

# PALYNOLOGY OF THE MESOZOIC SEDIMENTS OF KUTCH, W. INDIA — 3. MORPHOLOGICAL STUDY AND REVISION OF THE SPORE GENUS *TRILOBOSPORITES* PANT EX POTONIÉ, 1956

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## ABSTRACT

*Trilobosporites* Pant ex Pot., 1956 is here restricted to valvate spores of the type exemplified in the type species *T. hannonicus* (Delc. & Sprum.) Pot. Aivalvate spores with various ornamentation and with concentration of sculptural elements at the angular apices are here included under a new generic name *Impardecispora*.

## INTRODUCTION

**D**ISPERSED fern spore genera *Trilobosporites* Pant ex Potonié (1956), *Pilosisporites* Delcourt & Sprumont (1955), *Concavissimisporites* Delcourt & Sprumont (1955) are abundant in the Lower Cretaceous sediments of Kutch, W. India (VENKATACHALA, in press). These genera are characterized by a triangular to roundly triangular amb and ornamented with grana, verrucae, coni, pila, bacula and other such sculptural elements. While studying spores referable to *Trilobosporites* from this assemblage Venkatachala (*l.c.*) noted two distinct types of spores included under the genus, viz.

- A) Triangular spores with distinct *valvate cushions* at the three angular apices referable to *Trilobosporites*, *sensu* Potonié (1956).
- B) Roundly triangular - triangular - trilobed, *avalvate* spores with distinct verrucate ornamentation mostly crowded at the three angles referable to *Trilobosporites* by various authors (COUPER, 1958; COOKSON & DETTMANN, 1958; DETTMANN, 1963; PO-COCK, 1962, 1964 and others).

The genus *Trilobosporites* was proposed by Pant (1954) to include trilobate, microspores of various ornamentation previously designated as *Trilobotriletes* by Naumova (1937). The proposition of Pant (*l.c.*) was mainly theoretical and he did not designate a type species. Potonié (1956) validated the genus and designated *T. (Concavissimis-*

*porites) hannonicus* Delcourt & Sprumont (1955) as the type species. The genus as recircumscribed by Potonié (*l.c.*) includes triangular, trilete spores with microreticulate or verrucose ornamentation and well defined valvae at the three angular apices. The genus was placed under the subturma *Aurilotriletes* Potonié & Kremp (1954) and infraturma *Auriculati* (Schopf) Potonié & Kremp (1954). Potonié (*l.c.*) placed the genus in proximity with *Triquitrites* Wilson & Coe (1940) and further commented that the genus *Trilobosporites* is the Mesozoic equivalent of *Triquitrites*. *T. hannonicus* and *T. bernissartensis* (Delcourt & Sprumont) Potonié (1956) are referred to this genus by Potonié (*l.c.*). Both the species have distinct, well developed auriculae (valvae) at the three angular apices and variously ornamented exine.

Couper (1958), Cookson and Dettmann (1958), Pocock (1962, 1964), and Dettmann (1963) have included triangular, verrucate and murate spores of the Type B which are distinctly not valvate but showing concentration of the ornamentation at the three angular apices under the genus *Trilobosporites*. Their contention perhaps is to equate the three-angular regions crowded with ornamentation with the valvae of *Trilobosporites hannonicus* type (= valvae of *Triquitrites*).

The valvate spores of Type A — *T. hannonicus* and *T. bernissartensis* are more akin to the spores produced by *Cyathea* spp. and *Dicksonia* spp. (HARRIS, 1955) and comparable to *Triquitrites* Wilson & Coe (1940), *Matonisporites* Couper (1958), and *Boseisporites* Dev (1961). The ornamented avalvate ones of Type B — *T. apiverrucatus* Couper, *T. horridus* Pocock, etc. are akin to the spores produced by *Lygodium* Swartz and *Schizaea* J. E. Smith (COUPER, 1953; HARRIS, 1955; BOLKHOVITINA, 1959) and comparable to *Concavis-*

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*simisporites* (Delcourt & Sprumont), Delcourt, Dettmann & Hughes (1953) and *Pilosisporites* Delcourt & Sprumont (1955).

Because of these distinct differences in these two types of spores included in *Trilobosporites* we here propose to restrict *Trilobosporites* to valvate types of the like exemplified in *T. hannonicus* (type species) and *T. bernissartensis*. The other species with concentration of sculptural elements at the three angular apices lacking equatorial valvate extensions are included here under a new generic name *Impardecispora* and placed under infraturma *Apiculati* (Bennie & Kidston) Potonie (1956).

#### SYSTEMATIC PALYNOLOGY

- Anteturma — *Sporites* H. Pot. 1893  
 Turma — *Triletes* (Reins.) Pot. & Kr. 1954  
 Subturma — *Azonotriletes* Lub. 1935  
 Infraturma — *Apiculati* (Benn. & Kid.) Pot. 1956

#### *Impardecispora* gen. nov.

*Syn.*—*Trilobosporites* Pant ex Pot., 1956 (in parts).

