FURTHER OBSERVATIONS ON THE GENUS *DANDOTIASPORA*
SAH, KAR & SINGH, 1971

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ABSTRACT

The genus *Dandotiaspora* Sah, Kar & Singh, 1971 is a dominant form in the Lower Eocene assemblages of India. It has been considered a marker fossil for Lower Eocene sediments. This paper deals with the taxonomic resolution of the various species described under this genus. A new approach dealing with the development of various morphographic characters within the genus, as envisaged from the present study, has been suggested.

INTRODUCTION

The genus *Dandotiaspora* was originally instituted by Sah et al. (1971) to include the pteridophytic spores possessing the characters—"Spores triangular-subcircular in polar view, trilete rays extending half equator. Exine laevigate, sometime infrastructured, exine thickened on distal side of spores opposite to haptotypic mark". They described five species under the genus, viz., *Dandotiaspora dilata* Sah et al., *D. plicata* Sah et al., *D. telonata* Sah et al., *D. pseudoauriculata* Sah et al. and *D. densicorpa* Sah et al. According to these authors the following species, viz., *D. dilata*, *D. plicata*, *D. telonata* and *D. pseudoauriculata* are mainly characterized by the presence of globular thickening, folds, continuous exi-
the initial development of distinctive morphology in this genus (Sah et al., 1971, p. 60) as is the case in Dandotiaspora plicata. Further extension of these thickenings or folds has been assumed to be responsible for the globular thickenings in D. dilata. A continuous exinal thickening (on the same side) all along the trilete mark is the characteristic of D. telonata. In the fourth species, D. pseudoauriculata, Sah et al. (1971) believe that the globular thickenings so characteristic of Dandotiaspora dilata shift to the apices of the spores. But in Dandotiaspora densicorpa the exinal thickness becomes more prominent in the central part of the spore appearing as a central body.

During the course of the present study, it has been observed that the disposition of distal exinal thickenings opposite the triradiate mark, as stated by Sah et al. (1971), is not correct. Also, the terms folds and thickenings have been very loosely applied which often convey confusing meaning. In fact, all the exinal thickenings, in general, are associated with the triradiate mark or sometimes extend to the apices of the spores wall.

Realizing the crucial stratigraphic value of this genus, extensive morphological studies were further undertaken. In order to substantiate our observations all the original slides of Sah et al. (1971) were planned to be re-examined. Unfortunately, the slides were not available for study. In the absence of the original slides, the present authors were left with no other alternative but to examine the palynological preparations of the Tura Formation to which the original slides belonged. These slides were available with one of us (R. Y. S.). The photographs of original specimens illustrated in a paper by Sah et al. (1971) were also restudied thoroughly. The present critical study of the genus is based on the availability of palynological preparation from the same area. In view of this it has been possible to establish lecto-holotypes in some cases.


Type Species — Dandotiaspora dilata (Mathur) Sah, Kar & Singh, 1971.

Remarks — An extensive study carried out on a large number of specimens belonging to the genus Dandotiaspora reveals that there is no exinal or globular thickening on the distal side or spores as stated by Sah et al. (1971). All these thickenings and other related features are indisputably restricted to the proximal surface of the exine and are mostly associated with the haptotypic characters. The triradiate mark in D. dilata is thick and raised along the full length. The exinal thickening which is intimately associated with the labra gradually dilates into semicircular globules at the ray-ends. Vimal (1952, p. 138, pl. 7, figs 9, 10) who described such type of spores for the first time from the Dandot Lignite of Pakistan, seems to have rightly observed that, "Triradiate mark very clear and each mark has on its two sides a thick area (in pl. 5, fig. 9). Each scar dilates into a thick rounded area dark in colour". Similarly, Mathur (1966, p. 38) described Psilatriletes dilatus the present holotype of Dandotiaspora in perfect agreement to our observations. Therefore, morphologic characters of the genus as described by Sah et al. (1971) are incorrect. According to the generic diagnosis of Dandotiaspora, triradiate rays extend up to half equator but the illustrations of various species given by Sah et al., 1971 and our observations show that they extend up to 3/4 or more than 3/4 of the equator. Organizationally, this genus closely compares with Biretisporites (Delcourt & Sprumont) Delcourt, Dettmann & Hughes, 1963. However, Biretisporites (Delcourt & Sprumont) Delcourt, Dettmann & Hughes, 1963 differs from Dandotiaspora by its triangular to subtriangular outline and uniform elevated lips which are upturned extensions of the proximal exine. Matonisporites Couper, 1958 though a thick-walled spore like Dandotiaspora, possesses a triradiate scar which is surrounded by a distinct margo. The revised diagnosis of the genus Dandotiaspora is, therefore, now as follows:

Emended Generic Diagnosis — Spores subtriangular to subcircular in polar view. Trilete mark prominent, raised extending usually more than 3/4 radius, labra raised, thick, straight to sinuous enclosing the Y-mark. Exine variably thickened along the Y-mark or near ray-ends, approximating the apices rarely delineating a central body.
Dandotiaspora dilata (Sah, Kar & Singh, 1971) emend.
Pl. 1, figs 1, 3-6, 8-9, 11, 14, 15

Junior synonyms:
1971 D. plicata Sah, Kar & Singh
1971 D. pseudoauriculata Sah, Kar & Singh

Emended Diagnosis — Spores triangular, 55-98 μ, trilete, Y-rays straight, extending more than 3/4 spore radius, bifurcating at tips. Y-mark enclosed within the elevated lips. Exinal thickening intimately associated with the abnormally thick labra, raised terminating as semicircular to globular like feature at the ray-ends. Exine 2-5 μ thick, laevigate.

