Friday, 8th March 1867.

Mr DAVID PAGE, F.G.S., F.R.S.E., in the Chair.

The following Communications were read :—

I. *Geology of the Carboniferous Strata of Carluke.* By JOHN
R. S. HUNTER.

The parish of Carluke is of considerable extent, being about 8 miles in length by 4 or $4\frac{1}{2}$ miles in width. The appearance of the greater portion is hilly, and the soil exceedingly poor. There are, however, a few delightful localities near the margin of the river Clyde. The lover of physical geology sees abundance to cheer him on in his rambles, and may perceive undoubted evidences of former great convulsions, which have tended to a considerable extent to give some localities their present aspect.

There are numerous beautiful glens of considerable extent, which are highly picturesque; among them may be mentioned Braidwood or Fiddler's Gill, Jock's Gill, and Waygateshaw Gill, showing some grand sections and dislocations of strata. No description of mine could adequately portray the beauty that lies concealed in these romantic glens. Days and months might be passed away in them by a plodding worker with the greatest of pleasure, searching and bringing forth to light hidden geological treasures; and the poet's dream may be fitly applied to the geologist here, viz.,—

“ And this our life exempt from public haunt,
Finds tongues in trees, books in the running brooks,
Sermons in stones, and good in everything.”

I will endeavour, so far as possible, to read the fossil contents of each stratum, because I consider stratigraphical as well as palæontographical details, wrought out systematically, are the best means of enabling us to arrive at a correct idea of the contemporaneity of fossils. I do not say that the lithological details are or will be always the same, as we often find practically such is not the case. What is sandstone in one locality is shale in another; what is coal in one place, at a very short distance may be ironstone. We often see, especially in clay ironstone workings, the shale running, as it were, into ironstone. With regard to sections, I may state that we need not put implicit reli-

ance on any to guide us for the same position in a different district. Still, we have certain landmarks which guide us, and that, most assuredly, on a large scale, is the science of palæontology. This science is comparatively a recent one, yet it has given us many facts, and has laid down laws, as it were, by which the geologist is enabled to state, in all probability, what should be above or below certain strata; all this depending or resting on the study of organic remains. I am certain all of you will have often seen this exemplified in many a quarter, and heard of the repeated searches for coal in localities where no such thing could be. Such attempts have been made even in our own locality. A few years ago a gentleman put down a number of bores, expecting to get the position of the gas coal, when he was commencing work nearly 100 fathoms below it. Coal was sought for at Lanark Moor twenty or thirty years ago; boring was commenced by subscription among the inhabitants; and, after going down a few fathoms, the "black diamond" was certainly got, according to some ideas. A pit was then sunk for a considerable distance, and a little coal was *got*; but the right seam was further down still. In the meantime, some of the sinkers caused a quantity of coal to be put down the shaft one night, and next day they were carried to the *cross* for a bonfire. More money being got, the sinkers decamped with the proceeds. The dodge soon got wind, and many a good laugh was got over "*the head of it*." It would have been strange, indeed, to have got such coal beds, when they were out of the Carboniferous formation. A friend of mine, some five years or so ago, tried to get coal in the same place, and often large pieces of gas coal were got on the surface. This party, I may state, was what some would consider a practical geologist, being lessee of the works.

Other attempts have been made at various places and times. I have heard of one at Melrose, but, as the old people say, the party that bored for the coal was bought up by the then Duke of Buccleuch. Coal was sunk for at Moffat, but came to the same end—nothing. Such are a few instances in which a little knowledge of geology or palæontology would have saved a great deal of money, and many a useless speculation. The science, however, has more in view than this knowledge. Some one will try to unravel the mysteries that are locked up in the various strata, and tell us whether the forms of life we now see inhabited salt or fresh water, or estuaries; if such remains have been carried by furious storms in bygone periods, and been suddenly destroyed, or have lived and died on the spot where we find them. All this, and more than this, may be sifted out by paying attention to the recent forms of life, by comparing the habitat of the various species of life at the present day; and reasoning by analogy, I cannot see but that great progress may

be made. What has been done by scientific men with regard to the molluscan world, by dredging and other means, may be done so far by geologists in collecting and being good observers of nature, watching and noting the various forms that we see in the various strata. Never mind whether they are beautiful or not, still keep on the track and inquire, or work the harder. As the cog of honey is made from the united efforts of the hive, so we geologists must combine, and assist one another, if we expect our efforts to be of much avail. Diligence must not be wanting; we must wield the hammer profitably, and not be very particular how we use our legs and arms; as the proverb has it, "Diligence is the mother of good luck, and God gives all things to industry." So "plough deep while sluggards sleep, and we will have corn to sell or to keep;" in other words, we will have fine and beautiful gems to put in our cabinets, and still have some we can spare and give away to friends, or make exchanges for those forms of life which have never crossed our path. Lukewarm friends may say, "Well, we cannot afford to lose so much valuable time as to form a collection,"—never thinking about the many hours spent in idle talk, or perhaps reading books of no great value, when, by a little determination and forethought, we might be storing up materials to be the nucleus of some grand work. All we say now is, "Begin," to those who may have wavered, as the saying has it, "Many a little makes a mickle." If this be granted, then let us handle our tools without mittens, always remembering that the "cat in gloves catches no mice." I daresay you must by this time be thinking, I am *lecturing*, and going from my subject. Perhaps I may, but I am certainly of the opinion, that unless we procure specimens, whether they may be rocks or fossils, we may read and hear papers a precious long while, and still be little the wiser of our studies. But if we see and examine anything well, we generally take *stock*, if I may be allowed to use such an expression, and are enabled afterwards to decide, seeing we have got our minds fortified with all its bearings, and will be enabled to tell at a glance if we have seen such and such things before. A reality is surely quite a different thing from an ideal; and those who would like to pry into the science, should come and work in the field, and they will undoubtedly bring forth fruits of diligence, though in a humble way. Well, some of our friends may tell us too much stress is put on the collecting of fossils. Regard such ideas for what they are worth. Always keep in mind the ship without a rudder in a tempest; it is tossed and buffeted with the winds, but cannot make much progress to speed it on, on its onward journey; so would geology be without the study, collecting, and arranging of fossils. Mark me, I do not insinuate that the mere collecting of fossils is of much consequence; we may collect and not know very much after

all. However, we are in the right direction, and, perhaps, on the path which, some day or other, may turn out better than we anticipated. We are on no account to keep them as curiosities; we are to learn and know their true meaning; we must try and build up or fit in some portion of the mighty structure which awaits the anxious student. The book of nature is spread before us, and those who would fain read must put themselves to the trouble to cut the leaves. One word more with regard to collecting; we should never keep secret the localities where certain remains are found. *No true geologist* will harbour such unwarrantable ideas, but will frankly tell any brother worker where he or they might find them.

