

23. NOTES on NEW ERIAN (DEVONIAN) PLANTS. By J. W. DAWSON, LL.D., F.R.S., F.G.S., Principal of McGill College, Montreal. (Read June 23, 1880.)

[PLATES XII. & XIII.]

THE principal purpose of the present paper is to add a few new facts to our knowledge of the Precarboniferous flora of Eastern America. Since the publication, in the Journal of this Society, of my paper, "Further Observations on the Devonian Plants of Maine, Gaspé, and New York" (1863), and that on "Fossil Ferns of the Devonian" (1871), a large addition was made to the knowledge both of the species of plants and of the general character and conditions of Devonian and Upper Silurian vegetation in my "Report on the Devonian and Upper Silurian Plants of Canada"*. In a subsequent report on the "Plants of the Lower Carboniferous and Millstone Grit"†, I endeavoured, by the aid of the American formations, to remove the perplexities that had been caused by the disputes respecting the age of the Kiltorcan beds in Ireland and the so-called "Ursa-stage" of Bear Island, difficulties which, however, still appear to constitute subjects of discussion.

In 1878 I contributed a paper to the Geological Society of Edinburgh, entitled "Notes on Scottish Devonian Plants," comparing these plants with those of America, and at the same time establishing the genus *Ptilophyton*‡ for those remarkable pinnately-leaved Lycopodiaceous plants of which *Lycopodites Vanuxemii* of the Devonian of New York and *L. plumula* of the Lower Carboniferous of Nova Scotia are types, and of which *Pt. Thomsoni* is a Scottish representative described in the paper above referred to.

Since the publication of these reports and papers several interesting new forms have come into my hands from the Devonian or Erian of North America, to which I shall add two new species, one from Scotland and one from Australia, kindly communicated to me by friends in those countries.

Plants from the Erian (Devonian) of New York.

1. ASTEROPTERIS NOVEBORACENSIS, gen. & sp. n. (Pl. XII. figs. 1-9.)

The genus *Asteropteris* is established for stems of Ferns having the axial portion composed of vertical radiating plates of scalariform tissue imbedded in parenchyma, and having the outer cylinder composed of elongated cells traversed by leaf-bundles of the type of those of *Zygopteris*.

* Geol. Survey of Canada, 1871, pp. 100, 20 plates.

† Ibid. 1873, pp. 47, 10 plates.

‡ *Ptilophyton* may perhaps be considered too near to *Psilophyton*, but the sound of the names is quite different. In a recent Report of the Regents of New York, Hall has stated his belief that *Pt. Vanuxemii* is not a plant but a zoophyte. He does not fully state the reasons for this conclusion; but should this view be established with regard to this species, then Göppert's *Lycopodites pennæformis* or my *L. plumula* may serve as the type of the genus.

The only species known to me is represented by a stem 2·5 centimetres in diameter, slightly wrinkled and pitted externally, perhaps by traces of aerial roots which have perished. The transverse section shows in the centre four vertical plates of scalariform or imperfectly reticulated tissue, placed at right angles to each other, and united in the middle of the stem (figs. 1-4). At a short distance from the centre, each of these plates divides into two or three, so as to form an axis of from ten to twelve radiating plates, with remains of cellular tissue filling the angular interspaces (fig. 3, *b*). The greatest diameter of this axis is about 1·5 centimetre. Exterior to the axis the stem consists of elongated cells (fig. 7), with somewhat thick walls, and more dense towards the circumference. The walls of these cells present a curious reticulated appearance, apparently caused by the cracking of the ligneous lining in consequence of contraction in the process of carbonization. Imbedded in this outer cylinder are about twelve vascular bundles (figs. 2, 3, *d*), each with a dumb-bell-shaped bundle of scalariform vessels enclosed in a sheath of thick-walled fibres. Each bundle is opposite to one of the rays of the central axis. The specimen shows about two inches of the length of the stem, and is somewhat bent, apparently by pressure, at one end.

