PARTHA A NEW TYPE OF FEMALE FRUCTIFICATION FROM THE LOWER GONDWANA OF INDIA

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ABSTRACT

Two species of a female reproductive organ are described under a new generic name *Partha*. Fertile leaf petiolate, lamina oval-spathulate with no midrib. Two to four pedicels bearing cupules spring from the middle of the petiole. Each pedicel carries 2-4 cupules at its apical end. Two species described are *Partha indica* and *Partha spathulata*.

INTRODUCTION

SURANGE and Maheshwari (1970) described some male and female fructifications of Glossopteridales, which included one female fructification, *Lidgettonia indica*. On closer examination of this fossil plant, it was found that this specimen of *Lidgettonia indica* does not belong to the Thomas's genus *Lidgettonia* (1958) for reasons explained below. We have, therefore transferred *Lidgettonia indica* under *Partha indica* comb. nov.

Our material was collected from the same place in a thick bed cutting at Hinjrida Ghati, north of Handappa in the Dhenkanal district of Orissa. About half a dozen specimens in our collection are identical with *Lidgettonia indica* Surange and Maheshwari. One specimen is different and, therefore, described under a new specific name, *Partha spathulata*.

Genus — *Partha* nov.

Diagnosis — Fertile leaf with long petiole; lamina oval-spathulate; no midrib, a few prominent veins run in the middle, secondary veins bifurcate and may form anastomoses; two to four pedicels bearing cupules spring from middle of petiole; one to four, may be less, cupules attached at the apical end of each pedicel; or cupules may be in the form of peltate discs.

Type Species — *Partha indica*

1. *Partha indica* comb. nov.

1970 — *Lidgettonia indica* Surange & Maheshwari. Palaeontographica, Vol. 129, Pt. B, Pl. 42, Figs. 15, 16.

Diagnosis — Fertile leaf petiolate, 3·5-5 cm. or more long; petiole 2 cm. long, 3-4 mm. broad; lamina oval-spathulate; no midrib, secondary veins dichotomise, no anastomosis or anastomoses rare; 2-4 short pedicels attached on the middle of the petiole, each pedicel with 2-4 cupules at its apical end.

Holotype – B.S.I.P. No. 34207 Surange & Maheshwari.

Pl. 1, figs. 1, 2 and Text-figs. 1 & 2 show our best specimen and its counterpart. The fertile leaf is preserved sideways and so the lamina is not fully visible. There is, however, no doubt that our specimen is identical with Surange and Maheshwari's (1970) type specimen of *Lidgettonia indica*.

The fertile leaf is 3·5-4·5 cm. in length. The petiole is about 2 cm. long and 3-4 mm. broad. The lamina is about 2 cm. long and the venation, although not distinc in our specimen, may not be different from that described by Surange and Maheshwari (1970).

From the petiole of the fertile leaf, just near the base of the lamina, spring two short pedicels bearing cupules at their apical ends (Pl. 1, Figs. 1, 2). In Surange and Maheshwari's figure 15, Plate 40 (1970) only two pedicels are seen. In its counter part shown by them in figure 16, there is an indication of a third pedicel. The pedicels are 6 mm. long and 1 mm. broad and appear to have been attached on the middle part of the petiole on its abaxial side. Each pedicel carries four cupules at its apex. Pl. 1, fig. 3 shows impressions of four distinct bodies on each pedicel which could be interpreted as cupules. Pl. 1, fig. 4 shows the counter part of these cupules. One cupule has left an oval impression with one pointed end. The longitudinal lines on the cupules seen in the photograph (Pl. 1, Fig. 4) might be the impressions of vascular bundles supplying the cupule. Text-fig. 3 illustrates a diagrammatic sketch showing one possibility of the attachment of four oval cupules at the apicel end of a pedicel. We are inclined to

believe that these are cupules and not actual seeds or ovules as suggested earlier by Surange and Maheshwari (1970), because not a single specimen of *Partha indica* in our collection gives any indication that these could be seeds. The other alternative explanation is that it is a disc-like cupule on the underside of which four seeds are attached. There appears to be no possibility of sporangia being associated with these structures. A detached winged seed (Pl. 1, Fig. 3) lying near the fructification may have belonged to *Partha indica*.

COMPARISON

Our specimens were identical with those described by Surange and Maheshwari

TEXT-FIG. 1 — A drawing of the specimen of *Partha indica*. B.S.I.P. No. 35036. × 4.

TEXT-FIG. 2 — A counter part of the specimen shown in text-fig. 1. × 4.

TEXT-FIG. 3 — A diagrammatic drawing showing the attachment of four cupules on the pedicel. ×6.

(1970) under the name *Lidgettonia indica*. These specimens differ from the genus *Lidgettonia* in the following important characters:

(1) The shape, size and the venation of the fertile leaf of Thomas's (1958) *Lidgettonia* is quite different from that of Surange and Maheshwari's (1970) specimen of *Lidgettonia indica*.

