

CONIFERAE: *Cryptomerites divaricatus* Bunb., *Cheirolepis setosus* (Phill.), *Araucarites Phillipsi* Carr., *Taxites zamioides* (Leck.), *Brachyphyllum mamillare* Brongn., *Pagiophyllum Williamsoni* (Brongn.), *Czekanowskia Murrayana* (L. and H.), *Nageiopsis anglica*, sp. nov.

GINKGOACEAE: *Ginkgo digitata* (Brongn.), *G. Whitbiensis* Nath., *Baiera Lindleyana* (Schimp.), *B. gracilis* Bunb., *B. Phillipsi* Nath., *Beania gracilis* Carr.

CYCADALES: *Williamsonia gigas* (L. and H.), *W. Pecten* (Phill.), *Otozamites Beani* (L. and H.), *O. acuminatus* (L. and H.), *O. graphicus* (Leck.), *O. Bunburyanus* Zign., *O. obtusus* (L. and H.), var. *oolitica*, *O. Feistmantelli* Zign., *O. parallelus* Phill., *Dioonites*, sp., *Nilssonina compta* (Phill.), *N. mediana* (Leck.), *N. tenuinervis* Nath., *Anomozamites Nilssoni* (Phill.), *Ptilozamites Leckenbyi* (Leck.), *Ctenis falcata* L. and H., *Podozamites lanceolatus* (L. and H.), *Pachypteris lanceolata* Brongn.

A. C. SEWARD, Cambridge.

**A NEW GENUS OF PALAEOZOIC PLANTS**<sup>1</sup>.— The following description is based on the examination of ten sections prepared from a fragment of stem in the Binney Collection (Woodwardian Museum, Cambridge). The type-specimen occurs in a calcareous matrix associated with the shells of *Goniatites*, and was originally obtained from the Lower Coal-Measures of Lancashire; it consists of a cylinder of secondary xylem, 2 cm. in breadth, enclosing a central region, 1.9 cm. in diameter, occupied by primary xylem. The wide primary stele is made up chiefly of groups of unusually large tracheids with their walls covered with bordered pits, associated with thin-walled parenchyma; the tracheids are characterized by their isodiametric or horizontally elongated form, while a few are distinguished by their greater length. In the peripheral region of the primary stele the tissue assumes various forms; the large short tracheids and parenchyma extend in places close up to the inner edge of the secondary wood, but more or less compact groups of narrower and longer tracheids occur here and there in the peripheral zone and constitute leaf-traces.

<sup>1</sup> Read before the Botanical Section of the British Association, Dover, Sept. 1899. For a more complete account of the genus *vide* Proceedings of the Cambridge Philosophical Society, Vol. x, Part III, p. 158, 1899.



A leaf-trace, as seen near its entrance into the secondary wood, presents the appearance of an oval group of comparatively narrow elongated tracheal elements and vertical rows of parenchyma, with about six external protoxylem groups. Each leaf-trace on passing vertically downwards through the primary tissues of the stem becomes less compact and spreads laterally in a fan-shaped manner; the elongated tracheids become shorter and more irregular in shape, and finally merge into the short and large tracheids of the more central region or metaxylem. Between the metaxylem and the xylem of the leaf-traces there is no sharp line of division, as each foliar strand in its downward course gradually loses its individuality and becomes indistinguishable from the metaxylem. An examination of the transverse sections leads to the conclusion that the stem had a phyllotaxis of two-fifths. The secondary wood agrees in structure with that of recent Cycads and with *Lyginodendron*, *Medullosa* and other Palaeozoic genera. The characteristic features of the plant, which it is proposed to name *Megaloxylon Scotti*<sup>1</sup>, may be summarized as follows:—

*Megaloxylon Scotti*, gen. et sp. nov. The primary single stele consists of a peripheral leaf-trace region and a central metaxylem region; the metaxylem consists of tracheids varying in shape from isodiametric and somewhat flattened to more or less elongated elements with numerous bordered pits on their walls. With the large isodiametric or even horizontally elongated tracheids occur some smaller short tracheids and occasionally irregularly-shaped longer tracheal elements. The metaxylem tracheids occur in groups of varying size and form scattered through a parenchymatous ground-mass, which includes small secretory cells.

