

A Fossil Plant Formation in Central Queensland.

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I wish to bring under the notice of the Society a fossiliferous formation in Central Queensland, which has recently yielded plant remains which are new to Australia. It is situated on the central line of railway, which runs westward from Rockhampton to the Drummond Range, a distance of about 230 miles from the farthest navigable point of the Fitzroy River, and nearly 300 miles from the sea. It is intended to carry the line far into the plains of the western watershed, but as yet it has not crossed the divide. It is necessary to bear this in mind in considering the relations of the rocks exposed in the railway cuttings. There is no part of the continent where the Dividing Range makes so far a curve inland to the sea. Even when the Drummond Range is cut through, the railway will not be found upon western waters. The valley the Belyando will be reached, which is a tributary of the Burdekin River. On the further side of this valley will be the al divide. I shall have occasion to refer to this more particularly in the latter part of this paper. In the Drummond Range occurs a fossiliferous formation whose plant remains I am about to describe. Its highest point where the railway crosses is 1,840 feet above the sea-level, at 235 miles from Rockhampton.

After crossing the basaltic plains west of Emerald, with their immense tracts of brigalow scrub, a remarkable change occurs in the geology of the country, at a place called Zamia Range, 1,180 feet above the sea, at the railway cutting 213 miles from Rockhampton. The soil is sandy, supporting an open forest of *Calyptrix melanophloia*. The railway cuttings expose one or two dykes, and some granite, or metamorphic rock of some kind, which is not exposed beyond the weathered portions, and before its true character is difficult to determine. It is mingled with a stratified rock, in which no fossils could be detected, but in appearance it was like some of the oldest mesozoic rocks in Victoria; it overlies, as it seemed to me, certain dark brown sandstones, which soon rise to the surface and occupy the whole extent of the country around. The rock forms low outliers from the Drummond Range, giving an undulating but not rugged outline to

land. These are sometimes overlaid by coal measures, sometimes volcanic rocks, and consequently do not crop out on the surface over such districts * * *. In the higher members of this group, which form their general analogy to the English group of the same name we will term Devonian, specimens of fossil plants are abundantly met with." Mr. Carruthers, F.R.S., has described and figured those from three widely separated localities—Mount Wyatt, Monna, and the Broken River—and refers them all to one genus, *Lepidodendron nothum*, Unger (not Salter's species of that name). To the same paper Mr. Carruthers added an appendix in which the fullest details of the plant were given. He states that the specimens of Mr. Daintree were so full and complete, and so much more perfect than any previously at the disposal of paleontologists, that he was able to give a description of the whole plant as far up every doubtful point of its structure.

Before giving details of the species I have recognized, it may perhaps be as well to remind the members of the Society who may have access to all the literature of the subject, of the progress that has been made in this portion of paleontology. The plants of the early geological periods differ so completely from anything existing at the present day that they presented very puzzling problems to paleontologists. This is not a matter of wonder when we remember how fragmentary were the specimens submitted to examination, and how rare it was to find stem, leaves, roots, fruits, and fruits so associated together that they could be recognized as belonging to one plant. To add to the difficulty of the problem, it has been found that in these extinct forms of vegetation the various parts of the plant were more differentiated and specialized than they are now. Thus roots of plants in the present day are very uniform and simple organs; in fact, so uniform that only slight difference or no difference can be traced even those of shrubs or trees widely separated in every other respect. But the roots of coal plants seem to have been very different structures. *Stigmaria*, for instance, is now known to be the root of trees resembling our club mosses, called *Sigillaria*. These roots were arranged in a regular spiral series. They were swollen fleshy tubers, articulating by a joint to the rhizome, leaving peculiar scars in the bark outside and in the woody tissue beneath. Furthermore, they are forked or divided, and terminate in an obtuse apex. No wonder that Sternberg, when he first described these rootlets by themselves, compared them to arborescent rhizaceous plants. Von Martius referred them to a fleshy caudex (*Cacalia*) or a fig-tree. Brongniart classed them with Lycopods, but later as roots of such peculiar conifers as in the present day *Stigmaria* were. Corda regarded them as plants uniting the characters of houseleek, euphorbias, *Cactus* and *Zamia*. Lindley and Hitchcock took them for the fleshy leaves of some horizontal

