13. *On the DISCOVERY of PLANTS in the LOWER OLD RED SANDSTONE of the NEIGHBOURHOOD of CALLANDER.* By R. L. JACK, Esq., F.G.S., and R. ETHERIDGE, Junr., Esq., F.G.S., of the Geological Survey of Scotland. (Read June 21, 1876.)

(Communicated by permission of the Director-General of the Geological Survey).

1. *Introduction.*—Before proceeding to describe the plants from the localities in question, and their geological horizon, we append a brief historical outline of the vegetable remains of the Scotch Old Red Sandstone. The gradually accumulating evidence of a terrestrial flora in the Old Red Sandstone of Scotland since the first discovery of plants in that formation by the Rev. Dr. Fleming and Hugh Miller, and the reference of many of them to land rather than aquatic forms, by Charles William Peach, leads all observers interested in the subject to hope that ere long botanists may be in possession of sufficient material to enable them to illustrate the flora of that remote period in a more satisfactory manner than can be done at present, and to restore, in some degree at least, the bygone vegetable organisms which then existed. As a slight contribution to this end, we have now the pleasure of announcing the discovery by one of us (R. L. J.) of land plants in the Old-Red-Sandstone series of the neighbourhood of Callander, during the progress of the Geological Survey of that district under the direction of Prof. Geikie, F.R.S.

2. *Bibliography.*—One of the earliest notices which has come under our observation is a short paper, in 1811, by the Rev. Mr. Fleming, entitled, ‘A Mineralogical Account of Papa Stour, one of the Zetland Islands’*, wherein it is stated that in Bressay, near Lerwick, “the sandstone includes beds of slate-clay, and contains vegetable impressions similar to those common in the sandstone of the coal-fields of the Lothians.”

In 1831 the same author describes, in a paper “On the Occurrence of the Scales of Vertebrated Animals in the Old Red Sandstone of Fifeshire”†, with the scales obtained at Parkhill, near Newburgh, and Arbroath, circular flat patches, composed of numerous smaller, contiguous, circular pieces, as probably the conglobate panicles of extinct species of *Juncus* or *Sparganium*. It is probable that these are the Crustacean remains now known as *Parka decipiens*, Flem.

In 1841 Mr. Hugh Miller published his ‘Old Red Sandstone,’ in which he described the vegetable remains of that series in the north of Scotland as obscure, consisting mostly of carbonaceous markings such as might be formed “by comminuted seaweed.” He further noticed the bifurcating nature of some of his specimens, and that one exhibited scars resembling those of *Stigmara*, whilst the branches of

* Mem. Wernerian Nat.-Hist. Soc. i. p. 175.

† Cheek’s Edinb. Journal of Nat. & Geogr. Science, iii. p. 86, pl. ii. fig. 5.

another terminated in hooks. One example showed the remains of ligneous fibres; and this only was regarded by Miller as of terrestrial origin. In Fife, he says, the vegetable remains are "dark impressions of stems confusedly mixed with what seem slender and pointed leaflets"*. In the Carmylie-Parish Quarries, "irregularly grooved stems branching out into boughs at acute angles were also noticed."

In 1853 Dr. J. D. Hooker published a "Note on the Fossil Plants from the Shetlands, collected by the Right Hon. Henry Tufnell," which are provisionally referred to two species of *Calamites* †.

In 1855 Mr. C. W. Peach presented two short notes to the Royal Geological Society of Cornwall (namely "A Notice of the discovery of Land Plants and shells in the Lower Old Red Sandstone of Caithness," and "A Note on the Fossil Flora of the Lower Old Red Sandstone of Wick, Caithness")‡, in which he respectively notices the occurrence of wood at several localities near Thurso and Dunnet Head, and records the discovery of land plants at Kilmster, near Wick.

The Rev. J. Duncan described and figured, in Jeffrey's "History and Antiquities of Roxburghshire and adjacent Districts"§, published in 1855, plant-remains from Denholm-Hill Quarry, consisting of dichotomizing stems, regarded by the author as fucoidal, another specimen with more or less alternate branches, which he supposed to be a land plant, and, lastly, an organism described as "the radical portion of what we cannot hesitate to call a species of *Calamite*."

