Saury or Skipper	368
Pleuronectes hippoglossus.....	361	Scad	342
Poggè.....	349	Scald-fish.....	365
Pollack.....	359	Sciæna aquila	341
Porbeagle	377	Scomber scomber	345
Raia Batis.....	381	—— thynnus	345
—— clavata.....	381	—— vulgaris.....	345
—— oxyrhynchus	381	Scomberesox saurus	368
—— radiata	381	Scyllium catulus	378
—— <i>Torpedo</i>	380	—— canicula.....	378
Raniceps trifurcatus.....	360	Sea-Bream, Black	340
Rays or Skates.....	381	——, Common	340
Ray or Skate, Common	381	Sea-Scorpion.....	347
——, Eagle	382	Sebastes Norvegicus	341
——, Electric.....	380	Selache maxima.....	378
——, Sharp-nosed	381	Shad, Allice	374
——, Starry.....	381	——, Twaite	374
——, Thornback	381	Shanny	351

	PAGE		PAGE
Sharks	377	Torpedo hebetans.....	380
Shark, Basking	378	——— <i>vulgaris</i>	380
——, Blue	377	Torsk.....	359
——, Fox	378	Trachinus draco	346
——, Greenland	379	——— <i>vipera</i>	346
——, Spinous.....	379	Trachypterus arcticus.....	354
Skates	381	Trigla cuculus.....	348
Skate, Common	381	——— gurnardus	349
Skulpin, Dusky	350	——— hirundo	348
——, Golden	350	——— lineata	348
Smear Dab	362	——— lyra	349
Smelt or Sparling	372	Trout, Bull	369
Smelt, Sand.....	352	——, Burn	372
Sole, Common.....	363	——, Salmon- or Sea.....	371
——, Lemon.....	363	Tunny.....	345
Solea solea	363	Turbot	363
—— aurantiaca.....	363	<i>Tusk</i>	359
Sparus Dentex	339	Twaite Shad.....	374
Sticklebacks	353	Vaagmår or Deal-fish	354
Sturgeon	382	Viviparous Blenny	352
Sun-fish, Short	376	Weever, Greater	346
Surmullet.....	340	——, Lesser.....	346
Swordfish	342	Whiff.....	363
Syngnathus acus	375	Whiting.....	359
——— <i>æquoreus</i>	376	<i>Whiting Pout</i>	358
——— <i>lumbriciformis</i>	376	Wolf-fish or Cat-fish.....	351
——— <i>ophidion</i>	376	Wrasses.....	356
——— <i>pelagicus</i>	376	Wrasse, Ballan.....	356
Tadpole fish or Forkbeard	360	——, Cook	356
Tench	367	——, Green	356
Thornback Ray.....	381	——, Streaked.....	356
<i>Thresher</i>	378	——, Variegated	356
Thymallus thymallus	372	Xiphias gladius	342
Thynnus pelamys.....	346	Yarrell's Blenny.....	351
——— thynnus.....	345	Zeus faber.....	342
Tinca tinca	367	Zoarces viviparus.....	352
Tope or Toper	377		
Topknot, Bloch's.....	364		
——, Muller's.....	364		

APPENDIX TO CATALOGUE.

DESIDERATA.

The following list of local desiderata in the Museum Collection of Fishes is appended here with the hope that Members and friends of the Museum, and especially anyone desirous of perfecting our knowledge of the local Faunas, will assist by sending specimens, with well authenticated localities, of any of the following species to the Museum :—

Perch.	Sand-Launces or Sand-eels.
Basse.	Flat-fishes (all the rare kinds).
Dentex.	Brill.
Red Mullet.	Topknots.
Surmullet.	Scaldfish or Megrim.
Black Sea Bream.	Lemon Sole.
Gilthead.	Little Sole or Solenette.
Bergylt or Norway Haddock.	Chub.
Swordfish.	Bream.
Boar-Fish.	Saury or Skipper.
Black-Fish.	Argentine or Pearlside.
Opah or King-fish.	Smelt or Sparling.
Spanish Mackerel.	Hebridal Argentine.
Tunny.	Anchovy.
Bonito.	Pilchard.
Bullheads (all the kinds).	Allice Shad.
Gurnards (all the species).	Twaite Shad.
Piper.	Anglesea Morris.
Sucker, Unctuous.	Pipe-fishes (all kinds).
——, Montagu's.	Lampreys (all kinds).
Gobies (all the species).	Lancelet.
Band-fish, Red.	Blue Shark.
Blennies (any of these).	Tope or Toper.
Atherine or Sand-Smelt.	Smooth Hound.
Grey Mullet.	Basking Shark.
Stickleback, Ten-spined.	Large-spotted Dog-fish.
Deal-fish or Vaagmår.	Spinous Shark.
Ribbon-fish, Banks' Oar-fish.	Torpedo Ray.
Wrasses (any of these).	Starry Ray.
Burbolt.	Sandy Ray.
Rockling, Three-bearded.	Shagreen Ray.
——, Five-bearded.	Sting Ray.
Torsk or Tusk.	Eagle Ray.
Hake.	Chimera or Rabbit Fish.

ADDRESS TO THE MEMBERS OF THE TYNESIDE
NATURALISTS' FIELD CLUB,

READ BY THE PRESIDENT, JNO. PHILIPSON, ESQ., J.P., M.I.M.E., ETC.,
AT THE FORTY-THIRD ANNIVERSARY MEETING, HELD IN THE COM-
MITTEE ROOM OF THE LITERARY AND PHILOSOPHICAL SOCIETY,
NEWCASTLE, ON WEDNESDAY, MAY 15TH, 1889.

LADIES AND GENTLEMEN,—It is once more my duty to acknowledge most gratefully the special mark of favour you bestowed in electing me President of your Society for the second consecutive year, and in now resigning the position, which I have very sincerely appreciated, I cannot refrain from expressing the pleasure with which I have learnt that the Rev. Canon Tristram has consented to undertake, for the third time, the duties of your President. Dr. Tristram's name does honour to our Society, and his attainments make him one of the worthiest who ever held the position.

A retrospect of the past year reveals few remarkable events or discoveries of importance to the naturalist, but I am pleased that my term of office has been marked by the completion of an admirable work by one of our members, and concerning which we all may indulge in the pleasure of praise.

Mr. Howse has supplied for the use of those who have, as well as for those who have not, visited our Museum a permanent record of the Fossil Plants of the local Coal Measures. It has been said that "a person who is not a botanist or a mineralogist cannot admire because he cannot discern the advantages resulting from a scientific classification of plants or minerals;" but the mind is always pleased with order and classification, especially when their advantages are apparent. I have not cultivated the science of Geology, but I can appreciate its application, and I admire the skill, the labour, and care which Mr. Howse has lavished upon the classification of the Hutton Collection, those "Sermons in Stone," so full of meaning and suggestion, teaching us that "a thousand years are but as one day."

Two of our members, Prof. G. S. Brady, who, I am glad to observe, has recently had conferred upon him the degree of LL.D. of Aberdeen University, and the Rev. Dr. Norman, have just published an important joint memoir in the Transactions of the Royal Dublin Society. It is a "Monograph on the Marine and Freshwater Ostracoda of the North Atlantic and of North Western Europe, Section I. Podocopa." It contains descriptions and notes on 249 species, and includes all the British and other forms of the area to which it relates; the results of Dr. Norman's extensive dredgings in Norway and the Bay of Biscay; all the recent additions to the British list which have resulted from the investigations of the authors, of Mr. D. Robertson, and Mr. Scott; the species procured in the English Government expeditions of the "Porcupine," "Valorous," "Discovery," and "Alert;" and, through the aid of the Marquise de Folin, the Ostracoda obtained during the expeditions of the French Government sent out in the "Travailleur" and the "Talisman," are included in it. Men of Science in various parts of Europe have assisted the authors in their work by the communication of specimens and information. In addition to this the known fossil distribution of the species in the Tertiary and Post-Tertiary beds is given. The work is illustrated with sixteen quarto plates, many of which are devoted to anatomical details.

In the summer of 1887 Prof. Brady did some interesting work among the Meres of Shropshire, taking some scarce species of Ostracoda, which enabled him to clear up the anatomy and relations of some species previously imperfectly known, and the results are embodied in the Monograph I have referred to. In addition to this, Prof. Brady has been working at a large series of gatherings and dredgings made by his brother, Mr. H. B. Brady, F.R.S., in the South Sea Islands, Fiji, New Caledonia, etc. The Ostracoda of these, including a large number of very interesting forms, are the subject of a memoir, which will probably be published by the Royal Society of Edinburgh.

My friend Professor Simmonds, F.L.S., well known for his numerous works on Natural History, and as the Scientific Referee for the Department of Science and Art, at the Bethnal Green

Museum, has a work ready for the press on "Commercial Products," which will furnish much valuable information on various animals and plants and objects of Natural History utilized in commerce, and the range of which is every day extending. This will form a very useful book of reference for the scientific description, statistics, and uses of animal and vegetable substances.

Baron Sir F. Mueller, K.C.M.G., the eminent Australian Government Botanist, of Melbourne, has just brought out, under the auspices of the Victorian Government, a seventh revised edition of his work, "Select Extra Tropical Plants, with indications of their native countries and some of their uses." This is a work which has already found a wide circulation, by separate editions issued by the New South Wales Government, the Indian Government, a North American issue, and a German translation. It is one of the most useful and complete books of reference I know of, from its alphabetical classification, its arrangement of genera into special uses of plants, and its index of popular names. Running to 512 pages, it is published at only 4s. in Melbourne, and can doubtless be had through London booksellers.

Like many other north-countrymen I have been delighted by a perusal of a work by one of our members. "Bird Life of the Border," by Mr. Abel Chapman, is a book of which we may reasonably be proud. No one but a naturalist could have made such observations, no one but an accomplished author could have written so charming a narrative, and no one but an artist could have so faithfully and so lovingly depicted the creatures whose lives, haunts, and habits he describes.

I have also been pleased to find an excellent list of the Flora of the North-East Coast in Dr. Ellis' "Handbook of North Country Health Resorts," and I have verified the correctness of the list in so far as regards Dunstanborough and Marsden.

The Field Meetings of 1888 were well attended, and, with the exception of that to Whittingham, I had the pleasure of being present at them all, and enjoyed the renewal of some

early friendships with some of our oldest members, who are not at all times able to attend our pleasant gatherings.

