

*CRESCENTIPOLLENITES* GEN. NOV.—A NEW NAME FOR HITHERTO KNOWN  
*LUNATISPORITES* LESCHIK (1955) FROM THE LOWER GONDWANAS

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ABSTRACT

LESCHIK (1955) instituted the genus *Lunatisporites* from Keuper (Upper Triassic) of Neuwelt near Basel, BHARADWAJ (1962) emended the genus to include striate pollen grains from the Lower Gondwanas of India. SCHEURING (1971) observed taeniae i.e. exoexinal thickenings on the central body of the type species of *Lunatisporites*. He subsequently emended the genus to accommodate only taeniate forms. The pollen grains hitherto described as *Lunatisporites* from the Lower Gondwanas do not possess exoexinal bands (taeniae). Since none of the existing genera can hold these specimens—a new genus viz. *Crescentipollenites* is proposed hereby to include Lower Gondwana pollen grains which have been previously described under *Lunatisporites* Leschik (1955).

The spore genus *Lunatisporites* was instituted by LESCHIK (1955) from Keuper (Upper Triassic) of Neuwelt, near Basel. He selected *Lunatisporites acutus* Leschik (1955) as the type species of the genus. In the same paper, albeit slightly later, he also proposed another new genus viz. *Taeniaesporites*. He designated *Taeniaesporites krausei* Leschik (1955) as the genotype.

LESCHIK (1956) while describing the miospores from Zechstein (Upper Permian) of Neuhof, near Fulda further elaborated the diagnosis of *Taeniaesporites* to include forms with multistriate body and sacchi with fine reticulation. He also transferred *Lueckisporites richteri* Klaus (1955) to *Taeniaesporites* and redesignated the same as the type species of the genus. He also described *T. noviaulensis* to include pollen grains with striations and a haptotypic mark on the central body.

BHARADWAJ (1962) on the basis of a re-examination of the diplotype of *Lunatisporites* and some specimens indistinguishable from *Taeniaesporites krausei*, opined that only *Lunatisporites* be retained because it had been described earlier than *Taeniaesporites*. He, however, found the diagnosis of *Lunatisporites* furnished by LESCHIK (1955, 1956) inadequate and emended the genus as follows:—"bilateral, disaccate pollengrains, central body subcircular to oval, with proximal exine thick to thin, intramicroreticulate, horizontally segmented by grooves or striations continuous with the adjacent ones nearer the equator; distal exine also intramicroreticulate but thinner, body wall frequently folded inwards in flattened specimens giving rise to two, vertical, semi-lunar or arcuate folds. Laterally sacchi often coming together, distally inclined and forming a biconvex sulcus, zones of saccus attachment convex."

He also instituted a new species viz. *Lunatisporites fuscus* from the Raniganj coalfield, (Upper Permian), West Bengal.

SCHEURING (1971) in a very exhaustive palynological study of the Keuper Formation from Switzerland observed numerous pollen grains previously described by LESCHIK (1955) as *Lunatisporites* and *Taeniaesporites*. He studied meticulously *Lunatisporites acutus* Leschik (1955) and *Taeniaesporites krausei* Leschik (1955)—the type species of *Lunatisporites* and

*Taeniasporites* respectively and found them similar to each other. He, thus, maintained *Lunatisporites* after emendation as follows:—

“—Bisaccate Pollenkörner mit:

- breiten, fein retikulierten Ectexinenstreifen (Taeniae), die den Corpus in Längsrichtung bedecken und mitunter Auf-oder Abspaltungen aufweisen;
- einer (zumindest am Proximalpol) breit aufklaffenden, zentralen Ectexinenläsur, welche die Kalotte längs der Longitudinalachse in zwei Streifenpakete teilt;
- einer durch diese Läsung entstandenen ectexinenfreien Zone am Proximalpol (“Zentralstrasse”), in deren Zentrum sich eine kurze, längsgerichtete Intexinenläsur befindet;
- einem, zwei (oder auch völlig fehlenden) Taeniarudiment (-en), welche die Enden der Zentralstrasse bedecken können.
- einem Sulcus zwischen den distalen Luftsackansätzen.”

From the above diagnosis, it becomes evident that *Lunatisporites* (*sensu* SCHEURING) has taeniae on the central body. These bands are exocxinal in origin and are reticulate (? intrapunctate). The central body has also an intexinal haptotypic mark. This mark, in the opinion of Scheuring, is a reduced trilete and may even approximate a monotele mark in appearance.