The geologist should always be free with his information, so far as he knows, and allow his cabinet, or his specimens, as the case may be, to be seen by any fellow-inquirer. I daresay you will by this time consider I should say something regarding my paper. Well, with your permission, I will now commence operations, and give you something anent the Carboniferous strata of Carluke.

The dislocations of strata in this district are numerous. Some of them are of little, whilst others are of great extent. One in particular, passing near Braidwood, having line of dyke metals, the *Productus giganteus* limestone, and on the other side, and on the same horizon, the Cannel or Lesmahagow gas-coal, a distance of throw or dislocation of upwards of 80 fathoms. The strata on the one side dip or incline north-west, or into Clyde, and the other range of metals dip to the north-east. At a point near the margin of this great dyke the main post limestone is shattered into a thousand pieces, presenting an appearance as if it had been broken into road-metal and spread on the surface of the ground. At several points, when working this limestone at the crop, it had the appearance as if it had been disturbed—large blocks lying in their natural position, whilst others were half on edge. Numerous large gullies, or wants of strata, were frequently got. In these were deposited clay and boulder stones of various descriptions, and water-worn, impressing the mind forcibly that in some bygone era there were mighty changes taking place. Trap-rock is seen in several localities, and of considerable thickness, one place being upwards of 30 feet thick. There has been occasionally got, when sinking to main post limestone, small portions of trap, slightly altered in its usual appearance, lying near and, in one instance, completely incorporated with the Calmy limestone. If this is truly trap, it must have floated and been carried some distance, as no known disturbance lies within say nearly half a mile. In several places we see undoubted traces of glacial action, large blocks of sandstone presenting a smooth and polished appearance, whilst others show those furrows attributable to the

passing iceberg, with its huge boulders, grating and bumping whilst passing along. The markings on freestone are generally north-west and south-east. In the boulder-clay, seen when working open-casts, we find blocks of trap and other rocks, of various sizes, water-worn and scratched. Large pieces of excellent coal are sometimes got, having the appearance as if they had been carried and polished by water. Large deposits of sand and gravel are got at Cameron's cottage, Chapel, Braehead, and Way-gateshaw (some of the sand is highly charged with saline particles), evidently bearing out great physical changes of a recent geological era. Clays of various sorts are got abundantly; large tracts are seen and extensively wrought for the manufacture of bricks and drain-tiles. No fossil remains in these clays, so far as I am aware, have ever been found, though search has been often and fruitlessly made. We sometimes, however, find very curiously shaped nodules of ironstone. An extraordinary deposit of clay has been discovered, whilst sinking a pit at Hallcraig, by the Coltness Iron Company, the total thickness, as I am informed, being nearly 100 feet in thickness.

The geological strata of the parish presents us with a section embracing the upper portions of the Coal-measures down to the upper members of the Old Red Sandstone. These strata may be divided into, viz.—

- 1st. Upper Coal-measures.
- 2d. Mountain or Carboniferous Limestone.
- 3d. Lower Coal-measures.

The upper Coal-measures are developed to a considerable extent, and contain coals of well-known celebrity, such as the Ell, Main, and Splint. The position of black-band ironstone is in the parish, but seems to be very thin so far as known, and not generally persistent.

The exact position of the Mountain or Carboniferous limestone is an extremely difficult problem to solve. There is no body of limestone at the base of this group, as in other parts, to guide us. We can only look to the fossil contents to show that this position of ours is identical with the Mountain limestone of England and other countries. What occasioned the splitting up of the strata into so many beds and of so different substances, will, I am afraid, remain a mystery, though there might be made many plausible stories regarding such phenomena. The strata of limestones above the *Productus giganteus*, are generally persistent, and can be easily recognised in different and widely-spread localities in the west of Scotland, showing that the "horizontal" extent must be great.

In the parish we have abundance of limestone to last for ages

for all practical purposes. We have subdivided the section into several distinct series.

1st. We have the lower Coal-measures, embracing strata from immediately below the *Productus giganteus* limestone to the strata below the *Productus punctatus* beds.

2d. Lower Carboniferous or Mountain limestone, embracing strata from *Productus giganteus* to the *Lingula* limestone.

3d. Middle Coal-measures, embracing strata from the gas or cannel coal to the strata immediately above the Carluke first coal.

4th. Upper Carboniferous limestone, embracing strata from Howgate or Climpy limestone to strata above Gare limestone.

SECTION OF STRATA, CARLUKE.

1.	Upper Coal-measures.	Carboniferous or Mountain Limestone.
2.	Millstone Grit.	
3.	Upper Limestone.	
4.	Middle Coal-measures.	
5.	Lower Limestones.	
6.	Lower Coal-measures.	
7.	Upper portions, Old Red Sandstone.	

1. From . . . to Castlehill Fifth Coal.
2. From . . . to Sandstone above Gare Limestone.
3. From Gare to Belstone Limestone.
4. From strata above Carluke First Coal to Gas Coal.
5. From *Lingula* Ironstone to *Productus* Limestone.
6. From bottom *Productus* Limestone to *Productus Punctatus* Beds.

The last three subdivisions are what we consider the equivalent of the Carboniferous or Mountain limestone series, embracing strata upwards of 130 fathoms in thickness. We will now give a reading of strata, beginning at the lowest portion of our designation of lower Coal-measures. This is very sparingly developed in the parish. We seem to want entirely

the great deposits of sandstone, shales, &c., as they occur near Campsie and other localities. The lower members of this group abut on the upper portion of the Old Red Sandstone seen at Yuildshields Burn, near the ford at Burnhead, in the stream east of the farm-house, and in Braidwood Hill, about 200 yards above the bridge on the Stirling and Carlisle road; the last example is not very evident, from the effects of a downcast eastward. The first traces of former life as yet discovered in this parish were specimens of *Lingula mytiloides*, and a cast of a Bellerophon, found by Dr Selkirk, Carlisle; these were got in ironstone nodules or balls, 33 feet above the red fireclay seen in Braidwood Gill, near railway tunnel.

The only coal here, which may be considered a member of the lower Coal-measures, is seen in this locality, viz., 12 feet above the ironstone nodules formerly alluded to, or 46 feet above Old Red Sandstone; it is of very inferior quality, being much mixed with clay, and very thin, only being 10 inches in thickness. 27 feet above these nodules we come to ironstone bands, with shale beds 4 feet 3 inches in thickness. These have been styled "Punctatus beds." In these we find abundance of remains, viz.—

Poteriocrinus crassus (Miller).
Actinocrinus.

