2. AN UNUSUAL TRIASSIC SEED FROM INDIA

SHYAM C. SRIVASTAVA

Birbal Sahni Institute of Palaeobotany, 53 University Road, Lucknow - 226007, India

Abstract

Under the name *Kedvesospermum montidorsum* a new seed is described from Middle Triassic sediments of Nidpur, India. The seed is distinguished by its asymmetric micropylar opening - an unusual feature not generally common among the gymnosperms.

Key words: Palaeobotany, fossil seed, Triassic, n.gen. et sp.

Introduction

Recent studies by PANT and BASU (1977), MANIK (1988), SRIVASTAVA and MANIK (1990, 1993a,b, 1996, 1999), SRIVASTAVA et al. (1998, 2001) have contributed significantly to the systematics of Triassic seeds from India. Continued investigations further on seed remains from Nidpur have revealed the presence of distinctive grade of evolution. The record from pre-Cretaceous beds of plant fossils displaying characters which, according to our present knowledge, are indicative of angiospermid traits. So far the known pre-Cretaceous plant remains, which do not demonstrate the total complement of modern angiospermous characters but share one or more characteristics could reasonably be thought to be the angiospermid plant remain are: *Fraxinopsis major-alata* seeds of fruits from the Rhaetic of Argentina (WIELAND, 1929), *Furcula granulifer* – a dicotyledonous type of leaf impressions from Rhaetic of Greenland (HARRIS, 1932), *Sueviоxylon zonatum* from Jurassic of Germany (KRÄUSEL, 1928), *Sanmiguelia* a monocot type of leaf from the Upper Triassic of Colorado, U.S.A. (BROWN, 1956, TIDWELL et al., 1977), pollen grains cf. *Tricolpites (Eucommiidites) troedssonii* ERDTMAN 1948, juglandoid grains from Upper Jurassic of Isle of Wight (BORGE and ERDTMAN, 1954), *Sporojuglandoidites jurassicus* – from Lower Cretaceous of Rajmahal Hills, India (VISHNU-MITTRE, 1955) and *Problematospermum ovale* – an ovoid elongate seed with a pappus on tube at one end resembling to the achens and pappus of Compositae from Late Jurassic of Kazakhstan (TURUTANOVA and KETOVA, 1930, KRASSILOV, 1973). This finding adds an other evidence to the occurrence of a seed displaying angiospermoid feature prior to Cretaceous period.

Results

Genus: *Kedvesospermum* nov. gen.

Diagnosis:
Seed oblong ellipsoidal, micropylar opening lateral or asymmetrical, chalazal end

Plate 2.1.

globose, centrally recessed spatulate structure located surrounded by radiating fine creases, epidermal cells isodiametric, nucellar membrane distinct.

Derivatio nominis: In honour of Professor Dr. M. KEDVES, Szeged, Hungary whose monumental contribution in the field of Palaeobotany-Palynology is a widely known fact.

Differential diagnosis: In its asymmetric or lateral position of micropylar opening, the present seed-taxon can be distinguished from the other gymnospermous seed genera, however, in the same particular character it compares with the seed designated under *Spermatites* MINER, 1935 which was found in association of angiospermous remains from Cretaceous coals of Western Greenland.

Species: *K. montidorsum* n. sp.

Diagnosis:

Seed ellipsoidal, oblong to sub-globose, measuring 2 mm in length, 1.5 mm in breadth, micropylar opening asymmetric or lateral, chalazal end thickened and rounded, centrally spatulate recessed structure with radiating markings distinct, outer integument thin bearing fine irregular creases over the surface, sides slightly rounded, outlines with fine undulations, outer integument composed of elongated-rectangular cells, irregularly arranged surface, wall striated, lateral- and end-walls straight, nucellar cells exceptionally of bigger size having thickly cutinized anticlinal walls, surface uneven, cells encircling the micropylar opening forming a sort of thickened rim around the pore, chalazal end consists of dense mass of compact cells.

Isotype: Nos. 37279, 37303, 37307, 37419, 37420, 37421, 37422, 37423, 37424.

Holotype: No. 37305 (Fig. 2A, Plate 2.1., figs. 1-7 in Birbal Sahni Institute of Palaeobotany.

Locus typicus: Nidpur, Sidhi District, Madhya Pradesh, India.

Age: Middle Triassic (Tiki-Formation).