The FIRST FIELD MEETING was held at Corbridge and Hallington Waterworks, on Whit Monday, May 21st. The morning was exceedingly fine, and consequently more members assembled at Corbridge than had given notice to the Secretaries that they would require conveyance to Hallington. Only two conveyances could be obtained, after every effort had been made by telegraph and messenger to Hexham, so that some of the party were left behind with myself to stay and visit the Church and some other interesting localities nearer at hand; and here let me emphasize the advantage to be gained by giving to the Secretaries timely notice of the accommodation required. As soon as the conveyances were filled a start was made along the Watling Street for the ascent of Stagshaw Bank—rather a steep climb out, as it is a rise of about 650 feet in a distance of three miles, the line of the Roman Wall crossing the Watling Street at a height of 800 feet. This northern bank of the Tyne is covered with a thick deposit of lateral moraine and drift, which has been shaped into numerous rounded hillocks and other irregular mounds along its side, covering up almost entirely and concealing the subjacent upper beds of the Carboniferous rocks. Looking south from Stagshaw Bank moor a splendid view of the broad valley of the Tyne, with its numerous and important tributary valleys, well wooded and sheltered, gladdens the eye of the citizen escaped from the thick and smoky atmosphere of the town. After passing the line of the Roman Wall, and descending towards the Erring Burn, a most extensive panoramic view of the lower part of the North Tyne is obtained. The line of outcrop of the Whinsill from Gunnerton to Great Bavington; the hills bounding the Rede Water, and the Great Cheviot on the far distant horizon, with the small white straight line of the Watling Street stretched before you, as if drawn with a rule, burst at once upon the view, affording, on the fine day we saw it, one of those charming moorland scenes which are peculiar to the Tyne district and Western Northumberland. On each

side of the road extensive escarpments of Carboniferous Limestone outcrop, and form lines of low cliffs on the side of the valley, with here and there a small landsale colliery or a limestone quarry, neither of which produce smoke enough to mar the prospect or the purity of the air. Soon we leave the main road, so steep in part as to require not only cautious driving but a diminution of load, and turn into green lanes, where the forced pedestrians commence to do a little botany and gather the early spring flowers that deck the sunny banks and sheltered nooks. Violets, Primroses, Cowslips, and "Ladies' Smocks, all silver white," abound, and thus passing along rough, narrow, and difficult roads, the party arrive at last at Cheviot, close to the Hallington Reservoir. Most of the party started off, under the guidance of Mr. Smith, to perambulate this artificial lake, on the margin of which Professor Reis captured some species of Coleoptera, for the most part under the stones.

Some few of the party secured the boat and pulled off to the bird-island, situated at the north-east corner of the reservoir. An immense cloud of the Black-headed Gulls was seen hovering over the island, uttering their loud and incessant screams; and as the boat approached nearer another flight of nesting birds rose up in a dense mass to join their noisy comrades in the air. As the birds had been robbed of their eggs two or three times, visitors were not permitted to land—a very necessary precaution, as there were some in the party whose bird-nesting propensity would not have been checked in any other way. These useful birds to the farmer, in many parts of Northumberland, follow the plough and search the newly turned up ground for grubs and worms even more assiduously than the Rooks, those farmers' friends whose characters have been lately more blackened than their own glossy coats. At Pallinsburn, in North Northumberland, and also in many other counties on the East Coast, the Black-headed Gulls are protected, and are fully appreciated by the intelligent and liberal agriculturists, who are wise enough to know that their own interests are best served by a wise conservatism of the forces of Nature, and that injudicious destruction of our feathered friend will in the long run lead to summary retribution.

The long drive out and home left but little time to investigate the margins of this fine sheet of water, which, as correctly as we could ascertain, fills a hollow, deepened by a steep embankment on the south, and is about 500 feet above the sea-level.

On the return to our conveyances permission was kindly granted by Mr. Frank Snowball for the party to walk through the grounds attached to Hallington Hall, the residence of Miss Trevelyan. A little stream has cut a deep channel for itself through the grounds, and advantage has been taken of the quiet pools and secluded nooks to introduce numerous wild plants, both aquatic and terrestrial. After seeing the wilder spots we were kindly conducted round the gardens.

The most notable botanical specimens gathered were some very dark-red-petaled Cowslips. In one field the majority of the plants were of that colour.

It was one of those charming Spring days when to be in the open air is itself a delight, but there was added to this the sight and close inspection of a piece of country new to most of us, the excitement of the ride and fresh air, the conversation of friends, as well as the release from the fag of every-day life.

After wishing the more fortunate visitors an enjoyable drive to Hallington, we, who had been left to our own resources, walked through the ancient and picturesque town of Corbridge, which occupies a position just south of the Roman Wall, and in the direct line of the Watling Street. This, one of the most considerable of Northumbrian villages, once possessed, with two others, the privilege of sending members to Parliament, and is supposed to occupy the site of one of the stations created by Agricola.

We examined the Roman Altar and several of the Incised Stones so familiar to local antiquarians, and next reached the Parish Church of St. Andrew, which stands on the site of the Monastery where the Bishop of Lichfield was consecrated in 786. The oldest parts, like the bridge over the Cox Burn, are almost entirely built of Roman stones. The windows in the belfry bear a striking resemblance to those in the towers of Bywell, Ovingham, and Monkwearmouth. In the chancel there is

a fragment of a Saxon gable cross supposed to have belonged to the earliest church.

Leaving the town, with its two Pele Towers and its quaint Market Cross, we wended our way in the direction of Dilston, over the only bridge that resisted the great flood of 1771, and we were fortunate, owing to the low state of the river bed, in seeing the remains of the mediæval bridge founded in 1235. We were kindly accorded admission to the charming grounds, and were shown the Baronial Castle, erected by Sir Francis Radcliffe, the initials F. R. and I. R. carved on the gateway reminding us of that remarkable man and his wife Isabel. Attention was next directed to the Domestic Chapel, where members of this illustrious family were interred. After a glance at the picturesque residence of Mr. W. B. Beaumont, M.P., we rambled on under the shade of Beech, Fir, and Birch trees, charmed by the beauty of the foliage and the rushing sounds of the Devil's Water. Surrounded by ferns and wild flowers we traversed the banks of the river to Dilston Mill, and after a brisk walk through the plantation bordering the Tyne arrived at the "Golden Lion," where a large party sat down to a well-supplied dinner, after which two papers were read, viz. :—

1. "History of the Early Life of a Hedgehog," by Miss Abbs. Communicated by Mr. John Hancock.
2. "List of Plants found near Wooler, at the Field Meeting in September, 1887, with special remarks on the Corn Mildew, or Blight," by Professor J. Batalha Reis.

The following Natural History Notes on the Birds which frequent the Hallington Reservoirs have been kindly contributed by Mr. R. C. Hedley, Cheviot, Corbridge-on-Tyne :—

The birds which frequent these reservoirs form a feature of the highest possible interest. The Black-headed Gull (*Larus ridibundus*), from being the most assertive in numbers as well as noise, deserves notice in the first place. Some hundreds of them breed on the island in East Hallington Reservoir each year. A few stragglers appear about the middle of March, and every one leaves within a week or two in the autumn. These birds do an immense amount of good to the surrounding land, especially

to that under tillage, by the destruction of grubs. At night, during the time of sitting, the male birds roost on the water, and keep up an incessant noise. At certain times these Gulls hawk for flies after the manner of Swallows; at others they hover above the shallow water, and pounce upon minnows *more* Osprey. The other members of the *Larus* tribe are the Lesser Black-backed Gull and the Common Gull. The Common Tern is not an unusual visitor, and I have a stray Sandwich Tern's egg obtained on the island. I have twice seen a Cormorant here, and one stayed for three days. An immense number of Ducks come to the reservoirs. The Mallard, the Teal, the Golden Eye, the Widgeon, the Sheldrake, the Pochard, the Gadwall, and once a Pintail Drake. It is not infrequent to see 300 to 400 Ducks at once during winter. The habits of the Mallards are guided by a most marvellous instinct. During autumn an observer may remark the exactness as to time and place that the various flights of Ducks take. Twice we have had an extended visit from a Great Northern Diver; one remained two weeks, and was, I regret to say, shot at last. The last specimen remained a few days, and seemed to be both familiar and inquisitive. Both were male birds. Goosanders are frequent visitors, and in small flocks of four to fourteen Grey Lag and Bean Geese occasionally come, but usually make a very short stay, and frequently do not settle but go noisily on their way, and always in a triangular form of flight. I have known Bewick's Swans occur thrice here; once in a flock of twelve, and on the last occasion a single bird stayed about a week, and was almost too familiar for its own safety, but it escaped. The Coot breeds regularly at the lake, under strong protest from the Gulls, who are impudent, selfish, and vindictive, except with Curlews and Pewits. Herons are common; I have seen thirteen within 200 yards of each other. Redshanks breed here regularly, as also the Common Sandpiper and Snipe. Common and Bar-tailed Godwits occasionally visit us, and Whimbrels and Dunlins in profusion; Ringed Plovers, Little Stints, and probably several more unascertained Waders. The Little Grebe has on one occasion bred here,

and is a frequent visitor; and a pair of Eared Grebes has been seen.

As regards the botanical productions, the north part of East Hallington Reservoir is very interesting, not from the special rarity of its flora, but the profusion of each individual. First comes the *Anemone nemorosa*, succeeded by *Cardamine pratensis*, *Geum rivale*, *Bartsia Odontites*, *Scabiosa succisa*, *Stellariæ*. The beautiful *Ranunculus aquatilis*, *Persicaria*, *Iris Pseud-acorus*, *Carduus palustris*, *Lychnis flos-cuculi*, *Potentilla tormentilla*, *Caltha palustris*, Milkwort, and Buckbean, besides aquatic grasses in great profusion and rarity.

Puss Moth Caterpillars are to be found on a small Willow bush on the north side of the reservoir.

For a description of Ancient British remains found at West Hallington *vide* Proc. Soc. Antiq. P. E., Vol. II., pp. 337, 338. Besides the discoveries mentioned there two more cists were found, one filled with fine white clay. A curious outcrop of Dolerite is to be seen close to East Hallington Reservoir, on the east side of the north part, on this was found a burial by cremation, and a fine cup marked stone now in my possession.

