

A Pair of Gymnospermous Ovule from the Deccan Intertrappean Series of Chhindwara District, M.P., India

Sharadkumar P. Patil

Bhagwantrao Arts & Science College, Etapalli, Gadchiroli, Maharashtra, India
patilsharadkumart@gmail.com

Abstract: This paper deals with the study of pair of gymnospermous ovule with ovuliferous scale from the Deccan Intertrappean beds of Mohgaonkalan, M.P., India which is of Uppermost Cretaceous to Lower Eocene age. The complete specimen measures 1.440 to 1.620 mm in length and 0.920 to 1.080 mm in breadth. It shows single, parenchymatous ovuliferous scale. On the upper surface of ovuliferous scale two orthotropous ovules are present. The integument is parenchymatous and undifferentiated. The micropylar canal 74-80 μ m long and 60-65 μ m broad. Nucellus is free from integuments. Scerotic cells are absent. Vascular supplies are seen only in the chalazal region. The present ovule is compared with reported gymnospermous ovule and modern gymnospermous taxa. As the specimen is not comparable with any of the living genus and reported ovule, it is kept under a separate genus *Deccanoovuliteskapgatensis* gen. et. sp. nov.

Keywords: Deccan, Intertrappean, fossil, cherts, gymnosperm, ovule

I. INTRODUCTION

This paper deals with the study of pair of gymnospermous ovule with ovuliferous scale from the Deccan Intertrappean beds of Mohgaonkalan, M.P., India which is of Uppermost Cretaceous to Lower Eocene age. From the Deccan Intertrappean series there are very few records of gymnospermous ovules and cones, listed as, *Takliostrobusalatus* (Sahni, 1931); *Indostrobusbifidolepis* (Sahni, 1931); *Harrisostrobusintertrappea* (Chitale & Sheikh, 1973); *Mohgaonstrobusahni* (Prakash, 1956, 1962); *Gymnoovulites* (Shukla, 1948); *Gymnoovulitesshuklaii* (Kate, 1974); *Podocarpoovulitestriwingatus* (Singh, 1977); *Podocarpoovulitesmohgaonensis* (Upadhey, 1979); *Podocarpoovuliteschitaleyi* (Sheikh & Kolhe, 1982); *Cupressaceoovulitesintertrappea* (Mistri et al., 1985); *Coniferoovulitesintertrappea* (Yawle, 1975) are the ovule specimens described so far. One more new gymnospermous ovule is being described here from the Deccan Intertrappean series of Mohgaonkalan, M.P., India.

II. MATERIAL AND METHOD

The fossiliferous chert has been collected from the Deccan Intertrappean beds of Mohgaonkalan, M.P., India. While breaking the cherts the ovule was exposed in obliquely transverse plane. After etching the specimens with hydrofluoric acid (HF), serial peel sections are taken with Cellulose Acetate peel Technique. The peels were mounted in DPX mountant and photographed. The camera lucida sketches of the slides are drawn for detailed study of ovule cut in oblique transverse plane.

2.1 Description

The complete specimen measures 1.440 to 1.620 mm in length and 0.920 to 1.080 mm in breadth. It shows single, parenchymatous ovuliferous scale. On the upper surface of ovuliferous scale two orthotropous ovules are present. The integument is parenchymatous and undifferentiated. Nucellus is free from integuments. Scerotic cells are absent. Vascular supplies are seen only in the chalazal region. It shows following anatomical details-

2.2 Ovuliferous Scale

The ovuliferous scale is single and made up of thin walled parenchymatous cell. At the basal region it shows some thick

walled cells which show its attachment region to the female cone. On the upper surface of ovuliferous scale two orthotropous ovules are present.

- **Ovules:** The number of ovules are two embedded on the upper surface of ovuliferous scale. The ovules are orthotropoustype; one is in clearly longitudinal plane while another is in oblique transverse plane. The ovule measures 745 X 345 μ m in size.
- **Integuments:** The integuments are narrow at base and broader at micropylar region. The integument is not differentiated into zones and measures 65 to 70 μ m in thickness. It is made up of parenchymatous cells of moderate size.
- **Nucellus:** The nucellus is covered by integument and forms a distinct broad micropylar chamber towards the apical region. Micropylar canal is 74-80 μ m long and 60-65 μ m broad. The ill preserved integument is free from integuments and made up of very small parenchymatous cells. The female gametophyte found inside the nucellus is thin walled. The sclerotic cells generally found in gymnospermous ovule are not seen in present specimen either in integument or ovuliferousscale.
- **Vasculature:** The integument and ovuliferous scale do not show vascular bundles. Vascular bundles of the ovule in the chalazal region are endarch and consist of 2-4 metaxylem and 1-2 protoxylemtracheids associated with fibres and xylem parenchyma.