the country. The dip is very regular to the eastward, but the inclination is slight, hardly more than 10 degrees. At about 12 miles from the range an anticlinal axis is crossed about 150 feet above the sea-level, and then the dip is regularly to the eastward, with the same or a less inclination. As the chain of mountains is approached, it is seen to consist of a series of terraces or escarpments facing to the eastward. The lines of bedding are very visible on all the sides of the valleys, and give the scene a remarkable and characteristic aspect. The sandstone is now then interrupted by beds of shale of a dark and earthy composition. It weathers into a fair soil in some places, but is generally poor and sandy.

A little beyond Bobuntungen, which is the last station on the railway, there is a heavy embankment, and the stones composing it are entirely derived from the sandstone range. At the first glance I was struck with the number of plant impressions that it contained, none of them being sufficiently well preserved to admit of their identification. There were some long, linear, narrow, ligulate leaves which strongly resemble the *Cordates australis* McCoy, to which reference will be made presently. It was afterwards that these leaf-like impressions were in reality stems of *Calamites*. The discovery of this much, however, encouraged me to a closer and more extended exploration of the rocks around, and soon an immense number of fragments of stems of *Lepidodendron* and *Stigmaria*, with *Calamites*, were obtained. I spent all a week at Bobuntungen, yet being occupied in other ways could not give to the formation all the attention I desired; but I found an active co-operator in Mr. Phillips, the Station-master, who, since my departure, has been indefatigable in seeking well-preserved specimens from the abundance of fossils in the locality. I have lately received from him a small box of specimens which are of the highest interest, and which, together with my own collections, will form the subject of this evening's paper.

Before entering into a description of the species, it may be well to give a retrospect of what has been done hitherto by geologists in illustrating the paleozoic plant remains of Queensland. In 1872 the Rev. W. B. Clarke, F.R.S., in a paper read before the Geological Society of London (see vol. xvii, p. 354), speaks of the occurrence of shales and grits charged with plants in Queensland associated with calcareous beds holding abundance of corals, bryozoans and Devonian zoological forms. These referred to the Bowen River and other coal-fields. In 1872 Mr. Daintree to the same Society a sketch of the geology of Queensland (vol. xxiii, p. 271), in which were fuller details. He says, at p. 271, "Devonian."—From the southern boundary of Queensland, about lat. 18 degrees south, a series of slates, sandstones, and conglomerates extend to a distance of 500

In the 3rd edition of the late Rev. W. B. Clarke's "Sedimentary formations of New South Wales" (1875), at p. 17, mention is made of a species named *Lepidodendron rimosum*, of which in 1878 Feistmantel gave a fig. (*loc. cit.*), remarking that it seemed more to resemble *L. veltheimianum*. Before this, in 1876, as I shall hereafter see, Professor de Koninck had submitted about twenty plant specimens sent to him by the Rev. W. B. Clarke to the eminent Belgian palaeontologist, M. Crepin, of the Brussels Museum. Though the specimens were in a very bad state of preservation, he was able to recognize *L. veltheimianum*, besides *Leptopteris radiatus* and *C. varians*, all of which we shall see are found in the Drummond Range. Dr. Feistmantel was not aware of Crepin's determinations at the time he pronounced upon specimens, so that the independent testimony of two such eminent and experienced authorities gives additional weight to the identification. Mr. Clarke's fossils are quoted by De Koninck as from the quarries of Murree, Russell's Shaft, Glen William, Ragood, and the Ichthyodorulite Range. Dr. Feistmantel's examples came from the strata of Smith's Creek, near Stroud, and Bouchel River.