*Type Species*—*Impardecispora* (*Trilobosporites*) *apiverrucata* (Coup.), comb. nov.

*Diagnosis*—Spores triangular, trilobed with concave inter-apical margins. Trilete. Exine thick, granulose-verrucose or covered with muri at angular apices, sculptural elements also crowded at angular apices.

*Description*—Spores mostly triangular in polar view, sometimes subtriangular, with rounded, blunt apices and mostly marked by concave inter-apical margins. Trilete, rays well developed,  $\pm$  equal in length, tapering at ends. Commissure well defined. Exine thick, ornamented with grana, verrucae and such other elements. Verrucae larger and tend to concentrate at apices, in rest parts they are comparatively smaller in size and sparsely distributed. Exine granulose and murate at angles in certain species (TEXT-FIG. 1).

*Derivation of name*—Latin: *Impar* = uneven, *decus* = ornament.

The following species are included in *Impardecispora* gen. nov.

(i) *Impardecispora* (*Trilobosporites*) *apiverrucata* (Couper, 1958) comb. nov.

*Holotype*—Couper, 1958; pl. 21, fig. 11. Illustrated here in PL. 1, FIGS. 1 & 2.

(ii) *I. (Trilobosporites) trioreticulosa* (Cook. & Dettm. 1958) comb. nov.

*Holotype*—Cook. & Dettm., 1958; pl. 17, fig. 3.

(iii) *I. (Trilobosporites) minor* (Poc. 1962) comb. nov.

*Holotype*—Pocock, 1962; pl. 4, fig. 61.

(iv) *I. (Trilobosporites) canadensis* (Poc. 1962) comb. nov.

*Holotype*—Pocock, 1962; pl. 4, fig. 63.

(v) *I. (Trilobosporites) tribotrys* (Dettm. 1963) comb. nov.

*Holotype*—Dettmann, 1963; pl. 12, fig. 10.

(vi) *I. (Lygodium) purverulentus* (Verb. 1958) comb. nov.

*Syn.*—*Trilobosporites purverulentus* (Verb.) Dettm. 1963.

*Holotype*—Verbitskaya, 1958; pl. 3, fig. 43. (For detailed discussion—See Dettm. 1963).

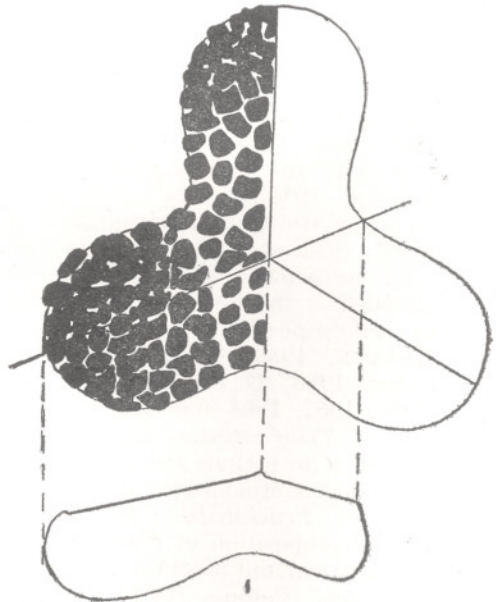
(vii) *I. (Trilobosporites) horridus* (Pocock, 1964) comb. nov.

*Holotype*—Pocock, 1964; pl. 5, fig. 10.

(viii) *I. gibberulus* (Kara-Murza, 1951) comb. nov.

*Syn.*—*Trilobosporites gibberulus* (Kara-Murza) Poc. 1964.

*Holotype*—Kara-Murza, 1951; pl. 9, fig. 7.



TEXT-FIG. 1—Organization of *Impardecispora apiverrucata*. Polar view and meridional section. Note the thick crowding of verrucae at apices.

(ix) *I. (Lygodium) multituberculatus* (Bolikh. 1961) comb. nov.

*Syn.*—*Trilobosporites multituberculatus* (Bolikh.) Poc. 1964.

*Holotype* — Bolkh., 1961; pl. 28, fig. 7.

(x) *I. (Lygodium) uralensis* (Bolikh., 1961) comb. nov.

*Syn.*—*Trilobosporites uralensis* (Bolikh.) Poc. 1964.

