ONTHEOSTROBUS SESSILIS GEN. ET SP. NOV.,
A NEW TYPE OF SEED-BEARING GYMNOSPERM
FRUCTIFICATIONS FROM THE JURASSIC OF
ONTHEA IN THE RAJMAHAL HILLS

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(With two Plates)

INTRODUCTION

The interesting material which forms the subject-matter of this paper was found at Onthea on 28th January 1942, when also the forms described earlier (Ganju, 1944, pp. 76-77, 1946, 1946 a, 1946 b) were collected. Onthea has now turned out to be a very interesting and useful place for the study of fossil plants. The forms described in all these four papers were found in a single day’s field work. One can easily imagine the wealth of material that the fossiliferous outcrop at Onthea (Ganju, 1946, Text-Fig. 1) may be expected to yield on a detailed study.

Some of the forms here described were seen on the exposed weathered surface of the specimens, while some were discovered only on breaking the familiar kind of hard grey siliceous rocks so commonly found at Onthea. Dr. R. V. Sitholey found a few specimens while breaking the big slab, a detailed reference to which has been given in an introduction to the first paper (1946). I am very thankful to Dr. Sitholey for kindly giving me these specimens for description.
The work has been carried out, as usual, under the guidance of Professor Birbal Sahni, F.R.S., to whom I owe sincere thanks for helping me to plod through many of the difficulties that so often confront one in a new field of research. I have to thank Mr. R. N. Lakhanpal for correcting the proofs of this paper.

An extremely interesting new type of seed-bearing gymnosperm fructification is described in this paper. It is not possible yet to say anything definite about the real affinities of this form, but at first sight a distant comparison with the Bennettitales is suggested. The absence of interseminal scales, however, remains an obstacle in including this genus within that phylum. For the present, therefore, the systematic position of this type of fructification must remain unsettled.

**Description**

*Ontheostrobus* gen. nov.

**Generic diagnosis**

Megastrobilus consisting of an axis bearing numerous crowded sessile seeds on all sides. Seed orthotropous, seated in a shallow saucer-shaped cupule sessile on the axis, with a central point marking the vascular supply. Chalazal end of detached seed shows a large elliptical scar of attachment; micropylar end not preserved.

This genus too is very well represented at Onthea and is based upon a number of well preserved though incomplete specimens. The "flower" consists of a much elongated axis which functions as a female receptacle bearing numerous crowded orthotropous seeds all round it. There are no megasporophylls in the ordinary sense but the seeds are borne directly or almost directly upon the receptacle, with only a small intervening basal cup-like structure which itself is sessile on the axis. With the meagre data at hand it is impossible to say anything about the real affinities of the plant. At first sight a distant comparison with the Bennettitales may suggest itself, but there is no indication of any interseminal scales, nor has a perianth yet been discovered. For the present the systematic position of this extraordinary type of fructification must remain an open question.

*Ontheostrobus sessilis* sp. nov.

(Pl. XIII, Photos. 1-5; Pl. XIV, Photos. 6-9)

(Specimens 0/76-0/79, 0/81-0/90, 0/102; Also the big slab from Onthea)

**Specific diagnosis**

A much elongated receptacle bearing numerous sessile closely crowded seeds (broadest diam. about 6 mm.) all round through its length. Receptacle
Ontheostrobus sessilis *gen. et sp. nov.*

about 3·5 cm. long (actual base and apex not preserved), about 1·6 cm. × 1 cm. in diameter at the base (? flattened by pressure), above which it rapidly narrows down to about 7 mm. × 4 mm. diam. and then tapers very gradually from below upwards to about 3 mm. diam. at the top. The seed is placed in a shallow cupule which itself is seated on a cushion; the cushion, in turn, is sessile on the axis. Where the seeds have fallen off a number of elliptical areas are left on the receptacle; these are the exposed surfaces of the cushions, which are themselves slightly hollowed out and show in the centre a small pit marking the vascular supply of the seed. The micropylar end of the seeds is never preserved. The detached seeds have a large elliptical scar (about 2 mm. × 3 mm.) at the chalazal end, evidently showing the area of attachment with the cupule.