III. DISCUSSION

The following morphological and anatomical characters are used to identify the ovule:

- Presence of single ovuliferous scale with two orthotropus ovules.
- Absence of bract scale.
- The integument is not differentiated in distinct zones.
- Vascular supply ends at the chalaza.
- Nucellus is completely free from the integuments.
- Presence of broad pollen chamber and elongated micropylar canal.
- Absence of brachyscerides in ovule and ovuliferous scale.

From above features the present specimen is confirmed as a pair of orthotropous gymnosprmous ovules on a ovuliferos scale having undifferentiated integument and absence of scereids.

Identification:

The present ovule is compared with reported gymnosprmous ovule and modern gymnospermous taxa;

Comparison with reported gymnospermous cones and ovules-

The present specimen differs from *Takliostrobusalatus*(Sahni,1931);*Indostrobusbifidolepis* (Sahni,1931); and *Harrisostrobusintertrappea* (Chitaley& Sheikh, 1973), all are which bears two type of scales and inverted ovules while in present specimen the ovules are orthotropous. In *Mohgaonstrobusahni* (Prakash,1956,1962) bract scales are absent as in present specimen, but differs in ovules size and integument structure. Also *Gymnoovulites* (Shukla,1948); *Gymnoovulitesshuklaii*(Kate,1974); *Podocarpoovulitestriwingatus* (Singh, 1977); *Podocarpoovulitesmohgaonensis* (Upadhey, 1979); *Podocarpoovuliteschitaleyi* (Sheikh & Kolhe, 1982); *Cupressaceoovulitesintertrappea* (Mistri et al.,1985) are not comparable as they have single ovule, while in present specimen there are two ovules. It is also not comparable with *Coniferoovulitesintertrappea* (Yawle,1975) as it has br.acts and two anatropous ovules. It is also could not been comparable with *Cupressaceoovulitesintertrappea* (Mistri et al.,1995) as it has air spaces in its integument towards micropylar region while in present specimen no such space is observed.

Comparison with modern gymnospermous taxa

The fossil ovule described here is not Cycadean since the Cycads lack covering of scales while the present specimen shows single ovuliferous scale with two orthotropus ovules. This particular structure is comparable with Coniferales, specially with family Cupressaceae in some of the characters but differs in more characters. Thus, the present specimen is unique in its structure

A comparison with known fossil gymnospermous cones & ovule and with modern gymnospermous taxa indicates that it could not be included in any one of these. Hence it is kept under a separate genus *Deccanoovuliteskapgatensis* gen. et sp. nov. Generic name after the Deccan Intertrappean series and specific name after eminent palaeobotanist Dr. D. K. Kapgate.

Diagnosis:

Deccanoovulites gen. nov.

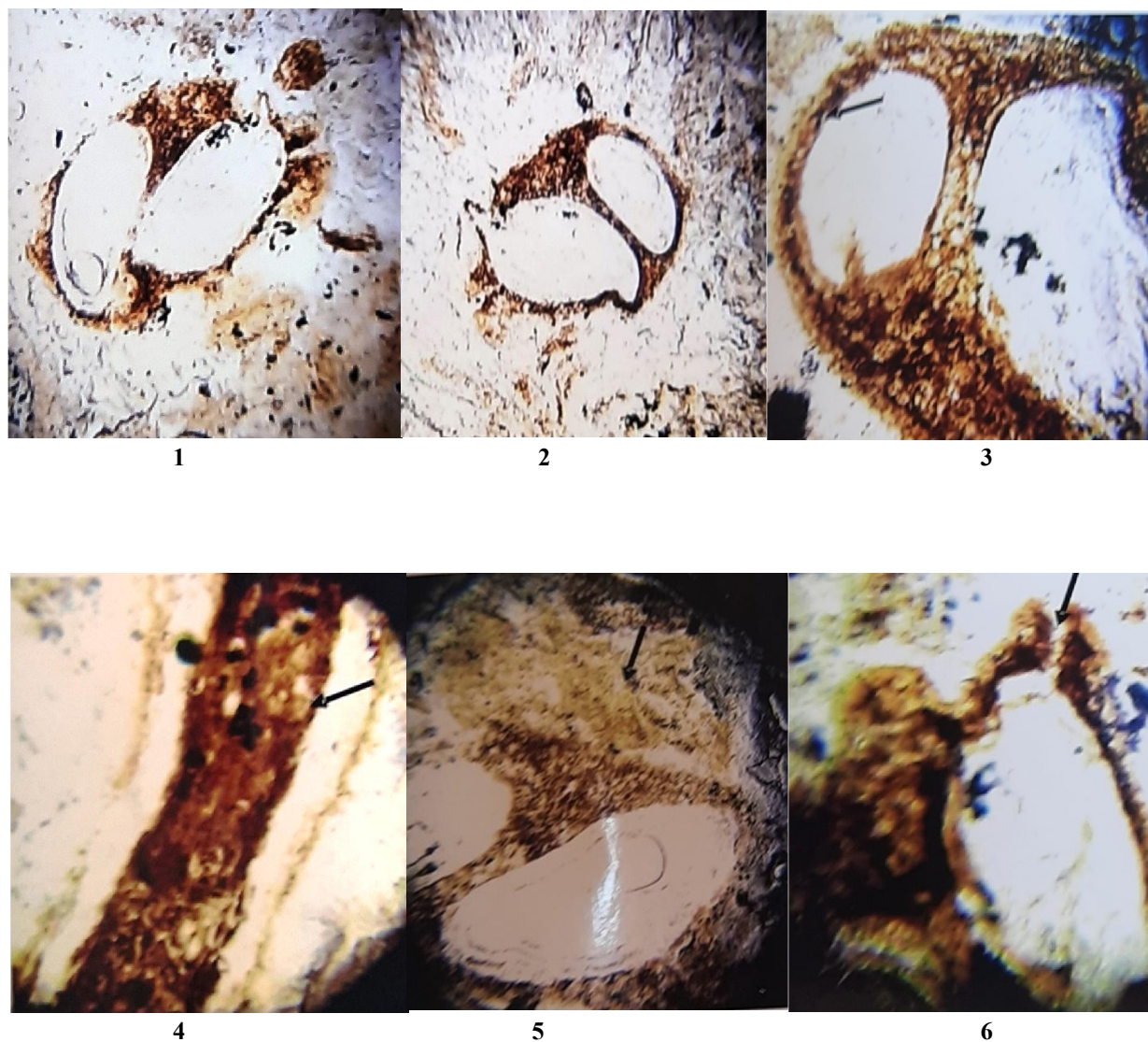
It shows single, parenchymatous ovuliferous scale. On the upper surface of ovuliferous scale two orthotropous ovules are present. The integument is parenchymatous and undifferentiated.