ENTOMOSTRACA.

Cythere simplex (J. & K.)
Leperditia Okeni (Munster).
Bairdia curta (M'Coy).
Bairdia grandis (J. & K.)
Beyrichia multiloba.
Pteronitis persulcatus.

Arca ?

BRACHIOPODA.

Productus semireticulatus.
longispinus.
punctatus.
Orthis resupinata.
Lingula mytiloides.

GASTEROPODA.

Bellerophon Urii.

The strata are seen in several parts of Braidwood Gill. Above this are various sorts of strata; but no remains are found till we come to the shale immediately below the great *Productus giganteus* beds, the base of the Mountain or Carboniferous limestone. Fine sections are seen in different localities, and of various thicknesses, averaging say 5 feet thick. In the limestone and shale we find numerous remains, viz.—

Poteriocrinus crassus.
Actinocrinus.
Platycrinus.
Lithodendron fasciculatum.
Ceriopora interporosa.
Bairdia curta.
Leperditia Okeni.
Spirifera bisulcata.
lineata.

Spiriferina octoplicata.
Athyris ambigua.
Streptorhynchus crenistria.
Orthis resupinata.
Productus giganteus.
latissimus.
longispinus.
semireticulatus.
Loxonema rugifera.

It is very probable that this stratum would yield abundantly if ever wrought for any economic purpose. Having yielded so prolifically under disadvantages, it is not, however, likely it will be brought to any use till the other and better limestones are nearly exhausted. Two feet above *Productus giganteus* limestone we find an ironstone band which promises well, having produced specimens of—

Serpulites membranaceus.	Streptorhynchus crenistria.
Productus semireticulatus.	Aviculopecten intercostatus.
aculeatus.	Pecten ?
Rhynchonella pleurodon.	Pteronites persulcatus.
Orthis resupinata.	Bellerophon striatus.

By proper caution numerous other specimens might be procured. It is very difficult to get the specimens whole, even though they are single valves, the ironstone being so brittle and crossgrained. In referring to the section, it will be again observed, 31 feet 3 inches above the last-named strata, we come to what is known as the Shelly limestone. This is of very superior quality, but being only 1 foot 6 inches thick, it cannot be wrought to profit. It is seen in several places, viz., Nellfield Burn and Braidwood Glen. The list of remains got is very large, and are generally very fine specimens—

Terebratula hastata.	Productus semireticulatus.
sacculus.	longispinus.
Spirifera bisulcata.	undatus.
lineata.	scabriculus.
Athyris ambigua.	mesolobus.
Rhynchonella pugnus.	punctatus.
pleurodon.	spinulosus.
Streptorhynchus crenistria.	

In this limestone we find abundantly a very small *Productus*, which has not the apparent characters of *semireticulatus*. Specimens have been submitted to Thomas Davidson, Esq., the historian of the Brachiopoda; but he tells us they are only the young shell. We find the same characters in specimens got in the main post limestone, and other higher strata of the parish. Leaving this, we arrive at no interesting strata, so far as yet observed—if we except a few fossil vegetable remains, and a small seam of coal—till we come up to the coal of the main post limestone. This is generally, in our district, of a very inferior quality, and no great thickness, averaging say 6 inches; it is, however, in other localities of better quality and thickness. In the laminated beds are numerous plant remains, but they are not well preserved. Close above the coal we have a fine strong

shale containing numerous remains, and some of extreme rarity.
We have—

Sphenopteris.
Pecopteris.
Lepidodendron Sternbergii.
Productus semireticulatus.
 longispinus.
Lingula squamiformis.
Discina nitida.

Aviculopecten Verneulli.
Pteronites.
Axinus deltoideus.
Leda attenuata.
Amphicentrum granulosum.
Gyrolepis Rankinei.

Large portions of *Gyrolepis Rankinei* have been got in this stratum; was named in honour of Dr Rankine, Carlisle, twenty years ago, by Agassiz; large portions of the scales being *in situ*, and are ridged in diamond shape, if I may use this expression. Pieces of the headplates are observed, and portions of the small spines are beautifully shown. This seems to be a very rare fish, as few specimens have ever been found in this or any other locality. A very small piece only of *Amphicentrum granulosum* has been found in this locality. This new genus of carboniferous ganoid fish was described by Professor Young of Glasgow. It is allied to *Platysomus*, but differs from that genus in the dentition or ornamentation of the scales. Five inches above the last-named stratum occurs shale, very aluminous, containing masses of—

Productus longispinus.
 semireticulatus.
Discina nitida.

Axinus deltoideus.
Leda attenuata.

Immediately above this we have the “main post limestone.” This stratum occupies the greater part of the area of the parish; it has been seen cropping out in several localities, and dipping in different directions. At Braidwood it dips or inclines north-east; Kilncadzow, north-east; Langshaw, north; Mossie and Hillhead, north-west; Thornmuir, in the east of the parish, it dips towards the east; the same occurs at Bashaw, Waygateshaw, and Milton Lockhart. The most of the crop or limestone near the surface—at all events anything like near the railway—has been all nearly wrought out. The limestone is of very superior quality, containing from 92 to 96 per cent. of carbonate of lime, and is extensively used for the smelting process of the iron trade. It is likewise used to some extent for agricultural and building purposes. The thickness varies from four to six feet, and the mode of mining is various—some parts working long wall, others stoop and room. The organic remains in this strata have been extremely prolific, considering the aspect it presents to a casual observer. Like all other limestones, it is divided into large blocks by fissures, and

are denominated by the workmen backs and ends ; these facilitate the working greatly ; they have evidently, at one time, acted as drains. Some of these cracks or fissures are of great extent, and contain deposits of sandy particles ; and the sides of some of them present the appearance of being worn by the action of water. Where these fissures are, the limestone is generally decomposed, and been altered into a very soft and friable state. The inclination of these large water-courses run nearly from east to west, and are generally found near the middle or bottom of the limestone rock. In this decomposed stone numerous remains have been discovered, and are beautifully preserved. Large numbers of Entomostraca have been found in it ; some of the forms are common, but others are new to science, viz. :—

Cypridina primæva (<i>M'Coy</i>).	Bairdia brevis (<i>J. & K.</i>).
Entomis concentrica.	curta (<i>M'Coy</i>).
Cytherella simplex (<i>J. & K.</i>)	gracilis (<i>J. & K.</i>)
Lepiditida Armstrongiana (<i>J. & K.</i>)	mucronata (<i>Reuss</i>).
Okeni (<i>Munster</i>).	subcylindrica (<i>Munster</i>).
oblonga (<i>J. & K.</i>)	Hisingeri (<i>Munster</i>).
Beyrichia bituberculata.	Cythere bilobata (<i>Munster</i>).
colliculus (<i>D'Eichwald</i>).	intermedia (<i>Munster</i>).
multiloba (<i>Jones</i>).	amputata (<i>Kirkby</i>).
Kirkbya Permiana (<i>Jones</i>).	intermedia (<i>Munster</i>).
Bairdia grandis (<i>Jones</i>).	