Amongst the numerous examples found in the Drummond Range, there are many compressed branches which have formerly been considered cylindrical, and instead of having the lozenge-shaped depressed scars with a raised margin, are marked with impressions of narrow-pointed leaf-like scales. They exactly correspond to the figure given by Feistmantel in the above work, at plate 23, figs. 2 and 3, and which are lettered *Knorriastadium* (?) of *Lepidodendron veltheimianum* (?), the doubtful note in both cases being put there can be but little doubt, from the mode in which they are associated, that they belong to the same plant. There are also other stems, of which I figure one example, which seems to me to be the internal casts of the smaller branchlets. The surface is covered with raised cushions, which are closely quincuncial. The cushions rise gradually towards the apex, and have an imbricated trace. In the larger examples the cushions are longer and much narrowed. I think we have in these, internal casts of branches. If we suppose the external scars to be raised in a way as to give rise to a corresponding depression in the cylindrical, then the casts would present the appearance of a cylinder above. Moreover, they are ill-defined, and without any impressions, just as internal depressions would be. The strong fine enough to retain the most delicate marks where they are. The shape of these casts also confirms this explanation, for they are always more or less cylindrical, or the casts of cylinders have been compressed. Whenever the exterior of the area is exhibited, it is on the surface of concave casts.

subterranean tree entirely different from anything at present known. In the course of time the discovery of true *Lepidodendron* trees with upright stems and with roots (*Stigmarioidea*) the ground has manifested the true character of these remains.

In like manner, different portions of the same plants have been subjects of doubt and controversy until their nature and office were known. The cones, or fruit spikes, of *Lepidodendron* were at first referred to the pith, and *Knorria* to the internal casts of *Lepidodendron*; *Cyperites* was the name given to the leaf scars. Other specific and generic distinctions were built upon the mode of preservation, which was subject to great variation, the stems of these trees were soft and hollow, or at any rate with a soft yielding pith; then, when the entombling rock pressed upon them in the course of time, they became flattened, and sections of round stems, or the cast of the interior, were then at each end, so that the section became like the section of a leaf.

All these remarks are necessary to understand the character of the fossils which I exhibit this evening. They have been subjected to great pressure, and there are fragments of all different portions of the plant. I will begin by describing species to which most of them must be referred.

LEPIDODENDRON VELTHEIMIANUM.

Sternberg—*Flor. d. Vorw. I.*, part 12, pl. 52, fig. 2. See Schimper, "Palaeontologie Végétale," vol. ii, p. 29, atlas, pl. figs. 6, 7, 8. Schimper gives a large list of references to synonyms, which I need not quote here. See also Feistmantel, "Palaeozoische und Mesozoische Flora des östlichen Australiens," Cassel, 1878 and 1879, p. 151, pl. 5, figs. 2 and 3 (though fully referred to this species); pl. 7, fig. 2; pl. 23, fig. 2. Apparently a moderate-sized tree, with dichotomous branches covered with a network of very narrow leaf-scars; leaves narrow lanceolate, spreading slightly incurved; scars of the branches rhomboid, close, with an obovate cushion acuminate at the keeled, furnished with a transverse rhomboid cicatrix; scars of trunk oblong-rhomboid, apex and base long and acuminate, flexed, and after the disappearance of the little cushion, fused.

This plant is characteristic in Europe of the lower coal formations, corresponding to the carboniferous limestone. It has been found in many places in Silesia, in the *Postonimya* section of the Harz Mountains, at Nassau, in the village of Thann and Niedurburdlach; in France, in the Upper Voges in the coal-seams of the Black Forest. This fossil is also, according to M. Geinitz, the same as *Ulodendron ornatisimum*.

* But the name *Knorria* is now generally applied to a genus like *Lepidodendron*, but with peculiar fleshy leaves.

CYCLOSTIGMA. Haughton.

The plants thus distinguished were first brought to the notice of science by Dr. Haughton, in a paper published in the *Annals of Nat. History* for 1860 (3rd ser., vol. v., p. 444), entitled "On *Cyclostigma*: a new genus of fossil plants from the old sandstone of Kiltorkan." *

CYCLOSTIGMA AUSTRALIS.