This stem is evidently that of a small tree-fern of a type, so far as known to me, not heretofore described*, and constituting a very complex and symmetrical form of the group of Palæozoic Ferns allied to the genus *Zygopteris* of Schimper. The central axis alone has a curious resemblance to the peculiar stem described by Unger ('Devonian Flora of Thuringia') under the name of *Cladoxylon mirabile*; and it is just possible that this latter stem may be the axis of some allied plant. The large aerial roots of some modern tree-ferns of the genus *Angiopteris* have, however, an analogous radiating structure.

The specimen is from the collection of Berlin H. Wright, Esq., of Penn Yan, New York, and was found in the Portage group (Upper Erian) of Milo, New York, where it was associated with large petioles of ferns and trunks of *Lepidodendra*, probably *L. chemungense* and *L. primævum*.

In previous communications to the Society I have described three species of tree-ferns from the Upper and Lower Devonian of New York and Ohio; and this species is from an intermediate horizon. All four occur in marine beds, and were, no doubt, drift-trunks from the fern-clad islands of the Devonian sea. The occurrence of these stems in marine beds has recently been illustrated by the observation of Prof. A. Agassiz, that considerable quantities of vegetable matter can be dredged from great depths in the sea on the leeward side of the Caribbean Islands. The occurrence of these trunks further connects itself with the great abundance of large petioles (*Rhachiopteris*) in the same beds, while the rarity of well-preserved fronds is explained by the coarseness of the beds and also by the probably long maceration of the plant-remains in the sea-water.

* Prof. Williamson, to whom I have sent a tracing of the structure, agrees with me that it is new.

2. *EQUISETIDES WRIGHTIANA*, sp. n. (Pl. XII. fig. 10 & Pl. XIII. fig. 20.)

This is a specimen in the same collection with the above. It is a cast in sandstone, 6 centimetres in diameter, with nodes from 4 to 5 centimetres apart. The surface has a slight carbonaceous coating and is finely tuberculated, the tubercles being very regularly arranged, and representing the bases of very short hairs or bristles, which are seen entering the surrounding matrix. Impressions above the joints appear to indicate sheaths, each of about twelve broad leaves, which are abruptly narrowed and acuminate at the top, and show an indication of a median nerve or rib (fig. 10). The leaves of the sheaths are 1 centimetre broad and 1·7 centimetre long. It would be possible, however, to interpret these supposed sheaths as due to mere plications or foldings of the epidermis; and in this case the plant may have borne verticils of leaves, of which these supposed sheaths may be merely the remains. The first explanation, however, appears more probable; and, if it is correct, the plant is a true *Equisetides*, and the present specimen is the first occurrence of this genus in beds older than the Carboniferous. It is to be observed, however, that Unger has described from the *Cypridina*-slates of Thuringia plants of the genera *Kalymma* and *Asterophyllites* (*A. coronata*) with sheaths at the nodes; and my *A. scutigera*, from St. John's, has verticils of scales at the joints, which may represent sheaths. The present species has a remarkable resemblance in its markings and the form of its sheaths to a greatly magnified stem of the modern *Equisetum fluviatile*, except that the leaves of the sheaths are shorter.

The species is named in honour of its discoverer. Its essential characters will be as follows:—

Stem stout, cylindrical or broadly ribbed, surface marked with short hairs or tubercles regularly arranged. Sheaths at the joints, of about twelve leaves, of the general form of those of *Equisetum fluviatile*.

The specimen is from the Portage group (Upper Erian) of Italy, New York.

3. *CYCLOSTIGMA AFFINE*, sp. n. (Pl. XII. figs. 11 & 12.)

Stem marked with alternate circular leaf-bases or areoles, slightly prominent below, evanescent above, and each with a circular dot or vascular mark. Scars scarcely two millimetres in diameter, and separated by finely corrugated bark, about twice their diameter apart. These markings occur on a stem about an inch in diameter. The *Knorria*, or decorticated form of this plant, presents irregular waving ridges, produced by the longitudinal confluence of the oblique vascular bundles.