Several specimens of *Spirorbis caperatus*, and a few species of Foraminifera, along with very minute specimens of *Productus punctatus* or *elegans*, *Productus semireticulatus*, and several beautiful gems of *Retzia radialis*, showing the whole character of the shell completely. We will now try and enter into details of the fossil contents of this stratum—

Chætites tumidus.	Alveolites depressa.
Cyathophyllum.	Michelinia tenuisepta.
Lithodendron junceum (<i>F.</i>)	Syringopora ramulosa.
fasciculatum.	
Clisiophyllum prolapsum.	Serpulites carbonarius.
Alveolites septosa.	Spirorbis globosus.

These last named are rare forms in this stratum, as few specimens have been discovered. Of the crustacea we have—

Griffithides mesotuberculata.	Cyclas radialis.
-------------------------------	------------------

Of the Bryozoa we find—

Ceriopora interporosa.	Fenestella plebea (<i>M'Coy</i>).
	irregularis.

The Brachiopoda have been well searched out, and we can furnish beautiful specimens of—

Terebratula hastata.	Chonetes Hardrensis.
sacculus.	Buchiana.
vesicularis.	polita.
Spirifera duplicostata.	Productus giganteus.
bisulcata.	latissimus.
trigonalis.	cora.
ovalis.	semireticulatus.
pinguis.	longispinus.
glabra.	undatus.
Urii.	costatus.
lineata.	Youngianus.
Spiriferina laminosa.	scabriculus.
Athyris ambigua.	pustulosus.
planosulcata.	fimbriatus.
Royssii.	punctatus.
Retzia radialis.	aculeatus.
Rhynchonella pugnus.	spinulosus.
pleurodon.	mesolobus.
Camarophoria globulina.	Deshayesianus.
Steptorhynchus crenistria.	Discina nitida.
Orthis resupinata.	Lingula mytiloides.
Michelini.	Crania quadrata.

The Lamellibranchiata furnishes us with a goodly array. Of the Monomyaria, in lowest group, we have—

Aviculopecten intercostatus.	Aviculopecten fimbriatus.
stellaris.	arenosa.
cognatus.	segregatus.
plicatus.	Pinna flabelliformis.
granosus.	Pteronites persulcatus.

Of Dimyaria we have—

Axinus axiniformis.	Edmondia Egertoni.
deltoides.	Arca Lacordairiana.
Conocardium armatum.	Arca ?
Cypicardia rhombia.	Leptodomus costellatus (M'C.)
acuticarinata.	Modiola elongata.
striato-lamellosa.	Nucula gibbosa.
Edmondia unioniformis.	Sanguinolites plicatus.
rudis.	Myacites sulcatus.
sulcata.	Solenimya primæva.

The Gasteropoda give us a great number of genera and species, and some of these of the greatest rarity—

Dentalium.	Euomphalus pentangulatus.
Chiton.	cossatus.
Euomphalus carbonarius.	Dionysii.
	Loxonema rugifera.

<i>Loxonema Lefebvrei.</i>	<i>Pleurotomaria lævis.</i>
<i>scalaroidea.</i>	<i>multicarinatus.</i>
<i>Macrocheilus imbricatus.</i>	<i>Trochus lepidus.</i>
<i>acutus.</i>	<i>Bellerophon Dumonti.</i>
<i>Michotianus.</i>	<i>striatus.</i>
<i>Murchisonia quadricarinata.</i>	<i>Urii.</i>
<i>Lacuna antiqua.</i>	<i>cornu-aries.</i>
<i>Naticopsis elliptica.</i>	<i>decussatus.</i>
<i>elongata.</i>	
<i>Pleurotomaria carinata.</i>	<i>Porcellia armata.</i>
<i>octivittata.</i>	

The Cephalopoda present us with a few fine specimens. Among them—

<i>Nautilus ingens.</i>	<i>Actinoceras giganteum.</i>
<i>tuberculatus.</i>	<i>Orthoceras cylindraceum.</i>
<i>Leveillianus.</i>	<i>attenuatum.</i>
<i>sulcatus.</i>	<i>rugosum.</i>
<i>biangulatus.</i>	

The fish remains are extremely rare in the limestone. We have only discovered a few inconsiderable fragments of the following genera and species, viz. :—

<i>Petalodus Hastingsiæ.</i>	<i>Cochliodus magnus.</i>
<i>Poecilodus obliquus.</i>	<i>acutus.</i>
<i>Rhizodus Hibberti.</i>	<i>minor.</i>

We have likewise occasionally found small fragments of lignite lying in contact with small portions of fish remains, showing evidently that they had been floated from a distance. The whole fossil contents of the main post limestone, as yet determined, includes upwards of 150 genera and species. I will now give some remarks concerning a few of the rarer forms, &c., named in the list. Small blocks of limestone are sometimes found, containing numerous remains of former life huddled together, presenting an appearance as though they had all consented to die together. I remember breaking up one small piece which contained, I daresay, upwards of a hundred specimens of *Spirifera bisulcata*. We again sometimes got clustered together numerous specimens of *Rhynchonella pugnus*, *Athyris ambigua*, and *Cypricardia*, and not unfrequently small specimens are contained within the larger ones, and of different genera. Pectens are often found lying side by side or close to Gasteropoda, such as *Bellerophon* or *Pleurotomaria*. *Entomoconchus Scouleri* are often generally associated with *Productus aculeatus* and *Bryozoa*. I have a very small piece of limestone, which contains *Productus mesolobus*, *Productus aculeatus*, *Spirifera bisulcata*, *Athyris ambigua*, *Porcellia armata*, and *Lithodendron junceum*. Another slab contains a *Pecten*, *Trilobite*, *Pleurotomaria*, *Productus*, *Euomphalus*, *Natica*,