In 1855 Hugh Miller read before the British Association a paper "On the less-known Fossil Floras of Scotland"¶, in which reference was made to the bituminous nature and dark colour of the Caithness Flagstones, the latter arising chiefly from the vegetable portion of the contained organic matter. He further notices the discovery of a *Lepidodendron* in the Caithness Flagstones at Clockbriggs Quarry, and a form resembling the maiden-hair spleenwort, in the Orkney Flags. At the same meeting, Mr. J. Miller, of Thurso, exhibited a collection of plants from the Caithness Flagstones similar to that described by Mr. H. Miller ¶.

In 1857 the 'Testimony of the Rocks' appeared**, with the author's figures of many of the previously mentioned plants. Three sectional figures of the Cromarty Conifer, examined by Prof. Nicol, are given, magnified 40 diameters††, and two vignettes of the supposed fucoidal remains ‡‡, regarded by Mr. Salter, however, as roots. Reference is made to a "curious nondescript vegetable organism"

* Afterwards pronounced by Prof. Nicol to be coniferous in character.

† Quart. Journ. Geol. Soc. ix. pp. 49, 50.

‡ Trans. Royal Geol. Soc. Cornwall, vii. pp. 230 and 289.

§ 2nd edit. 8vo, p. 123, pl. vii.

¶ Brit.-Assoc. Rep. 1855, Trans. Sect. p. 83.

¶¶ *Ibid.* p. 85.

** Testimony of the Rocks, or Geology in its bearings on the Two Theologies, &c., 8vo.

†† *Ibid.* p. 11.

‡‡ Figs. 118 and 119.

found at Stromness by Dr. Fleming, provisionally named by him *Stroma obscura*, "in all probability a plant of the sea"*. It consisted of a "flattened cylinder traversed above and below by a mesial groove extending to the extremities." A figure is given of a fine *Lepidodendron* from Thurso †, and a description of the Clockbriggs specimen, which was four feet in length, and threw off two branches at an acute angle. The specimen was covered with a brittle coal, and internally was converted into a brown calcareous substance similar to that of the celebrated Granton and Craighleith trees ‡. Mr. Miller describes some supposed Calamites from Thurso §, 9 inches to 1 foot in length, and figures a plant discovered by Dr. Fleming, with the usual thick rachis of palæozoic plants, and pinnules even smaller than those of our true Maiden-hair ||. Not the least interesting of the plants figured in the 'Testimony' is the *Palæopteris* (*Cyclopteris*) *hibernicus*, Forbes, from the Upper Old Red Sandstone of Prestonhaugh, near Dunse ¶.

We are indebted to the late Mr. J. W. Salter for one of the first connected accounts of these old plants. His paper "On some Remains of Terrestrial Plants in the Old Red Sandstone of Caithness" was published in 1858**. He there describes and figures "Coniferous wood" allied to *Dadoxylon* of the Coal Measures, "Rootlets," and two plants to which specific names were assigned, *Lycopodites Milleri*, Salter, and *Lepidodendron nothum*, Salter (non Unger).

In the same year also (1858) appeared a short paper by Dr. J. A. Smith, "Notes of Fossils from the Old Red Sandstone of the South of Scotland" ††, in which plants similar to those previously discussed by the Rev. J. Duncan are noticed from Denholm-Hill Quarry, Roxburghshire.

To his original description of the genus *Psilophyton* in 1859, Dr. J. W. Dawson ‡‡ appended a few remarks on Scotch Old-Red-Sandstone plants. He considers the dichotomous roots described by Salter, and the bifurcating plants noticed by Hugh Miller, to belong to his genus *Psilophyton*, and probably to *P. princeps*, Dn., or *P. robustius*, Dn.

1859.—Appended to the late Sir R. I. Murchison's paper "On the succession of the older Rocks in the Northernmost counties of Scotland" §§, are a series of figures by Mr. J. W. Salter, identical with those given in certain editions of 'Siluria,' with an additional figure of a large stem with subalternate lateral branches found at Thurso by Mr. C. W. Peach, and named after him by Mr. Salter *Caulopteris Peachii* |||, and another representing the young shoot of a coniferous (?) plant with leaves from Duncansby Head ¶¶.

In 1862 Prof. R. Harkness communicated to the Geological Society a paper "On the Position of the *Pteraspis*-beds, and on

* Testimony of the Rocks, p. 430.

† *Ibid.* p. 432.

‡ *Ibid.* p. 447.

§ *Ibid.* pp. 433, 434.

|| *Ibid.* p. 445, fig. 122.

¶ *Ibid.* p. 454, fig. 124.