This plant is the nearest approach to the well-known *C. kiltorkense* of Ireland hitherto found in America. It differs chiefly in the more closely placed areoles. It was collected by Mr. Wright, and is from the Chemung (Upper Erian) of Italy, New York. The study of this plant has led me to the belief that *Stigmaria exigua* of my Report of 1871 may, when better known, prove to be a new species, allied to the present, and a member of the genus *Cyclostigma*.

4. *LEPIDODENDRON PRIMÆVUM*, Rogers. (Pl. XII. fig. 13.)

Mr. Wright's collection contains fragments of a *Lepidodendron* from Milo, New York, which seems to belong to the species above named, but presents the curious peculiarity of having the leaf-bases depressed instead of being prominent. This may result either from some peculiarity of pressure or from the leaf-bases being deciduous and leaving depressed scars when removed. In either case these specimens illustrate this peculiarity as seen in the Lower Silurian *Glyptodendron* of Claypole, which may possibly have had decorticated leaf-bases. Specimens of this kind, of course, retain no distinct vascular marks, and the impression on the matrix resembles those decorticated *Lepidodendra* of the Coal-formation which used to be named *Lyginodendron*, but which, in Nova Scotia at least, usually belong to the species *Lepidodendron rimosum*.

5. *CELLULOXYLON PRIMÆVUM*, gen. & sp. n.

A silicified trunk, showing in cross section large and somewhat unequal hexagonal cells, with an appearance of lines of growth caused by concentric bands of smaller cells. No medullary rays. The longitudinal section shows either cells superimposed in vertical rows, or a sort of banded prosenchymatous tissue; but the structure is much masked by the crystallization of the quartz.

This specimen is from the collection of Prof. J. M. Clarke, of Amherst, Massachusetts, and was obtained from the Hamilton (Middle Erian) of Canandargua, New York. It was undoubtedly a woody stem and not an Alga; but its structure is even less specialized than that of *Prototaxites*, from which it differs in the want of medullary rays, and in its less distinctly elongated wood-cells without spiral markings. It has some resemblance to *Aphyllum paradoxum* of Unger, but is more uniform in its structure. It adds another to those mysterious woody stems of doubtful affinities which, in the Devonian or Erian of both sides of the Atlantic, represent the Taxineæ and Conifers of later formations.

Additional specimens received from Prof. Clarke show that the appearance of rings of growth is caused by large cells disposed in concentric narrow bands between the wider bands of fine fibrous tissue. In the longitudinal section these bands of large cells appear to be parenchymatous and not vascular. There are no medullary rays, but rounded patches of cellular tissue appear here and there in the fibrous layers. The structure is thus very peculiar, and appears to have been the result of a kind of exogenous growth, in which coarse parenchymatous layers were deposited between the periodical rings of the stem, reminding one of the bark-like layers interposed between the growth-rings in *Gnetum* and in some tropical climbers. The stem of the present plant was, however, in all probability, of much more simple character, though woody and capable of resisting pressure. It is to be observed also that the specimens neither show the structure of the pith or bark, and that the finer structures of the tissues preserved must have been partially obliterated by the

granular crystallization of the quartz with which the specimen is mineralized.

Miscellaneous Specimens from New York.

Numerous large petioles of Ferns occur in collections sent to me by Mr. Wright and Dr. Parker of Ithaca, New York. Being destitute of the fronds, it seems unnecessary to describe them more particularly; but they indicate the possibility that the Erian of New York may yet afford a rich Fern-flora comparable with that of St. John, New Brunswick. In collections made by Mr. Wright are also specimens of those singular plants, supposed to be Algæ, which Hall has named *Dictyophyton*. A very fine specimen of one of the species was figured in my paper of 1863, under the name *Uphantænia chemungensis*, originally bestowed on one of the species by Vanuxem, but which is rejected by Hall in favour of the generic name above given. The specimens sent by Mr. Wright do not give any additional information as to the mode of growth of these curious forms; but he has found in the Hamilton formation, not previously known to contain these plants, a species probably distinct from those described by Hall, and which may be named *D. hamiltonense*; though if these plants were really Algæ, the supposed species may be nothing more than varietal forms or stages of growth.

