

RECONSTRUCTION OF THE VEGETATIVE BRANCHES OF *Phyllothea etheridgei* ARBER AND *P. SAHNII* SAKSENA

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ABSTRACT

On the basis of the impressions of fragments of stems and old and young leaf-sheaths the vegetative branches of *Phyllothea etheridgei* Arber and *P. Sahnii* Saksena have been reconstructed in natural size diagrams. *P. etheridgei* is an Australian species belonging to the New Castle Series (Upper Coal Measures) while *P. Sahnii* is an Indian species from the South Rewah Gondwana basin. The reconstruction of *P. Sahnii* is based considerably on the idea derived from the impressions of *P. etheridgei*, as the fragmentary impressions of the Indian species are very similar to those of the Australian.

INTRODUCTION

THE original material of *Phyllothea etheridgei* Arber (1905) was obtained by the late Professor Birbal Sahni from the Australian Museum, Sydney, and from the Sedgwick Museum, Cambridge, for comparing with *P. Sahnii* Saksena (1952) from South Rewah Gondwana basin, Central India. Both the Sydney and the Cambridge specimens came from the same locality in Australia. They consisted of the type specimens which were collected from the New Castle Series (Upper Coal Measures) at Shepherd's Hill, near New Castle, New South Wales, and from the same horizon at Merewether Beach, New Castle. The Indian specimen was collected by Mr. N. K. N. Aiyengar of the Geological Survey of India. It is now kept at the Birbal Sahni Institute of Palaeobotany, Lucknow.

The reconstruction of the vegetative branch of *Phyllothea etheridgei* is based on the impressions of stems and leaves which are preserved in different stages of growth. The Indian species, *P. Sahnii*, is very closely allied to *P. etheridgei* and its reconstruction is based partly on its actual impressions and partly on the idea derived from the impressions of the Australian species.

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to the late Professor Sahni who very kindly placed the material for study at his disposal.

MATERIAL

Three specimens—F. 5470 (smaller piece), F. 5470 (bigger piece) and F. 29696—from Australian Museum, Sydney, and seven specimens—L 95, L 96a and b, L 98a to d—from Sedgwick Museum, Cambridge, were obtained. Out of these all the specimens from Sydney and L 96a from Cambridge have proved helpful in the reconstruction of the vegetative branch of *Phyllothea etheridgei*.

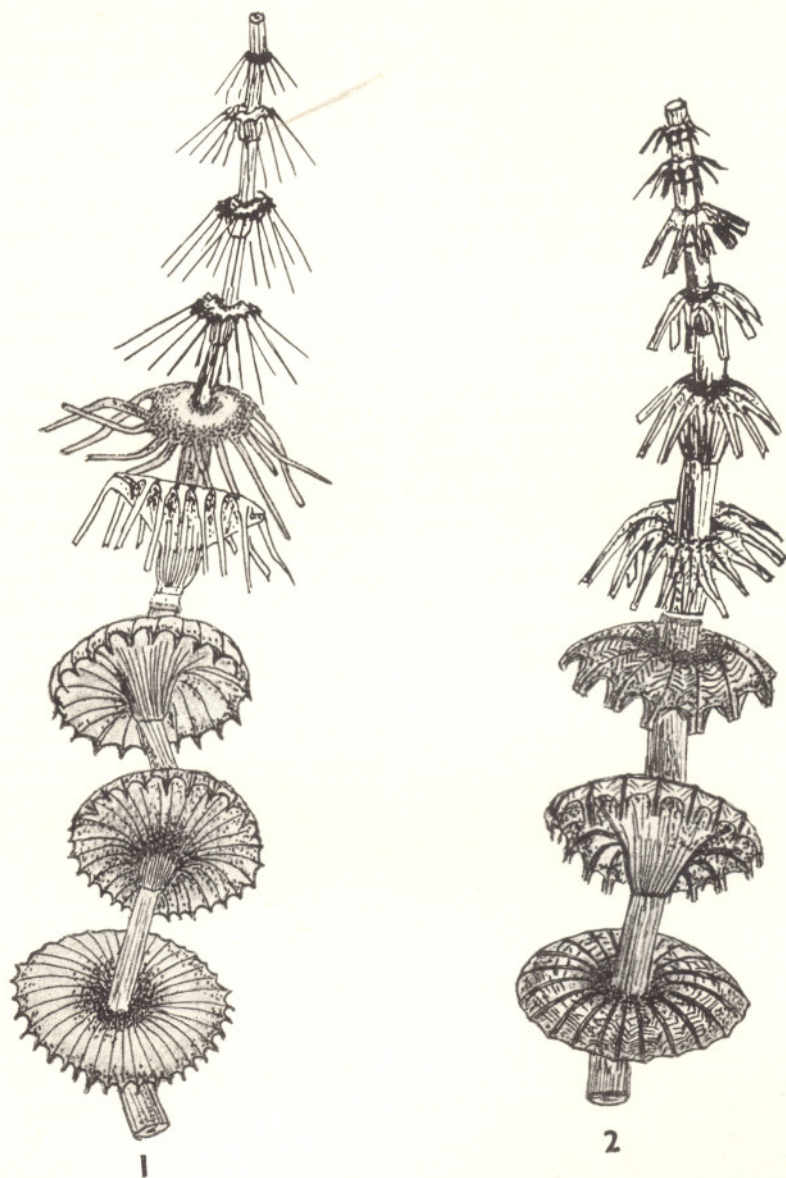
P. Sahnii is represented by four fragments preserved on two counterparts of a specimen of carbonaceous shale, bearing Geological Survey of India number K 25/522. The plant material is in the form of soft, delicate, highly carbonized crust.