The largest Burn Trout I have seen killed in the reservoir weighed five and a quarter pounds.

PARTICULARS OF WATER SUPPLY OF THE NEWCASTLE AND GATESHEAD WATER COMPANY.

Contributed by Mr. George Smith, Secretary of Water Company.

SOURCE OF SUPPLY.—The supply is obtained from Reservoirs at Whittle Dene, 12 miles distant from Newcastle, and at Hallington, 22 miles distant, and at Little Swinburn and Colt Crag, 24½ and 25 miles distant. The storage capacity of all these Reservoirs is equal to 3,042 million gallons, and the water is obtained from Whittle Burn, Pont, Fair Spring, Mortlaw Burn, Hallowall Small Burn, Hallington North Burn, and Hallington East Burn, Dry and Swin Burn. The total drainage area of these streams being upwards of 22,000 acres, almost all pasture land.

The works at Colt Crag and Swinburn are connected with the Hallington Reservoirs by means of a tunnel and open aqueduct, two and a half miles in length and five feet in diameter. The Reservoirs at Hallington, into which water from Colt Crag and Little Swinburn flows, are connected with Whittle Dene by an open aqueduct and tunnel ten miles in length.

From Whittle Dene the water is conveyed by an open aqueduct, tunnel, and pipes to filter beds at Throckley, five miles from the town, and all water for domestic purposes is then distributed by 30-inch and 24-inch metal pipes.

The supply is by gravitation to a height of 200 feet, the higher portion of Newcastle being supplied from a Reservoir at Fenham, into which the water is pumped from a service Reservoir at Benwell.

The higher portion of Gateshead is supplied from a Reservoir at Carr's Hill, into which the water is raised by a pumping station on Windmill Hills.

There is also a pumping station at North Wylam, from which a supply can be obtained for manufacturing purposes by a separate line of pipes.

The Newcastle and Gateshead Water Works were established in the year 1845. At that time the population of the two towns supplied was about 100,000 persons, and the daily consumption of water was estimated at 700,000 gallons.

In 1846 an Act of Parliament was obtained for the construction of Storage Reservoirs at Whittle Dene, which were completed, and the water brought into the town in 1848. The surface area of the water in those Reservoirs was equal to 43½ acres, and their storage capacity 215 million gallons.

In 1850 the consumption of water was estimated at 1½ million gallons per day, and the supply having failed, the capacity of the Storage Reservoirs was increased to 330 million gallons.

In 1852 the consumption had increased to 2 million gallons per day.

In 1853, the consumption having increased to 2½ million gallons per day, and the supply having again failed, the Company had to resort to the old system of pumping from the Tyne.

In 1854, to meet the requirements of a rapidly-increasing population, it was again found necessary to further increase the storage capacity of the Reservoirs at Whittle Dene, and in 1857 the surface area of the water was increased to 125 acres, with a storage of 525 million gallons. The extent of the drainage area into the Whittle Dene Reservoirs was 4,340 acres.

Between 1857 and 1860 an aqueduct was formed between Whittle Dene and the Hallington district, where a very extensive watershed existed. This was done by forming an open watercourse from the Reservoirs at Whittle Dene as far as the river Pont, and utilizing the Pont as far as Matfen, where a subterraneous passage was made through the Ryal Banks into the valley beyond, and continued as far as Small Burn, Hallington East Burn, and North Burn, the site of the present Hallington Reservoirs. The additional drainage area brought into Whittle Dene by this aqueduct was 12,760 acres, making a total drainage area of 17,500 acres.

In 1863 the consumption of water had increased to $4\frac{1}{2}$ million gallons per day, and in 1868 to 6 million gallons per day.

In 1868 an Act of Parliament was obtained for constructing the East Hallington Reservoir, which was completed in 1872.

The East Hallington Reservoir has a surface area of water equal to 131 acres, and contains when full 686 million gallons.

In 1877 an Act of Parliament was obtained to construct the Colt Crag, Little Swinburn, and West Hallington Reservoirs. These works were commenced in 1878, and in 1881 the Little Swinburn with the covered aqueduct, connecting the Little Swinburn with the Hallington Reservoir, was completed, and the water diverted into the latter Reservoir.

The Little Swinburn Reservoir has a water area of 15 acres, and contains 34 million gallons.

The Colt Crag Reservoir when full has a water area of 206 acres, and contains 1,070 million gallons.

The West Hallington Reservoir contains 722 million gallons.

In 1889 the total daily consumption is about 12 million gallons per day, and the population of Newcastle and Gateshead and district supplied by Company about 340,000.

The total storage of the Company is 3,042 million gallons, and the water in store on 1st May was 2,315 million gallons, equal to about 200 days' consumption without rain.

The rainfall at Hallington averages over 20 years 31.269 inches, and at Whittle Dene 26.224 inches.

THE SECOND FIELD MEETING was held at Rothbury, for Brinkburn and Weldon Bridge, on Thursday, June 21st.

The members left the Central Station at 8.20, and arrived at Rothbury at 10.30, when they breakfasted at the Queen's Head Inn. Conveyances were obtained here, and the party drove to Brinkburn Priory, permission to view which had kindly been granted by Arthur Fenwick, Esq.

Brinkburn Priory, which is in an excellent state of preservation, was founded during the reign of Henry I., and was dedicated to St. Peter, by William de Bertram, Baron of Mitford. It was restored in 1858, and these restorations were inspected with great interest. Concerning the architecture Mr. Wilson says, "The richest Norman work is blended inextricably with the purest English, and the fabric must be regarded as one of the most fascinating specimens of the transition from one to the other that there is in this country." This combination of styles is seen in the windows of the clerestory and the triforium. In the chancel rest the remains of the late lamented owner, Cadogan Hodgson Cadogan, Esq., on whose tomb beautiful flowers were strewn, and the visitors stood for a moment bowed in silent respect for the memory of one who had endeared himself to all lovers of Nature. We visited the rest of the monastic buildings and the "Bell Pool," where, legend tell us, the Scots cast the Priory bells and other treasures, and many have been the efforts made to recover them. The walk through the grounds was much enjoyed, and amongst the plants that were noticed were the Wild Basil, Foxglove, Throatwort, Woodruff, Golden Saxifrage, Figwort, Sweet Cicely, Celandine, Pellitory, Toad Flax, St. John's Wort, and Barberry.

On reaching Weldon Bridge the party dined together, and afterwards held the usual meeting.

On returning the members left the conveyances at the eastern entrance to Cragside, and walked through the grounds back to Rothbury. The Azaleas, Rhododendrons, and many other flowering shrubs were in full bloom, and afforded a feast of colour such as is not often to be seen.

The members returned home at 4.35, having spent a very pleasant day.

A portion of the party had come to Rothbury from the West, having walked on the Tuesday from Woodburn to Elsdon, where the Church and Rectory (converted from an old Peel) were inspected, as well as the Mote Hills near. The route then lay past Bilsmoor Park, down the Grasslees Burn, till the Coquet was reached opposite Hepple. They then proceeded to Holy-stone, and saw the operation of clearing and cleaning the Lady's Well, where Paulinus is said to have baptised 3000 heathen. The "Well" is about forty feet in diameter and three feet deep, of which the constantly-springing water only fills about one to two feet, as the outlet is arranged. The spring cleaning is necessitated by the quantity of dead leaves falling from the surrounding trees, the water itself being fresh and pure, and rising through a gravel bed. Harbottle was then reached, and the hospitality of the "Cherry Tree" was very welcome.

Next day was spent in visiting the tarns near, where were noticed many nests of the Black-headed and other Gulls, a few still having eggs in them. Some of the waterfowl, with their little broods, swimming about afforded a pretty and interesting sight. In the Coquet were seen a number of Sandpipers, locally known as "Pick-a-deedees."

On the Thursday, this portion of the party walked from Harbottle to Rothbury in time to join the others on their arrival from Newcastle.

The THIRD FIELD MEETING was fixed to be held at Longhoughton, on Wednesday, July 18th, but owing to the very wet and inclement weather it was postponed until September 12th. Thus what had been decided upon as the fourth was actually the third meeting, and was held at Whittingham, on Monday,

August 6th, a Bank holiday, when about twenty-five members assembled at the Central Station. They arrived at Whittingham at 9.30, where they breakfasted at the Castle Inn. They then walked past Whittingham Peel Tower, which was restored by the late Lady Ravensworth, and made habitable. It now affords a comfortable residence for four old servants of the Ravensworth family.

The next stopping place was Eslington, which Lord Ravensworth had most kindly given permission to the members to visit. In the Park the numerous groups of Fallow Deer gave a most animated and pleasing effect to the woodland scenery. In the gardens the *Lilium auratum* and *L. Harrisii*, *Eryngium giganteum*, and the Magnolias were especially admired.

Afterwards the party climbed the Callaly Crag, and explored the full length of the crags on their way back to Whittingham, much enjoying the fine views obtainable.

After a substantial repast the usual meeting was held, when it was reported that in the neighbouring streams an unusual quantity of Water Crowfoot, *Potamogeton densus* and *P. crispus*, and other water plants were to be found, and by their sides the Meadow Sweet was very luxuriant. There were also gathered *Vaccinium Myrtillus* and *V. Vitis-Idæa*, *Geranium sylvaticum*, *Scrophularia*, *Myriophyllum verticillatum*, *Empetrum nigrum*, *Ligustrum vulgare*, and *Drosera rotundifolia*. Specimens of *Cicindela campestris* were caught.

Mr. Charles Moffitt, of Winlaton, and the Rev. Henry Walmsley, of Annitsford, were proposed and duly elected members.

As I have said, the FOURTH FIELD MEETING was held at Longhoughton, for the Sea-Coast between Howick haven and Dunstanborough Castle, instead of West Hartlepool and Seaton Carew, on Wednesday, September 12th.

We were favoured with a very fine day, which tended to heighten the beauties of the autumnal tints just appearing. The walk was by the Rumbling Churn, Sea Houses, and Craster to Dunstanborough, returning by Dunstan Square, Dunstan,

and Howick to Longhoughton, a distance of about ten miles. The walk was much enjoyed, but very few birds were on the Coast, although a small flock of Waders, the Knot, *Tringa canutus*, were noticed.