Feistmantel, *loc. cit.* p. 76. A tree trunk with slender branches, cushioned or raised scars subglobose, pitted, approximated spirally disposed, impressions oblong oval, rather deep, situated in the upper portion of the oblong ovate tubercle. The species was found in two places in New South Wales, according to Dr. Feistmantel, namely Goonoo Creek, near Tainworth, and Smith's Creek. Dr. Feistmantel was of opinion that the species was so near *C. kiltorkense* that he could see little difference, but lest he should make a false identification in a plant where details are so few and simple, he preferred to give it another name. He gives figures of a few specimens at pl. i, fig. 1, doubtful identification, pl. iv., fig. 3, pl. v, fig. 1, pl. xii, fig. 1. Amongst the Drummond Range specimens I have only one which can be referred with any probability to this species, and in case the impressions are so faint and worn that I describe it as *Stigmaria* (*Cyclostigma*?). I quote from the Rev. Dr. Haughton's paper somewhat fully, because his description corresponds with the strata of the Drummond Range that lithologically may certainly be said to belong to one formation. The rock is sandstone in which some of the fossils are embedded, and golden yellow colour of others, is especially remarkable.

"The fossil plants of the yellow sandstone of the Kilkenny occur, as they do in other parts of Ireland, in sandstone lying immediately under the great mass of the boniferous limestone, which constitutes the most important member of our Irish fossiliferous rocks. They are found at Jerningham, about a mile and a half south of the Abbey, on the roadside the corn-mill, on the road to Ballyhale, about 90 feet below the lowest bed of limestone, in rocks composed of red, white, and yellow limestone, with trilobites formed of pink quartz, rounded pebbles of grooving the hone stone; and above the plant beds a red, white grit conglomerate is found. The plant-beds, on the geological horizon, are also found in the railway cuttings at Ballyhale. They are found, however, in the greatest abundance at Jerningham."

* Other species have since been described by Hocr. *Fossil Plants* (Insel, p. 43, pl. xi; by Lesquereux, *Geol. Survey of Arkansas*, fig. iii, fig. 3; and Dawson, *Fossil Plants*, *Geol. Survey of Canada*, p. 10, figs. 92 to 96.

state of preservation, on the top of the Kiltorkan Hill, near railway station of Ballyhale. I believe the plant-beds on the top of this to form an 'outlier,' and to occupy the same relative position with respect to the limestone as the beds at Jerningham and those of the railway cutting. The fossil plants here have never been described except casually. They consist of a large fern, called *Cyclopteris hibernica*, by Professor Brongniart, associated with a large bivalve, named by him *Anodon*, and of undescribed dermal plates of a cartilaginous fish, probably species of *Coccosteus*; and of numerous unknown plants called to *Lepidodendron*, and so named by Professor Forbes Brongniart, the latter of whom has named a remarkable specimen preserved in the Museum of the Royal Dublin Society, *Lepidodendron griffithsi*. Others of these fossil plants have been named *Knorria*; and a large undescribed group remains, to which we give the name *Cyclostigma*."

CYCLOSTIGMAE.

Natural order of fossil plants found in the lowest beds of the Silurian system, part of the oldest flora known to have been on the globe, probably closely allied to the orders described by Brongniart, *Lepidodendron*, and *Sigillaria*, known only by their stems and leaves, which were arranged in alternate whorls, and not jointed at the whorls, the leaf-scars perfectly circular, and in many cases a minute and well-marked dot in the centre, coinciding with a central bundle of woody tissue. Many larger plants show traces of a thick central woody axis, like *Stigmaria*; stems much crushed and flattened, as if they were not woody throughout. They approach nearest to *Stigmaria*, from which they differ in the leaf-whorls being separate and more distinct. There are many varieties of this fossil, showing the alternate whorled arrangement of the leaves. None of them are perfect stems, but appear to be torn off at the base of the stem, or of the whorl of leaves, which have been macerated by water for a long time in water. In the quarry of Kiltorkan the fossil is found in layers different from those in which the *Stigmaria* occurs. In some specimens of *Cyclostigma* the leaf-whorls are closer together than in the last, and are somewhat oblique to the transverse line of the stem—this obliquity being due to distortion caused by lateral pressure of the mudstone in which the fossils occur. The whorled arrangement of the leaves, and the fact of the whorls being alternate to that above and below it, is frequently observed.

