

A NEW PARASITIC DISEASE OF THE JUNCACEAE.—PRELIMINARY NOTICE.—The roots of various species of *Juncus* are subject to the attack of a Mycetozoon parasite, which I propose to call '*Sorosphaera Junci*' as being allied to *S. Veronicae*. The terminal stages in the life-histories of both these Fungi are strikingly similar, the wedge-shaped spores being collected into spherical balls, the sorospheres, although in the case of *S. Junci* many of these balls are of elliptical shape, and often merely loosely aggregated masses of spores fill the root-cells. The stages of nuclear division in both parasites are also similar. In old infected roots the cortical cells are filled with sorospheres and spores, and in those of recent infection the cells contain the nucleated amoebae of the parasite, and in some the nuclei may be seen collecting in masses previous to spore-formation. The infection of the root takes place by the entry of an amoeba into a root-hair and thence into the cortex of the root. The roots show no hypertrophy. This Fungus is in no way related to the *Entorrhiza*, which has been described by Weber in Bot. Zeit., 1884, as being the cause of tubercle-formation in the roots of *Juncus bufonius*. The latter is doubtless one of the Ustilagineae; its young spores are binucleate, and it infects the root by means of conidia which push their way down the root-hairs. I hope shortly to publish in detail an investigation into the life-history of *Sorosphaera Junci*.

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ON MESOXYLON, A NEW GENUS OF CORDAITALES.—PRELIMINARY NOTE.—The relation of *Poroxylon* to *Cordaïtes* has been recognized ever since the discovery of the former genus by Renault, in 1879. The main anatomical distinction lies in the presence, in the stem of *Poroxylon*, of well-marked strands of centripetal wood, forming part of the leaf-trace bundles at the margin of the pith; the stem of *Cordaïtes*, as Renault states, is 'absolutely deprived of centripetal wood',¹ the leaf-traces only acquiring it on entering the leaf. Another character of importance is the usually discoid pith of *Cordaïtes*, while that of *Poroxylon* is continuous, and further distinctions are to be found in the denser wood of *Cordaïtes* and in the structure of the phloem.

Within the last five years several stems have come to light in the calcareous nodules of the Lower Coal-Measures of Lancashire, combining the characters of *Poroxylon* and *Cordaïtes*. The object of the present Note is to briefly place these observations on record, and to establish a new genus for the fossils in question. The generic name *Mesoxylon* has been chosen, to express the intermediate position of the genus.

One of the species now placed in *Mesoxylon* has already been shortly described by one of us under the provisional name *Poroxylon Sutcliffii*,² while others have been referred to under *Cordaïtes*.³ It is now proposed to unite these forms, with others since discovered, making five species in all, in the genus *Mesoxylon*. There are already indications that further species may shortly have to be added.

¹ Bassin Houiller et Permien d'Autun et d'Épinac. Flore Fossile. II^me Partie, 1896, p. 332.

² Scott, Studies in Fossil Botany, 2nd edition, 1909, p. 511, Fig. 184.

³ Loc. cit., p. 526.

The new genus, the species of which may be said to combine the anatomical habit of a *Cordaite* with the centripetal xylem of a *Poroxyton*, may be characterized as follows:—

MESOXYLON, gen. nov.

Pith relatively large, discoid.¹

Wood dense, with narrow, usually uniseriate medullary rays, and relatively small tracheides.

Leaf-traces double where they leave the pith, the two strands uniting at a lower level, but undergoing further subdivision in the pericycle and cortex, before entering the leaf.

Centripetal xylem present in the stem, where it forms part of the leaf-traces at the margin of the pith and throughout their course outwards into the leaves.

Outer cortex strengthened by a system of sclerenchymatous bands of the Dictyoxylon or Sparganium type.

Throughout the genus the wood is of the kind usual in Cordaitales, the bulk of the secondary tracheides having multiseriate bordered pits on the radial walls.

The tracheides of the leaf-traces, so far as observed, are spiral or scalariform, and in some species this is also the case in the inner part of the intermediate secondary wood.

A brief diagnosis of the species follows:—

1. *Mesoxylon Sutcliffii*²; *Poroxyton Sutcliffii*, Scott, Studies in Fossil Botany, 2nd edition, 1909, p. 511; Fig. 184 (transverse section of stem).

Leaf-bases crowded, completely covering the surface of the stem.

Pith large, discoid, with a persistent outer zone.

Twin-bundles of the leaf-trace, at the margin of the pith, remaining separate through several internodes before fusing; subdividing in the cortex to form about eight bundles in all.

Petiole of leaf flat, containing about sixteen bundles.

Centripetal xylem distinct, persisting below the point of fusion of the two leaf-trace bundles.

Tracheides of the leaf-traces spiral or scalariform; those of the intermediate secondary wood pitted, except sometimes at the extreme inner margin.

Medullary rays uniseriate, 3–6 cells in height.

An axillary bud present in the axil of every leaf.

Dictyoxylon zone of cortex somewhat narrow.

Roof-nodules; Shore, Littleborough.

The very numerous sections of this species appear to represent about nine distinct specimens. The diameter is pretty uniformly about 3 cm., including the leaf-bases, the pith alone having an average diameter of 1.4 cm. This is the only species in which anything is known of the leaf.

2. *Mesoxylon poroxyloides*, sp. nov.