The specimens referred to are unequally turbinate or unequally conical in form, rapidly expanding from the base, and marked with sharp longitudinal ridges, crossed with much finer and more frequent revolving lines. The largest specimen is almost $1\frac{1}{2}$ inch in diameter, narrowing to less than 1 inch in a length of less than 2 inches.

The remarkable spiral plant belonging to the genus *Spirophyton* of Hall, the "*Cauda-galli* furoid" of the earlier Reports on the State of New York, is found in the same beds with *Dictyophyton*. It is also found, as mentioned in my paper of 1863, in Gaspé, where it ranges from the Upper Silurian into the Lower Devonian. Plants of the same genus have been found by the late Prof. Hartt on the Rio Tapajos, in Brazil, in beds referred to the Carboniferous period, though some other plants found in the same beds might in North America be supposed to be Upper Devonian in age. In MS. descriptions of these plants sent to Prof. Hartt, and which may have been published in his Reports, I named this species *S. brasiliense*. It is of interest as showing the very wide distribution of this form in the palæozoic seas.

Plants from the Erian (Devonian) of St. John, New Brunswick.

I have recently obtained, from the widow of the late lamented Prof. Hartt, the remainder of his Devonian plant-collections, consisting principally of duplicates of the more common species found at St. John, but with a few fragments indicating forms not previously known to me.

Since the publication of my papers and reports on the fossils of the St.-John beds, they have been repeatedly referred to by European

palæobotanists as Lower Carboniferous, apparently on no better grounds than their superior richness in plants to the Devonian of Europe. On this account it may be desirable here to summarize the evidence now available as to their actual age. This may be stated thus:—(1) The *Dadoxylon* Sandstone and Cordaite shale of Southern New Brunswick are folded up and partially altered with the Silurian and Cambrian rocks of the district, and are overlain unconformably by the Lower Carboniferous conglomerates (Subcarboniferous of some American geologists). These conglomerates are, further eastward, associated with beds holding the characteristic fossil plants of my Horton series, equivalent to the Tuedian or Calciferous series of Scotland. There is also evidence that the Devonian plant-beds are anterior to the great intrusive Devonian granite of this region, whose débris are found in the Lower Carboniferous conglomerates, but not in the underlying rocks. Additional facts illustrative of these points will be found in the Reports of Messrs. Bailey and Matthew in the publications of the Geological Survey of Canada for 1871 and 1875.

(2) The flora of these beds is markedly different from that of the Lower Carboniferous, of the Millstone Grit, and of the true Coal-formation in New Brunswick and Nova Scotia, all of which have been studied and described.

(3) The prevalent forms in the St.-John beds are those characteristic of the Devonian in Gaspé, New York, and Maine, such as *Archæopteris*, *Cyclopteris obtusa*, *Psilophyton*, *Calamites radiatus*, *Dadoxylon ouangondianum*, though several genera are common to these beds and the Carboniferous. The fact that the flora of these beds is richer than that of the European Devonian, and contains types which appear later in Europe, is in harmony with known facts as to the earlier appearance of plants in America in other stages of geological history. I may add that some of the genera noticed in 1863 from St. John, and not then known in the Devonian of Europe, have subsequently been found there. Even as late as 1879 some of them were discovered by Peach in the Old Red of Scotland.

(4) The new facts which have been disclosed, more especially those which indicate the great richness of the Devonian flora of New York in Ferns, now induce me to believe that these St.-John beds, though rivalling the Coal-formation in their abundance of fossil plants, are really of the age of the Hamilton group of New York, which in Europe would be regarded as Middle Devonian.

