

PTERIDOSPERMIC REMAINS FROM THE TRIASSIC OF NIDPUR, MADHYA PRADESH, INDIA

SHYAM C. SRIVASTAVA

Birbal Sahni Institute of Palaeobotany, Lucknow

ABSTRACT

The paper describes some new features concerning the external morphology and the cuticular characters of rachis of *Lepidopteris indica* BOSE AND SRIVASTAVA.

In addition to this, a detailed description of *Pteruchus nidpurensis* nom. nov. has also been given here. It is presented as a detached fertile head which bears pollen bearing bodies or pollen sacs around its central part. Each pollen sac contains numerous non-striate, bisaccate pollen grains which resemble the pollen grains of various species of *Pteruchus* THOMAS TOWNROW, 1962.

INTRODUCTION

From the Triassic of Nidpur some specimens belonging to *Lepidopteris indica* BOSE AND SRIVASTAVA (1972) and *Pteruchus* THOMAS (1933) have, recently, been collected. Out of them, two specimens of *L. indica* BOSE AND SRIVASTAVA (in counterparts) clearly show the bipinnate nature of the fronds. They have further given more informations regarding the cuticular features, especially of the rachis. Besides this, amongst the specimens of *Pteruchus* the specimen selected here for description is a laterally compressed, detached fertile head and is quite distinct from the other known species of *Pteruchus*. So, it is here described as *Pteruchus nidpurensis* nom. nov.

DESCRIPTION

Lepidopteris Schimper, 1869

Lepidopteris indica Bose & Srivastava (Text-figs. 1 A—G)

EXTERNAL MORPHOLOGY—The largest specimen measures 15 cm. in length. Main rachis is 6.5-7 mm. wide and bears prominent longitudinal ridges and tiny lumps on the lower part (Text-fig. 1A & C) but becomes somewhat smoother above. Pinnae are 4-17 cm. long and 1.6-3.8 cm. broad and their angle of emergence has been marked from 40°-55°. Pinna rachis is clearly winged in some specimens but in others it is indistinct. Pinna rachis is 3-4 mm. wide and also reveal minute lumps and fine longitudinal ridges on the entire surface (Text-fig. 1D). Pinnules are of 1.1-2 cm. × 0.4-0.8 cm. in size and are broadly lanceolate or oval in shape with entire or wavy margin having obtuse apex. They are usually attached with decurrent base and usually overlap each other. The pinnules present in the lower part of pinnae on the basiscopic side are partly decurrent upon the main rachis. On the pinna rachis where wing is distinct, pinnules have been found joined by the wing. Pinnules are arranged in opposite or sub-opposite order and diverge at about 50° at pinnae base but in some at about 45°.

A few *zwischenfiedern* (Text-fig. 1B) have also been observed, which are attached

by its entire width on the adaxial surface of the main rachis. They are lanceolate or ovate in shape with entire margin and obtuse apex.

Venation is not very clear but a distinct midrib is visible from which a few lateral veins are arising and out of them some have been bifurcating after the emergence (Text-fig. 1E).

CUTICLE

Main Rachis—Both the surfaces are 2.5 μ thick and the epidermal cells are arranged in longitudinal direction. Cells are rectangular to polygonal in shape, sometimes they are rhomboidal. Lateral and end-walls are straight and oblique respectively. Cell surface is smooth but sometimes thickened. Stomata are longitudinally orientated. The stomatal apparatus consists of 5 subsidiary cells along with papillae overhanging stomatal pit. Guard cells thinly cutinized, sunken with slit-like aperture.

Main rachis is also marked by longitudinal irregular ridges appearing in the cuticle as longitudinal folds (Text-fig. 1F).

Pinna-Rachis—Pinna-rachis is similar in structure like the main-rachis, except that the epidermal cells are smaller in size and are not much thickened.