Bartholomew, in his appendix on the fossil plants (see *Dain*, *the Geology of Queensland*, *loc. cit.*), says:—"Among the fossils presented by the Rev. W. B. Clarke to the Museum there is a fragment of a lepidodendroid plant

which I cannot separate from that found at Kiltorban, to Dr. Haughton gave the name of *Sigillaria dichotoma*, and wards of *Cyclostigma kiltorkense*, and which, after receiving other aliases, should be named, I believe, *Syringodendron tommum*, as being a species of that genus as amended by Brongniart, in his 'Histoire,' and again in his 'Tableau.'"

Order CALAMITEÆ. Brongniart.

(See Schimper, *op. cit.* vol. i, p. 291.) For the convenience of students in Australia, where the works of Schimper, Brongniart, Ettingshausen, &c., are so difficult of access, I give an abstract of the literature of the order, and fuller descriptions of character. This order is distinguished from the *Equisetaceæ* by horse-tails, to which also belongs our fossil *Phylloleuca*, by the triellate leaves, which are entirely free or confluent at the base, and by the sporangiferous spikes being axillary like the *Lycopods*. Some of the genera of this order have been named in the early history of paleontology from fragments of specimens, and, as investigation has gone on, and better and more numerous specimens were discovered, just as in the case of the different sections of the *Lepidodendron* family, they have proved to be distinct portions of the same plants. Thus Ettingshausen has proved that *Asterophyllites* are the branches and branchlets of *Calamites*, the spikes known under the name of *Volkmannia* are the bearing portions of the same genus. It is to Mr. Binney, of Chester, that we owe the knowledge that the capsules and the spikes are not anthers but sporangia.

CALAMITES. Suckow.

Including *Calamites*, *Equisetites* (in part), *Asterophyllites mannia*, *Becheria*, *Bruckmannia*, *Bornia*, of Sternberg, in part, and the *Calamites*, *Equisetites* (part), *Calamodendron phyllites*, of Brongniart, Bunbury, Binney, Dawson, and others. Tree-like plants, rising from subterranean rhizomes, stems somewhat conical, jointed and gradually narrowed, bearing whorls, with forked branchlets. Bark smooth, or more distinctly sulcate, internodes of varying length, but shorter as they descend. Inner lining always subulate and striated at the joints. Internal structure similar to *Equisetum*. Cauline leaves extremely fugacious, wholly unknown in their place, usually represented by minute, convex, orate the inner wood. Branch leaves longer and more numerous than the cauline, of equal length, free or confluent at the base, narrowed or slightly dilated above, acuminate, ribbed, erect or reflexed. Sporangiferous spikes verticillate at the axils of the leaves, disposed in corymbs along the branches.

extremities, oblong or elongately cylindrical, small for the size of the plant. Bracts, alternating with the sporangia, verticillate, lanceolate, erect above, below uniting into a disc. Sporangia bearing stalks, peltate, and arranged in whorls of six; four to each stalk, borne on the under side of the peltate stalks; spore cases, with cellular walls; spores spherical, with three-lobed elaters. The fruit-spikes or cone bears a very strong resemblance to *Equisetum*, but in the latter all the leaves of the cone are fruit-bearing, while in *Calamites* some are fruitful and some are like the ordinary leaves of the plant.

Calamites abound in the carboniferous rocks, and no doubt the mass of the coal was formed by them. They may be said to died out at the close of the palæozoic period; though some are found amongst the lower members of the mesozoic strata. There are only two quoted from Australia, and those are from the group of our coal strata. Smith's Creek, near Stroud.

CALAMITES (BORNIA) RADIATUS.

Brongniart, Histoire des Végétaux Fossiles, i, p. 122 (quoted by Schimper as *Bornia*, vol. i, p. 335). Paris, 1828. This species belongs to the subdivision *Bornia*, distinguished amongst the *Calamites* by its interrupted, non-alternating ribs, its free leaves, on the branches are once or twice-forked, divided above, elliptic spikes, scutellæ with a scar on the centre of the adaxial face. It is thus characterized:—Leaves of branches very linear free, often forked. Cauline leaves much shorter. The plant is very wide-spread, being found in the lower coal and carboniferous rocks of Europe and those of America. (See Dawson's *Canadian Plants*, Quart. Jour. Geol. Soc., vol. xviii, p. 309; also Schimper, atlas, pl. xxiv, where many figures are given of stem, leaves, and fruit.) In Feistmantel's Nachtrag zur Fossilen Flora von Böhmen, already quoted (Paleontographia, loc. cit., plates vi, vii, xxv) there are three figures given of this fossil, representing some leaves and certain portions of the stem. It should be mentioned that, except to an experienced eye, or without some knowledge of the structure of the plant, these fossils might easily be mistaken for *Phylloleuca*. It belongs, however, to a much lower horizon, and the plant will be found to be dichotomous, which is never the case in *Phylloleuca*. *Calamites varians* is quoted by Feistmantel (loc. cit., p. 10) on the authority of De Koninck. The passage referred to follows:—*