Deccanoovuliteskapgatensis gen. et sp. nov.

The complete specimen measures 1.440 to 1.620 mm in length and 0.920 to 1.080 mm in breadth. It shows single, parenchymatous ovuliferous scale. On the upper surface of ovuliferous scale two orthotropous ovules are present. The integument is parenchymatous and undifferentiated. The micropylar canal 74-80 μ m long and 60-65 μ m broad. Nucellus is free from integuments. Scrotic cells are absent. Vascular supplies are seen only in the chalazal region.

REFERENCES

- [1]. Sahni, B. (1931). Revision of Indian fossil plants Part II. Coniferales (Petrifactions). Paleont. Indica (N. S.) 11 : 51-124.
- [2]. Chitaley, S.D and Sheikh, M.T. (1973). "Harrisostrobus intertrappea" A petrified gymnospermous cone from Deccan Intertrappean Beds of India, Palaeontographica. 111-119.
- [3]. Prakash, U. (1956) Studies in the Deccan Intertrappean flora. I- On a petrified ovuliferous cone from Mohgaonkalan cherts in Deccan. The Palaeobotanist, V.5;: 91-94.
- [4]. Prakash, U. (1962) Further observations on a petrified ovuliferous cone (Mohgaostrobus sahnii gen. et sp. nov.) from Mohgaoncherts in the Deccan. Palaeobotanist, V.10(1-2), : 1-9.
- [5]. Shukla, V.B. (1948) Gymnoovulites gen. nov. Central Provinces, Mohgaonkalan (Chhindwara Dist.) in Palaeobotany of India, VI Jour. Ind. Bot. Soc. 26 : 255-259.
- [6]. Kate V. R. (1974). Studies of Deccan Intertrappean flora of India. Ph. D. Thesis Nagpur Uni. , Nagpur.
- [7]. Singh, R. B. (1977). Contribution to the knowledge of fossil flora from the Deccan Intertrappean of Mohgaonkalan, M. P. India. Ph. D. Thesis Nagpur University, Nagpur.
- [8]. Upadhye, E.V. (1979). Morphological studies of the Deccan Intertrappean flora of Mohgaonkalan, M.P. India. Ph. D. Thesis, Nagpur Uni., Nagpur.
- [9]. Sheikh, M.T and Kolhe, P.D. (1982) A new petrified ovule Podocarpoovulites chitaleii from a new locality of Nagpur, Deccan Maharashtra, India. Botanique, V.10: 99-108.
- [10]. Mistri, P.B., Kapgate, D.K. and Sheikh, M.T. (1985) A petrified gymnospermous ovule from Deccan Intertrappean Beds of Mohgaonkalan, M.P. Nag. Uni. Jour. (sci.), : 115-121.
- [11]. Yawle, N.R. (1975). Investigation of plant fossils from Intertrappean series of India. Ph. D. Thesis, Nagpur Uni. Nagpur.



Explanation of Plate Figures:

Fig.1 & 2- Pair of Ovules in Transverse Section (Part &Counterpart),

Fig. 3- Enlarged view showing seed coat.

Fig.4- Tissue of Integument (Arrow).

Fig.5- Enlarged view showing ovuliferous scale (Arrow).

Fig.6-Ovule showing micropylar chamber and Nucellus tissue.