Remarks—Fresh cuticular preparations of new specimens have revealed that these all belong to *L. indica* BOSE AND SRIVASTAVA (1972). However, the upper surface (earlier described as thinner surface) is better preserved in these specimens and the lateral and end-walls are straight or undulated and quite distinct with smooth or thickened surface (Text-fig. 1-G). Stomatal and non-stomatal regions are also well marked. Besides these characters, in these preparations also narrow and elongated cells have been observed radiating around polygonal cells. Thus, it is obvious that such pathogenic features are always common. The other cuticular features of lamina was, however, found quite similar to the previously described specimens.

Pteruchus Thomas, 1933

Pteruchus nidpurensis nom. nov. (Text-figs. 2A—S)

nom. subst. pro. Pteruchus indicus Srivastava, (in press), pl. 1, fig. 1; *Triassic. non P. indicus* Pant & Basu, 1973, pp. 11—24.

Diagnosis—Male fructification with a detached fertile head. Central part of head bearing laterally arranged, oblanceolate or elliptical pollen-bearing bodies. Head cuticle tough, amphistomatic. Cells polygonal or elongated rectangular having straight or undulated lateral-walls and oblique or straight end-walls. Surface smooth or mottled. Stomata longitudinally orientated, subsidiary cells 6 in number. Stomatal pit dumb-bell-shaped. Guard cells cutinized and sunken.

Wall of pollen sac membranous, consisting of narrow-elongated epidermal cells with smooth surface. Pollen grains numerous in each pollen sac, bisaccate, non-striate, haploxytonoid. Central body distinct, sub-circular, exine laevigate bearing minor folds, proximal attachment of sacci to central body equatorial, distal attachment sub-equatorial, mostly associated with semilunar folds. Sulcus uniformly broad, boat-shaped. Sacci intra-reticulation medium.

Holotype—No. 35144 of the Birbal Sahni Institute of Palaeobotany, Lucknow.

Locality—Nidpur, Gopad River Valley, Sidhi District, Madhya Pradesh.

Age—Triassic.



Text-fig. 1

Description—Detached fertile head measures about 6 mm. in diameter and is somewhat rounded in appearance, more or less dome-shaped. Central part of head is covered with thick cuticle and is free from pollen-bearing bodies. The pollen-bearing bodies or pollen sacs are borne around the central part of head and are closely set in lateral fashion (Text-fig. 2 B-D), sometimes overlapping one another. Pollen sacs are about 25 in number, 1.5-2.5 mm. long and 0.5-1 mm. wide and are usually elliptical or oblanceolate sometimes more or less obovate or pyramidal in shape (Text-figs. 2 E-K), with pointed or rounded apices. Each pollen sac has been found containing a thick mass of pollen grains, which gives an idea that the pollen chambers would have been unilocular in nature.

Head cuticle is 2.5μ thick, tough and amphistomatic. Sometimes cell outline is concealed because of dense wrinklings on the surface. Both the surfaces of cuticle are similar in structure. Stomata are irregularly distributed and mostly longitudinally orientated. Cells are polygonal or elongated rectangular having straight or undulated or pitted lateral-walls and oblique or straight end-walls. Generally surface wall is smooth, but at places mottled. Subsidiary cells are irregularly placed and are usually 6 in number. Stomatal pit is dumble-shaped or rhomboidal and guard cells are cutinized and sunken.