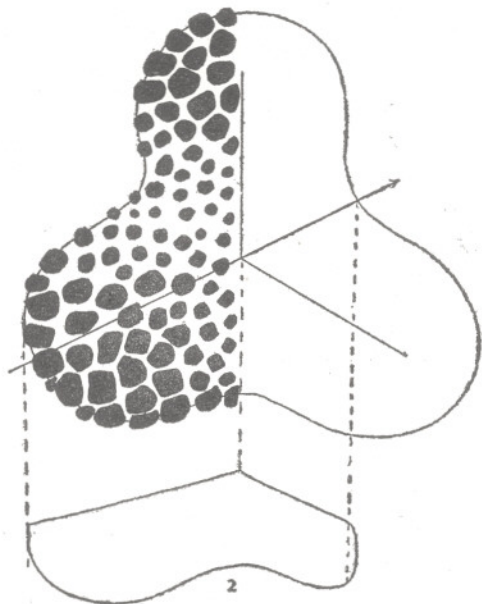
*Holotype* — Bolkh., 1961; pl. 27, figs. 6a-c. (Illustrated here in PL. 1, FIGS. 3-5; TEXT-FIG. 2).

*Remarks*—The different species here included under *Impardecispora* show distinct elaboration of form and sculptural pattern. *I. simplex* is triangular and is bedecked with faint verrucae at the angles. From this simple form through elaboration of form and sculptural pattern, spores of the type exemplified in *I. apiverrucata* which are distinctly trilobed with concentration of verrucae at the angles and sparse elements all over the spore, is attained. The various other species form the intermediate stages in this pattern of elaborations.

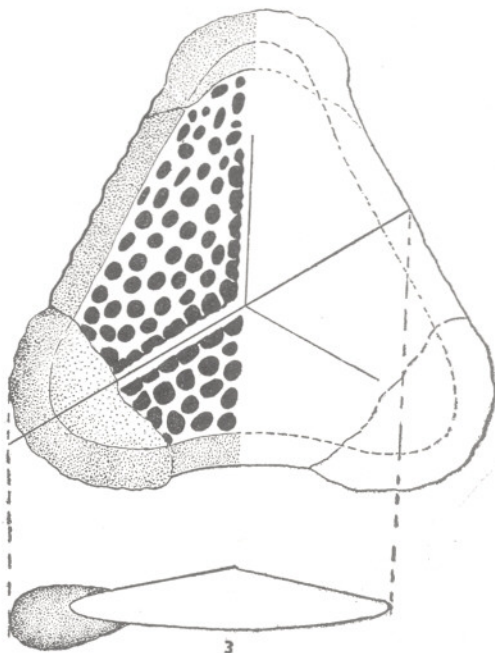
**Subturma** — *Auritotriletes* Pot. & Kr. 1954

**Infraturma** — *Auriculati* (Sch.) Pot. & Kr. 1954

*Trilobosporites* Pant, 1954 ex Pot. 1956



TEXT-FIG. 2 — Organization of *Impardecispora uralensis*. Polar view and meridional section. Note the thick crowding of verrucae at apices.



TEXT-FIG. 3 — Organization of *Trilobosporites*. Polar view and meridional section. Note the three angular valvate thickenings.

*Type Species* — *Trilobosporites hannonicus* (Delc. & Sprum.) Pot. 1956.

The following species are included under this genus:

(i) *Trilobosporites hannonicus* (Delc. & Sprum.) Pot. 1956.

(ii) *T. bernissartensis* (Delc. & Sprum.) Pot. 1956. (Illustrated here in PL. 1, FIG. 13).

(iii) *T. (Cyatheacidites) verrucosus* (Singh, Sriv. & Roy, 1964) Venk.

(iv) *Trilobosporites triangularis* sp. nov.

Pl. 1, Figs. 9-12; Text-fig. 3

*Holotype* — Pl. 1, Fig. 12.

*Description* — Triangular miospores with rounded valvate angles and straight to slightly concave sides; 100-120  $\mu$ ; holotype 108  $\mu$ . Y-mark distinct, rays reaching the valvae and bordered by verrucae, apex and vertex high, lips broad. Exine 6-8  $\mu$  thick, thickened into  $\pm 25 \mu$  wide valvae at angles; proximally subverrucose, verrucae low set, evenly distributed over the exine, distally intragranulose (See PL. 1, FIG. 10).

*Comparison* — *T. hannonicus* is smaller in size and is granulose in ornamentation.

*T. bernissartensis* has large verrucae and is also smaller in size. *T. verrucosus* has incipient valvae.

(v) *Trilobosporites* sp.

Pl. 1, Fig. 8

*Description* — Triangular, with distinctly rounded, valvate, angles. Valvae upto 20

$\mu$  wide. Exine 4  $\mu$  thick, intrastuctured. Y-mark present but masked in the specimen studied.

*Remarks* — The illustrated specimen is the only one that has been found and hence not assigned or compared with any known species. Because of the prominent valvae seen in the apices it has been thought necessary to illustrate this specimen.

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## EXPLANATION OF PLATE

(All photomicrographs are enlarged ca.  $\times$  500)

### PLATE 1

1-2. *Impardecispora apiverrucata*.  
3-5. *Impardecispora uvalensis*.

6-7. *Impardecispora* sp.  
8. *Trilobosporites* sp.  
9-12. *Trilobosporites triangularis* sp. nov.  
13. *Trilobosporites bernissartensis*.