Remarks — In order to examine fool proof specimens of Dandotiaspora plicata and D. pseudoauriculata, now the junior synonyms of D. dilata, many specimens were examined. Unfortunately, we did not come across any specimen elucidating the diagnostic characters of the above mentioned species as stated by Sah et al. (1971). On the other hand, there were numerous spores assignable to Dandotiaspora dilata and D. telonata preserved in different modes of compression. The specimens of D. dilata compressed under different modes of compression exhibit different disposition of the thickenings which have generally been misunderstood for the institution of more species than necessary. Since these thickenings are associated with haptotypic characters, various configurations under proximo-distal and proximo-lateral compressions are possible. The observed range of variability relating to these intimately associated morphographic characters is illustrated in Pl. 1, figs 1-15. It has been observed that the globular thickening at the ray-end quite often looses over backwards resulting in the formation of a semicircular thickening which appears crescent-shaped. This situation is usually possible in proximo-distal compression and compares with the forms described under the junior synonym D. plicata. With this reason, this species has been merged with D. dilata.

Some specimens of D. dilata in lateral compression appear to exhibit false auriculae at the apices. These, in fact, correspond to the thickenings at the ray-ends which when viewed in proximo-distal condition remain indistinguishable from those in D. dilata (Pl. 1, figs 3, 9). D. pseudoauriculata has also been merged with D. dilata.

Dandotiaspora telonata (Sah, Kar & Singh, 1971) emend.
Pl. 1, figs 2, 12, 13

Lectoholotype — Pl 1, fig. 13; Slide no. 5334/23

Emended Diagnosis — Spores triangular-subcircular, 48-90 μ, trilete, Y-rays straight, extending 3/4 radius, bifurcating at tips. Y-mark enclosed with thickened and raised labra. Exine 2-3 μ thick, sometimes more thickened near apices, laevigate, sometimes intrapunctate in proximal view.

Comparison — Dandotiaspora telonata resembles D. dilata in shape and size but is distinguished from the later in having a continuous raised and thickened labra.

Dandotiaspora densicorpa (Sah, Kar & Singh, 1971) emend.
Pl. 1, figs 7, 10

Lectoholotype — Pl. 1, fig. 7; Slide no. 5332/14.

Emended Diagnosis — Spores subtriangular-subcircular, 70-106 μ, trilete, Y-rays straight, lips thin, sometimes elevated. Y-mark extending more than 3/4 radius. Tips of laesura surrounded by semicircular thickenings. Exine 2-6 μ thick, more thickened in central region simulating an inner body.

Comparison — This species differs from Dandotiaspora telonata and D. dilata in possessing a centrally thickened area.

Remarks — Dispersed spores assignable to Dandotiaspora densicorpa are found in very low frequency in the type material. Considering its relationship with the other species of the genus Dandotiaspora the present species appears to be an aberrant form.

DEVELOPMENTAL CHARACTERISTICS

Palaeocene sediments of India have been found to be exceptionally rich in Dandotia-
spora dilata and D. telonata. The occurrence of D. densicorpa is very low in numbers. While strata belonging to Lower Eocene exhibit a marked dominance of D. dilata. Detailed studies of the morphological variations within the different species of the genus have clearly demonstrated that these species possess a close morphological relationship with one another. The morphological relationship of the three species, i.e., D. telonata, D. dilata and D. densicorpa is discussed below:

1. In Dandotiaspora telonata, triradiate suture is enclosed within the uniformly elevated lips. The thickness at the tips of the ray-ends is also mostly uniform. By virtue of these morphographic characters D. telonata resembles the genus Biretisporites (Delcourt & Sprumont) Delcourt, Dettmann & Hughes, 1963 which is known from the older sediments.

The morphological characters in D. dilata exhibit two important changes, (i) reduction of exinal thickness along the Y-rays from the apex to the 3/4 of the Y-ray, and (ii) concentration of the exinal thickening in the form of globular features. These morphological developmental features make this species very distinct and easily recognizable.

2. In association with D. telonata, some spores possessing a central thickening (D. densicorpa) are noticeable. Since these spores occur in very low numbers in the material studied, we feel that this morphological character may represent a specialized development of the thickening.

3. The spores assignable to D. dilata in which semicircular thickenings are confined to the laesural tips occur in abundance in Lower Eocene. The predominance of their population in Lower Eocene sediments alone may indicate the maximum phase for the development of the genus. Keeping in view the above discussion, it seems reasonable to assume that the genus Dandotiaspora may be considered as a spore-complex.

REFERENCES


EXPLANATION OF PLATE

(All magnifications. × ca. 500)

PLATE 1