Before commencing the study of the numerous animal forms occurring in the carboniferous period, I will glance on some coniferous plant remains received at the same time and also often

recherches sur les Foss. Paléoz. Nouv. Galles de Sud. Australie, part 3,

in the same rocks from the Rev. W. B. Clarke. I should previously, that the specimens sent to me (not above ten number) were in such a bad state of preservation that, notwithstanding the immense experience of M. Crepin, who was enough to examine them, or the abundant materials for comparison which he had at his disposal in the Brussels Museum, he was unable to determine any specimens with certainty. According to nevertheless, some specimens came very near to *Lepidodendron veltheimianum*, Sternberg; others to *Bornia radiata*, A. Br. others to *Calamites varians*, Germar, and constitute the densest form. All these plants are contained either in a hard and compact greyish yellow or greenish limestone, the other in a easily powdered, grey or brownish sandstone. Many are associated with marine animal remains such as stems of *Orthis ductus*, *Corrularia*, &c. By their characteristics they cannot belong to the carboniferous formation properly speaking, the period which preceded it, being preserved in the rocks which the carboniferous rocks rest. The principal localities in which these different fragments have been collected are the quarries (Loder's Creek), Russell's Shaft, Glen Williams, Burragood."

CALAMITES VARIANS.

Selloth, Petrefac, p. 399, pl. xx, fig. 2. Artia, Antiqu. Phytology, pl. 4.

This species is distinguished by the very short intervals between the shoots of the trunk becoming suddenly elongated in the basal part. The shoots of the basal portion were rather stout, disposed quincuncially. The scars are large and round, and the ribs near them converge towards them with their upper and lower extremities. The same thing is seen in the leaf-scars, but the converging ribs are less numerous, and there are more than three. From the Drummond Range I have a very good series of these plants, as will be seen from the accompanying measurements and figures, which place the nature of the fossils beyond doubt. It is the first time that we have any record from Australia of the roots and stems of this characteristic paleozoic plant. They abound in the strata, and there are some portions of the stone which seem to be made up entirely from the plant. Nevertheless, leaves are rarely found associated with the stems, fact, none of the more tender plants—such as ferns, or other plants—are found in these strata where *Lepidodendron* plants are found. In the neighbourhood of the shales, leaf impressions and ferns may be found; but these I have not as yet been able to examine.

It remains to say a word as to the age of these beds. It can be but little doubt that they agree in the fossil

Creek beds and those of Goonoo Goonoo. These, again, are typical with the plant remains of the lower coal formation of the type. These Australian formations, for which I propose the name of Bobuntungen beds, because they are best represented in place, are distinctly separated in their fossils from the Australian beds of Gippsland and Queensland, with *Lepidodendron australe* (McCoy), *Sphenopteris ignavensis* (McCoy), *Phleboteris howittii* (McCoy). They are equally distinguished from the Newcastle beds with *Glossopteris*, *Phylloleuca australis*, &c. and the well-known flora of our New South Wales coal area. I think we may also safely say that the Bobuntungen beds should be intercalated between them, which will give one link in the series which gradually unfolds itself of our Australian coal-bearing strata.

Without venturing to decide finally as to the horizons or the age to which I here give only provisionally to the formations I think that the time has come when we may very safely rely on the following order in which they are placed, as marking the relative age of their distinct and well-marked flora:—

Devonian rocks, with *Lepidodendron australe*, *L. nothum*, *Phylloleuca australis*, *Sigillaria*, *Stigmaria*, *Archiopteris howittii*, *Sphenopteris ignavensis*. Victoria: Iguana Creek, Gippsland. South Wales: Capertee? Mt. Lambie, Nyngang Creek (near Murrumbidgee). Queensland: Mt. Wyatt, Canoona, Broken River, &c. &c.