Recently, BHARADWAJ (1974) has re-examined the problem arising out of the emendation of *Lunatisporites* by SCHEURING *vis-a-vis* *Lueckisporites* Potonié and Klaus (1954). The emended diagnosis of *Lunatisporites* given by Scheuring includes forms with two taeniae also, the like of which normally characterize *Lueckisporites*. However, SCHEURING does not mention *Lueckisporites* under synonyms of *Lunatisporites* Leschik emend. Scheuring. With regard to the number of taeniae, which is a quantitative feature, there could be no line of separation between *Lueckisporites* and *Lunatisporites* as apparent from the futile attempts by a large number of palynologists in the past, viz., GREBE (1957); POTONIÉ (1958); KLAUS (1960); JANSONIUS (1962) and others. However, one feature, which separates the diplotypes of *Lueckisporites* and *Lunatisporites*, is the distal biradial tenuitas which is absent in the former and present in the latter as recognized by BHARADWAJ (1974), who has, thus, re-circumscribed these two genera accordingly.

But since the emendation of *Lunatisporites* by BHARADWAJ (1962), many species of the genus were reported from the various Lower Gondwana sediments besides those by Bharadwaj from the Raniganj Formation, Raniganj coalfield, West Bengal.

TIWARI (1965) found *L. fuscus* Bharadwaj (1962) in the Barakar Formation (Middle Permian), Korba coalfield, Madhya Pradesh. He also instituted two new species viz. *L. notabilis* and *L. korbaensis* from the same formation.

BHARADWAJ, SAH AND TIWARI (1965) also reported the presence of *Lunatisporites* in negligible percentage in Barren Measures Succession (Middle-Upper Permian) of Jharia coalfield, Bihar.

NAVALE AND TIWARI (1966) reported the occurrence of *Lunatisporites* in meagre percentage from Talcher coalfield, Orissa.

MAHESHWARI (1967) described *Lunatisporites fuscus* Bharadwaj (1962) and two new species: *L. gondwanensis* and *L. santalensis* from the Bansloi river exposures, Barakar Formation, in Rajmahal hills, Bihar.

\**Lunatisporites amplus* and *L. hirsutus* were instituted by KAR (1968) from the subsurface material belonging to Barren Measures Sequence from Jharia coalfield. KAR (1969a,

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\*This species has already been transferred to *Crescentipollenites* as *C. oblongus* by BHARADWAJ, KAR and NAVALE (Ms.)

1969b) also reported the presence of this genus from Barakar and Barren Measures of North Karanpura coalfield, Bihar.

MAITHY (1968) found *Lunatisporites amplus* (Balme & Hennelly) Potonié (1958) from the Umaria coalfield, Karharbari Formation (Lower Permian), Madhya Pradesh.

LELE AND MAKADA (1971, 1972) recorded the presence of *Lunatisporites* in Talchir-Karharbari formations (Permo-Carboniferous to Lower Permian) in the Jayanti coalfield, Bihar. LELE AND CHANDRA (1973) also found this genus in Talchir boulder bed and the overlying needle shales in the Johilla coalfield, Madhya Pradesh.

From the Lower Gondwana sediments of Zaïre (Congo), BOSE AND KAR (1966) described *Lunatisporites asulcus* Bose and Kar (1966) and *Lunatisporites* sp. from the assises glaciaires et périglaciaires (Permo-Carboniferous) of Zaïre. They have also described another new species, *L. brevis* from the assise des schistes noirs de Walikale (Lower Permian). KAR AND BOSE (1967) found the latter species in assise des schistes noirs de la Lukuga (Middle Permian) of Zaïre. *L. asulcus* Bose and Kar (1966) was also described by BOSE AND MAHESHWARI (1968) from the Coal Measures near lake Tanganyika, South of Albertville. MAHESHWARI AND BOSE (1969) described *Lunatisporites* sp. from the Kibamba river in the area of Lukuga coalfield. KAR (1969c) and MAHESHWARI (1969) also described this genus from Ombela-Lokandu and South Katanga respectively.

From the Lower Gondwanas of South Africa, HART (1960, 1964, 1965) reported the occurrence of *Lunatisporites*. He also proposed *Lunatisporites globosus* from the Coal Measures (K<sub>2</sub>), Katewaka—Mchuchuma coalfield, Tanganyika.

Since, *Lunatisporites* Leschik emend. Bharadwaj (1974) comprises the proximally taeniate and distally tenuitate pollen grains, those species of *Lunatisporites* described from the various parts of Lower Gondwanas being non-taeniate, need to be assigned to some other genus. Among the striate spore genera from Lower Gondwanas, *Lahirites* Bharadwaj (1962) comes very near to these species. However, the latter differ in their arcuate, full length zones of sacci attachment distally as opposed to the straight, full-length zones of sacci attachment in *Lahirites*. For the same reason as well as the absence of intramicroreticulation in the body exine, *Striatites* (Pant) Bharadwaj (1962) is also excluded. Regarding *Striatopodocarpites* (Zoricheva & Sedova) Sedova (1956) as has been re-illustrated by HART, the holotype differs in having a central body which seems to be taeniate and intrapunctate. The sacci in *Striatopodocarpites* are also broadly reticulate unlike the species described from the Lower Gondwanas. In *Striatoabietites* (Zoricheva & Sedova) Sedova (1956) also re-illustrated by HART the distal attachment of the sacci to the central body is also straight producing a uniformly broad sulcus. *Striatopinites* (Zoricheva & Sedova) Sedova (1956) is very much similar to *Striatoabietites* in having the distal attachment zones of sacci to central body straight and attached to their full-length. Evidently, none of the existing striate genera can receive these species. Hence, a new genus viz., *Crescentipollenites* is being instituted to accommodate the Lower Gondwana pollen grains which have so far been described under *Lunatisporites*.