At the periphery of the primary stele numerous strands of spirally pitted protoxylem tracheids occur in an exarch position; these strands of protoxylem occupy different positions in regard to one another in different parts of the stem, according to the position in its vertical course at which a leaf-trace is seen. A leaf-trace has the sectional form of an elliptical mass of long tracheids—with bordered pits on their walls and of somewhat larger diameter than the tracheids

<sup>1</sup> I have associated this new species with the name of my friend, Dr. D. H. Scott, whose researches have so materially extended our knowledge of the Cycadofilices and demonstrated the importance of this extinct group from a phylogenetic standpoint.



of the secondary wood, but much narrower than the large metaxylem tracheids—associated with short parenchymatous cells; several groups (at least six) of protoxylem elements occur on the external edge of the trace. As a leaf-trace passes deeper into the stem the tracheids become less compactly arranged, and the whole leaf-trace becomes wider and less well defined; its long and narrow tracheids are gradually replaced by shorter elements of more irregular and variable form, and these are eventually linked on to the short and large tracheids of the metaxylem region; the peripheral leaf-trace region and the axial metaxylem regions of the stele are in close organic connexion.

The secondary wood of the stem is made up of regular rows of tracheids, with multiseriate bordered pits on their radial walls, and broad and deep medullary rays composed of short parenchymatous cells.

As a leaf-trace passes through the secondary xylem of the stem its primary tissues become enclosed by a zone of secondary tracheids and medullary rays.

The structure of the primary wood recalls that of *Heterangium* and *Medullosa anglica* Scott, but there are certain important peculiarities in the present species which constitute well-marked differences and render advisable the institution of a new generic name. The primary peri-medullary strands in the stele of *Heterangium*, as also in *Medullosa anglica*, are distinctly mesarch in structure, whereas in *Megaloxylon* the protoxylem groups occupy an exarch position. Another distinctive feature of the new type is the unusually large size and the peculiar short form of the metaxylem tracheids—elements which probably served for water-storage rather than for transport.

In *Megaloxylon* we have a type of stem in which the primary xylem is distinctly of the fern type; the protoxylem is external, and not internal as in *Heterangium*; but in recent ferns the xylem may be endarch, mesarch or exarch, and no great importance from the point of view of affinity to the ferns as a group should be attached to this point. On the other hand the mesarch structure of the xylem of *Heterangium*, *Lyginodendron* and other *Cycadofilices* affords an important Cycadean character, which is not met with in *Megaloxylon*.

*Megaloxylon* adds another connecting link between the Palaeozoic *Cycadofilices* and recent ferns; in anatomical characters the two



genera *Lyginodendron* and *Heterangium* approach most nearly to the Osmundaceae and Gleicheniaceae respectively; in *Megaloxyton*, on the other hand, the structure of the primary xylem affords evidence that the *Lygodium* type of stem was also represented in the Cycad-fern alliance, which played so prominent a part in Palaeozoic vegetation.

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**ON THE PRIMARY WOOD OF CERTAIN ARAUCARIOXYLONS.**—The genus *Araucarioxylon* of Kraus (*Araucarites*, Goepp., *Dadoxylon*, Endl.) is used to include those fossil Gymnospermous woods which have approximately the structure of the recent *Araucaria* or *Dammara*. The characters of the genus as given by Kraus are as follows: ‘Lignum stratis concentricis distinctis vel obsoletis; cellulis prosenchymatosis porosis; poris magnis rotundis, rarius uniseriatis contiguis, creberrime pluriseriatis spiraliter dispositis compressione mutua hexagonis; cellulis ductibusque resiniferis nullis; radiis medullaribus uni-rarius pluriseriatis<sup>1</sup>.’

The genus is admittedly an artificial and provisional one. From the investigations of Grand'Eury and Renault we know that many, though not necessarily all of the Palaeozoic Araucarioxylons were identical with the wood of the Cordaiteae, that remarkable extinct Order of Gymnosperms which those observers have revealed to us. Other specimens, and especially those of Mesozoic age, no doubt belonged to true Coniferae; in fact the secondary wood, by itself, is of little value as a guide to affinities. Where other tissues, such as the pith and primary xylem, are also preserved, the case is a good deal more favourable, for we then have the anatomical ground-plan of the organ before us. The study of the primary tissues will no doubt lead in the future, as it has done in the past, to the gradual breaking up of these artificial genera into more natural groups.

In the Cordaiteae and in the more typical Araucarioxylons generally, the primary wood of the stem, where it has been investigated, has proved to be purely *centrifugal* in development, the first-formed spiral tracheides lying at the inner edge of the wood, adjacent to the pith<sup>2</sup>.

<sup>1</sup> In Schimper, *Paléontologie Végétale*, vol. ii, p. 380, 1870.

<sup>2</sup> I leave out of account, for the moment, such stems as those of *Protopitys* or *Lyginodendron*, which were at one time included under *Araucarioxylon*, but have long since been separated.



Seward, A C . 1899. "A new genus of Palaeozoic plants." *Annals of botany* 13, 612–615. <https://doi.org/10.1093/oxfordjournals.aob.a088755>.

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