(5) I would further add that the richness of this flora in species, as well as the discovery of rare and exceptional forms, such as insects, is in part due to the excellent exposure of the beds in the vicinity of St. John, and in part to the extensive and thorough nature of the explorations carried on with the aid of blasting by Messrs. Hartt and Matthew, under the auspices of the Natural-History Society of New Brunswick. It is probable that few fossiliferous beds in the world have been so thoroughly explored. In connexion with this it is to be observed that the mass of the specimens obtained represents only a few species, while the greater number are represented

by only a few fragments, which would undoubtedly have escaped the observation of ordinary collectors.

In the collections now in my hands the following forms occur, which may be considered new, though most of them are too imperfect for complete description.

ODONTOPTERIS SQUAMOSA, sp. n. (Pl. XIII. fig. 17.)

Petiole slender, bearing short pinnules placed at right angles to it, and each consisting of two rounded decurrent pinnulæ and a terminal pinnule of triangular form. Toward the end only the terminal pinnule appears. Veins obscure, diverging from a midrib, broad at base. Frond apparently of a thick or coriaceous texture.

This would seem to have been a creeping or parasitic Fern. In its general habit it bears some resemblance to *Cyclopteris dissecta* of Unger, from the Devonian of Thuringia, but appears to have more affinity with the genus *Odontopteris* than with *Cyclopteris*.

CARDIOPTERIS ERIANA, sp. n. (Pl. XIII. fig. 18.)

Pinnules nearly round or slightly oblong, nearly equally cordate at base, somewhat crowded on a slender petiole. Length from 8 to 14 millim. Veins regularly spreading from the centre of the base, curving toward the margin, and forking twice or thrice.

This is the first appearance of this Lower Carboniferous genus in the Devonian. The species closely resembles *Cyclopteris polymorpha* of Göppert, though every way smaller and more delicate.

ARCHÆOPTERIS?, sp. n. (Pl. XIII. fig. 19.)

Petiole apparently woody, bearing broadly obovate decurrent pinnules, with strong, flabellate, straightish nerves. Pinnules overlapping each other.

This plant bears a general resemblance to *Archæopteris* of the type of *A. (Cyclopteris) Maccoyana* of Göppert; but the woody petiole or branchlet, and the coarse texture of the pinnules, raise the suspicion that the specimen may not be a Fern, but may have belonged to a coniferous tree of the type of *Voltzia* or *Salisburya*.

CYCLOPTERIS, sp.

Fragments of a very large cyclopterid leaf, with flabellate veins, and which, when entire, must have been three inches in diameter. It is too imperfect for description, but indicates a frond of the same general character with *Cyclopteris Brownii* from Peny, in Maine.

Other specimens indicate a small species of *Archæopteris*, more delicate than *A. Jacksoni*; and there are some fragments which seem to show, though not indisputably, that the submerged leaves of *Asterophyllites latifolia* were long and linear, approaching in form to those previously described as *A. lenta*. A fragment of *Hymenophyllites*, about the size and form of *H. Gersdorffii*, shows minute rounded spore-cases comparable with those of the modern genus *Todea*, which the Fern itself also closely resembles.

The species above described add to the number of small and delicate Ferns by which the St.-John beds are so especially characterized.

Specimens from Scotland and Australia.

ÆTHEOTESTA DEVONICA, sp. n. (Pl. XII. figs. 14, 14a.)

Fruit 4 millim. in diameter, oval in cross section. Testa less than 1 millim. in thickness, and consisting of radiating fibres. Nucleus represented by white mineral matter with coaly specks. The specimen shows only a cross section; but there seems no reason to doubt that it is the seed of the above genus of C. Brongniart*, hitherto found only in the Coal-formation of France. It may be referred to *Taxinea*, and may have been the seed of trees of the genus *Dadoxylon*.