(2) In *Lidgettonia* the cupular discs are arranged in *two rows* whereas in Surange and Maheshwari's specimen (and our specimens) of *Lidgettonia indica* they are in one row.

(3) In *Lidgettonia* (Thomas, 1958) a cupule is in the form of a companulate disc (with perhaps a number of small unwinged seed attached on its under surface), whereas in *Partha indica* either there are four oval cupules attached at the apical end of a pedicel or there is a peltate disc, on the underside of which four large seeds are attached.

These differences are fundamental enough to warrant the creation of a new genus for the reception of the specimens described under *Lidgettonia indica* by Surange and Maheshwari (1970). Therefore, a new combination, *Partha indica* has been created for their reception.

The attachment of pedicels in the middle region of the petiole on its upper side is somewhat similar to that of *Scutum* and *Cistella*. The latter are perhaps attached a little higher up on the midrib itself. *Partha Indica* is, however, distinct from all the known fructifications of the Glossopteridales.

2. *Partha spathulata* n. sp.

Diagnosis — Fertile leaf spathulate with round apex, 3·8-4 cm. long, basal portion narrows down into a petiole, 2 cm. long and 3 mm. broad; no midrib, but 4-6 strong veins in the middle persist up to apex, secondary veins bifurcate, anastomosing not clear, may be absent or rare; 2-4 round or triangular cupules born on pedicels attached to the middle of the petiole on the upper side; each cupule with probably one winged seed.

Pl. 2, figs. 5 & 6; Text-figs. 4 & 5 show a single specimen and its counter part which we have in our collection. The fertile leaf is distinct from *Partha indica* and hence described here under a new specific name. General organization of the reproductive organ is like *Partha*.

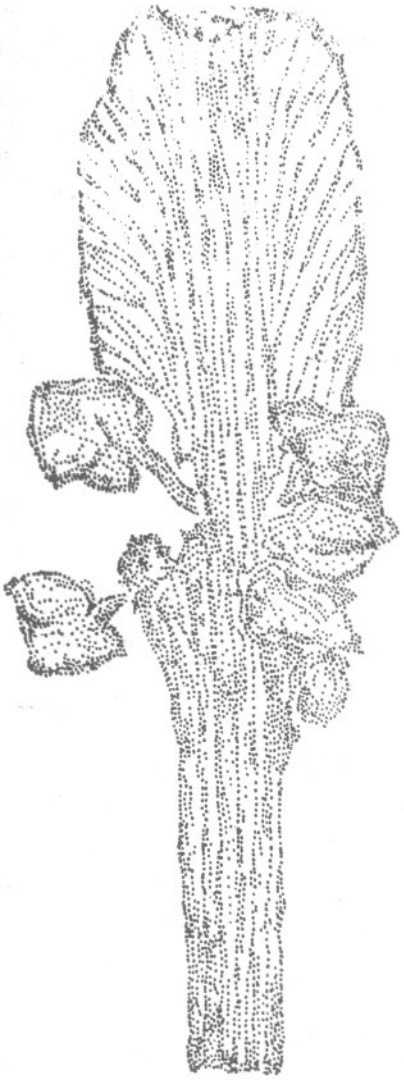
The fertile leaf is small, spathulate in shape with broadly rounded apex and measures 3·8 cm. in length (Text-figs. 4, 5). The maximum breadth of the lamina is 1 cm. which narrows down into a petiole, measuring 2 cm. in length and 3 mm. in breadth. The venation is clearly preserved (Pl. 2, Figs. 5, 6 & 7). 5-6 strong veins enter the lamina from the petiole and run straight upwards, each vein bifurcating into two weak veins near the apex. From the outer veins, secondary veins arise at an angle, bifurcate once or twice and meet the margin. There may be a few anastomoses.

2-4 (most probably 2) stalked cupules are attached near the base, close to one another. Fig. 5 in Pl. 2 shows a cupule on the top left, the stalk of which was traced right up to the midveins by excavating the rock with a fine needle (see arrow Pl. 2, Fig. 7). It shows that the stalks of the cupules arise from the middle, almost on the midveins near the base of the lamina. In Pl. 2, fig. 5 two cupules with their stalks are clearly visible on the left side, whereas the impressions on the right side are those of winged seeds. These seeds might be those which were squeezed out of the cupules seen on the left side. Some indication is, however, there that there might be some remnants of cupules lying near the seeds. But we are not sure. It is, therefore, likely that there are two more cupules on the right side, thus the total number of cupules may be four. The cupules are attached very near to each other.