We first devoted our attention to the Church of St. Peter, and noticed the Early Norman windows in its massive towers. The walls are of great strength, and are mentioned in Clarkson's "Survey," where it is said they should be strengthened, as it was the place in which the people took refuge. A brisk walk brought us to the "Rumbling Churn," popularly known as the "Rumble Churn," where, in stormy weather, the sea rushes in, and the waves are carried through into an immense chasm, caused by the crumbling away of the basalt, where they seethe and toss, and are borne high in the air in clouds of spray.

"With strange turmoil did it bubble and boil,
And echo from place to place;
So strong was its dash, and so high did it splash,
That it washed the Castle's base."

We saw to great advantage the Castle, standing on the promontory formed by the great Whin Sill, which here runs directly south to Howick. The Castle is built on a layer of freestone overlying the basalt. In this neighbourhood and further south geologists find proofs of extensive disturbances of the strata. The area of the Castle, about nine acres, was greater by far than that of any other in the county, and upon it, according to Camden, there has been reaped in one summer 200 bushels of corn. The greater part of this grand fortress has disappeared, but on the west Lilburn's Towers rise boldly from the edge of the Crag, where, says Mr. Freeman, the tall basaltic columns stand in front of it like "Sentinels of Stone."

Leaving "Dunstanborough's caverned shore" we passed Craster Tower, once a Border fortress, but now a modern dwelling house, and the residence of one of the oldest and most respected families in the county. Passing Boulmer, where an extensive contraband trade used to be carried on, we reached Howick Hall, which occupies the site of an ancient tower destroyed in 1780. Through the kindness of Earl Grey we were

met at the station by Mr. Inglis, his lordship's head gardener, who acted as our *cicerone* during the day, and showed us all the beauties of the noble mansion and the lovely park.

The following paper, contributed by Professor Lebour, was read at the fourth Field Meeting :—

In the past year the chief geological points which require notice are the Seaton Carew Boring, the Dunston Excavations, and the Publications of the Geological Survey.

Beginning with the last, attention must be drawn to Mr. Clough's Memoirs on the Cheviot country and on the country around the Plashetts district of the North Tyne. These memoirs contain a very large amount of new information, perhaps the most important and newest of which is the unexpectedly large area occupied by Granite in the Cheviots. Both are the condensed resumé of a very detailed series of observations, and cannot be usefully abstracted. They must be carefully studied themselves. The same may be said of a very elaborate Memoir on the Lower Carboniferous Rocks of the Rede Water, by Mr. Hugh Miller, published before the past year, but which has scarcely attracted the attention which it deserves. The lists of fossils from various horizons in the Limestone Series are unique and of the greatest value.

The Seaton Carew Boring has been put down by subscription between the village and the railway, and the interest of its results can scarcely be over-estimated. After proving the Salt-measures (Triassic or Permian according to different authorities) without, however, finding any salt, and after giving the first known complete section of the Magnesian Limestone, and proving that rock to be some 800 feet thick, a series of grits, sandstones, and shales, with thin coals, was struck, which may in part belong to the Millstone Grit Series, but in all probability comprise a very large amount of Coal-measure rocks (probably Lower Coal-measures or Gannister beds). However this may be (and a boring about to be put down at Hart will soon prove this), we have here an undreamed of extension of the Coal-measures, which may mean another Coal-field between those of Yorkshire and Durham. Borings at Middlesbro', or a little

east of Thirsk, are very desirable to throw light on the subject.

The Dunston Excavations are made in a portion of the well-known Team Valley Works, for the purposes of the erection of the Co-operative Mills near the river Tyne. The Boulder clay is met with here sometimes at a depth of 60 or 70 feet, the deposits above it being brick-earth, sands, loams, etc. These include thin beds of fresh-water mussels (*Anodon*), and innumerable branches, snags, and portions of trunks of trees—oak, ash (?), alder, etc. The most interesting find, however, is a portion of a wooden canoe, the prow, well-shaped and excavated out of a single piece of timber.

The LAST FIELD MEETING was held at South Shields and Marsden, on Friday, October the 5th. Only a few members attended—the unsettled state of the weather influencing, no doubt, the attendance on this as on many other Marsden meetings; yet the day turned out not so unfavourable, and those who ventured reaped the enjoyment often allotted to the brave and unweatherwise, and the short excursion from Shields to Marsden was found to be nearly as enjoyable as in days of yore. Before proceeding along the coast the party paid a visit to the Borough Free Museum, where, under the guidance of Mr. John Hinde, they were shown the most noteworthy of the remains found in the excavations of the remarkable Roman Camp on Shields Lawe, which was afterwards visited by the excursionists.

Shields Lawe is a huge mound of boulder clay and glacial drift, attaining an elevation at the site of the Roman Camp of about 80 feet, and in the time of the Romans would form an isolated mound, fortified naturally on the north by the Tyne and steep clay-cliffs, which swept well round to the east and south. On this side a tidal river, from the sea to the Tyne, would partially protect it or allow it to be easily protected on the south and west. This mound is situated on the north side of the great, original valley of the Tyne, which extended from the Tynemouth Cliffs to the Trou Rocks, two miles direct. No ungainly ballast-hills then disfigured the banks of the noble

river. No volumes or clouds of black smoke obscured the view of the Roman sentinels, as they watched on the one side the entrance to the river and the distance intervening between the adjoining opposite camp at Tynemouth, or the more distant one at Jarrow Point—then easily discernible, smoke and ballast being absent. But how changed now. Uncouth ballast hills and the darkness of the blackest clouds of smoke close in all the view, and obliterate and blot out all that is or was beautiful in the landscape. Trees and forests have disappeared, and only what is ugly and artificial remains. A hasty visit to the portion left of the Roman station was made, and then the journey along the coast to Marsden was resumed.

The changes that have taken place in the town seemed to follow us along the coast. The sand-dunes, once so extensive and luxuriant with rare plants and insects, have suffered from the innovations of men, and are nearly exterminated. Ballast hills have been extended even to the sea-coast, and the lofty dunes of sand have been swept away by currents of air or buried beneath heaps of outlandish rubbish. The site of that rare English plant, *Convolvulus soldanella*, has been destroyed, and the homes of rare Moths and other insects have been unthinkingly obliterated. The Whin bushes, the Ferns, the Roses, and Harebells have also nearly all disappeared. When we proceed onwards we find the Trou Rocks, with its wild piece of moorland, the home of many wild flowers, have entirely been removed, and an empty void left in the coast-line, which only time can replace; and it is not until we reach Frenchman's Bay, and regain the old bridle-path (for you may ride along the coast if you like to Marsden, or Whitburn, or Cleadon), that we begin to breathe a little fresh air, and renew our acquaintance with old familiar scenes. And how beautiful is the fretted rockwork along this old wave-worn coast. You stand at each headland and look back upon what you have passed, and see fresh forms of rock and unique cave-worn grottoes in every direction. How many who walk along this well-trodden coast know of or have explored the two extensive wave-worn caverns that are situated between Frenchman's Bay and Man Haven. How few have

plodged round the base of the cliffs at low tide and examined all the fairy caves and inlets. And yet most of our members think they have seen all that is worth looking at between Shields and Marsden. Our sea-coast walks and rambles are too often done in the I came-I saw-I conquered style, and half or more of what is really worth observing is left unseen.

We found Marsden Bay, at least the north end, slightly changed by natural agencies. Large beds and layers of sand, that had been drifted up against the cliffs and accumulating for years, were being swept away by the action and set of the tides into the bay; so much so as to expose large masses of rocks that had been buried for years, and to lay bare old deposits of flint ballast, that had been washed in from the offing, where the colliers in olden times anchored to cast their ballast before entering the Tyne. Marsden Bay appears to greater advantage in the autumnal and winter months than earlier in the year. Its loneliness then lends a charm to it, which is dispelled by the boisterous influx of a holiday crowd. For this reason partly our meetings have been fixed for this period, and wisely, so that the splendid rock scenery can be contemplated with less distraction. We found ourselves alone on this occasion, and were able to examine the chief features of the bay and to collect specimens of the flexible limestone and other varieties of limestone at leisure, but we could not hope to make important discoveries in such a well-searched locality. At the south end of the bay we soon discovered more remarkable changes. The cliff had actually been built up and supported by artificial handiwork over the grotto. No Peter Allan was there to welcome us, or his family busy preparing girdle-cakes, and ham and eggs and other festive dainties, for the expected visit of the Club. Although the Grotto and its inmates were more changed than the aged and time-worn cliffs, Mr. Flawith, the new host, kindly administered to our comfort, and now having made our acquaintance will doubtless heartily welcome the members when they next visit the scene of so many happy meetings.

MATTERS OF INTEREST TO THE NATURALIST.

Amongst matters of interest to the naturalist I may mention that the Crossbill, *Loxia curvirostra*, has visited us in some numbers this year. Mr. Hancock, in his Catalogue, mentions their occurrence in 1856 and 1869. On the 5th January, this year, several were shot at Whittonstall, near Stocksfield; and again a few at Winlaton, on March 2nd, and where, on the following day, Mr. Thomas Thompson, one of our Honorary Secretaries, in company with Mr. T. Robson, had the pleasure, for the first time in his life, of seeing these birds in a wild state. Ten of them were feeding on the Scotch Firs. They were very tame, and some of their movements resembled those of the Titmice. Two were in the red dress or plumage, while the others were green. They remained in the neighbourhood up to the 28th of March, but got wilder and more difficult of approach. Their note resembles that of the French Linnet or Lesser Redpole, *Fringilla linaria*, more than that of any other bird.

Amongst other occurrences of the year I may mention that a flock of fourteen Turtle Doves, *Columba turtur*, were observed at Seaton Burn. On June 8th, two female Ruffs, *Machetes pugnax*, in summer plumage, were observed at Newbiggin-by-the-Sea, a late date for these birds to be seen.

Mr. Duncan, the taxidermist, also informs me that on August 21st, a curious variety of the Common Snipe was shot near Morpeth. This bird was nearly white, with the markings of the Snipe family shown.

In the latter part of October several Rough-legged Buzzards, *Archibuteo lagopus*, were observed in Northumberland, and one seen on Newcastle Town Moor.