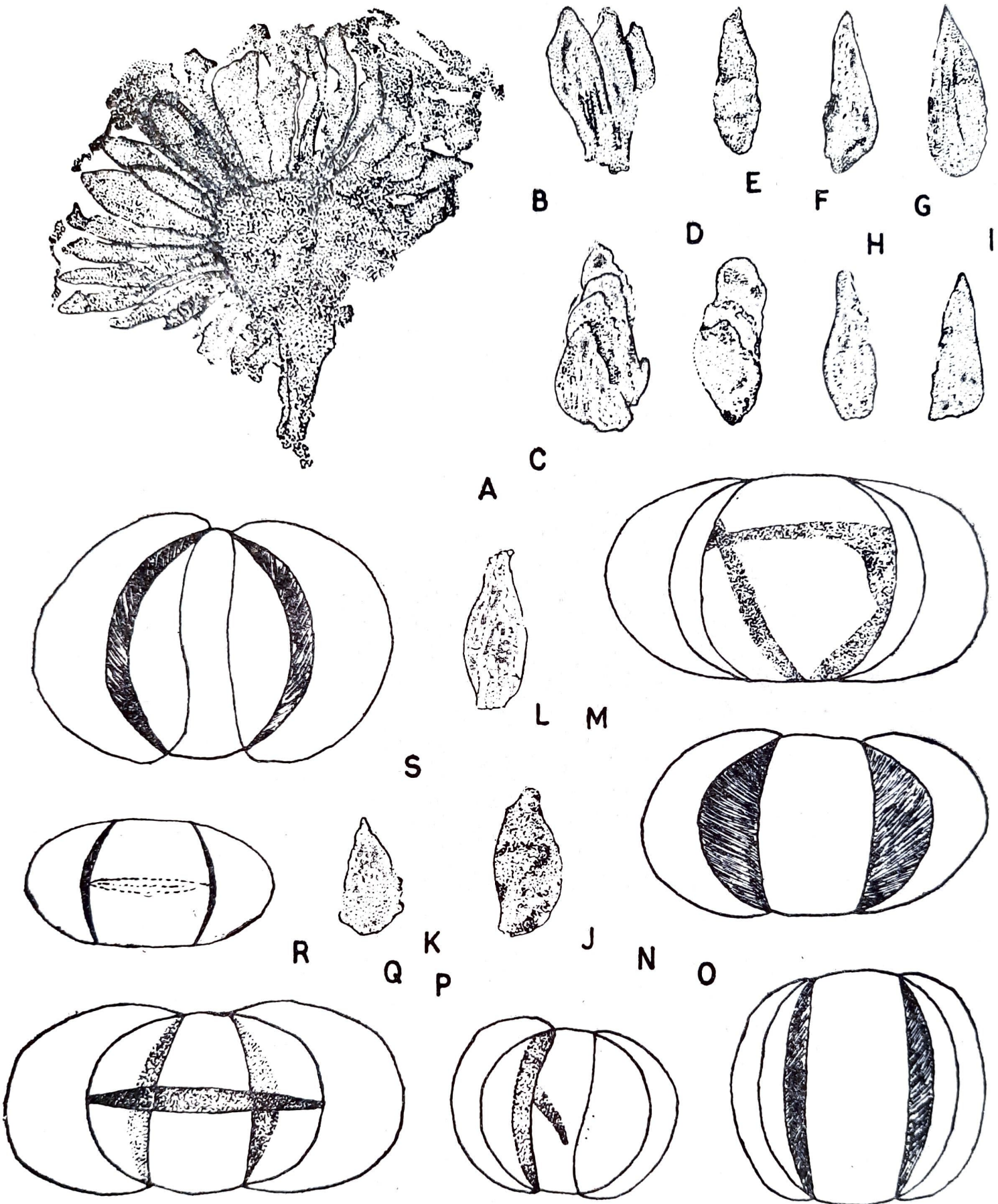
Pollen sac cuticle is very delicate and is composed of narrow longitudinally elongated epidermal cells (Text-fig. 2L) within which the pollen mass remain enclosed.

Pollen grains (Text-fig. 2 M-S) are bisaccate and haploxytonoid. Their shape is oval or elliptical but may be sub-circular in some cases. Size range has been found from $26.5-66 \mu \times 20.5-50 \mu$. Generally central body is distinct and sub-circular but rarely in some vertically oval. Exine is up to 2μ thick, \pm laevigate or microverrucose without any haptotypic mark but sometimes bears minor folds. Proximally sacci equatorially attached to central body and distal attachment is subequatorial, mostly associated with semilunar folds, sometimes folds may also be associated in between the two attachment zones or even near the proximal attachment zone. Zone of saccus attachment is distinct, slightly darker than the rest part. Proximally one or more irregular folds are also observed in some grains on central body; sometimes a single transverse fold resembling a chorda is also visible. Sulcus is well developed, mostly wide, uniformly broad, boat-shaped or diverging at lateral ends. Sacci are \pm hemispherical, leathery and mediumly intrareticulate.