** Quart. Journ. Geol. Soc. xiv. pp. 72-76.

†† Proc. Royal Phys. Soc. Edinb. ii. p. 36.

‡‡ Quart. Journ. Geol. Soc. xv. p. 482.

§§ Quart. Journ. Geol. Soc. vol. xv. p. 407, fig. 13.

||| *Ibid.* p. 408, fig. 14a.

¶¶ *Ibid.* fig. 14b.

the Sequence of the Strata in the Old-Red-Sandstone series of South Perthshire" (Quart. Journ. Geol. Soc. xviii. p. 253, read 16 April, 1862). This paper will be afterwards referred to.

In the fourth edition of 'Siluria,' published in 1867, Sir R. I. Murchison gave figures of the chief vegetable remains of the Scotch Old Red*. The longitudinally fluted stems mentioned by previous writers as common throughout the formation were microscopically examined by Prof. Quekett, and found to exhibit true coniferous structure, approaching that of the Araucarian group.

Mr. W. R. M'Nab communicated† his researches into the structure of Hugh Miller's Cromarty lignite, which had been previously examined by Prof. Nicoll. Mr. M'Nab pronounces the structure exhibited by these sections to be allied to the Coniferæ, but not referable either to *Dadoxylon* or *Dictyoxydon*, as surmised by Mr. Salter: he proposes the name of *Palæopitys Milleri* for the Cromarty lignite, and pronounces it distinct from the coniferous wood examined by Prof. Quekett for Sir R. I. Murchison.

The welcome appearance, in 1871, of Dr. J.W. Dawson's monograph of the Devonian and Silurian plants of Canada‡, published by the Geological Survey of Canada, not only afforded botanists an opportunity of becoming acquainted with the British-North-American fossil flora of those periods in a collective form, but, what was of equal importance, put us in possession of Dr. Dawson's notes on Mr. C. W. Peach's extensive collection of Scotch Old-Red plants. In the latter, Dr. Dawson noticed two species of *Psilophyton*, one allied to *P. princeps*, Dn., the other to *P. robustius*, Dn. There are three species of *Lepidodendron*: one, perhaps *L. nothum*, Salter, Dr. Dawson considers closely allied to his *L. gaspianum*; the second is allied to *Cyclostigma densifolium*, Dn.; and the third, that described by Salter as *Lycopodites Milleri*, he considers an herbaceous plant. The collection also contains a *Cyclopteris* (allied to *C. Brownii*, Dn.), a *Calamites* (near *C. transitionis*, Dn.), *Stigmaria*, bark of *Sigillaria*, a plant probably allied to *Anarthrocanna*, and pieces of Coniferæ§.

In 1872, Mr. C. W. Peach delivered a Presidential Address to the Royal Physical Society of Edinburgh, "On the Fossil Flora of the Old Red Sandstone of the North of Scotland," when drawings of all the discovered forms were exhibited. In the 'Journal of Botany' for 1873 Mr. Carruthers gave a paper "On some Lycopodiaceous plants from the Old Red Sandstone of the North of Scotland." He there refers the fragments figured by Miller, on plate vii. of the 'Old Red Sandstone,' to Dawson's *Psilophyton*, and proves that the coniferous rootlets of Salter are really the upper branches of his *Lepidodendron nothum* and *Lycopodites Milleri*, all of which Carruthers considers identical with *Psilophyton (Haliserites) Dechenianus*, Göppert; further, *Caulopteris Peachii*, Salter, is probably a fragment of a large plant allied to *Psilophyton robustius*, Dn.

* *Op. cit.* p. 269, foss. 73.

† Trans. Bot. Soc. Edinb. 1870, x. p. 312.

‡ The Fossil plants of the Devonian and Upper Silurian Formations of Canada, pp. 92, pls. xx. 8vo. Montreal, 1871.

§ *Op. cit.* p. 77.

In the foregoing notes we have endeavoured to give a short and concise sketch of the literature of the Old-Red plants of Scotland. We have not thought it necessary to refer to the general accounts to be found in various manuals.

3. *Description of the Specimens*.—Plant-remains in various states of preservation, but chiefly of the most fragmentary nature, have been met with by one of us [R. L. J.] at no less than twelve localities; and specimens have also been collected by Mr. A. Macconochie, one of the fossil-collectors of the Geological Survey. Those to which the greatest interest is attached, now to be described, and fortunately the best-preserved, occur in a fine-grained blue-grey micaceous sandstone near Braendarn House, near Callander (group C. of the following Table, p. 220).