Terebratula, Modiola, Cypricardia, Bellerophon, Spirifera, Axinus, one or two species of Entomostraca, and Lithodendron. The interior of the dorsal valve of *Athyris ambigua* has been got beautifully preserved, and shows the spiral appendages. The interiors of Spirifera are more common, as several have been rescued from the unrelenting smash of the hammer. Of Camarophoria a few small specimens of *globulina* have fallen into our hands. This is a new species to Scotland. Examples were first got by Mr James Thomson, Glasgow, from the Carboniferous limestone of Campbeltown. Of *Productus giganteus* only one specimen has been taken from this stratum, showing that the species had nearly expired. This is curious after being so very abundant in the lower or *Productus giganteus* limestone, and not a great number of fathoms of strata intervening. *Productus Youngianus* and *Productus aculeatus* are abundant forms in this strata. The interior of *aculeatus* has been found here, and, I believe, the first recorded locality where it has been found. Interiors of *Productus mesolobus* have likewise been got here, and been determined by that great geologist of the Brachiopoda, Thos. Davidson, Esq., F.G.S. *Productus mesolobus*, though rare in other parts of Scotland, is not so with us, as you will observe by the numerous specimens. A small and damaged specimen of *Productus pustulosus* has also been verified by Mr Davidson. Specimens of *Productus Deshayesianus* have been got; this is a species new to Scotland, and, I believe, a rare British form, only two imperfect specimens having hitherto been found in England. Of the genus Chonetes three species have been procured, and all of extreme rarity in this stratum. One specimen only of *Chonetes Buchiana*, from Gare, has been got in Scotland till these were found. Of the Lamellibranchiata, Pectens are somewhat rare, and present fine specimens. The common form is *Aviculopecten intercostatus*, a large and finely-preserved specimen of *Aviculopecten granosus*, showing the characters of the species finely. We find beautiful specimens of *Conocardium armatum*, and a few of another species, but have not been able as yet to get them identified. We have got a fine specimen of *Arca Lacordairiana*; this is a very rare and beautiful species. Of the Gasteropoda we have gorgeous representatives. We have fine examples of *Euomphalus Dionysii*, of Goldfuss. *Pleurotomaria octovittata*, though excessively rare in other parts, is not so with us, as, I daresay, two dozen of specimens have been got first and last. We have been fortunate in procuring two specimens of *Trochus lepidus*. This is a rare fossil in Scottish strata, and, so far as I am aware of, only one specimen has ever been got before in the west of Scotland; this is in the collection of James Armstrong, Glasgow. Of the Nucleobrianchiata we have fine specimens of *Bellerophon*

cornu-arietes and *Porcellia armata*. One specimen of *Nautilus tuberculatus* has been found, and is now in the Society's Museum. I will now bid farewell to the strata which has occupied our time so largely, and will now proceed to the strata immediately above the main post limestone. In these beds we have numerous remains, and some of great rarity. Among them are, viz. :—

Archæocodaris Urii.	Leptodomus costellatus.
Productus longispinus.	
Lingula squamiformis.	Gyrolepis Rankinei.

Immediately above these beds we come to the "*Calmy limestone*." This is unfit for any economical use, except perhaps for making a sort of Roman cement. One part presents a curious appearance, being completely studded with very minute white spots, showing oolitic structure.

The remains found in this stratum are few. We have found the following :—

Leperditia Okeni.	Orthis resupinata.
Spirifera lineata.	Lingula squamiformis.
bisulcata.	
Productus costatus.	Bellerophon striatus.
Orthis Mechelini.	Pinna fiabelliformis.
	Pecten intercostatus.

Passing this we discover no remains of any consequence till we arrive at freestone, ten fathoms or so above the last-named strata. In this large specimens are got of *Sigillaria*, *Stigmaria*, and *Lepidodendron*. No other organic remains are perceived, so far as known, till we ascend to the Hosie limestone. In it we find the following organic remains, viz. :—

Leperditia Okeni.	Productus semireticulatus.
Lingula mytiloides.	

In the shale above, 1 foot 6 inches in thickness, we find abundant remains of—

Spirifera Urii.	Spirifera Carlukenensis.
Chonetes Hardrensis.	

In the overlaying shale we find the following genera and species :—

Actinocrinus.	Spirifera bisulcata.
Platycrinus.	Athyris Roysii.
Cyathophyllum.	Rhynchonella pleurodon.
Cyathopsis fungites.	Orthis resupinata.

Chonetes Hardrensis.
Productus longispinus.
Lingula squamiformis.
Discina nitida.

Nucula gibbosa.
Edmondia rudis.

Dentalium priscum.
Euomphalus carbonarius.
Macrocheilus acutus.
Pleurotomaria.

Bellerophon Urii.
striatus.

Goniatites diadema.
Looneyii.

Nautilus sulcatus.
Lyellianus.

Orthocercas attenuatum.
cylindraceum.
unguis.
undatum.

Rhizodus Hibberti.

Eight inches or so above the last-named stratum we have an ironstone containing numerous *Nucula*. In the shale they are finely preserved; some show the interior structure and teeth most beautifully. Five feet four inches above the aforesaid strata we have a shale which has yielded a few specimens of—

Gyrolepis Rankinei.

Palæoniscus.

Megalichthys.

Here was discovered a few years ago, by Dr Grossart, a fine specimen of *Volkmanina Morisii*, the first example recorded in British strata. We find no remains worthy of note till we arrive at the ironstone and shale, 15 or 16 feet above the last-named strata, viz. :—

Megalichthys.
Gyrolepis.

Palæoniscus.
Homacanthus.

In these we find fragments of fish remains and large accumulation of *Entomostraca*, viz. :—

Beyrichia multiloba.

Cythere Rankiniana.

Cythere fabulina.

This exhausts all the fossil contents of the "*Rae's Gill beds*," so far as known. The ironstone is of very superior quality, and extensively wrought by means of open-casts and pits for the use of various ironworks, the average thickness being about 4 feet altogether. The mode of mining is variously conducted. We must pass upwards 8 or 9 feet, till we find shale 7 inches thick; this contains very minute—

Murchisonia striatula.

Beyrichia multiloba.

Sanguinolites.