**The receptacle:** mode of attachment of seeds

Out of about ten more or less complete specimens collected at Onthea, five show well preserved receptacles with some of the seeds still attached round them (Photos. 3, 6, 8, 9) while the remaining specimens only show groups of seeds detached from the axis but still packed into closely crowded groups and exposed by their chalazal ends (Photos. 5, 7).

Specimens No. 0/77 (Photos. 1–3) when split revealed the presence of a large number of seeds attached to the long tapering receptacle. The piece which came off first is shown in Photo. 1 and the receptacle is shown in Photo. 3. A similar number of seeds was expected to be attached on the other side of the receptacle and on careful splitting another piece came off which is shown in Photo. 2. Thus all the seeds represented in the Photos. 1, 2 were attached round the receptacle shown in Photo. 3.

It is very difficult to form an idea of the entire length of the receptacle because the actual base and apex are not preserved, but the portion exposed measures about 3·5 cm. long. At the base it is 1·6 cm. × 1 cm. In passing from below upwards, at first it rapidly narrows to about 7 mm. × 4 mm. and then tapers very gradually towards the apex (Photo. 3). This is the most complete specimen and it is regarded as the holotype. Here the size of the seeds and of the scars (measuring about 3 mm. × 2 mm. at the base and about 2 mm. × 1·5 mm. at the apex) left by them on the receptacle decreases towards the narrow end of the receptacle, hence the thicker end is taken as the proximal part and the thinner end as the distal. About 75 more or less complete seeds may be counted in this specimen and these were attached all round the receptacle in a length of about 3·5 cm. Thus the
total number of seeds on the complete receptacle must have been very considerable.

Axes of a similar type are preserved in some other specimens, e.g., 0/76 (Photo. 9), 0/78 (Photo. 8), 0/79, 0/81 (Photo. 6), etc., but none is so complete as the one just described.

A few seeds still attached to the receptacle are well seen in specimen 0/81 shown in Photo. 6. On carefully observing this photograph it appears as if the seeds were enclosed in a shallow membranous saucer-like or cup-like structure. But the preservation is not good enough to show whether this membranous structure was a cupule-like organ distinct from the seed or whether it only represents the persistent basal part of the integument of the seed, the rest of which is not preserved.

Receptacles from which all seeds have fallen off are also present. These usually bear a number of characteristic circular or elliptical scars left by the seeds. One of these receptacles appears in Photo. 4. The elliptical scar is a raised cushion slightly hollowed out on its exposed surface, in which the seed is seated. In the centre of this depression a small pit can be made out (marked p in this photograph). These pits probably mark the vascular supply of the seeds. Photo. 5 shows a group of seeds which were once attached on this particular receptacle but which came off as a single piece while splitting the specimen. The seeds are all exposed by their chalazal ends, and show the characteristic elliptical scar of attachment, in the centre of which a distinct pit is sometimes seen marking the vascular supply.

Photo. 8 shows another specimen consisting of numerous seeds crowded together in their original grouping. In the upper part of the figure a small portion of the receptacle (r), is still left intact. The side of the receptacle facing the reader shows a number of scars left by the seeds which were broken off with the counterpart. Where the receptacle is not preserved, the seeds are exposed by their chalazal ends and some of these show clearly an elliptical scar, representing the surface of attachment with the receptacle.

The Structure of the Seeds

We have seen that the seeds are closely packed and no interseminal scales are present. The detached seeds too have an elliptical scar at the chalazal end (Photo. 7) corresponding to the elliptical scar on the receptacle and evidently showing the area of attachment. This area of attachment measures about $2 \times 3$ mm.; above this the seed gradually widens out to about 6 mm. diam. The shape and size of the entire seeds is difficult to tell because the micropylar end is never preserved.
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**Affinities**