Lower carboniferous, with *Lepidodendron veltheimianum*, *Calamites radiatus*, *Rhacopteris inequaliterata*, *Cyclostigma australis*. Victoria: Not known. New South Wales: Smith's Creek, Goonoo Creek, Liverpool Plains, Rouchel River, County of Murrumbidgee, Queensland: Bobuntungen.

Upper Paleozoic (according to most authors), with *Glossopteris* (several species), *Phylloleuca australis*, *Vertebraria australis*, *Phleboteris angustifolia*, *Neggerathiotopsis spathulata*. Victoria: New Marsh. New South Wales: Newcastle, Greta, Raymond Island, Blackman's Swamp, Bowenfels, Mudgee, Illawarra, &c. &c. Queensland: Mackenzie and Dawson Rivers, Bowen River, Pelican Island (all within the tropics). Tasmania: Don River, Mersey

Mesozoic Beds. *Zamites*, *Atelopteris australis*, *Equisetum*, *Feldia odontopteroides*, *Ptenopteris daintreei*. *Palissya*, &c. and probably *Thinnifeldia indica*, with a *Brachyphyllium* resembling *B. manillare*, which would all indicate an age of so well-marked an oolitic form as this *Brachyphyllium* form, as Professor McCoy has long since pointed out. The age quite recently made by me. *Thinnifeldia indica* (at least), or a closely allied form to what is a characteristic fossil, has been recognized amongst some plant remains

Some of these were to be seen near Narrandera, Brown. They all, as it were, represented islets of vegetation, the intermediate country being filled up by beds had been seen, but they had proved to be of very still in some of these localities workable and valuable be found, and therefore this subject became one of importance as the railways extended into the interior of the

EXPLANATION OF PLATES.

PLATE XI.

Fig. 1. Portions of branches of *Lepidodendron veltheimianum*, natural size. These exhibit the impressions of peculiar scale-like leaves sharply to a point.

Fig. 2. Cast of exterior of same enlarged, showing the leaf scars.

Fig. 3. Branch of same internal cast. The reniform tubercles preceded by an elongated leaf impression; still this may not be the same plant.

Fig. 4. This was seen to be (from the lower portion which destroyed in getting out the fossil) a large Calamite root.

Fig. 5. Better preserved portion of root end of *Calamites* root. This specimen the scars of rootlets are well seen at the septa.

Fig. 6. Internal cast of trunk of *Lepidodendron veltheimianum*, natural size. This was seen to belong to the same species, as part of a tree-stem which had well defined leaf-scars.

PLATE XII.