Immediately above this we come to what is denominated the Coralline limestone. This is seen in various parts of the parish, but is of no marketable value. It is found of various thicknesses. At *Rae's Gill* it is only 12 inches thick, whilst at one place near *Braidwood* it was 9 feet in thickness. One portion near the bottom is com-

posed of "encrinitical marble;" when polished it presents a very pleasing appearance. It has yielded numerous remains, viz.:—

Lithodendron junceum.	Athyris ambigua.
Clisiophyllum.	Strophomena rhomboidalis.
Alveolites depressus.	Chonetes Hardrensis.
Favosites parasitica.	Productus semireticulatus.
Fenestella membranacea.	longispinus.
plebia.	undatus.
Actinocrinus globosus.	punctatus.
Platycrinus rugosus.	aculeatus.
Poteriocrinus crassus.	Discina nitida.
tenuis.	Lingula squamiformis.
Rhodocrinus uniarticulatus.	Bellerophon Urii.
Archæocidaris Urii.	Goniates vescica.
Spirifera bisulcata.	Orthoceras.
lineata.	Petalodus.
trigonalis.	Palæoniscus.

Immediately underlaying the limestone there are numerous coprolites. When broken they sometimes contain—

Cypridina Rankiniana.	Lingula squamiformis.
Leperditia Okeni.	Goniates vescica.
Orthoceras undatus.	

Some time ago one of these coprolites was sent by Dr Rankine to Mr John Young, Hunterian Museum, Glasgow, and he procured 300 specimens from it. This large take of Entomostracans shows us that this order had been very abundant. It may be not amiss to note that we may always look to coprolites as containing remains, and sometimes of the greatest rarity.

For a considerable distance upwards we find nothing of any consequence till we reach the second Kingshaw limestone. This is of good quality, and is wrought to some considerable extent by the Coltness Iron Company. It is locally styled the "Lady's lime." The fossil remains are very scant. The following have been got, viz.:—

Griffithides mesotuberculatus.	Productus longispinus.
Edmondia sulcata.	aculeatus.
Nautilus ingens.	Spirifera duplicicostata.
Orthoceras rugosum.	octoplicata.
Euomphalus pentangulatus.	Streptorhynchus crinistria.

Above the aforesaid limestone, in shale 9 inches thick, we find numerous remains, viz.:—

Actinocrinus globosus.	Bairdia curta.
Poteriocrinus crassus.	Estheria punctatella.
Rhodocrinus uniarticulatus.	Spirifera bisulcata.
Archæocidaris Urii.	octoplicata.
Leperditia Okeni.	Athyris ambigua.
Beyrichia multiloba.	Orthis resupinata.

Chonetes Hardrensis.	Leda attenuata.
Buchiana.	Euomphalus carbonarius.
polita.	Loxonema Lefebvrei.
Productus semireticulatus.	Naticopsis placistria.
longispinus.	Pleurotomaria.
aculeatus.	Bellerophon Urii.
Discina nitida.	decussatus.
Lingula squamiformis.	Orthoceras attenuatum.
Aviculopecten interstitialis.	Pleurodus Rankinii.
pecten.	Platysomus.
Pinna flabelliformis.	
Nucula gibbosa.	

Then stepping up the section, we arrive at shale 25 inches in thickness, which has yielded the following remains, viz. :—

Spirifera octoplicata.	Aviculopecten.
Productus longispinus.	Pinna.
Caringtoniana.	Nucula gibbosa.
Chonetes Hardrensis.	Conularia quadrisulcata.
Lingula mytiloides.	Orthoceras cinctum.
Crania quadrata.	Archæocidaris Urii.

In the Lingula limestone and shale above, we find—

Lingula squamiformis.	Dithyrocaris testudineus.
Spirifera bisulcata.	Leperditia Okeni.
Productus longispinus.	

We will now draw your attention to the “Lingula beds.” These contain strata of ironstone and shale. First of all, in shale 2 inches thick we find *Lingula squamiformis*, and vast quantities of plant remains. Four inches above we have limestone 10 inches thick, containing—

Lingula squamiformis.	Loxonema Lefebvrei.
Productus longispinus.	Pleurotomaria.

Then, in shale containing ironstone balls immediately above, we have—

Athyris ambigua.	Lingula squamiformis.
Productus longispinus.	Conularia quadrisulcata.
semireticulatus.	

Above this, in ironstone 3 inches in thickness, we have great abundance of organic remains; in fact, nearly one mass of flattened Productus, &c., producing a very singular white lustery appearance, and containing the following genera and species, viz. :—

Leperditia Okeni.	Aviculopecten consimilis.
Productus longispinus.	plicatus.
aculeatus.	Veraneulli.
Rhynchonella pleurodon.	?
Lingula squamiformis.	Cypriocardia striato-lamellosa.

ON THE CARBONIFEROUS STRATA OF CARLUKE.

51

Nucula gibbosa.
Modiola lingualis.
Edmondia.
Anthracomya.
Loxonema scalaroidea.
Lefebvrei.

Natica Omaliana.
variata.
Pleurotomaria monilifera.
Bellerophon Urii.
Dentalium priscum.
Orthoceras.

In shale, 3 feet thick, lying above the last-named strata, we have—

Actinocrinus.
Poteriocrinus.
Rhodocrinus.

Serpulites membranaceus.

Lingula squamiformis.
Crania quadrata.
Spirifera bisulcata.
Aviculopecten Verneuilli.
Pecten.

Axinus deltoideus.
axiniformis.
Edmondia rudis.
Cardiomorpha oblonga.
Anthracosia robusta.
Modiola elongata.
Arca.
Naticopsis placistria.
Macrocheilus imbricatum.
Bellerophon cornu-arietes.
Nautilus sulcatus.

Leaving this, we have an ironstone, 5 inches thick, loaded with—

Lingula squamiformis.
Orthis resupinata.
Aviculopecten.
Nucula gibbosa.
Edmondia.

Leptodomus costellatus.
Sanguinolites plicatus.

Rhizodus Hibberti.
Megalichthys.

Before leaving the *Lingula* beds I must state that I have been fortunate in procuring *Natica Omaliana*, of De Koninck, showing the colour bands. It is an extremely rare occurrence, indeed, to find Palæozoic fossils perpetuating their colours, and bearing evidence of the brilliance and beauty of creation at a period when man, the lord of the creation, was—where? From the *Lingula* beds to the fireclay, 4 feet below gas coal, we see several of the beds, or layers of sandstone, showing the unmistakable ripple marks which had been caused in bygone periods by the action of the water. On some of the sandstones we may still perceive the markings of rain-drops, reminding us forcibly that the same atmospheric agency was at work then as now. In the sandstone we find specimens of *Lepidodendron* and *Calamites*. No other organic remains exist, so far as known. The stone is very easily decomposed by the weather; and when exposed in Braidwood Gill it has a curious appearance, and often tumbles down in large blocks. In the fireclay below gas coal we have seen several species of plant remains. In the ironstone which is associated with or lying below the coal at Lesmahagow, but not with us, we find fine and beautiful specimens of *Palæoniscus* and

