

STUDIES IN THE GLOSSOPTERIS FLORA OF INDIA —  
9. A MALE FRUCTIFICATION BEARING MONOLETE SPORES  
FROM THE LOWER GONDWANA OF INDIA

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ABSTRACT

A new type of male fructification is described from the Raniganj stage. It consists of a long, cylindrical, stalked perhaps fleshy axis on which are embedded exannulate, most probably sessile sporangia. Sporangia contain large number of bilateral monolete spores. Spore wall shows parallel ridges or longitudinal lines on the distal surface.

**A** NUMBER of isolated spores are known from the Lower Gondwanas, and sometimes even loose sporangia containing spores have been obtained by maceration of coal. However, the fructifications as such are rare and hence the present specimen is of some interest. The specimen was collected from the Raniganj stage, New Kenda Colliery in the Raniganj coalfields.

DESCRIPTION

The fructification (PL. 1, FIG. 1) is a long slender spike or cone-like organ, borne on a slender stalk about 1 mm. in diameter and exposed to about 18 mm. in length. The stalk must have been longer than this but it could not be traced further. It is swollen at the point of attachment with the fructification. The fertile part measuring 4 cm. in length and 5 to 3 mm. in breadth is cylindrical (PL. 1, FIGS. 1, 2), broad just above the base and narrowing gradually towards the apex which is triangular and acute.

The fructification was preserved in the form of a thick compression which came off easily from the shale and was mounted on a slide as a transfer.

The sporangia are oval in shape, leaving oval impression on the surface of the fructification, about 1.5 to 1 mm. in length and about 1 mm. in breadth at the broadest part (PL. 1, FIG. 2). They are arranged irregularly and no definite arrangement is discernible. They are 6 to 8 in a row in the lower part and 3 to 4 in the upper part of the fructification. No stalk is seen.

As regards arrangement, some of the sporangia have their narrow ends pointed

towards the base while in some they are towards the apex. It is not known how the sporangia dehisced.

The sporangia contain a large number of monolete spores (PL. 1, FIG. 3). In some fractured sporangia spores could be observed under the low power binocular microscope. A few such spores were picked up and were directly mounted on the slide (without treatment with acid or alkali). One such spore is shown in PL. 1, FIG. 4.

A small portion of the incrustation consisting of sporangia just above the stalk was removed and put into acid. A large number of spores were released (PL. 1, FIG. 3), but there was no trace of any cuticular pieces or even thickened cells of the sporangial wall. The carbonized crust yielded nothing but a large number of spores compressed in all directions.

*Spores* — Bilateral (PL. 1, FIG. 5), monolete, average size  $72 \times 55 \mu$  ( $64-90 \times 46-73 \mu$ ). The smallest spore measured  $46 \times 36$  and the largest  $92 \times 64 \mu$ . Slit is long with slightly prominent lips. The unmacerated spore shows long, slightly curved, almost parallel grooves enclosing darker ridges on the surface (PL. 1, FIG. 4). In the macerated spores these ridges almost disappear and the spores are smooth except for fine longitudinal lines which are seen in the place of grooves (PL. 1, FIG. 5). Folds are common but their positions are not definite.

DISCUSSION

The fructification consists of a large number of naked sporangia which in all probability were sessile and embedded on a cylindrical fleshy axis. It was borne on a long slender stalk.

The fructification was found detached and its affinities are rather difficult to determine. The arrangement and the mode of attachment of the sporangia preclude the possibility of this fructification being that of Lycopodiales or Equisetales.

It is possible that this may be a male spike belonging to some Pteridophyte. Important points in favour of this are that no cuticular remains are found and that sculpturing on the spore wall appears to be like some of the schizaeaceous types (SELLING, 1944). However, this spore could not be matched with any of the known schizaeaceous spores (SELLING, 1944, 1946; HARRIS, 1955). Moreover, the arrangement of sporangia is not like that of ferns (particularly those belonging to Schizaeaceae) although in *Trichomanes* of Hymenophyllaceae sporangia are arranged irregularly on a cylindrical axis; but the comparison does not go beyond this. Also annulus is absent and the size of the spike is much too large. Very few ferns are known from the Lower Gondwanas (ARBER, 1905) and those which are known are of uncertain affinities.