On January 26th, this year, a specimen of the interesting brown variety of Partridge was shot near Morpeth.* This variety first made its appearance in our district in 1863, and is fully described by Mr. Hancock in his Catalogue. It has been observed in a few localities only in Northumberland, no record of its occurrence in the county of Durham being known.

* This variety seems to be identical with the *Perdix cinerea*, var. *montana*, figured in the *Naturalist's Library*, Vol. IV., Part II., Plate 2, by Sir William Jardine.—Ed.

A marked feature of last season was the abundance of many Lepidopterous insects in the larval form. In the South of England much harm was done to fruit trees, while in our own district many usually scarce Caterpillars were quite abundant. This was noticed more particularly with regard to numbers of the *Bombyces*, especially the families *Dicranuridæ*, to which belong the Puss and Kitten Moths, and the *Notodontidæ*, in which are the Prominents. The Bed-straw Hawk Moth, which was so numerous in some parts of the South, also visited us, three or four specimens being got in or close to Berwick.

PALLAS'S SAND GROUSE.

The past year will be memorable for a remarkable irruption of Pallas's Sand Grouse, that beautiful migrant from the sandy plains of Asia.

The Sand Grouse was not seen in this country until 86 years after it was first noticed by the naturalist whose name it bears. This country has been visited by the Sand Grouse at varying intervals since that time (1863), but never in such numbers as was the case last year. In the spring, the Sand Grouse, in large numbers, visited both the south and the north parts of the country, and many were unfortunately destroyed. Numerous flocks were seen at large and upon the wing. Early in May they were reported to be crossing Germany and other parts of the Continent, and very soon afterwards they reached England. Curiously enough one of the first, if not the very first bird to be recorded, was one that was killed against the telegraph wires and picked up at Cragside, and sent by Lord Armstrong to Mr. Hancock, on the 23rd May. Cragside is within a few miles of the place where they were first noticed in England in 1863, when three were killed at Thropton, on May 21st, two of which came into the hands of Mr. Hancock. These birds are now included in our almost-unrivalled Ornithological Collection at Barras Bridge.

A few days before the Cragside bird was found the Sand Grouse seemed to have appeared at Holy Island, the Farne Islands, and the adjoining Coast. They frequented the edge of the shore

in flocks of more than a hundred at a time, and were often seen *lying on their sides* digging vigorously into the sand. My friend Mr. George Bolam, of Berwick, informs me that later in the season they were killed in numbers at Holy Island, where one farmer commenced to shoot them off his corn-field, "*for fear they might be damaging it,*" and this fortunate gentleman actually dined off *Sand Grouse Pie*. The dates of the appearances of the Rothbury and Holy Island birds have been confirmed to me by Mr. Robt. Duncan, of Pilgrim Street, and Mr. A. Martin, of Newcastle. Although they remained in this neighbourhood throughout the summer none of them appear to have nested, and as soon as August arrived they were shot down on all sides and gradually disappeared. Some of them were however seen near Goswick by Mr. Robert Crossman, of Cheswick House, about two months ago, and another a little further to the south. This has led some people to expect that when summer comes in they may again be found gathering together.

Mr. Cullingford, of the Durham University Museum, received Sand Grouse from Northumberland, Durham, Yorkshire, Lincolnshire, Warwickshire, Norfolk, and Suffolk, the first being a female which came into his hands on May 25th. On dissection the largest of the ovæ was found to be no bigger than a pea, nor was this exceeded in any other specimen received by Mr. Cullingford. The first bird was moulting its secondary quill feathers, and all those he received up to September were more or less in the moult; but when first through it, the feathers have a lovely bloom upon them, which makes them look more beautiful. The first bird weighed $10\frac{1}{2}$ ounces, and Mr. Cullingford never had one that weighed more. Those killed in August were poor and light, the heaviest being 9 ounces and the lightest $7\frac{1}{2}$ ounces. After August and up to November they were in much better condition, the heaviest weighing $10\frac{1}{4}$ ounces. But these were not the only counties visited by the birds. They were found all through Cambridgeshire and in parts of Essex. They also visited Westmorland.

Mr. William Cowlett, the naturalist, of Newmarket, tells me that there is not the slightest doubt that they bred here. Many

of the Grouse were full of eggs. From December 5th they were lost sight of until January 19th, when a flock of thirty was seen in a dry part of the old Wicken Fen near Newmarket. They were again seen on February 9th by Mr. Fred. Johnson, the owner of the fen, an excellent observer and protector of birds; and the same gentleman saw them again on April 15th.

Although large numbers were captured and killed in 1888, there was not, I am happy to state, the same wanton slaughter and destruction as characterized the visit of this rare bird in 1863, which was called "the time of the great visitation."

Mr. Thomas Thompson, one of our Secretaries, has in his collection a Sand Grouse that was shot near Swalwell, on the Derwent, on May 28th, last year. Three days previous to that time a male specimen was shot at Whickham, and Mr. Thompson examined this as well as another male on June 26th. The latter was alive but unable to fly, and was in a very miserable state. The poor bird had its lower mandible broken short off, probably by a shot from a gun, and it was picked up in a field near Lemington.

Mr. I. Clark, of Blaydon, saw twenty Sand Grouse on a farm on Holy Island on June 3rd last. They were feeding on clover seed, were very tame, and were not more than ten yards distant from him.

Another bird, one of three, was shot at Frenchman's Bay, and is now in the collection of Mr. Yellowley, of South Shields.

Mr. John Hancock contributed a paper on the Captures of Pallas's Sand Grouse to our Transactions some twenty or twenty-five years ago, and I remember noticing at the time that Mr. Hancock did not anticipate its becoming naturalised with us. He considered climatic influences and the migratory tendencies of the bird as likely to prevent its remaining. He was right in expecting that it would be mercilessly destroyed, but I yet hope that the stringent measures which have been taken for its preservation by many of our landowners on whose estates it had settled for a time, and amongst whom are the Prince of Wales, Sir John Haggerstone, of Ellingham, and Sir William Crossman, may have the desired result, and that Mr. Hancock may yet be

able to record the Sand Grouse not as a mere stray or casual visitant but as a *resident*, thus adding another rare and beautiful bird to the avifauna of our district.

A RAID ON ROOKS.

If we except the Sparrow, there are probably no birds so familiar to the English people as the "Social Rooks," and I notice with regret that a movement for a reduction in their numbers has been inaugurated in this part of the country. "*A reduction in their numbers,*" "*a judicious thinning,*" and "*a mitigation of the depredations of this omnivorous bird,*" are some of the terms used by the assailants of the Rook; but I hope, gentlemen, that this language may not mean "*extermination,*" and that the present agitation may not lead to the same unreasoning slaughter and destruction that has characterized former crusades of the kind.

I am not old enough to remember the Rookery in the Vicarage garden, in Westgate Street, referred to by my late friend Mr. James Clephan, in a paper which he wrote for the "Chronicle" in 1864, but I have a lively recollection of the "Colony" that first lived at the Crow Trees, and afterwards on the opposite side of the street, in St. Thomas' Churchyard. Mr. Hancock has told how the unfortunate Rooks were not allowed to rest in peace, "though so near to the Church, and within its fence." No street Arab could pass the clustering nests without having a shy at them with a stone. The birds being ruthlessly persecuted, and their nests destroyed, entirely disappeared from this locality in 1867.

While we in and near Newcastle would welcome the company of the birds, if only to watch their habits, an Association for their destruction has been formed in Northumberland. This Union is offering twopence each for Rooks' heads and twopence a dozen for Sparrows' eggs, but I hope that those who are now engaged in this warfare may not soon have cause to regret it, and that they may not be as anxious to reinstate the Rook as were their fellow-agriculturists on the other side of the Border.

I do not doubt that since the almost total disappearance of

birds of the Hawk tribe Rooks have become too numerous in the county, but, as a correspondent of mine puts it, a good deal of nonsense is talked about the damage they do. As is well known their food consists mainly of larvæ, insects, grubs, and worms, but they will and do eat turnips, potatoes, and other farm and garden produce occasionally, *i.e.*, when they are either too numerous or when their proper food is not forthcoming. Whether their numbers exceed reasonable limits is more a question for agriculturists than ornithologists, but I suppose their most inveterate enemy will not deny that the Rooks work incalculable good in destroying the vermin that would otherwise ruin the crops in certain places. It is well known to every schoolboy that, given a field which is being ploughed and another that is being sown, they will follow the plough and blacken the ground behind it; but then the farmer turns round and tells us there are no grubs on well-drained high-class lands, and that they belong to outlying districts imperfectly cultivated.

Mr. James Hardy, the Secretary of the Berwickshire Club, tells me that wire-worms come from old grass lands, that they have little chance to live on arable land under regular rotation of crops, and that Rooks prefer newly-sprouted grain to any kind of food. Mr. Hardy also asserts that the Rooks will leave all the freshly-ploughed fields round about to obtain this favourite morsel; but, he adds sententiously, "one would not like them destroyed, nor will they be, because they find out refuge when they are persecuted."

The result of what has been termed the "Rook-murder in North Northumberland" is already becoming apparent. A number of the birds have taken their departure from the mainland, and have sought sanctuary on Holy Island, where, I am informed by Mr. Adam Martin, they have built nests on a small clump of low trees, or rather bushes, at the Lough; indeed, so low down are some of the nests that anyone may put in his hand. Two years ago a pair of Jackdaws built their nest in the old abbey, and I am glad to say that the birds now number four or five pairs. This is the first time that Rooks have been

known to visit the Island, where there are now seventeen nests in all, the highest being about fifteen feet from the ground, while the lowest is only about five feet high. Some young birds are hatched, and there are still some of the parent birds sitting on their eggs. It is not singular that Rooks should build on low trees, for they have been known to build on pollard willows, on small apple trees, and in rough hedges and in bushes, as related in Stevenson's "Birds of Norfolk," and in Yarrell's "British Birds;" but they must have been hard pressed when they chose a place like Holy Island for a residence. The presence of the Rooks there has reminded me that in the churchyard on Holy Island rest the remains of the late Mr. Robert Crossman, of Chcswick, who would never allow his Rookery to be disturbed in any way, and Sir William Crossman informs me that the Rooks continue to increase unmolested.