Leaf-bases somewhat less crowded than in the preceding species.

Pith of moderate dimensions, discoid, with a persistent outer zone.

¹ This point is not yet demonstrated in the case of *Mesoxylon platypodium*; see below.

² The specific name, in honour of the owner of the colliery at Shore (reopened on account of its richness in fossil remains), was originally suggested by Mr. J. Lomax, who sent out the sections under the name *Cordaite Sutcliffii*. All the species described are derived from the Shore workings.

Twin-bundles of the leaf-trace soon uniting after reaching the pith, subdividing in the cortex to form eight bundles.

Centripetal xylem distinct, persisting after fusion of the two leaf-trace strands.

Tracheides of the inner part of the intermediate secondary wood, as well as those of the leaf-traces, spiral or scalariform.

Medullary rays usually uniseriate, 1–8 cells in height.

No axillary buds or branches observed.

Dictyoxylon zone of cortex very broad, fibres not much thickened.

Seam-nodule, Shore, Littleborough.

Only one specimen has been investigated, though others are probably referable to the same species. The mean diameter of the stem is about 2.5 cm., that of the pith about 8 mm. The great distinctness of the centripetal xylem, the early union of the leaf-trace strands at the margin of the pith, and the moderate size of the latter accentuate the resemblance to *Poroxylon*.

3. *Mesoxylon multirame*, sp. nov.

Leaf-bases moderately crowded, as in *M. poroxyloides*.

Pith large, discoid, with a persistent outer zone.

Twin-bundles of leaf-trace approximated on reaching the pith, but remaining separate for several internodes; subdividing in the cortex as in other species.

Centripetal xylem dying out rather rapidly after the leaf-trace reaches the pith.

Tracheides and medullary rays essentially as in *M. poroxyloides*.

An axillary branch present in most of the leaf-axils. Base of branch leafless, with a flattened stele, recalling a phylloclade.

Dictyoxylon zone of cortex broad, fibres strongly thickened.

Seam-nodule, Shore, Littleborough.

One specimen only has been investigated. Among the preparations, a series of fifteen transverse sections was available, in which the course of the leaf-traces and axillary steles could be traced with great precision.

The phyllotaxis, however, remains a difficulty. The orthostichies are sufficiently numerous to correspond to a $\frac{5}{13}$ arrangement, if not to a higher fraction, but the actual divergence between two successive leaf-traces seems to be considerably less than on any usual phyllotaxis.

The naked axillary branches are remarkable, and very different from the little buds of *M. Sutcliffii*—evidently the two organs had quite distinct functions.

The stem observed is about 2.5 cm. in diameter, the pith measuring just half this—12.5 mm.

4. *M. Lomaxii*, sp. nov.

Leaf-bases scattered.

Pith large and discoid, with a persistent outer zone.

Twin-bundles of leaf-trace converging, and fusing immediately on reaching the pith.

Centripetal xylem very distinct and persistent.

Xylem-strands at the margin of the pith sheathed by radiating parenchyma.

Scalariform tracheides almost limited to leaf-traces, only appearing at the extreme inner edge of the intermediate secondary wood.

Medullary rays uniseriate, 1-12 cells in height.

Dictyoxylon zone of cortex narrow; periderm very broad.

Roof-nodule, Shore, Littleborough.

This is a very distinct form, characterized by the very early fusion of the two leaf-trace strands, and the definite sheath about the primary xylem.

Three specimens have been observed (possibly fragments of one), all being about 5 cm. in diameter, with a pith about 2 cm. across.

The species is named after Mr. James Lomax.

5. *Mesoxylon platypodium*, sp. nov.

Leaf-bases very broad, scattered.

Pith large, with a persistent outer zone; interior not preserved.

Twin-bundles of each leaf-trace very far apart at margin of pith; where they leave the wood each of these bundles already subdivided, as regards its primary xylem. Leaf-trace in cortex consisting of two distinct rows of four bundles each.

Two distinct axillary steles to the same leaf.

Centripetal xylem very well developed and persistent at margin of pith.

Scalariform tracheides apparently limited to leaf-traces or their neighbourhood; those of secondary xylem sometimes pitted throughout.

Medullary rays 1-12 cells in height.

Sparganum zone of cortex narrow.

Roof-nodule, Shore, Littleborough.

This is the most isolated of the five species, and is characterized by the extreme separation (2 mm.) of the twin-bundles of the trace, and by their secondary division while still in the woody zone.

The two axillary steles corresponding to a single leaf constitute a very striking feature. It is interesting to note, in this connexion, that the axillary stele in *M. Sutcliffii* is sometimes double, though the two steles appear always to reunite before entering the bud. The specific name, *platypodium*, refers to the great breadth of the leaf-base.

The systematic position of the genus *Mesoxylon* will be discussed in our full paper which is in course of preparation. In the meantime it may be pointed out that these stems appear to completely bridge the gap, so far as anatomy is concerned, between the Poroxyleae and the Cordaiteae, and thus form valuable links in the chain of forms connecting the Pteridosperms with the typical Gymnosperms.

All the specimens were discovered by Mr. James Lomax and his son, in the Shore material, and the sections cut by them.

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Scott, Dukinfield Henry and Maslen, A. J. 1910. "On Mesoxylon, a new genus of Cordaitales.—preliminary note." *Annals of botany* 24, 236–239.

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