Megalichthys, along with large quantities of plant remains, likewise a great number of single valves of various species of Entomostraca; but seeing this deposit does not occur in our parish, I will leave the details till some other period. I may state that the gas or cannel coal, the equivalent of the famous "Lesmahagow," is not of very great thickness with us, at all events, so far as known. The coal, however, is of very superior quality. In splitting up the coal we sometimes find vegetable impressions, but taken as a whole, the flora is not very distinct. In the shale above the gas coal we have not found many organic remains. Specimens, however, have been got of *Lepidodendron*, *Calamites*, faint fronds of *Sphenopteris*, scales of *Megalichthys*, and *Palæoniscus*. Leaving this, we come to nothing very particular which will interest us, till we arrive at the "Maggy ironstone" beds. These have been always considered poor in quality, and have never been wrought except partially at Brock's Hole, near Carlisle, for the Castlehill Ironworks. The same kind of ironstone, however, was extensively used when the Wilsontown Ironworks were in operation. They were at that time considered good for making pig-iron. There are extensive fields of these ironstones lying nearly free of water, which could easily be wrought, and at a trifling expense compared with other ironstones in the district. The fossils got have not been very numerous.

Spirifera octoplicata.
Productus longispinus.
 scabriculus.

Chonetes Hardrensis.
Lingula mytiloidea.
Serpulites membranaceus.

Scales of *Megalichthys* and *Palæoniscus*, at the bottom of the Maggy ironstone, we sometimes get in a sort of ironstone *cone in cone*, which presents a very curious appearance. How this has been formed I cannot explain. I have observed nearly something like the same character in the feed or water pipes leading into the engine boilers. It is generally a calcareous ferruginous deposit. I have seen pipes nearly filled with this deposit. It is very marked in localities where the water comes in contact with lime, and it is often necessary to have the pipes drilled to let the water in. At first sight of *cone in cone* we would suppose it organic, but it will not bear the prying eye of the microscope, and it is most likely to have been formed by a kind of crystallisation, or at all events by some chemical process which is at present not known.

In ascending the section we come to the *Tower coal* position. This is considered a good coal, and was at one period extensively used for smithy purposes. The fossil remains in this and a lot of other strata I am unable to give, as the localities, where seen,

do not present inviting appearances. In going up the section we observe different kinds of strata, but we do not find anything extraordinary to detain us till we arrive at what is called Belstone limestone. In this we find abundance of—

Productus latissimus.		Spirifera bisulcata.
		Discina nitida.

From the Belstone limestone, up to Gare limestone, the strata have never been properly examined for organic remains, for a very good reason—they have never been sunk through in our district, though they have been bored. I trust the day is not far distant when we will be able to see with a glass, and pick out the forms of life which the strata may contain.

The Gare limestone hills may justly be termed the paradise of the West country for geological workers. The field has been long examined for its treasures. It is a great number of years since the Gare limestone was wrought. It certainly is of an old date since the operations were commenced, as the debris testifies, extending over a very large area, in fact for miles. There is a tradition that the lime used in building the High Church of Glasgow was taken from here, and conveyed in creels or baskets on horses' backs; a very tedious business it certainly would be, having to travel upwards of twenty miles. As I said before it is a paradise for geologists, the sequel will abundantly show, the shale heaps having furnished the following genera and species. Of the vertebrata, class *Pisces*, we have found portions of—

Rhizodopsis.		Cochliodus magnus.
Oelacanthus.		Helodus mamillaris.
Petalodus Hastingsiæ.		Ctenoptychius apicalis.
rectus.		Petrodus patelliformis.

Of the Mollusca we find the following:—

CEPHALOPODA.		Orthoceras Goldfussianum.
Nautilus biangulatus.		ovale.
globatus.		cylindraceum.
oxystomus.		Poterioceras fusiformis.
quadratus.		Goniatites Gibsoni.
sulcatus.		mucronatus.
nodiferus.		mutabilis.
Actinoceras gigantea.		paucilobus.
Orthoceras subcentrale.		vescica.
attenuatum.		striolatus.
cinctum.		excavatus.
Gesneri.		implicatus.
undatum.		reticulatus.
unguis.		Looneyi.
pygmæum.		striatus.
dilatatum.		

Of the Gasteropoda we have the following, viz. :—

Naticopsis placitra.	Pleurotomaria helicinoides.
rugosa.	striata.
Loxonema rugifera.	Benediana.
scalaroidea.	expansa.
ventricosa.	undulata.
curvilinea.	Platyceras vetustum.
tenuistria.	angustum.
brevis.	Murchisonia striatula.
Macrocheilus tricinctus	Dentalium priscum.
Michotianus.	Bellerophon Uriei.
acutus.	Oldhamii.
Euomphalus pentangulatus.	decussatus.
radians.	tenuifascia.
Dionysii.	tangentialis.
Pleurotomaria monilifera.	Leveillianus.
contraria.	costatus.
Frenoyiana.	Damontii.
Yvanii.	Porcellia armata.

Of the Pteropoda we have the solitary *Conularia quadrusulcata*.
The Brachiopoda embrace the following genera and species :—

Terebratula hastata.	Orthis Michelini.
saccula.	Chonetes Hardrensis.
Spirifera bisulcata.	Buchiana.
Urii.	Productus semireticulatus.
lineata.	longispinus.
Spiriferina cristata, var. octopli-	undatus.
cata.	fimbriatus.
insculpta.	Youngianus.
Athyris ambigua.	scabriculus.
plano sulcata	aculeatus.
Retzia radialis.	spinulosus.
Rhynchonella pugnus.	Crania quadrata.
pleurodon.	Discina nitida.
Strophomena rhomboidalis, var.	Lingula squamiformis.
analoga and distorta.	mytiloides.
Streptorhynchus crenistria.	Scotica.
Orthis resupinata.	

Of the Lamellibranchiata we have the following, viz. :—

Pecten simplex.	Axinus axeniformis.
Aviculopecten interstitiales.	Cypricardia cubucostata.
Jonesii.	acuticarinata.
plicatus.	tumida.
tesselatus.	Nucula gibbosa.
scalaris.	lineata.
Arca Lacordairiana.	lævirostrum.
reticulata.	luciniformis.
Leda attenuata.	undulata.
longirostris.	palmae.
Hunteriana.	Cardiomorpha oblonga.
Axinus carbonarius.	Puzosiana.
deltoideus.	elliptica.