#### GENUS—CRESCENTIPOLLENITES GEN. NOV.

Type species—*Crescentipollenites fuscus* (Bharadwaj) comb. nov.

*Generic diagnosis*—Disaccate, bilaterally symmetrical pollen grains. Central body distinct, subcircular to vertically oval, exine—thick, intramicroreticulate, rarely  $\pm$  laevigate, generally horizontally striated on proximal surface, sometimes a few vertical striations also observed on the same side. Proximal attachment of sacci to central body equatorial,

distal attachment subequatorial, arcuate. Biradial sulcus present between distal zones of sacchi attachment. Sacchi hemispherical, strongly built, sometimes laterally juxtaposed or continuous.

*Description*—Pollen grains are generally elliptical to oval in overall shape, rarely sub-circular due to lateral continuity of sacchi and strongly diploxytonoid condition. Size of pollen varies greatly, it may be as small as  $50\ \mu$  and as big as  $270\ \mu$ , generally, however, the size ranges from  $90$ - $130\ \mu$ . Central body is distinct, mostly denser than sacchi, sub-circular to vertically oval with rounded or pointed lateral ends, in some specimens it may be rhomboid. Exine of central body  $1$ - $2.5\ \mu$  thick, intramicroreticulate, sometimes it seems to be  $\pm$  laevigate, margin of central body is rarely ledged. Horizontal striations on central body vary in number; they are well defined, rarely branched, run  $\pm$  parallel to each other and extend from one end of central body to another. A few vertical partitions also observed in some specimens on the proximal side; striations may be wavy in rare occasions. Proximal attachment of sacchi to central body is consistently equatorial. Distal attachment is arcuate, the lateral ends of the sacchi are closer to each other than the middle region. Distally the sacchi may cover a little or major part of central body enclosing a well recognizable biradial sulcus. Distal attachment is often associated with well developed crescent shaped folds on central body. The presence of semilunar fold helps to identify this genus easily. The regular fold system along with the distal attachment zone probably points out that the central body in original condition was inflated but while flattening it deposited along with the distal attachment in the form of fold. Sacchi are well developed, bigger than the central body, generally hemispherical, intrareticulate, occasionally leathery in appearance and intrareticulation is not clearly discernible.

*Crescentipollenites fuscus* (Bharadwaj) comb. nov.

1962—*Lunatisporites fuscus* Bharadwaj; pl. 14, figs. 189-190; pp. 93-94.

1964—*Lunatisporites fuscus* Bharadwaj: Bharadwaj & Salujha; pl. 9, fig. 137; p. 208.

1965—*Lunatisporites fuscus* Bharadwaj: Tiwari; pl. 7, fig. 143; pp. 196-197.

1967—*Lunatisporites fuscus* Bharadwaj: Maheshwari; pl. 4, fig. 37; p. 273.

*Holotype*—Bharadwaj, 1962, pl. 14, figs. 189-190.

*Type locality*—Poniat seam, Raniganj coalfield, Raniganj Stage (Upper Permian), West Bengal, India.

*Diagnosis and Description*—See Bharadwaj, 1962, pp. 93-94.

*Crescentipollenites notabilis* (Tiwari) comb. nov.

1965—*Lunatisporites notabilis* Tiwari, pl. 7, fig. 146; p. 197.

*Holotype*—Bharadwaj and Tiwari, 1964, pl. 2, fig. 27.

*Type locality*—202 (II seam), E, Korba coalfield, Barakar Stage (Middle Permian), Madhya Pradesh, India.

*Diagnosis and Description*—See Tiwari, 1965, p. 197.

*Crescentipollenites asulcus* (Bose & Kar) comb. nov.

1966—*Lunatisporites asulcus* Bose & Kar, pl. 16, figs. 1-2; pp. 52-53.

1968—*Lunatisporites asulcus* Bose & Kar: Bose & Maheshwari, pl. 20, fig. 2; text-fig. 21, p. 78.

*Holotype*—Bose and Kar, 1966, pl. 16, fig. 1.

*Type locality*—Elila river (rt. side, only 11), near Fundi Sadi, assises glaciaires et périglaciaires (Permo-Carboniferous), Zaïre (Congo).

*Diagnosis and Description*—See Bose & Kar, 1966, pp. 52-53.

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