The specimens, as we now find them, appear as elongated flattened stems, on an average about one inch wide, and are either casts in the

Fig. 1.—*Psilophyton* (?), sp.

Portion of a simple stem, with the cellular tissue destroyed at one end, leaving the vascular axis, from the Quarry near Braendarn House, Callander.

Fig. 2.—*Psilophyton* (?), sp.

Portion of a stem showing bifurcation, from the south-west corner of Muir Plantation, near Braendarn House, Callander.

fine-grained matrix, or thin carbonaceous black films left by the soft cellular tissue. They are ornamented either with a series of pucker-like depressions, when viewed from the interior, or with a number of wart-like eminences, when seen externally. These are the scars of the points of issue of the vascular bundles passing to the leaves. Along the margins of the stems are a series of spine- or thorn-like projections, which may be the leaves themselves or only their persistent bases, and are apparently arranged in spirally oblique rows. They appear to be impunctate, although Mr. Carruthers thinks he has detected a cicatrix in one or two of them. In some of the specimens, around and near the scars, are a series of indistinct longitudinal more or less parallel lines, or perhaps wrinkles. Either as a faint impressed line on the surface of the micaceous matrix, or as a slender flattened carbonaceous band, is seen the internal axis of the stems, probably scalariform, and longitudinally striated. In fig. 1, this axis may be seen extending beyond that part of the specimen from which the cellular tissue has been removed; fig. 2 represents what appears to be a dichotomously branching stem.

After submitting the specimens to a careful and close examination, we were convinced of their great resemblance to and affinity with Dawson's genera *Psilophyton* (especially *P. princeps*), and *Arthrostigma**, our own conclusion being that the closest affinity was with the latter genus. With the view of receiving support in this opinion, or, on the other hand, correction, if necessary, the best specimens were submitted to Mr. R. Etheridge, F.R.S., and Mr. W. Carruthers, F.R.S. The latter has been kind enough to furnish us with some notes which we now append, with his permission. We take this opportunity of thanking Mr. Carruthers for his assistance.

In *Psilophyton princeps*, Dn., the leaves are described as rudimentary, or short, pointed, and rigid, becoming hard, spinous and prominent; in *Arthrostigma gracile*, Dn., as linear and rigid, with circular bases, and nearly at right angles to the stems, sometimes resembling spines. The spinous character is exhibited in our specimens, the spines more closely resembling those of *P. princeps* in their slightly curved form than those of *A. gracile*, which are almost at right angles to the stem, and much less crowded and inequidistant than in *P. princeps*. We at first thought that the scattered scars were impunctate; but Mr. Carruthers has detected what he thinks may be a cicatrix scar in one or two of them. The following are his remarks on the specimens submitted to him:—

"They have a true Lepidodendroid structure. The axis consisted of a slender column of vascular tissue; the soft cellular tissue left an undefined carbonaceous stain, except where the opening for the passage out of the vascular bundles existed, the scars of which are well seen from the inside. These are like *Cyclostigma*-markings; but in this specimen they are certainly the markings on the inner surface of the false bark of these plants. The spines are, I believe, the persistent bases of the leaves, not the leaves themselves, though that is possible. But I see, I think, indications of their being bases

* Dawson, *op. cit.* pp. 37-42, pls. ix. & xiii.

from which the leaves have disappeared. The leaf is not clean-cut on the upper margin, but has something like a cicatrix scar.

"As to their name, it is probably the larger stem of a plant like Dawson's *Psilophyton princeps*, with which it agrees in structure &c. No doubt his *Arthrostigma* and *Cyclostigma* are the same things; but we yet want light as to the true nature of these Devonian Lycopods."

The preceding facts comprise all the information we at present possess bearing on these interesting fragments. Beyond the probable dichotomous method of branching, we are unacquainted with any of the broader characters; neither do we know any thing of the fructification. The plentiful manner in which the matrix is traversed, gives rise to the hope that the discovery of more perfect specimens is only a matter of time and careful search. Under these circumstances we content ourselves with appending a short provisional description under the name of *Psilophyton* (?), sp., in accordance with the suggestion of Mr. Carruthers, as given above.

PSILOPHYTON (?), sp.