Edmondia gibbosa.	Sanguinolites sulcatus.
Sanguinolites iridinoïdes.	Leptodomus costellatus.
plicatus.	Venus elliptica.

Of the Polyzoa we have the following—

Ceripora interporoso.	Fenestella carinata.
similis.	plebia.
Diastopora megastoma.	Sulcoretopora parallela.
Polyposa dendroides.	

Of the Crustacea we have the following—

Bairdia brevis.	ZOOPHYTA.
curta.	Chætitis tumidus.
Cythere fabulina.	Cyathopsis fungites.
Cypridina Thomsoniana.	Zaphrentis Phillipsi.
Rankiniana.	Alveoletes septosa.
Griffithides mesotuberculatus.	Cyathophyllum.
ANELLIDA.	Clisiophyllum prolapsum.
Serpulites membranaceus.	ECHINODERMATA.
carbonarius.	Actinocrinus.
Spirorbis caperatus.	Platycrinus.
Spiroglyphus marginatus.	Archæocidaris Urii.

We have now exhausted the Gare beds. There is, however, a good number of fossils belonging to various collectors, which may turn out new to science. The genera and species, according to the foregoing lists, are upwards of one hundred and sixty; some are new to science, and a great number are very rare indeed. I will now give a few remarks regarding some of the organic remains found in this elysium. Where all may go and pick and choose for themselves, by all means do not think you will get great quantities, or even rare fossils all at once, but I am certain a trip to this ancient churchyard would add greatly to any cabinet, however crammed it may already be, as always now and again something good and rare is turning up. On the old shale heaps vast quantities of Crinoid stems are strewn about in all directions, and present a very beautiful appearance, and call to mind forcibly the period, whatever that was, when they were in their natural element, and enjoying their little pleasures, whatever these might be, until at last the fell destroyer came, and buried them where they now are. When going over these ancient sea shores or bottoms, we often pick up shells and pieces of Crinoids, with little parasites on them, which tell us plainly that what is done at the present time with lots of sea shells, was being done in a similar manner during the Carboniferous period.

Often do we find beautiful specimens of Bryozoa adhering to these remains. We sometimes find large specimens of *Streptorhynchus crenistria* nearly covered with these organisms. Some

of these shells are very smooth, and must have had many a buffeting ere they were attacked by these forms of life. It is in this locality that we sometimes find remains of that beautiful *Nautilus* described by James Armstrong of Glasgow, and named *Nautilus nodiferus*. Fine and beautiful specimens of *Pleurotomaria* have been found. This is a good locality for *Bellerophon Urii*. A single example of *Chonetes Buchiana* was found a great number of years ago by that never-tiring geologist, Dr Rankine. Earnest search has often been made to get another by many an anxious and willing gatherer. Of the crustacea, we have found the Trilobite, *Griffithides mesotuberculatus*, lying about in shoals, to use figurative language. If ever we fall in with one specimen, we may reasonably expect to fall in with more. I remember one day getting ten in number. The most of the parts got are the tail portions. They are beautifully sculptured, and found of various sizes. These possibly were thrown off at periodic times, as the animals increased in size and age. One or two specimens have been found of the animal rolled up. They had the power of doing the same as the hedgehog or woodlouse when attacked by their enemies; and from these specimens you can observe the head, body, and tail: no feet have ever been detected, so far as I am aware of. Taken altogether, these crustaceans are wonderful, and would require a great deal of minute study, so as to be able to appreciate the beauties that are hidden within such minute organisms. The eye is exceedingly beautiful when placed under the magic spell of the microscope. Strange is it indeed that the organs that were used by such feeble creatures give us such ideas of their wonderful powers of sight, as they must necessarily have had, having so many cells to look through; but perhaps they had as many enemies to contend against, and required a sharp look out to glide away from their foes. I must here state that I have been greatly assisted with my researches, and have received great kindness and information from my friends Dr Rankine, Carluke, and from Dr Selkirk, Messrs Young and Armstrong, of the Geological Society of Glasgow.

Much, however, remains to be worked from the strata we have gone over. It is only through minute searching that we can ever attain to a true knowledge, so as to determine rightly the true bearing in the Carboniferous system that these beds belong to. We need never expect to swell the list of fossil remains, so as to compete with more favoured localities. However, if strata, presenting great fossiliferous contents, were properly wrought out, there is no saying what numbers may still be got that are new to Scotland; and I would impress on all that have the opportunities and the will, to master, to work out diligently, one small area of strata. Never mind though we fail repeatedly to find

SECTION OF STRATA, CARLUKE.

Downloaded from <http://trned.lyellcollection.org/> at Carleton University Library on June 18, 2015

something new; we are still lending a helping hand to that science which all of us may be proud of.

It will be my endeavour to give you further information regarding the higher fossiliferous strata in our parish.

II. *Notes on some New Fossils* (Eurypterus Scouleri, &c.) *from the Tuedian or Passage Beds of Berwickshire.* By Mr DAVID PAGE.

III. *Notes on the Brachiopoda from the Upper Silurian Rocks of the Pentland Hills.* (Illustrated by Specimens.) By Mr THOMAS DAVIDSON, F.G.S., F.R.S. Communicated by Mr JOHN HENDERSON.

Thursday, 21st March 1867.

Mr DAVID PAGE, President, in the Chair.

The following Communications were read:—

On a New Genus of Graptolites, with Notes on Reproductive Bodies.
By HENRY ALLEYNE NICHOLSON, D.Sc., M.B., F.G.S., Baxter Scholar in the Natural Sciences in the University of Edinburgh. (With Plate.)

The Graptolite which I am about to consider is perhaps one of the most remarkable of all our known British forms, and was originally described by Mr W. Carruthers,* under the name of *Cladograpsus linearis*. The genus *Cladograpsus* is one which was proposed by Geinitz to include certain forms of *Didymograpsus*; but Mr Carruthers seems subsequently to have seen that the reference of *G. linearis* to this genus was inappropriate, as he had recently alluded to it,† under the title of *Dendrograpsus linearis*. The genus *Dendrograpsus* of Hall includes certain branching Graptolites, which are peculiar to the Quebec group in America, and which do not occur, as far as is yet known, in the Skiddaw slates—our undoubted representative of the Quebec series. The genus, in fact, appears to be characteristic of the lower Llandeilo period, the only known British species—the *Dendrograpsus furcata* of Salter—occurring in rocks of this age in Wales.‡ The

* Annals and Magazine of Nat. Hist., vol. iii. No. 13.

† Geol. Mag., vol. iv. No. 2, p. 70.

‡ Mem Geol. Survey, vol. iii.