The specimen is in grey sandstone, associated with fragments of carbonized plants. It was collected by the Rev. Thomas Bodun, of Edinburgh, in the Old Red Sandstone of Perthshire, where it is associated with *Lycopodites Milleri* and *Psilophyta*.

DICRANOPHYLLUM AUSTRALICUM, sp. n. (Pl. XIII. figs. 15 & 16.)

Stem slender, 3 millim. in diameter, not tapering in a length of 3 inches. It is marked with minute, narrow, elongated leaf-bases, spirally arranged. Leaves linear, 3 millim. long, bifurcating at an obtuse angle at their extremities.

The specimen is in white sandstone and is well preserved. It was collected by Mr. R. L. Jack, F.G.S., of the Geological Survey of Queensland, in sandstones associated with limestone, on Fanning River, Burdekin, Queensland. The horizon is said to be under the Mt.-Wyatt and Star beds, and consequently lower than that of the plants collected by Mr. Daintree, and described by Mr. Carruthers in the Journal of this Society.

The genus *Dicranophyllum* was established by Grand'Eury† for certain plants of the French Coal-fields, which, though larger and better-developed than the present species, must have been somewhat similar. Grand'Eury regards these plants as probably Coniferous.

The plants described in this paper are fragmentary and imperfect, but they add six or seven types to the Erian flora, and encourage the hope that all the Carboniferous genera may yet be recognized in the older formation, together with others peculiar to itself, thus tending to vindicate the opinion expressed in a former paper that the plant-life of the Devonian was more varied or less monotonous than that of the Coal-formation.

Supplementary Note.

As some delay has occurred in the publication of the above paper, I may be permitted to add the following:—

(1) In my paper on Devonian Tree-ferns in the 'Quarterly

* Annales des Sciences Naturelles, vol. xx.

† Flore Carbonifère.

Journal' of this Society for 1871, I referred, under the names of *Psaronius textilis* and *Caulopteris Lockwoodi*, to certain remarkable trunks of Ferns from the Chemung formation (Upper Devonian) of Gilboa, New York, placed in my hands by Prof. Hall and Mr. Lockwood, and which were stated to be from a locality where numerous erect trees exist. Prof. Hall has since extracted several of the largest of these trees, and they are now in the State Geological Collection at Albany, where I lately had the pleasure of examining them. They entirely confirm my conclusions as to their nature, derived from the fragments submitted to me, being evidently trunks of large tree-ferns surrounded by masses of aerial roots, in some cases 2 feet in diameter at the base, and apparently passing downward into a shaly bed or underclay filled with rootlets. Prof. Hall hopes shortly to publish illustrations of these remarkable trunks, representing the oldest fossil forest yet known.

(2) In the course of last summer, the researches of Messrs. Ellis, Foord, and Weston, of the Geological Survey of Canada, have disclosed, near the head of the Bay de Chaleurs, some interesting exposures of Devonian beds rising from beneath the Lower Carboniferous (Bonaventure formation of Logan). In some of these beds, probably Middle Erian, there are abundant remains of *Psilophyton*, similar to those of Gaspé Bay; but others, which are evidently upper members of the Erian system, contain fossil fishes referred by Mr. Whiteaves to the genera *Pterichthys*, *Tristichopterus*, *Phaneropleuron*, and *Cheirolepis*. In the same beds with these fishes occur fronds of three species of Ferns, of which I have myself collected specimens in a visit to the locality in July last, though the best examples have been found by Mr. Foord. One of the species is an *Archæopteris*, allied to *A. hibernica* and *A. Jacksoni*, but differing in the details of the fructification, which is well preserved (*A. magnacensis**, MS.). Another is a magnificent fern, referable in the meantime to the provisional genus *Cyclopteris*, and identical with that figured by Lesquereux in the Report of the Geological Survey of Pennsylvania (new series) as *Archæopteris obtusa*. Lesquereux's specimen is from the Chemung or Catskill of Montrose, Pennsylvania. A third species is that described by me, in Quart. Journ. Geol. Soc. vols. xviii. & xix., as *Cyclopteris Brounii*. In the specimens from Bay de Chaleurs the large flabellate fronds of this fern are seen to be attached in dense groups to a rhizome or slender stem, showing that this plant was either, as I supposed in regard to the specimens which I described from Peny, in Maine, a low-growing ground-fern or an epiphyte.