Stems branching dichotomously, and covered with spirally oblique lines of short, rigid, pointed and slightly curved thorn- or spine-like projections, the persistent bases of the leaves, or perhaps the leaves themselves. Axis composed of a slender column of vascular tissue, surrounded by a cylinder of cellular tissue.

4. *Geological Notes on Horizon*.—It now only remains for us to indicate the horizon of the plant-bearing flagstones within the limited district where these have been met with. This region is but the smaller end of the largest Scottish area of the Lower Old Red Sandstone formation; and the structure of the greater part of that area has yet to be mapped out. It is not improbable that similar flagstones containing similar fossils may yet be discovered in other places and at various horizons. It would be premature in the mean time to correlate the divisions of the strata, within the limited area in question, with those of separate and distant contemporaneous areas, considering the paucity of fossil and other evidence.

If we traverse a line parallel to the course of that part of the river Teith lying between Callander and Stirling, and about four miles to the north-east of that river, we meet, in a great synclinal trough, with an immense thickness, though by no means the whole, of the Lower Old Red Sandstone strata. The highest or axial beds of this trough cap horizontally the tableland of Uamh Mhor and Uamh Bheag, while the subjacent beds crop out on the south-east, with a dip gradually increasing to about 30° at the Sheriffmuir, and on the north-west with a dip which rises rapidly to very near the vertical at the heads of the Keltie and Ruchil Waters, where a great fault brings up the Silurian rocks of the Highlands.

As will be readily understood, from the trappean and conglomeratic nature of a large portion of the formation, especially in its lower parts, the strata vary very widely in character and in thick-

ness, within a short distance. The following is a rough *ad interim* Table of the strata occurring in the trough cut by the section-line above referred to. It will be seen that the conglomerate beds of the series are thicker to the north-west of the axial line, while the finer deposits thicken out in the opposite direction.

Centre of Trough, Uamh Mhor &c.

- A. Fine red conglomerate, with matrix of siliceous sand, enclosing pebbles of white quartz, porphyrite, and Silurian grit. The pebbles frequently angular 300 ft.

North-west side of Trough. Heads of Keltie and Ruchil Waters.

	ft.
B. Red pebbly sandstone, matrix mainly siliceous.....	500
C. Greenish-grey flags and thin-bedded sandstones	500
D. Conglomerate, stones up to 2 inches in diameter, mostly of white quartz, some of porphyrite, and various Silurian rocks	3300 ft.
Red Shales, conglomerates, and grey sandstones	1100 „
Brown gritty sandstones and brown shales with calcareous nodules and crustacean-tracks (?)	800 „
	5200
F. Very coarse conglomerate with well-rounded blocks, up to 2 feet in diameter, of porphyrite and quartzite, chiefly porphyrite	1500
G. Bedded porphyrites abutting against fault about a mile south of the section-line.	

South-east side of Trough. Braes of Doune, Allan Valley and Sheriffmuir.

	ft.
B. Red pebbly sandstone	550
C. Greenish-grey flags and thin-bedded sandstones ...	750
D. Fine-grained brown sandstones and dull brown shales	1700 ft.
Crumbling felspathic shales	500 „
Chocolate-coloured sandstones with calcareous nodules and a few pebbles .	8400 „
	10,600
E. Bedded porphyrites of Wharry Burn	200
F. Course trappean conglomerate	1100
G. Bedded porphyrites, melaphyres and ashes of the Ochils, their base masked by a fault.	

In the paper by Prof. Harkness, of 1862, above referred to, the “grey sandstone passing upwards into red sandstone,” and overlying the trappean conglomerate (F in above Table), is stated to have yielded remains of *Pteraspis*. These *Pteraspis*-beds are probably inferior in position to those marked C in the above Section. Professor Harkness remarks, “no traces of plants, so far as I am aware, have been found in this [Bridge of Allan] neighbourhood; nor are there any remains of Crustaceans.”

It is in the flagstone group marked C that the plant-remains above described are found. No large quarry or natural section in the group fails to furnish at least a few traces of plants; but here and there surfaces are to be met with which are quite black with

felted vegetable remains. In one or two places (notably Cameron Plantation near Balloch) lenticular patches of anthracitic coal a few lines in thickness have been observed. The flagstones are generally grey, with a more or less distinct greenish tinge, and contain pellets of shale and sparsely scattered pebbles of white quartz. Felspathic and siliceous granules contribute in about equal proportions to the composition of the flagstones. The flags, which are divided by green, grey, blue and purple shales, are extensively used for building-purposes in the neighbourhood (the Duke of Montrose's principal seat, Buchanan House, for example, being built of them), and occasionally for pavement, although they are less hard and durable than the Arbroath and Caithness flags. In former days they were frequently employed as tilestones; but this heavy roofing-material has entirely given place to the slates of the Highland border.