Mr. George Bolam, of Berwick, on whose unbiassed judgment we may confidently rely, has, through the medium of the daily press, been educating the public on the habits of the Rooks, and although he does not attempt to conceal the fact that they have, in some parts of the county, become a nuisance in rooting up wheat and other grain in a sprouting state, he adduces much evidence in their favour, and proves that much of the prejudice against the birds is unmerited. Mr. Bolam shows that the amount of service they render to the farmer is very considerable indeed, but that the diet of the Rook is varied in the extreme, and scarcely anything, animal or vegetable, comes amiss to it. At seed time a good deal of corn is eaten, though should the harrows or the ploughshare leave a grub or a wire-worm exposed, it is at once pounced upon and gobbled up in preference to the grain. In a paper on "Rooks and Rookeries," by Mr. James Smail, published in the Proceedings of the Berwickshire Naturalists' Club for 1882, it is related how Mr. Wilson, of Cleughhead, sowed a field with barley close to his house. The Rooks settled on the field in great numbers, and he requested his landlord's gamekeeper to shoot them. He accordingly killed two, and he and Mr. Wilson opened their crops on the spot. One grain was found in one and three in the other, but both

were crammed full of grubs. It is related in the same place how Rooks have been shot on barley stooks, where they were supposed to be eating the barley, but when opened they have not contained a single grain, but have been full of grubs and insects. Mr. Smail says, "They speculate now and then from the stooks, but very moderately. I have shot Rooks on several occasions when feeding in stubble fields where grain was abundant, and when opened I seldom found more than a few grains in the stomach, and I as often found none, but there was generally present a considerable mash of beetles, small earth-worms, hog-lie, and larvæ of various insects."

The Rev. Dixon Dixon Browne, of Unthank, has had exactly similar results from post-mortems he has made, and I am glad to observe that he mentions the fact in his letters to the daily press in defence of the Rooks.

Mr. Bolam has reminded us that when hard-pressed for food the Rook will feed with sheep on cut turnips in the boxes, as well as dig out turnips and potatoes and open out the hearts; but it is believed by many people, amongst them being Miss Omerod, the distinguished entomologist, and with some degree of reason, that the Rook is able to distinguish by the appearance of the leaves which plant is unhealthy, and that finding such a turnip or potato he digs it up in order to get at the grub with which it is infested. If this be so, then no material damage is done, because if the plant were left unmolested it would be worthless, or nearly so, in the autumn.

Mr. Henry Kerr, of Bacup, whose "Seasonal Bird Notes" form one of the most interesting features of our leading weekly newspaper, recently told me that on grass lands the Rooks thrive well, and do an infinity of good in preying on the ground vermin, especially wire-worms, and in this they are assisted by the smaller birds, Lapwings, Starlings, Sparrows, Larks, etc. In his district, Rossendale, North-East Lancashire, there are no cereal or root crops within a radius of fifteen miles, yet the Rooks swarm there, and are never molested by the farmers, who know that they would have no pasturage for their cattle except through the labours of the birds. Rooks are very partial to

the Earth or Pig Nut, *Bunium flexuosum*, and in spring and summer may be seen in flocks in the dry and friable pastures digging up the nuts or bulbs, and devouring them like omnivorous schoolboys.

It would appear however that the Rooks are to be slaughtered wholesale, as also the Wood Pigeons. It is an open secret that Cushats are now killed and poisoned illegally, and that they are offered for sale at the poulterers during the entire summer.

Be it understood that I am not against keeping the number of Rooks within reasonable bounds, but I am decidedly opposed to extermination and to some of the methods that have been proposed for their destruction, such as watching them at breeding time for a few days, startling and keeping the parent birds from the nest with guns so that the eggs may be addled. The old-fashioned practice of the landlord inviting his tenants and their friends to a day or two's shooting of the young is by far the most reasonable; and if Rooks so killed are not appreciated in the county I would earnestly recommend agriculturists to send them to town, where, I am sure, thousands of families will be glad to put them to a legitimate use. It is said, but I don't attach much importance to the opinion, that the increase is attributable to the gun license of 10s., which prevents many indulging in this two days' shooting. If that be the cause it is easily remedied by engaging persons to do the necessary work.

One of the most interesting and instructive works I have ever read is Mr. Theodore Wood's "Farmers' Friends and Foes," in which the author, referring to the abnormal increase of Wood Pigeons in Scotland, says, "And at this we can scarcely wonder when we learn, as the Rev. F. O. Morris tell us, that upon one Highland estate, in the course of three years only, no less than two thousand eight hundred and forty-seven birds of prey fell to the guns and traps of the gamekeepers. Interfering, after his wont, with Nature's balance, man has found to his cost that the slaughter of one animal brings with it as a necessary consequence the increase of others, and that he loses in one way far more than he hoped to gain in another. He preserves his game, but he loses his crops; and no one can deny that the latter are

the more valuable of the two. And it is far from easy to see in what manner he can repair the mischief which he has caused. He may strain every nerve to kill down the pigeons, but he can only do so at the cost of much labour and pecuniary expenditure. He may alter his position towards the birds of prey, and encourage them in the future as zealously as he persecuted them in the past; but many long years must elapse before they can attain to one tithe of their former numbers."

It is my personal opinion that had there not been that wholesale destruction of the birds of prey referred to by Mr. Hancock and scores of other practical men, the balance of life would have been maintained, and there would have been no necessity for campaigns against either Rooks or Sparrows. I am old enough to remember when Hawks and Magpies might be seen daily in the country, but now, thanks to the gamekeeper, they are rarely to be found, except it be nailed against the kennel-end, dead. I think it is within our province, as naturalists, to do something towards bringing about a change in this respect, and I recommend the subject to your consideration.

FRESHWATER FISH.

As an angler I have always taken an interest in the future prospects of the Salmon and Freshwater Fisheries of this country, a subject which for twenty-seven years has engaged the attention of our Governments. I have long thought that, as a department of Zoology, "Fishes" might receive greater attention at the hands of students of Natural History than they have hitherto been accorded. There are many points upon which information is required and will be welcomed by the official Inspectors, and there are none so well qualified to make these observations as students of Natural History, who have a wide field before them. Assistance is sought in obtaining information on such points as "The description of fish frequenting each district; the local varieties of each description of fish; the result of the introduction of fish from other waters, and the conditions necessary for the acclimatization of new fish; the periods and manner of migration of fish, whether male or female;

the times of the migration of young fish, and their size at such times; the diseases and parasites of fish; the earliest, latest, and principal times of spawning of each description of fish; the food of fish; the effect of different descriptions of food on their reproductive and other organs; the effect of pollutions, obstructions, land drainage, abstraction of water, and other artificial conditions on each description of fish; and, generally, any matters calculated to throw light on obscure points in the habits of fish."

Where, for instance, could the specialist more usefully employ his talents than in the investigation of that terrible fungoid disease which attacks Salmon, and which threatens the depopulation of more than one of our rivers. Respecting the Tweed my angling friend, Mr. George Crawhall, one of the truest sportsmen and keenest observers that ever cast a fly, tells me that clean Salmon running from the sea and the descending Kelts are alike affected, and it even extends to the autumn fish. The disease, *Saprolegnia ferax*, in the first instance, may be noticed by the appearance of a white fungoid growth about the nose and head of the victim. At this period the Salmon appear, and there can be little doubt on the point, to suffer much pain, frequently plunging aimlessly about and splashing along the surface of the water, shaking the head, as if to get rid of the tormentor. Gradually the white spots extend, and form loathsome blotches over the body of the fish. Salmon then leave the strong streams, fall into easier water, and, as the disorder increases in virulence, the fish are weakened, and in many cases nearly entirely blind, seek the sides of the river, where they may be seen lying in the shallow water, often with the dorsal fin and upper part of the tail exposed. Here they remain for days, growing weaker and weaker, until death ensues. Mr. Crawhall has seen diseased fish yet living with their eyes picked out by Carrion Crows. I have no desire to trench on the political aspect of the question, and shall leave to others the consideration of the laws which forbid that the diseased fish shall be taken from the river by anyone inclined to remove them, which at any rate would benefit the river and lessen the scope of the evil.

Although the Tyne, the most seriously polluted river in the kingdom, continues to be the most productive of all the Salmon rivers of England and Wales, report points pretty plainly to the fact that we are within measurable distance of the Salmonless and almost fishless state of the Mersey and the Thames. The increase of Salmon in the Tyne used to be termed "*glorious*." In some seasons Salmon were sold in scores at threepence per pound, and big weight at the money; but that is a thing of the past. It is believed by many people that "over-fishing" and "unseasonable fishing" are rapidly deteriorating the river. Mr. Ridley, of Walwick Hall, the Chairman of the Tyne Conservancy, says that the present practice is only "*seeking how to kill and for as long as possible*," and that unless another policy is adopted the Tyne Fisheries must deteriorate as well as become later.

I believe, however, that an extension of the rod-fishing in the autumn can have little or no appreciable effect on the stock of breeding fish. Rod-fishing is at all times uncertain, being controlled by floods, storms, and ice, and at times few days are available for anglers during the extended time for rods. Our fishermen ask for an extension of the close time, say to the 15th of September, urging that it would be beneficial to many of them who are poor and "unable to make ends meet;" and, personally, I do not think that the fish killed during this extra time would interfere with the number of Spawning fish to any serious degree; and although it must be admitted that the riparian owners have an undeniable claim, the fishermen argue that it is unfair to allow rod-fishers two months more than they have, and it is certainly very tantalizing to the sea fishermen to be compelled to cease operations, after probably a poor season, when the sea is swarming with fish, waiting to run up the river. But it is difficult to reconcile the interests of the net-fishers on the coast and in the tideway with the interests of the rod-fishers above, and any change is opposed, on the principle that it is wrong to kill the goose that lays the golden egg.

It is also urged that something should be done towards providing proper Spawning Beds, because anyone acquainted with

the subject knows the difficulty there is in finding the young fish sprouting into life; and it is evident that between the depositing of the Spawn and its coming to life severe frosts intervene, when the water subsides and the Spawn is left dry and injured; in fact, it is but a very small fractional part of Spawn that ever comes to life.

