

In the genus *Cystopus* fertilization is effected in *C. candidus* by the fusion of two nuclei, whereas in an allied species, *C. bliti*, about one hundred nuclei fuse in pairs to effect the same object.

Finally, in the Uredineae binucleate cells are usual during one phase of the life-cycle, but in *Entyloma glauci*, one of an allied group, the cells during this same phase are multinucleate.

The above examples illustrate only some of the variants as to number of nuclei in the cells of closely allied species, after which much faith is necessary to admit the value of the number of nuclei present in cells as indicating phylogenetic affinities.

Returning to the conidial form of *Hypomyces perniciosum*, where the binucleate cells are reproduced by conjugate division, or, in other words, where the two nuclei in a cell divide simultaneously, viewed from Dangeard's standpoint the fusing of the two nuclei in the conidium is a sexual act, and the conidium becomes an oogonium; hence what is considered by common consent to be an asexual conidial form is, according to Dangeard, the sexual form, and the ascophore stage emanating from the germinating conidium and having uninucleate cells, which is considered as representing the sexual phase, becomes according to Dangeard a conidial or asexual phase.

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**ON SOME NEW SPECIES OF LAGENOSTOMA<sup>1</sup>: A TYPE OF PTERIDOSPERMIOUS SEED FROM THE COAL MEASURES (ABSTRACT).**—The recent discoveries of the seeds of two genera of the Cycadofilices, *Lyginodendron* and *Medullosa*, mark an important epoch in the history of our knowledge of Palaeozoic plants. As a corollary of this work, attention has been called afresh to the impressions or casts of seed-like bodies which occur, here and there, in the sandstones and shales of the Coal Measures, with the result that two new species, described here, have been identified as members of the genus *Lagenostoma*. Although the anatomical structure is not preserved in either case, these seeds in their external morphology agree so closely with the three species of *Lagenostoma* previously recorded from petrified material that there can be no hesitation in referring them to the same genus. In view of the recent attribution of the seed *Lagenostoma Lomaxi* to *Lyginodendron* by Professor Oliver and Dr. Scott, it is highly probable that these new species belonged either to that genus or to some closely related member of the Lyginodendreae. These specimens also throw light on the habit of these plants, especially with regard to the manner in which the female organs were borne, a character which is, with rare exceptions, extremely difficult to ascertain in the case of fossil plants owing to the fragmentary nature of the evidence.

<sup>1</sup> Abstract of a paper read before the Royal Society on February 23, 1905.

*Lagenostoma Kidstoni* sp. nov.

The first species, for which the name *Lagenostoma Kidstoni* is proposed in honour of Mr. R. Kidston, F.R.S., to whom I am indebted for information respecting the specimens, was obtained many years ago from the Lower Coal Measures at Swinhill Colliery, Stonehouse, Lanark. There are two specimens showing these seeds, one of which is in the British Museum (Nat. Hist.), and the other in the Hunterian Museum, Glasgow.

The seed, *L. Kidstoni*, is of the radiospermic type, and measures on an average about 6 mm. in length, and 2.5 to 3 mm. at its greatest width. The integument, at the apex of the seed, is divided into several short, blunt lobes, which appear to be usually six in number. The seed is slightly ridged longitudinally, the number of ridges probably corresponding to the number of apical lobes. In point of size and in its general morphology, *L. Kidstoni* agrees fairly closely with *L. physoides*, Will.

A large number of these seeds have been examined, and in every case they have proved to be naked. In only one instance has any organ been observed which could be regarded as of the nature of a 'cupular' investment, similar to that of *L. Lomaxi*, and here it does not obviously subtend the seed.

The seeds are in nearly every instance detached. Associated with them are several long, naked rachis-like structures, which correspond somewhat closely with portions of certain highly-compound fronds of the *Sphenopteris* type. In one particular case several seeds may conceivably be still attached to what is probably the termination of one of the finer branches of these axes. If this specimen is rightly interpreted, there would appear to be some evidence, though not as conclusive as one could wish, for the provisional view that these seeds were borne sessile on the terminations of the finer branches of a foliar organ probably of the *Sphenopteris* type.

*Lagenostoma Sinclairi*, Kidston MS.

For the loan of these specimens I am indebted to Mr. Kidston, who has recorded them, and has since proposed in MS. the specific name *L. Sinclairi*. They were obtained from the Lower Coal Measures at Grange Colliery, Kilmarnock, Ayrshire.

These specimens are particularly interesting, since many of the seeds are enclosed in a 'cupule-like' investment, and are still attached to the axes on which they were borne in the living state.

The seeds are radiospermic, and vary from 4 to 5.5 mm. in length, and from 1.5 to 3 mm. in breadth at their widest part. The integument is slightly notched or fluted at the apex, and in this respect recalls *L. Lomaxi*. The 'cupules' vary from 8 to 9.5 mm. in length, and are attached to the axis slightly below the seed. They enclose the seed somewhat loosely, and are divided at the apex into several, apparently erect, lanceolate lobes.

It seems probable that the axes on which the seeds are borne are the segments of a highly compound frond with reduced lamina, in all probability of the *Sphenopteris* type.

*General Conclusions.*

The chief conclusion arrived at from a study of these new seeds relates to the light which they throw on the habit of members of the Pteridospermeae. At present we are only acquainted with one genus, *Medullosa*, in regard to the manner in which the seeds were borne.

In neither *L. Kidstoni* nor *L. Sinclairi* is there any direct evidence as to the type of sterile frond with which they were associated, but the general morphology of the branched axes bearing the seeds affords a valuable clue to the habit of the sterile fronds. These axes are regarded as portions of a compound frond with reduced lamina. In the case of *L. Kidstoni* the long rachis-like structures present many points of morphological similarity to the fronds of the *Sphenopteris* type. In *L. Sinclairi* the frond, had it possessed a lamina, would in all probability be placed in the same genus. Thus there is every reason to suppose that the sterile foliage associated with these seeds was of the *Sphenopteris* type.

This conclusion is supported by the recent attribution of the seed *L. Lomaxi* to *Lyginodendron*, a stem known beyond doubt to have possessed fronds of this nature. There is thus strong evidence that these new species, which in the morphology of their seed-bearing axes approach so closely to the foliar organs of *Lyginodendron*, and, in their seeds, agree so well with *L. Lomaxi*, were borne by stems either of *Lyginodendron* itself, or of some closely related member of the same family possessing the *Sphenopteris* form of sterile foliage.

There is, therefore, to be found in these specimens the first definite clue to the habit of the Lyginodendreae with regard to the manner in which the female fructification was borne. If this conclusion is correct, we may picture these plants as bearing, in addition to numerous highly-compound fronds of the *Sphenopteris* type, others in which the lamina was wholly or partially reduced, and in which the ultimate branches terminated in seeds, with or without a 'cupular' investment.

In the lax arrangement of the fructification, the Pteridospermeae must have presented a striking contrast in habit to the members of most of the other great Palaeozoic groups, in which compact strobili were for the most part conspicuous and dominant types of sporangial aggregation. Among living plants, almost the only analogue is to be found in the female sporophyll of *Cycas*.

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Arber, E. A. Newell. 1905. "On some new species of Lagenostoma: a type of pteridospermous seed from the coal measures (abstract)." *Annals of botany* 19, 326–328. <https://doi.org/10.1093/oxfordjournals.aob.a089004>.

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