We may now shortly trace the flagstone group from the Braes of Doune southwestward to the Clyde.

The fall of the ground from the Braes of Doune to the river Teith at once denudes the flagstone group of the overlying sandstones and conglomerates, so that in the valley the centre of the trough is formed solely by the flagstones. This continues to be the case till the raised beach-deposits of the Carse of Forth to the south of Thornhill obscure the solid geology.

South of the Carse of Forth, the Lower Old Red Sandstone area is rapidly narrowed by the south-westward continuation of the fault which bounds the Ochils on the south side. Extending from Kippen to Cardross Park on the Firth of Clyde, this fault brings, on its south-eastern side, the Calciferous Sandstones down against the Lower Old Red Sandstones. On the south side of the Carse of Forth, brown felspathic sandstones, probably representing those of group B, overlie the Flagstone group, which here dips to the south-east. The Flagstone group thickens considerably towards the Clyde, and between Geilston and the foot of Loch Lomond (where no other member of the Lower Old Red Sandstone formation is seen) it cannot be less than 2000 feet in thickness. Here the axial beds of the synclinal trough are concealed by the fault which throws down the Calciferous Sandstones against the Lower Old Red Sandstone. The Lower Old Red Sandstone does not reappear on the southern shore of the Firth of Clyde.

5. *Locality*.—Quarry, $2\frac{1}{2}$ miles S. by W. of Braendam House, E. of Callander, and S.W. corner of Muir Plantation, near Braendam House.

6. *Other Plant-remains*.—Fragments of plants have been found in the Lower Old Red Sandstone at the following localities:—

(a) *Buchanan-Castle Quarry*, near Drymen, Stirlingshire, in a thin-bedded sandstone. A small stem (?), nearly three inches long by two or three lines wide, with portions of the black carbonaceous matter into which it has been converted adhering, and a good deal wrinkled.

(b) *Old Quarry at Small Reservoir, near Kilmahew*, north of Cardross, Stirlingshire, in a light-coloured thin-bedded sandstone. A stem

222 ON PLANTS IN THE LOWER OLD RED SANDSTONE OF SCOTLAND.

three inches long by about two and a half lines wide, with a lateral branch one inch long. The substance of the specimen is converted into a similar material to the foregoing, but is brown in colour, instead of black. Along the margins of the stem and branch are a series of delicate horizontal processes given off at right angles. We believe this to be a *Psilophyton* allied to *P. princeps*, Dn.

(c) *Green Burn, Keltie Water*, $1\frac{1}{2}$ miles S. of Gartmore, Stirlingshire. A micaceous sandstone full of linear vegetable fragments, one specimen not unlike some examples of *Pinnularia*, Dn.

(d) *Keltie Water, above Chapellarroch*, 1 mile S. by W. of Gartmore, Stirlingshire. Portions of plants, probably stems, one having a very Lepidodendroid appearance, although leaf-scars were not discernible.

(e) *Keltie Water below Brackland Linns*, $1\frac{1}{2}$ mile E. of Callander, Perthshire. Fragmentary remains.

(f) *Quarry at Kames Farm*, 4 miles S. by E. of Callander. Fragmentary remains.

(g) *Quarry at Easterhill*, $1\frac{1}{2}$ mile E. of Gartmore, Perthshire. A stem three and a half inches long, giving off subalternate branches, two on each side, and in general appearance very closely resembling *Psilophyton robustius*, Dn.

(h) *Quarry in Cameron Plantation, near Alexandria, Dumbartonshire*. A grey flaggy sandstone crammed with plant-remains varying from mere comminuted fragments up to large specimens. There is one specimen in the collection, probably a stem, nine inches long by nearly one inch and three quarters broad, and at one end between four and five lines thick. Internally it is a sandstone cast; externally the vegetable matter is converted into the usual black bituminous substance. There is also a small stem of *Psilophyton* resembling that from locality b.

(i) *Turnpike road at Overballoch, Loch Lomond, Dumbartonshire*. Sandstone resembling that at the last locality, and similarly yielding fragmentary remains.