Some abnormal pollen grains which are monosaccoid to polysaccoid in configuration have also been observed. They seem here developed due to adherence of the individual pollen grain in the tetrad.

Comparisons—*Pteruchus nidpurensis* non. nov. differs from all the so far described species in the absence of lobes on the head. However, *P. nidpurensis* comes closest to *P. africanus* (THOMAS) TOWNROW (1962) in its equal size of head but the former differs

Text-fig. 1—*Lepidopteris indica* Bose & Srivastava. A, Bipinnate specimen with longitudinal ridges on main rachis. No. 35148 $\times 1$. B, showing attachment of *zwischenfiedern* on the adaxial surface of rachis. No. 35149 $\times 1$. C, Adaxial surface of main-rachis showing form of lumps. No. 35149 $\times 8$. D, A portion of pinna-rachis with wing, showing tiny lumps upon the surface No. 35148 $\times 8$. E, Counter-part of specimen no. 35148, showing venation $\times 3$. F, Pinna-rachis cuticle, showing epidermal cells and longitudinal folds on the cuticle, slide no. 35149-1. $\times 200$. G, Upper surface of lamina cuticle, showing form of epidermal cells and nature of cell walls, slide no. 35148. $\times 200$.



Text-fig. 2—*Pteruchus nidpurensis* nom. nov. A, holotype no. 35144×6. B-D, A few pollen-bearing bodies in groups, showing laterally arranged pollen sacs. No. 35144×6 E-K Detached pollen sacs of variable shape. No. 35144×6 L, A pollen sac showing faint markings of epidermal cells on the surface within which pollen mass remain enclosed. No. 35144×6. M-S, Isolated pollen grains from a single pollen bearing body, showing a good deal of morphological variations. No. 35144. ca×500.

rom the latter in lesser number and variable sizes of pollen sacs and in having usually six subsidiary cells.

In its higher number of pollen sacs and sinuous cell wall, *P. dubius* (THOMAS) TOWNROW (1962) readily distinguishes itself from *P. nidpurensis* whereas *P. simmondsi* (SHIRLEY) TOWNROW (1962) becomes distinct from latter species in lesser number and smaller size of pollen sacs.

Besides this, there exists a close similarity between the head cuticle of *Pteruchus nidpurensis* and *Dicroidium nidpurensis* BOSE AND SRIVASTAVA (1971), with an exception in the number of subsidiary cells. Because in *P. nidpurensis* commonly six subsidiary cells have been observed whereas in *D. nidpurensis* the number ranges from 5-8 but usually 5 subsidiary cells are met with.

In *Pteruchus nidpurensis* similar bisaccate grains have been found as have been reported from the various species of *Pteruchus* (TOWNROW, 1962). However, in the former species the pollen grains are slightly more longer but less wider than the latter species. Also the presence of minor folds on the central body of the former species differentiates from the pollen grains of the latter species.

Remarks—The pollen grains, hitherto, described as *Alisporites indicus* BHARADWAJ AND SRIVASTAVA, (1969; pl. 28, figs. 78-86, pp. 134-135) and *Klausipollenites* sp. cf. *K. staplinii* by BHARADWAJ AND SRIVASTAVA, (1969; pl. 28, figs. 73-77, p. 134) are the dispersed pollen grains of *Pteruchus nidpurensis*. Henceforth, *Klausipollenites* sp. cf. *K. staplinii* by BHARADWAJ AND SRIVASTAVA, 1969 becomes the synonym of *Alisporites indicus* (BHARADWAJ & SRIVASTAVA, 1969).

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