(3) In the "discussion" of my paper I observe a statement to the effect that *Asteropteris noveboracensis* may be a lycopodiaceous plant. In reply, I think it sufficient to refer to the description and figure, but may add that I have had occasion in previous papers to refer to the remarkable abundance and variety of ferns in the islands of the Devonian sea. In accordance with this, the beds near Milo, New York, in which *Asteropteris* occurs, abound in stipes of large ferns,

* Cape Magnach is the locality.

while the only lycopodiaceous plant which they have afforded is *Lepidodendron primævum*.

DESCRIPTION OF THE PLATES.

PLATE XII.

Figs. 1, 1a. *Asteropteris noveboracensis*, cross section, natural size and enlarged.

2. *A. noveboracensis*, portion enlarged, showing one vascular bundle.

3. ———, portion enlarged 12 times, showing rays and vascular bundle.

4. ———, stem restored in cross section.

5, 6. ———, scalariform vessels, $\times 100$.

7. ———, prosenchyma of outer cylinder, $\times 40$.

8, 9. ———, parenchyma of inner cylinder, $\times 40$.

In the above figures, *a* represents radii of axis, *b* cellular tissue of axis, *c* outer prosenchyma, *d* leaf-bundles.

10. *Equisetides Wrightiana*, leaf of sheath.

11. *Cyclostigma affine*.

12. ———, leaf-base, enlarged.

13. *Lepidodendron primævum*.

14. *Ætheotesta devonica*, natural size and enlarged.

PLATE XIII.

15. *Dicranophyllum australicum*.

16. ———, enlarged.

17. *Odontopteris squamosa*.

18. *Cardiopteris eriana*.

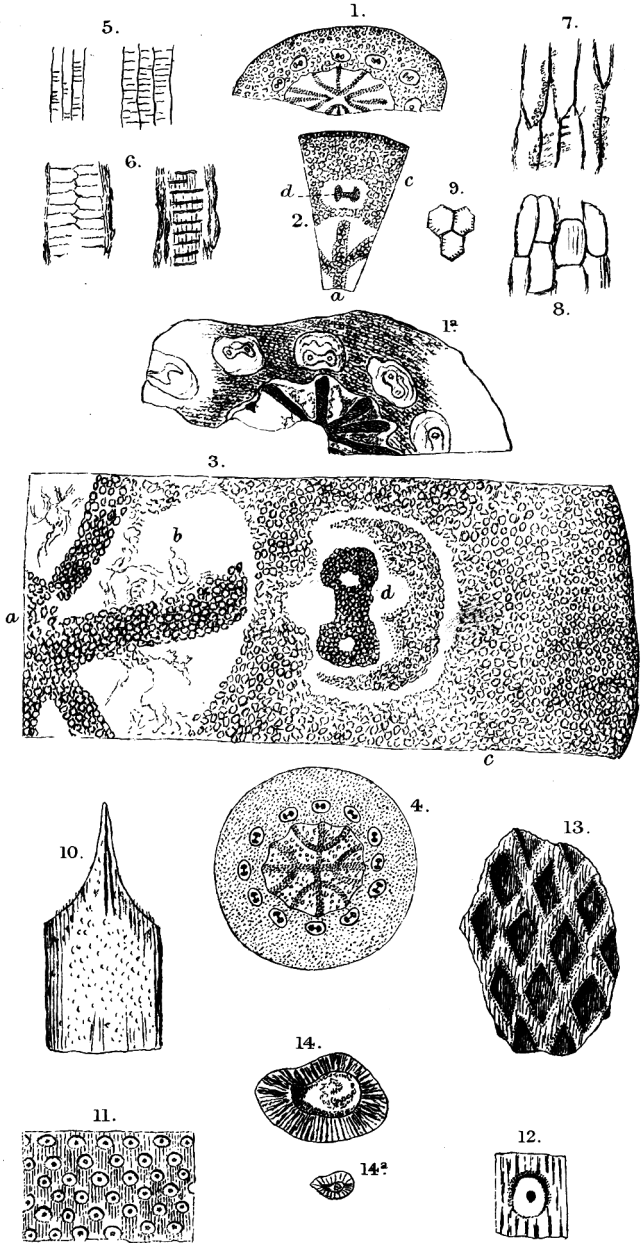
19. *Archæopteris*, sp. n.