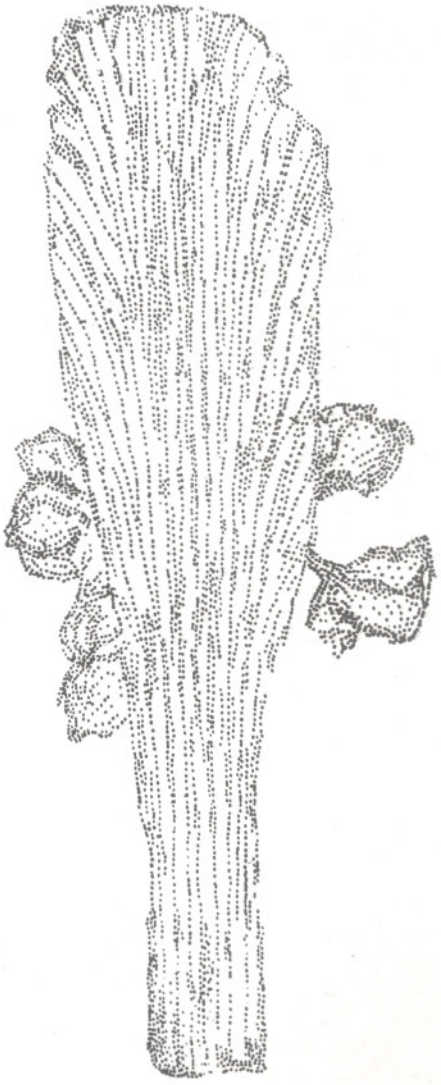
The pedicel or the stalk is short, 3 mm. long and 1 mm. broad. The shape of the cupule is triangular, but this may be due to flattening during preservation. It is also likely that the seed is anatropus, its apical end turned downwards. Pl. 2, Fig. 8, shows a winged seed facing downwards; its stalk (see arrow) appears to go over its body and get itself attached to its basal end. The seed lying on the right side of the fructification (Pl. 2, Fig. 5; in Fig. 7 it is lying on the left side) might belong to this plant. The seed is winged, flatly round and measures 4×3 mm.

COMPARISON

Although the fertile leaves and cupules of *Partha indica* differ from those of *Partha spathulata*, the organization of the fructification is similar in both. The two plants have, therefore, been described as two species of one genus. The fertile leaf of



TEXT-FIG 4 — A drawing of the holotype of *Partha spathulata*. Two stalked cupules are seen on the left side. Winged seeds are seen on the right side. × 3·5.



TEXT-FIG. 5 — A counter part of the specimen shown in Text-fig. 5. × 3·5.

Partha indica is different and distinct from that of *Partha spathulata*. We consider it as an important distinction, because the possibility of one plant having different types of fertile leaves is remote. The venation in *P. indica* is not very clear, but there may be minor differences. The cupules in *P. indica* are also different in shape than those of *P. spathulata*. The cupules in the latter are small, triangular and are attached close together near the base of the lamina. The seeds of *P. indica* might have been unwinged, whereas those of *Partha spathulata* were probably winged. However, we are not sure about this fact as seeds found near the fructifications could not be correlated with the plants with certainty.

Partha spathulata was most probably borne by one of the *Glossopteris* species which are dominant in this locality. In any case there is no doubt that *Partha* can be assigned to Glossopteridales.

REFERENCES

SURANGE AND MAHESHWARI (1970). Some male and female fructifications of Glossopteridales from India. *Palaeontographica* **129** Pt. B: 178-191.

THOMAS, H. HAMSHAW (1958). *Lidgettonia*, a new type of fertile *Glossopteris*. *Bull. Brit. Mus.* (nat. hist.) **3** (5): 179-189.

EXPLANATION OF PLATES

PLATE 1

Partha indica

1. The specimen of *Partha indica*. B.S.I.P. No. 35036. The fertile leaf is preserved sideways. Two stalked cupules are seen on the left side attached to the petiole. × *Ca*. 2.

2. Counter part of the specimen shown in fig. 1. Note four distinct bodies which could be called cupules attached on each pedicel. A detached winged seed is seen lying on the right side. × *Ca*. 3.

3. Four cupular bodies enlarged from fig. 2. × 6.

4. Counter part of the four cupular bodies. Note the shape and attachment of cupules and the longitudinal lines on them. × *Ca*. 9.

PLATE 2

Partha spathulata

5. Holotype of *Partha spathulata*. B.S.I.P. No. 35037. Fertile leaf shows mid veins clearly. The stalk of the cupule on the left side was excavated up to the midrib. Seeds (and also remnants of cupules ?) are seen on the right side. × *Ca*. 3.

6. Counter part of the holotype shown in fig. 5. Note the triangular shape of the cupule on the right side. × *Ca*. 3.

7. Fertile leaf of *Partha spathulata* as shown in fig. 5 enlarged to show the attachment of stalk cupule (see arrow). × *Ca*. 5.

8. A winged seed. B.S.I.P. No. 35038. The stalk is seen below (see arrow). A part of the cupule is seen on the right side of the seed (see arrow). × *Ca*. 5.

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