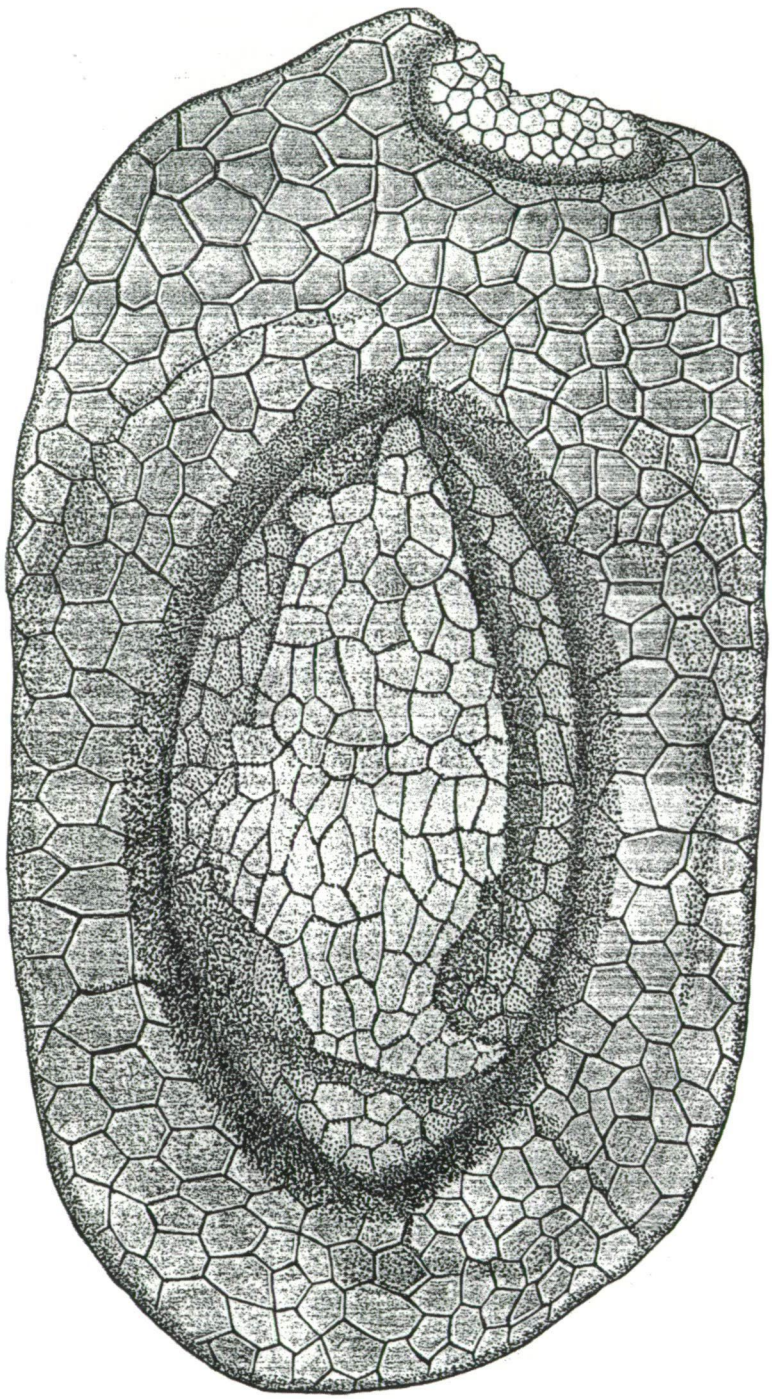
Plate 2.1.

Kedvesospermum montidorsum n. gen. et sp.