20. *Equisetides Wrightiana*.

DISCUSSION.

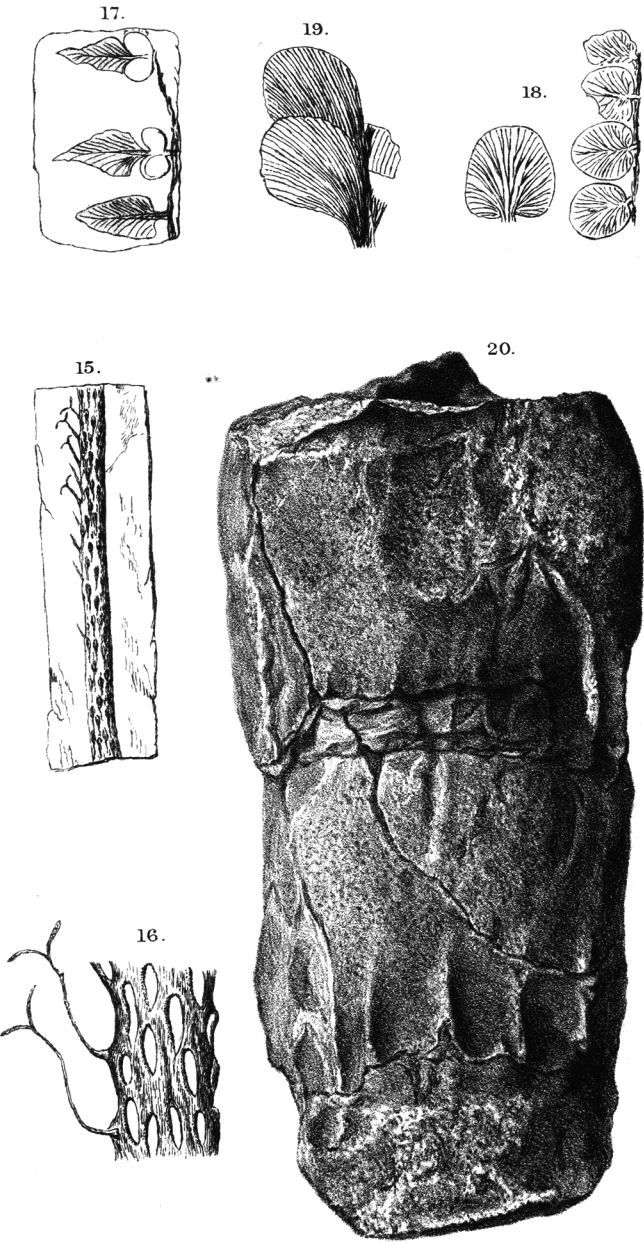
Mr. CARRUTHERS spoke very highly of the industry of Dr. Dawson in collecting fossils, but he could not agree with him in his conclusions as to their systematic relations. He thought the form described as a fern should be referred to the *Lepidodendroids*.

Quart. Journ. Geol. Soc. Vol. XXXVII. Pl. XII.



A.S.Foord del.

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