With only this much information in hand it is impossible to say anything definite regarding the affinities of this form. These features are not presented by any known gymnosperm fructifications. With the Cycadales no comparison is possible because the organ which bears the seeds cannot by any stretch of imagination be regarded as a sporophyll. It is evidently homologous with a floral axis. With the mention of a floral axis the Bennettitales come to mind, but here again there are difficulties, because there is no trace anywhere of interseminal scales. If subsequently a perianth is discovered at the base of the axis (which in our material is incomplete) a comparison with the Bennettitales may come within the range of possibility; but even then the absence of interseminal scales will remain an obstacle to our including this genus within the Bennettitales unless we are prepared to extend the present definition of that phylum. There is only one consideration which may still bring this genus within the fold of the Bennettitales and that is the perhaps rather remote possibility that in the younger stage of development interseminal scales of a delicate character were present, but that with the growth of the seeds they became crushed out of recognition. This again suggests that Onthea is a locality deserving of a closer attention by palæobotanists than it has so far received. It is possible that with further search younger stages and more complete specimens of Ontheostrobus may be discovered.

From the above consideration alone the extraordinary interest of this genus is self-evident.

It is possible that further research especially when more material is collected, may prove some sort of relationship between Ontheostrobus sessilis and Rajmahalia paradoxa Sahni and Rao, which is regarded by its authors (1935, p. 712), 'as an inverted funnel-like disc (possibly part of a deciduous andræcium) fallen from the top of a Bennettitalean receptacle and bearing on its inner surface the impress of seeds and interseminal scales once pressed against it, but now no longer preserved'.

In view of the sessile nature of the seeds the fossils described here are given the specific name Ontheostrobus sessilis sp. nov. This is the only species of this genus, of which ten specimens are available.

**Summary**

The forms described under the name Ontheostrobus sessilis come, as the name indicates, from Onthea. Most of the specimens show well preserved elongated receptacles bearing throughout their length numerous crowded
seeds. The seeds are sessile and placed in shallow cupules which in turn are seated on cushions, the cushions being sessile on the receptacle. The receptacles from which the seeds have fallen off, show the exposed surfaces of the cushions slightly hollowed out. A small pit in the centre of this hollow marks the position of the vascular supply of the seeds. The detached seeds, usually found crowded together in their original groupings, show an elliptical scar at their chalazal end; this marks the area of attachment of the seeds with the receptacle. It is a noteworthy feature that not a single seed shows its micropylar end.

With the present data in hand, it is not possible to express any definite views regarding the systematic position of this peculiar and interesting fructification. A distant comparison with the Bennettitales is, however, suggested.

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Figs. 1–5. *Oulheostrobus sessilis*
Figs. 6–9. *Ontheostrobus sessilis*
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**EXPLANATION OF PLATES**

All photographs are untouched. They are of natural size except where the magnification is given. The figured specimens are preserved in the Department of Botany and Geology, University of Lucknow.

**PLATE XIII**

*Ontheostrobus sessilis gen.* *et sp.* *nov.* (Photos. 1–5).

Photo. 1, 2. Groups of seeds exposed by their chalazal ends. These seeds were attached all round the receptacle shown in Photo 3. 0/77.

Photo. 3. The receptacle showing a number of elliptical scars which were left by the seeds shown in Photos. 1, 2. 0/77.

Photo. 4. Portion of receptacle showing a number of elliptical scars. Some of the scars show distinctly a small pit (marked p) in the centre, probably marking the vascular supply of the seeds. 0/79.²

Photo. 5. Counterpart of Photo. 4 showing some of the seeds which were attached to the receptacle shown in Photo 4. One or two seeds show the presence of a distinct pit in the centre. 0/79.

**PLATE XIV**

*Ontheostrobus sessilis gen.* *et sp.* *nov.* (Photos. 6–9).

Photo. 6. Portion of receptacle showing a number of seeds still attached to it. It appears as if the seeds were enclosed in a shallow membranous cup-like structure. 0/81. × *Ca.* 3½.

Photo. 7. A group of seeds exposed by their chalazal ends showing clearly the elliptical scar of attachment. 0/78. × 2.

Photo. 8. Numerous seeds crowded together in their original grouping. In the upper part of this photograph a small portion of the receptacle (r) is still left intact and shows a number of scars left by the seeds. 0/78.

Photo. 9. Portion of receptacle with the attached seeds. 0/76. × *Ca.* 2½.