The supply of Salmon has fallen off not only in the Tyne but in other noted rivers to an alarming degree, and many reasons have been given for the decrease. But, gentlemen, I do not think that it is to either over-fishing or unseasonable-fishing that we must look for the cause of the increasing scarcity. Under favourable conditions the supply of fish would always multiply much more quickly than our needs, and a long or short close season would have but an imperceptible effect on that supply. Respecting the Tyne the Government Inspector has said that the apparently small effect produced on the fisheries by the great extent and variety of its pollutions, has been explained by the fact that the principal manufactories are situated on the tideway, which is comparatively short, and up which a vast volume of sea water is carried at every flood, diluting and ultimately carrying away on the ebb the polluting matters. This explanation might probably be strengthened by the consideration that, in addition to the scavenging effect of the tide, the constant dredging of the navigation channel by the Tyne Commissioners has had the effect of preventing the continuous deposit of sediment injurious to fish, the disturbance of any accumulation of which by an unusually high flood or tide would cause serious injury. Nevertheless dead Salmon, adult fish as well as smelts, are frequently found in the estuary of the Tyne, showing that neither "up" nor "down" fish can safely run the gauntlet of the pollutions with which it is filled. But our members are well aware that the sewage of the towns and the manufacturing refuse that is discharged into the tideway from alkali and chemical works are not the only sources of pollution, but all the tributaries are polluted.

During the spring months some rivers are reduced to a very low state, and it is then that large numbers of fish, which having

spawned and now in a "kelt" state, crowd the deeper pools, anxious but unable to get to the sea. In this reduced state of the river we have pouring in day by day pollutions of all kinds, robbing the water of its vital and life-supporting elements, till at length the dread disease breaks out and sweeps the congested pools, destroying alike kelt and clean fish. Hundreds of dead and festering carcasses may be seen lying in the pools or thrown up on the sand-banks, a prey to the Rats and Crows, and a prolific source of death and desolation to such fish as have hitherto escaped the scourge.

From time to time we have been promised that this question shall be dealt with comprehensively, but will it ever be dealt with effectively? We cannot regard this subject with anything less than anxiety; but when the conflict lies between the protection of fish and the purification of rivers on the one hand, and the ever-increasing and important industries of the country on the other, I am afraid the former will come in for very small consideration. But surely the resources of modern Science can supply the means of purifying the polluting elements before they enter the river. Sir Lyon Playfair once said before a Select Committee of the House of Lords, "I think that if you force us to purify the water which we discharge fouled in this way, before long we shall find efficient modes of doing it, at the present moment we have not efficient modes of doing it, and yet, as one of the largest polluters of water in the kingdom from this very thing, I advocate that you shall make me purify the water before I discharge it."

The movements of Salmon are proverbially erratic. My friend Mr. Trotter, of South Acomb, who succeeded his father in the working of the Bywell fishery some forty years ago, says that at some seasons there were more fish than could be disposed of, while at other times there was scarcely one to be seen. The removal of the dam at Bywell was expected ultimately to fill the river with fish; but Mr. Trotter believes that the piers at the mouth of the river may have something to do with the scarcity, by preventing the fish from gaining easy access to fresh water. Migratory fish, like birds and mammals,

by a natural instinct return to the place where they were bred, provided there be no insurmountable impediment, and Salmon going to the sea from the Tyne would certainly return; but may it not be that the fish are often unable to find the mouth of the river, and consequently collect behind the North Pier. This may, or may not, be the case, but during the season I have more than once remarked late at night and in the early hours of the morning an unusual number of fishing-boat lights in this particular direction, leading me to suppose that the Salmon congregated there in more than ordinary numbers. The floods in the river bring the fish, but the fishermen say that they get more Salmon when the floods are the result of rain, with a strong wind and a high sea from the north-east. This confirms the opinion as to an unusual volume of sea water diluting the poisonous elements, and allowing the fish to gain the upper reaches of the river.

While such matters are being agitated and discussed, it is pleasing to notice what can be done in the way of Fish culture by individual effort. Messrs. Hardy Bros., of Alawick, have undertaken an experiment, the results of which will be keenly watched by many naturalists and pisciculturists in the North of England. Although the Coquet is one of the most favoured of British streams for angling, there has during recent years been a falling off in the size of the Trout; and, although there is an excellent stock of Burn Trout in the river, it had been thought that the introduction of some new blood of a larger kind would have a beneficial effect, and Messrs. Hardy introduced in April last 2,000 yearling Trout of the species *Salmo Levenensis*, Loch Leven Trout, which will go to swell the weight of the anglers' creels during this and following seasons. It is somewhat remarkable but there was not a single dead fish amongst the 2,000, although they had been carried such a distance. A few of these fish were caught in September, being returned to the river of course, and were found to have grown considerably; indeed, it is a characteristic of this species that they grow rapidly.

Dr. Day, in "The Salmonidæ of Britain," published in 1887,

says six-year-old examples, some weighing as much as seven pounds, were found in the Howietoun Ponds in 1882, and since then they have been captured up to ten pounds in weight. Let us wish, in the language of the angler, that the fish may have luck, or, if caught, that they may be returned to the river, and that they may be spared until the autumn, so that they may spawn and improve the size of the fish in the Coquet.

In March, 1887, Mr. C. B. P. Bosanquet, of Rock Hall, Alnwick, caused to be placed in his pond a number of the same species of fish as was used by Messrs. Hardy. A month ago some of these fish were caught, and were found to weigh from eight to twelve ounces, certainly a very satisfactory increase in size.

Last year I had the pleasure to append to my address a valuable contribution by Professor J. Batalha Reis, who, at the conclusion of his paper, suggested a matter well deserving the attention of all local naturalists. Signor Reis recommended the formation of a good Library of Natural Sciences, and in a letter which I recently received from Professor Oliver, of Kew, he says, "It would be a great encouragement to young workers if a small collection of selected hand-books for the simple determination of species were accessible on easy conditions, and you could readily secure a list of such works recommended by competent naturalists as the best for beginners in their respective fields. I should not aim too high at first. Illustrated books are necessarily expensive, and might be gradually increased at the Literary and Philosophical Society." Professor Oliver then gives me a note of a few books of the kind applying to the vegetable kingdom. If such special hand-books were added to the already extensive Library of Natural Sciences possessed by the Literary and Philosophical Society, the difficulty would in a great measure be overcome, because that Society has recently resolved upon a rule which will enable many young people to participate in the benefits of membership on very easy conditions.

Orders have been given by our local legislature for attaching the names, both common and scientific, to the trees, shrubs, and plants in our parks, and I expect this will include Jesmond

Dene. With a good Library and the living examples in our parks for reference, students of Botany, at any rate, have a tangible inducement to pursue their studies; and if Professor Brady, or some other specialist, will follow the example of Alderman Barkas, in giving practical lessons in one or all of our parks, we would in all probability revive in Newcastle the sight that is to be seen in the Botanical Gardens of Brussels, where the students may be seen in the morning learning from Nature a lesson in which they may be examined at the College later on in the day. In this connection our City Council have shown a commendable spirit, but I cannot pay them the same compliment respecting their decision as to the principal member of the very small Zoological Collection in Heaton Park. Much sickly sentimentality has been evinced concerning this unhappy brute. If Bruin is not comfortable it would be a much more sensible plan to make him so than to shoot him. Surely it is within the power of the authorities to provide suitable quarters not only for the Bear but the Gazelles and any other specimens that may be or have been presented to the public! I trust that immediate steps will be taken to remedy the defect at Heaton, and to make the collection worthy of the town that has produced so many naturalists of eminence.

To those who desire a lesson in the keeping and management of wild beasts I would recommend a visit to the Museum, where Mr. Wright will show them the Condor presented by Dr. Pattinson, apparently happy in its confinement, and watching the movements of visitors. The obliging keeper will also tell them how another Condor, given by Mr. Tripler, appreciated the gentle nursing it received during an illness, which unfortunately proved fatal.

Miss Omerod, the Consulting Entomologist of the Royal Agricultural Society, has given publicity to a great deal of practical information in a valuable little work called "Observations of Injurious Insects and Common Farm Pests." One of these, the Warble Fly, possesses a personal interest for me as a manufacturer, as I know full well the almost incredible damage it is capable of doing in reducing the value of a hide of leather.

The old-fashioned theory, like that respecting the terrible Salmon Fungoid disease, was that the injury was only "skin deep," but this is what the editor of the "Farmer" calls arrant ignorance. I have recently been pleased to see that Mr. W. H. Wakefield, of Kendal, has, through the "Westmorland Gazette," demonstrated in the most practical and convincing manner that Warbles do not only cause animals great pain, but appreciably reduce their value, not only when giving milk but in the condition of the carcase. Mr. Wakefield not only does this but he gives, for the benefit of agriculturists, simple directions for the extermination of the pest by which, it is calculated that from three to four million pounds are lost annually.

During the past year we have lost by death Mr. Daggett, whose cheerful and kindly face will be missed by many of the members. His official duties prevented him attending the meetings during recent years, but he often said that the early field days he spent in the company of our venerable Vice-President, Dr. Bruce, were very pleasing reminiscences to him.

Another face that will be missed was that of Mr. J. Jordan, who, for thirty-five years, was hardly ever absent from our gatherings.

The sister Society at Berwick has to lament the death of Mr. M. T. Culley, of Coupland Castle, an ardent naturalist, and an accomplished classical scholar. At the time of his death Mr. Culley was engaged in editing a Caxton translation of a French Treatise for the Early English Text Society.

I have taken the liberty to indicate one or two ways in which public opinion might be directed into channels favourable to the popularity of our pursuits, and I have pleasure in congratulating the members of our local Arboricultural Society upon the success that has hitherto attended the efforts they are making for the more pleasing adornment of our town. From the time of Evelyn to the present day the most conflicting opinions have been entertained both in regard to the selection and planting of trees and their subsequent management; but our local Society is fortunate in possessing competent advisers, and if they can

only influence the city authorities to insist that all new thoroughfares shall be made much wider than at present, and if they are mindful of the injunction to "Be aye stickin' in a tree, Jock; it will be growin' while ye're sleepin'," they will have the satisfaction of knowing that although he who plants a tree rarely lives to see it come to maturity, they are transmitting to their descendants a substantial benefit, and a lasting source of pleasure.

We may congratulate ourselves on the proposed visit of the British Association during the present year, and particularly when a naturalist so eminent as Professor Flower, LL.D, F.R.S., is to preside over the gathering. As the head of the Kensington Museum the President, I am inclined to think, may find much to attract his attention in our Museum.