The second possibility is that this male fructification belongs to some Pteridosperm, although this type of fructification is not known in the northern types of pteridospermous plants. The points in favour of this possibility are the exannulate sporangia and the arrangement of sporangia on a fleshy fertile axis. The fleshy heads which might have carried (? male or) female reproductive organs have already been reported by Plumstead in *Glossopteris* (PLUMSTEAD, 1956). However, it still remains a speculation at best.

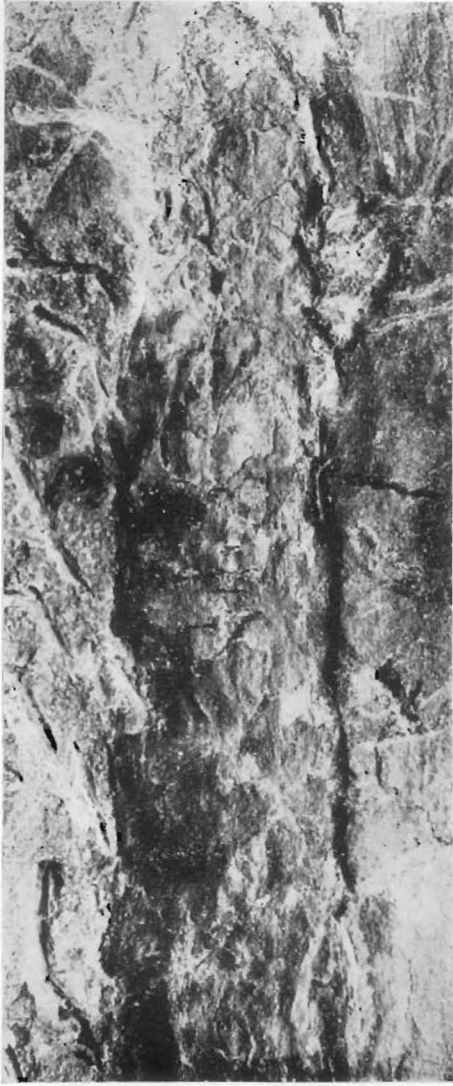
In any case the possibility cannot be ignored that some plants of the *Glossopteris* flora had such type of male reproductive organs. Whether these plants should be included under Pteridosperm or some other groups is a matter with which we are not concerned here.

#### REFERENCES

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#### EXPLANATION OF PLATE 1

1. Fructification attached on a stalk. Nat. size.
2. A part of the enlarged showing oval markings of the sporangia.  $\times 5$ .
3. A cluster of spores released from a sporangium.  $\times 130$ .
4. A spore mounted without maceration directly from a fractured sporangium.  $\times 500$ .
5. A macerated spore.  $\times 500$ .



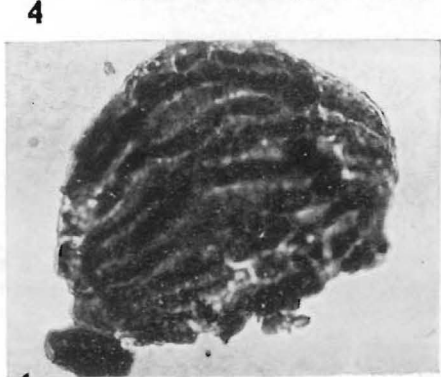
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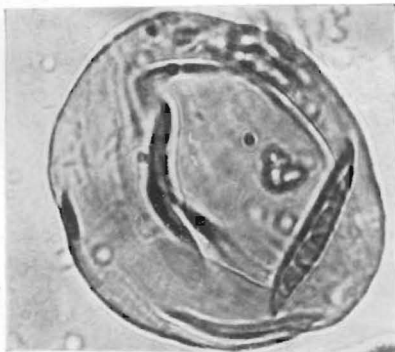
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