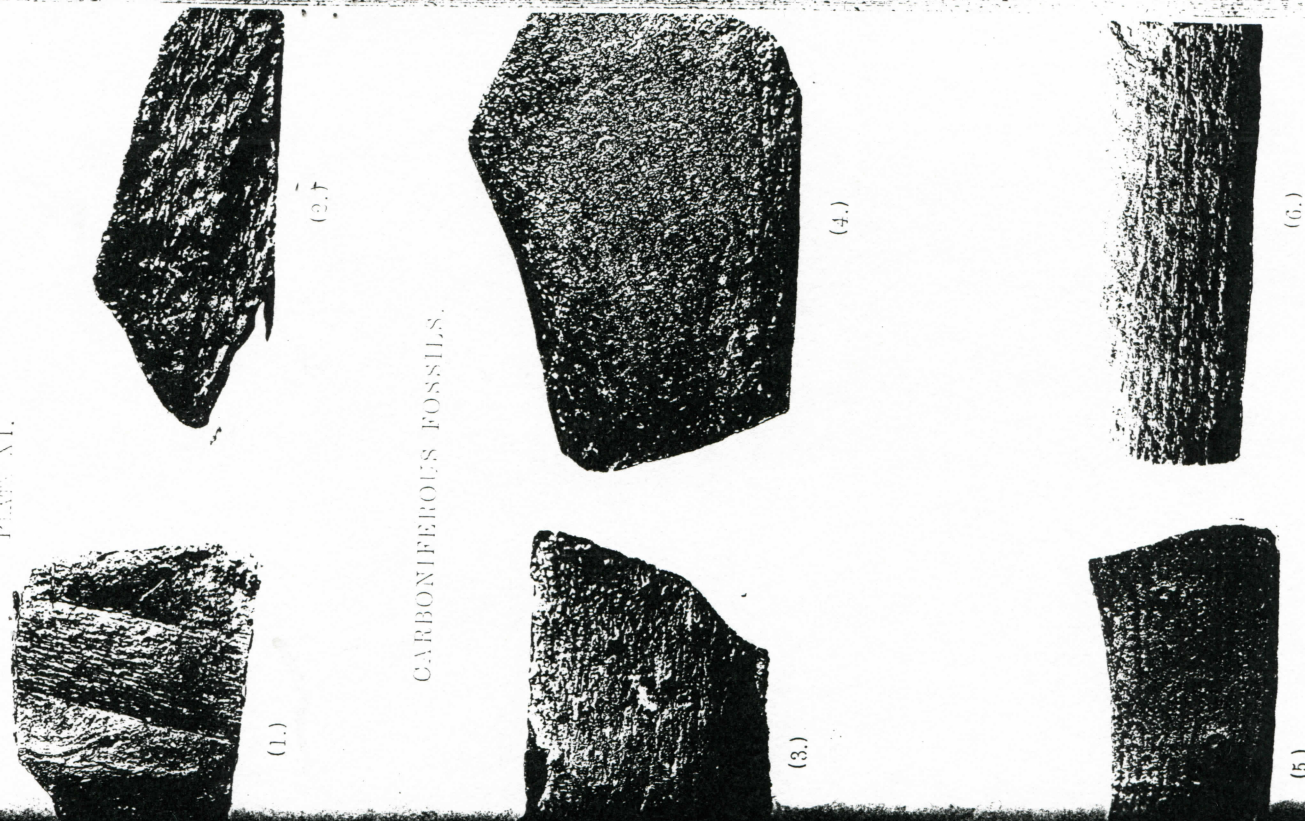
Fig. 7. *Calamites radiatus*. Stem natural size, showing septum of the ribs.

Fig. 8. Cast of small trunk of *Lepidodendron veltheimianum* inclined to regard this as an internal cast, nevertheless it may be surface with faint impressions of leaf-scars.

Sigmaria. Two-thirds natural size. This fragment lay in the rock in the rock, subtending a stem, probably of *L. veltheimianum* was three times the length of the portion figured.

Fig. 10. Stem of *Calamites radiatus*, half natural size. This has been an upper portion of a branch, as seen by the great distance the septa, and therefore was a large tree.

CARBONIFEROUS FOSSILS.



1. Portions of branches of *Lepidodendron veltheimianum*, half natural size.
2. Cast of exterior of same, enlarged.
3. Branch of same, internal cast, natural size.
4. Internal portion of root of *Calamites*, natural size.
5. Portion of a tree-stem which had well defined leaf-scars.
6. Stem of *Calamites radiatus*, half natural size.

PLATE XII.

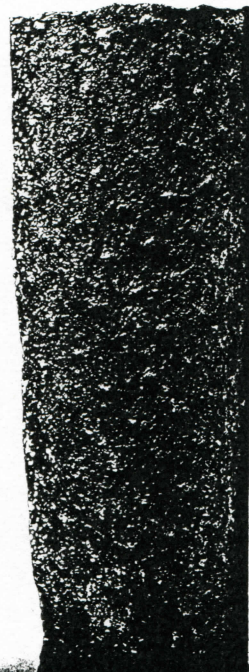


(7.)



(8.)

CARBONIFEROUS FOSSILS.



(9.)



(10.)

- 7. *Calamites radiatus*, stem natural size.
- 8. Internal cast of *Lepidodendron veltheimianum*, natural size.
- 9. *Siguanaria*, two-thirds natural size.
- 10. Stem of *Calamites radiatus*, half natural size.