In concluding, I take this opportunity of tendering my warmest thanks to Messrs. Howse, Thompson, and Spence, our accomplished Secretaries, and to the whole of the members, for the consideration I have received during my term of office. The harmony that prevails among our honorary officials and more prominent members has made my position an agreeable sinecure. I have derived conspicuous advantages from their assistance, and in no direction are the results of their labours more readily perceived than in the position which our Society occupies among the kindred associations of the country. This good feeling will continue, and I accept it as an auspicious omen for the future, because it cannot fail to produce that improvement in our membership and that public interest in our pursuits to which I referred when I last had the honour of addressing you.

Welcome silence! welcome peace!

Oh most welcome holy shade!

Thus I prove, as years increase,

My heart and soul for quiet made;

Thus I fix my firm belief,

While rapture's rushing tears descend,

That every flower and every leaf

Is moral Truth's unerring friend.

I would not for a world of gold
 That Nature's lovely face should tire;
 Fountain of blessings yet untold:
 Pure source of intellectual fire!
 Fancy's fair buds, the germs of song,
 Unquicken'd midst the world's rude strife,
 Shall sweet retirement render strong,
 And morning silence bring to life.

ROBERT BLOOMFIELD, *Love of the Country.*

The following gentlemen were elected members of the TYNE-SIDE NATURALISTS' FIELD CLUB during the years 1888-9:—

Allison, Rev. W., 36, Grey Street, Blyth.
 Franklin, Rev. Canon, St. Mary's Cathedral, Clayton Street.
 Moffit, Charles, Winlaton Iron Works.
 Walmsley, Rev. Henry, Annitsford, Newcastle-on-Tyne.

THE FIELD MEETINGS for 1889 were arranged to be held as follows:—

MAY 24TH Bebside and Hartford Bridge.
 JUNE 24TH Castle Eden Dene.
 JULY 18TH Gilsland and the Irthing.
 AUGUST 5TH (Bank Holiday).. Allendale and Allenheads.
 SEPTEMBER 19TH Woodburn and Redewater.
 OCTOBER 4TH Marsden.

THE TREASURER IN ACCOUNT WITH THE TYNESIDE NATURALISTS' FIELD CLUB.

FROM JANUARY 1ST TO DECEMBER 31ST, 1888.

Dr.	£ s. d.	Cr.	£ s. d.
1888.		1888.	
Jan. To Balance brought forward	134 6 2	Dec. 31. By Printing Transactions	34 6 6
„ Subscriptions	65 5 0	„ Journal	19 1 11
„ Sale of Transactions	1 3 6	„ Secretaries' Expenses	6 15 0
		„ J. Wright, Gratuity	5 0 0
		„ Commission	3 5 3
		„ Postage and Petty Expenses	1 16 6
		„ Balance	130 9 6
	<u>£200 14 8</u>		<u>£200 14 8</u>

1889, April 23rd.—Examined and found correct,

T. P. BARKAS, AUDITOR.

THE following gentlemen were elected officers of the Club for the years 1889-90:—

PRESIDENT.

The Rev. Canon Tristram, LL.D, F.R.S., etc., Durham.

VICE-PRESIDENTS.

Joseph Blacklock, Esq.	|	John Hancock, Esq.
D. O. Drewett, Esq.	|	Wm. Maling, Esq.

D. Embleton, Esq., M.D.	|	Rev. J. E. Leefe, M.A.
Rev. Canon Tristram, F.R.S.	|	Rev. G. R. Hall, M.A., F.S.A.
Rev. A. M. Norman, M.A.	|	G. H. Philipson, Esq., M.D.
Rev. J. C. Bruce, LL.D.	|	Rev. R. E. Hooppell, LL.D.
Rev. A. Bethune, M.A.	|	A. S. Stevenson, Esq., J.P.
E. I. J. Browell, Esq., J.P.	|	H. C. Abbs, Esq., J.P.
Rev. R. F. Wheeler, M.A.	|	Rev. J. M. Hick.
Prof. G. S. Brady, M.D.	|	John Philipson, Esq., J.P.
H. B. Brady, Esq., F.R.S.	|	

TREASURER.

R. Y. Green.

SECRETARIES.

Richard Howse. | Thomas Thompson. | Faraday Spence.

COMMITTEE.

T. W. Backhouse.	|	John Glover.
Benj. Barkus, M.D.	|	Rev. J. M. Hick.
E. I. J. Browell.	|	Rev. W. Johnson.
T. T. Clarke.	|	G. H. Philipson, M.D.
Wm. Dinning.	|	J. F. Spence.
D. Embleton, M.D.	|	Col. J. R. Young.

AUDITORS.

J. S. Forster. | Ald. T. P. Barkas.

INDEX TO VOL. X.

- Abbs, Miss, History of the Early Life of a Hedgehog, 214.
Archibuteo lagopus, 4, 410.
- Birds observed at Field Meetings, by Mr. T. Thompson, 410.
 Birds observed at Hallington Reservoir, by Mr. R. C. Hedley, 397.
- Catalogue of Fossil Plants from the Hutton Collection, 19.
 Catalogue of the Local Fossils in the Museum of the Natural History Society, 227.
 Catalogue of the Fishes of the Rivers and Coast of Northumberland and Durham, 327.
Coleoptera, 200.
Columba turtur, 410.
 Contents of Vol. X., iii.
Convolvulus soldanella, extermination of locality on South Shields Sand Dunes, 408.
 Corrigenda, 144.
 Criffell granite boulders, 10.
- "Devil's Arrows" near Borough-bridge, 9.
- Embleton, Dr., on Stump-Cross Cavern, 190.
- Field Meetings, list of: 1887, 16.
 1888, 211.
 1889, 429.
- Fishes, Recent, Catalogue of, 327.
- Fossil Fishes—Permian, 249.
 Coal-measures, 268.
 Carboniferous L., 285.
- Fossil Plants, Catalogue of, 19.
 Fossil Reptiles, 251.
- Goydon Pothole, 188.
- Hallington Reservoir, Birds at, 397.
 Hancock, John, on a curious proceeding of a Bullfinch, 218; on two Wild Hybrids recently captured in Northumberland, 218.
 Hedgehog, History of the Early Life of a, by Miss Abbs, 214.
 Hedley, Mr. R. C., on the Birds seen at Hallington Reservoir, 397.
Helix virgata, 203.
 Hemiptera, 200.
- Hick, Rev. J. M., Presidential Address, 1.
- Howse, Richard, Contributions towards a Catalogue of the Flora of the Carboniferous System of Northumberland and Durham. Part I.—*Fossil Plants from the Hutton Collection*, 19; Note on the South Durham Salt Borings, with remarks on the Fossils found in the Magnesian Limestone Cores, and the Geological position of the Salt, 220; Catalogue of the Local Fossils in the Museum of the Natural History Society, 227; Catalogue of the Fishes of the Rivers and Coasts of Northumberland and Durham and the adjacent Sea, 327.

How-steane Beck, 187.

Illustrations, List of, iv.

Index to Fossil Plants in the Hutton Collection, 145.

Index to Catalogue of Fishes, 385.

Larus ridibundus, 397.

Lebour, Prof., Remarks on Seaton Carew Boring, the Dunston Excavations, and Publications of Geol. Survey, 406.

Lecidea diacapsis (Ach.), 205.

Limax arboreus near Wooller, 194.

Local Fossils in the Museum of the Natural History Society, Catalogue of, 227.

Loxia curvirostra, 410.

Magnesian-limestone Fossils, 225, 230—247.

Marl-slate Fossils, List of, 248.

Miscellanea, 218.

Natural History Society Reports :

Annual Report, 1888, 153.

1889, 289.

Financial Account, 1888, 162.

1889, 300.

Officers, 1888, 166.

1889, 306.

Honorary Curators, 1888, 167.

1889, 307.

List of Donations, 1888, 168.

1889, 308.

List of Special Donations, 179.

Members elected 1888—89, 290.

List of Members, Jan., 1890, 318.

Obituary Notices :

Mr. James Sang, 15.

Mr. James Clephan, 209.

Henry Watson, Esq., J.P., 209.

Obituary Notices, continued :

Cadogan Hodgson-Cadogan, 209.

Mr. Daggett, 427.

Mr. J. Jordan, 427.

M. T. Culley, Esq., J.P., 427.

Pallas's Sand Grouse, 411.

Perdix cinerea, var. *montana*, 410.

Philipson, John, Esq., Presidential Addresses, 181, 391.

Plants noticed at Field Meetings, 184—6, 195, 399, 402, 404.

Presidential Addresses :

1887, Rev. J. M. Hick, 1.

1888, John Philipson, Esq., 181.

1889, „ „ 391.

Presidents' Accounts of Field Meetings :

1886.

Ebchester and Shotley Bridge, 2.

Northumberland Lakes, 3.

Staindrop and Raby, 5.

Boroughbridge & Aldborough, 7.

Gilsland, 9.

Cresswell and Newbiggin, 10.

1887.

Whitfield and West Allen, 182.

Teesdale and High Force, 184.

Pateley Bridge & Nidderdale, 186.

Dunstanborough, *nil*.

Wooller, 191.

Whitburn and Marsden, 202.

1888.

Hallington Waterworks, 394.

Brinckburn and the Coquet, 402.

Whittingham & the Breamish, 403.

Dunstanborough, 404.

West Hartlepool and Seaton

Carew, *nil*.

Marsden, 407.

Rooks, The Raid on, in Northumberland, 414.

- | | |
|---|--|
| Rooks breeding on low trees in
Holy Island, 415. | Tyneside Naturalists' Field Club,
continued : |
| | Members Elected, 1886, 16. |
| | 1887, 210. |
| | 1888, 429. |
| Salmon Culture, 419. | List of Officers, 1887, 18. |
| Shields Lawe, 407. | 1888, 212. |
| Smith, Mr. George, on the Water
Supply of the Newcastle and
Gateshead Water Co., 399. | 1889, 431. |
| Stump-Cross Cavern, 190. | List of Field Meetings, 1887, 16. |
| | 1888, 211. |
| | 1889, 429. |
| Tyneside Naturalists' Field Club : | Treasurer's Reports, 1886, 17. |
| Presidential Addresses, 1887, 1. | 1887, 213. |
| 1888, 181. | 1888, 430. |
| 1889, 391. | Water Supply of the Newcastle and
Gateshead Water Company, 399. |