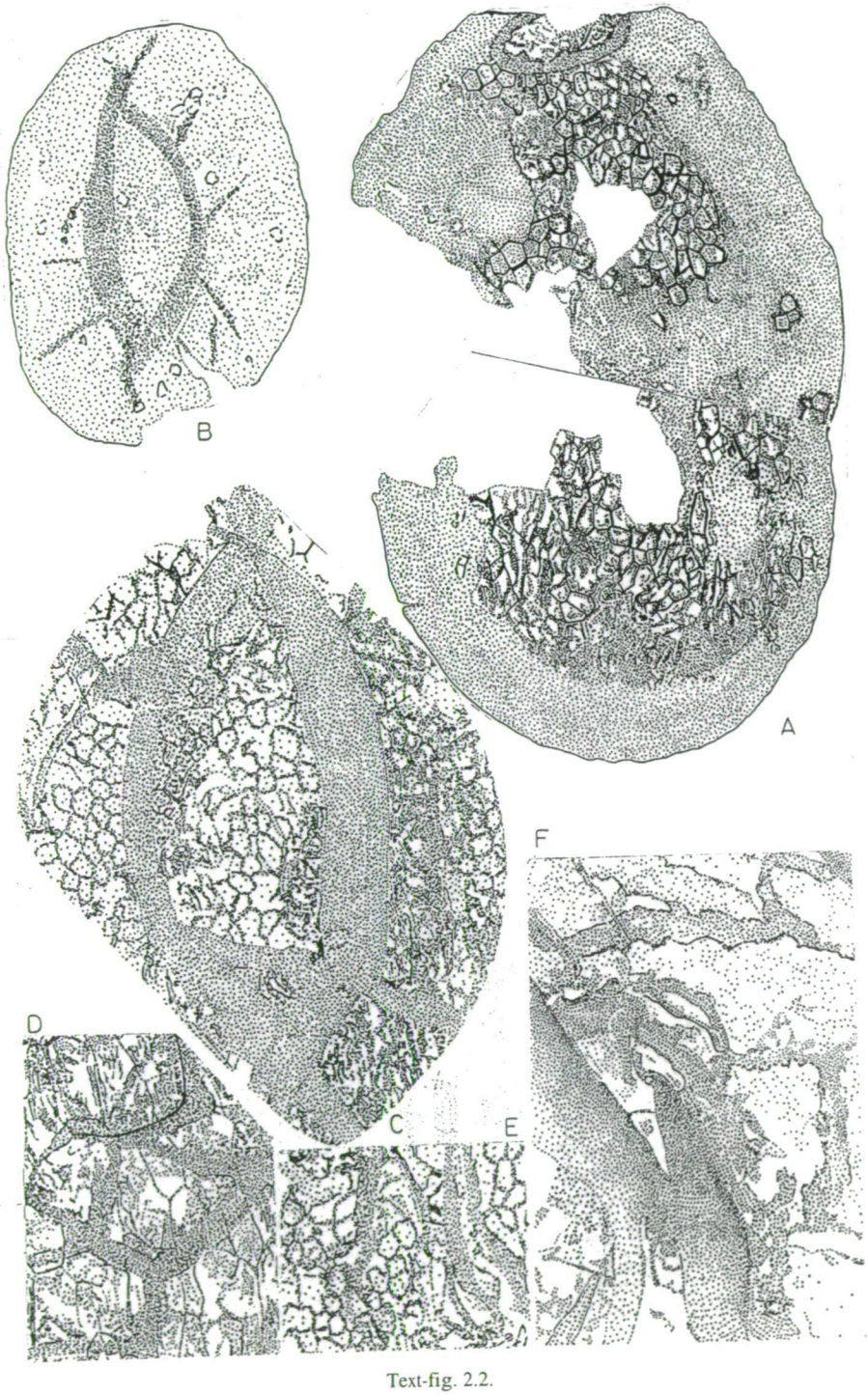
1. Unmacerated seed dipped in glycerine. Holotype BSIP No. 37305 - S/14 7.0x,
2. Seed after processing showing asymmetrical micropylar end. BSIP No. 37305 - S/14 19.5x.
3. Upper half of seed enlarged to show the micropylar hole associated with outer integument. BSIP No. 37305 - S/14 39.0x.
4. Chalazal portion of seed with cellular details and thickened end. BSIP No. 37305 - S/14 19.5x.

5-10. Seed exposed in glycerine. 5. BSIP No. 37419 - S/490 7.8x, 6. BSIP No. 37303 - S/12 7.8x, 7. BSIP No. 37279 - S/471 7.8x, 8. BSIP No. 37420 - S/685 7.8x, 9. BSIP No. 37421 - S/305 7.8x, 10. BSIP No. 37426 - S/272. 7.8x.