DESCRIPTION

Phyllothea etheridgei Arber

On specimen 96a there are well-preserved impressions of nodes with leaf-sheaths and internodes of the older parts of the stem. On specimens F. 5470 and 29696 are preserved a young branch with nodes and internodes, a young leaf-sheath and several others in cross-section. The leaf-sheaths are preserved at various angles, on the basis of which a complete reconstruction of the same can be made. The structure of the young and old leaf-sheaths can be well made out in one and the same specimen (F. 5470, FIG. 5). After giving the description of each part separately the whole branch has been reconstructed (TEXT-FIG. 1) on the basis of actual impressions.

Internode—There are two specimens showing several internodes. One of these (L 96a, FIG. 2) shows a portion of an adult stem. It has two clear internodes, both of which are 1.8 cm. long. The stem



TEXT-FIGS. 1, 2 — 1, reconstruction of a branch of *Phyllotheca Etheridgei* Arber. 2, reconstruction of a branch of *Phyllotheca Sahnii* sp. nov.

is ridged. The other specimen (F. 5470 — bigger piece, FIG. 4) shows a younger stem with three complete and two incomplete internodes. The complete internodes measure approximately 1.3, 1.1 and 0.7 cm. respectively, the smallest internode indicating the portion of the stem nearer the apex. The gradual shortening of the internodes clearly shows the

approach of the apical portion which is not preserved in the specimen. The adult internode is about 1.8 cm. long, while the longest internode in the young branch is 1.3 cm. The intermediate portion has been completed on imaginary basis.

Nodes and Leaf-sheaths — The nodes are marked with the attachment of the lower portion of the leaf-sheaths. The old leaf-

sheaths can be divided into three portions — base, disc and teeth (FIG. 3). The tentacle-like prolongations of teeth are seen. In young leaf-sheaths are seen tentacle-like prolongations of the teeth (FIG. 5) which represent individual linear leaves or segments forming the sheath. In the sheath there are 31 or more veins which continue in the teeth or in the tentacular prolongations of the free portions of the leaves.

The base of the sheath, which is marked by veins, is narrow, ascending, amplexicaul. It clasps the stem for about 3 mm. (FIG. 3A) after which it gradually spreads out into an open saucer-like peltate disc, which gradually curves backwards. The teeth point outwards and bend slightly downwards at the tip while the tentacles, due to their length and weight, hang downwards (FIG. 4).

All these characters which are seen clearly preserved in different specimens have been put together to give the collective idea of a vegetative branch of *Phyllothea Etheridgei*.

Phyllothea Sahnii Saksena

One of the four fragments shows a leaf-sheath flatly preserved, the distal portion of which seems to be incomplete. The sheath

consists of 22 veins (FIG. 8). It cannot be said decisively about this species whether in its adult sheaths there are teeth or strap-shaped projections, because the distal part of the sheath is not visible. Most probably, due to the incurved margin of the disc the distal portion is either overlapped by the body of the disc or destroyed. Moreover, due to the carbonized impression the overlapping cannot be made out.

The other fragment represents only a part of a leaf-sheath, but in this impression the segments give the clue that their distal ends are free and are continued into a strap or tentacle-like prolongation (FIG. 6C). The third fragment shows the longitudinal section of a stem at a node in which the ascending amplexicaul base of the sheath, and the spreading and incurving of the saucer-like peltate disc is well represented (FIG. 7). This fragment compares very well with a similar impression of *P. Etheridgei* (FIG. 3B). On the basis of these similarities it is concluded that *P. Sahnii* was very similar to *P. Etheridgei* in general habit and form. It differed only in minor details (SAKSENA, 1952, p. 414). Therefore, in the reconstruction of the vegetative branch of *P. Sahnii* much help has been taken from the details available from *P. Etheridgei* especially with regard to the internodes and younger portion of a branch.

REFERENCES

- ARBER, E. A. N. (1905). *The Glossopteris flora. British Universities Catalogue, London.*
 SAKSENA, SHIVDAYAL (1952). On a new species of *Phyllothea* (*P. Sahnii*) from the South Rewa Gondwana basin, Central India, and its comparison with *P. Etheridgei* from the New Castle Series, New South Wales, Australia. *The Palaeobotanist* (Birbal Sahni Memorial Volume). 1: 409-415.

EXPLANATION OF PLATE 1

1. *Phyllothea Etheridgei* Arber, specimen L 96b. × 1.
2. *Phyllothea Etheridgei* Arber, specimen L 96a. × 1.
3. *Phyllothea Etheridgei* Arber, specimen F. 29696. A, leaf-sheath in side view showing base, disc and teeth. B, a node with leaf-sheath in sectional view.
4. A young branch of *P. Etheridgei* Arber, with an impression of an old leaf-sheath lying in its side. Specimen F. 5470 (bigger piece). × 1½.
5. *Phyllothea Etheridgei* Arber (smaller piece), showing two young leaf-sheaths at A and B and an old one at C. × 1.1.
6. *Phyllothea Sahnii* sp. nov. General view of all the four segments (A-D). Specimen K 25/522. × 1.
7. *Phyllothea Sahnii* sp. nov. Counterpart of specimen K 25/522. × 1.
8. *Phyllothea Sahnii* sp. nov. Fragment A (leaf-sheath), and fragment B (stem with a node) enlarged from the counterpart of specimen K 25/522, Fig. 7. × 3.