11. Specimen figured in No. 8 after treatment. BSIP No. 37420 - S/685 39.0x.
12. Seed after maceration with distinct creases over outer integument. BSIP No. 37421 - S/305 16.3x.
13. Seed showing highly thickened outline and chalazal end. BSIP No. 37420 - S/685 3.9x.
14. Seed after acid treatment showing nucellar membrane. BSIP No. 37422 - S/703 3.9x.
15. Seed on dorsal face showing moderately recessed, centrally located, elongate ellipsoid, spoon-shaped structure surrounded by radiating markings up to the margin. BSIP No. 37307 39.0x.
16. A part of nucellar membrane depicting cellular thickenings and interspersed with minor folds. BSIP No. 37423 - S/164 39.0x.
17. A part of micropylar region of seed with distinct nucellar beak. BSIP No. 37423 - S/164 117.0x.
18. Cellular details exhibiting imprints of epidermal cells probably representing inner integument adherent intimately to nucellar membrane composed of fairly big sized rhombic cells. BSIP No. 37424 - S/470 39.0x.
19. Outer integument - epidermal structure. BSIP No. 37426 - S/164 39.0x.
20. A portion of outer integument on both faces showing cellular details. BSIP No. 37425 - S/164 39.0x.



Text-fig. 2.1.



Text-fig. 2.2.

Text-fig. 2.1. .

Kedvesospermum montidorsum n. gen. et sp., a reconstruction of seed exhibiting overall shaped, cutinized membranes, centrally elongate, ellipsoid, spoon-shaped, moderately recessed structure associated with asymmetrical micropylar opening.

Text-fig. 2.2.

Kedvesospermum montidorsum n. gen. et sp. A. Seed after treatment showing structural details of cutinized membranes. Asymmetrical micropylar hole and chalazal end BSIP No. 37305 - S/14 78x. B. A complete seed after maceration showing overall outline of nucellus associated with centrally located, recessed, ± spatulate structure surrounded by radiating folds. BSIP No. 37303 - S/12 19.5x. C. Central portion of seed with spoon-shaped structure associated with membrane consisting of fairly big-sized rhombic cells, (D) imprints of epidermal cells adherent usually over the nucellus. BSIP No. 37 - S/470 39.0x. E. Cells of outer integument intermingled with radiating folds. BSIP No. 37425 - S/164 19.5x. F. Cellular details between radiate folds BSIP No. 37425 - S/164 117x.

Comparison and Discussion

As already mentioned the most distinctive character of the present seed is the possession of asymmetric micropylar opening which, according to our current knowledge, has only been marked in the fossil seeds *Spermatites* MINER 1935 (represented by seven species) in the association of angiospermous fossil plant from Upper Cretaceous coals of Western Greenland.

The present seeds assignated of *Kedvesospermum montidorsum* while comparing in its overall configuration with *Spermatites pylophorus* MINER 1935 depicts close identity with the later in the feature of lateral position of micropylar opening. Further in the presence of recessed spatulate-shaped structure associated with radiating creases, the seed *K. montidorsum* approaches to the seed *Vitis pseudorotundifolia* of the family Vitaceae described by TIFFNEY and BARGHOORN (1976) from Tertiary of North-Eastern U.S.A. As a consequence, these seed which share the angiospermid traits could reasonably be thought from angiosperm-like plant form. Obviously, the earliest forms would not demonstrate the total complement of modern angiospermid trend. However, it could be also speculated that in the beginning not a fully formed angiosperm must have evolved but their subsequent diversification should have been occurred during late Jurassic-Cretaceous time in a relatively short period. Additionally, the angiospermid traits marked in a few Triassic plant around the globe reflect towards the belief that angiosperms may conceviably have arisen during the Triassic period. To identify pre-Cretaceous flowering plants, the criteria from modern organisms, which have had millions of years to evolve, have been taken to use as to depict the differentiation of angiospermid character. In this reference MELVILLE's (1960) opinion appears to be quite reasonable that the earliest angiosperms may have looked so different from the ideas about them that in fossil state they probably would not be recognized.

However, there is the possibility of recognizing the flowering plants among gymnosperms, in *K. montidorsum* the asymmetrical micropylar opening is suggestive of these seeds to be borne laterally aggregated into infructesences. Such earliest forms must have been of small population size and quite delicate in nature. The pollen recorded in pre-Cretaceous strata are quite similar to monosulcate grains of angiosperms (HUGHES, 1976). In this context, it would be worth to mention here that the palynoassemblage of Nidpur Triassic sediments have also yielded *Praecolpatites* BHARADWAJ and SRIVASTAVA (1969) which is quite similar to monocolpate grains of primitive angio-

sperms. In case *Praecolpatites* is found in situ it may provide clue for earliest angiosperms.

Further, during preceding years upsurge in research by DOYLE (1977) and HICKEY and DOYLE (1977) have shown that the oldest angiospermid forms were not advanced.

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