

ON SOME NEW SPORE GENERA FROM THE UPPER CARBONIFEROUS COALS OF LOTHRINGEN-SAAR — PFALZ BASIN

B. S. VENKATACHALA

Birbal Sahni Institute of Palaeobotany, Lucknow

ABSTRACT

Four new genera, *Bullaspora* gen. nov., *Aggerispora* gen. nov., *Cymbospora* gen. nov. and *Candidispora* gen. nov. from the Saar region have been described. Generic diagnoses and detailed descriptions of these genera have been given.

INTRODUCTION

THE new spore genera described in the present paper are from the Falkenberg Colliery (Westphalian-D) which lies in the south-western region of Lothringen-Saar—Pfalz basin, which extends from Lorraine in Central-eastern France to Pfalz in West Germany. In this basin a detailed study of the microflora was initiated by Bhardwaj (1955, 1957). In his two papers the *Sporae dispersae* recovered from the Saar have been described in detail. The *Sporae dispersae* of Pfalz have been studied by Bhardwaj and Venkatachala (1957).

The descriptive terminology used in this paper is that used by Potonié & Kremp (1955, p. 9) and the supra-generic arrangement is after Potonié (1956, 1958).

DESCRIPTION

Anteturma	<i>Sporites</i> H. Pot. 1893
Turma	<i>Zonales</i> (B. & K.) Pot. & Kr. 1954
Subturma	<i>Zonotriletes</i> Waltz 1935
Infraturma	<i>Cingulati</i> Pot. & Kl. 1954

Bullaspora gen. nov.

Pl. 1, Fig. 1

Generotype — *Bullaspora implicata* sp. nov.
Generic Diagnosis — Trilete miospores, circular, oval to roundly triangular in shape. Y-mark present but usually not well marked and distinct. Extrema lineamenta and exine of the spore covered by coarse grana interspersed with knob-like bacula. Equatorial, crassitudinous rim present.

Description — Light yellowish brown miospores of circular, oval to roundly triangular shape. Trilete mark obscure, rarely prominent. Exine ornamented with coarse grana and knob-like bacula which are sparsely distributed all over. The size of the bacula varies considerably. Conspicuous equatorial crassitudo present (TEXT-FIGS. 1a, b).

Comparison — *Gravisporites* Bhard., differs in possessing a massive trilete apparatus and lacks the granulose ornamentation interspersed with bacula which is a prominent feature in *Bullaspora*. *Crassispora* Bhard., differs in possessing finer sculptural elements consisting of coni. *Lycospora* S.W. & B., *Angulisporites* Bhard., *Savitrissporites* Bhard., and other similar cingulate genera differ from the present genus in possessing prominent cingulum instead of a crassitudo and thus are not comparable.

Remarks — *Lycospora gigantea* Alpern 1958 (Pl. 1, Fig. 24, p. 78) probably belongs to *Bullaspora*.

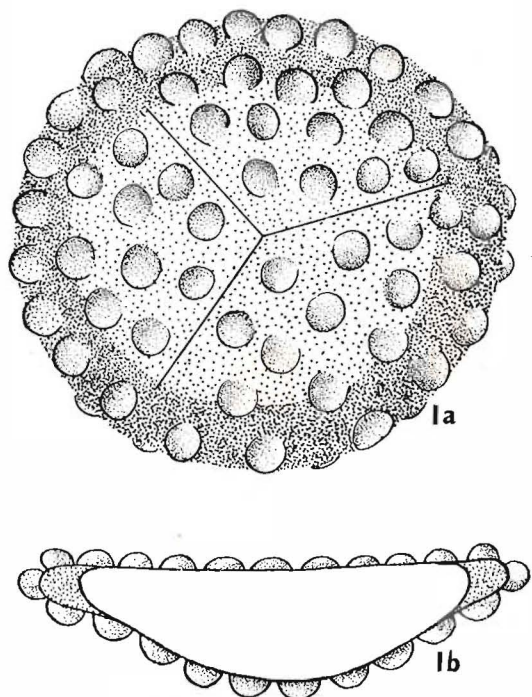
Bullaspora implicata sp. nov.

Pl. 1, Fig. 1

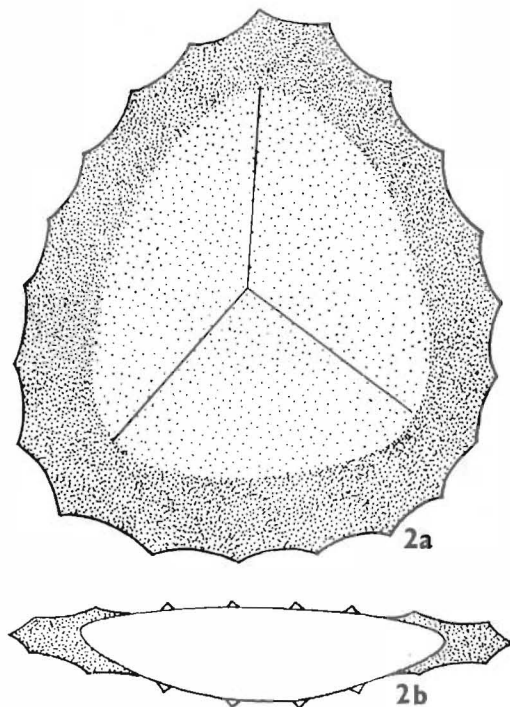
Holotype — Pl. 1, Fig. 1.

Diagnosis — Oval to roundly triangular miospores, 80-100 μ . Y-mark very faint. Exine covered with 4-6 μ broad bacula which have flat to rounded tops, in between the bacula exine finely granulose, crassitudo 4-8 μ wide.

Description — Oval to roundly triangular, the former shape being common. Size 80-100 μ , holotype 94 \times 78 μ . Y-mark hardly perceptible, but present. Exine sparsely covered over by knob-like bacula which are 4-6 μ wide with rounded or flat tops; they appear more crowded in the thick, crassitudinous area than in the centre. Interspersed between the bacula are grana making the spore exine appear coarse. The bacula under higher magnifications appear to be



TEXT-FIG. 1 — *Bullaspora implicata*. a, polar view. b, vertical section.



TEXT-FIG. 2 — *Aggerispora campta*. a, polar view. b, vertical section.

granulose. The crassitidinous rim is 4-8 μ wide and thick. In the holotype, there appears to be a faint inner body which is slightly folded.

Aggerispora gen. nov.

Pl. 1, Figs. 2-4

Generotype — *Aggerispora campta* sp. nov.

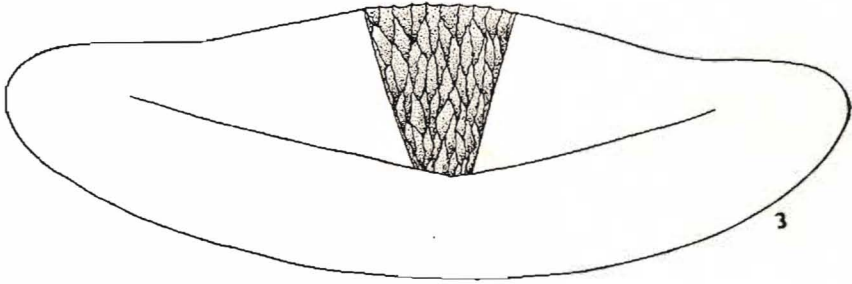
Generic Diagnosis — Roundly triangular miospores having broad rounded angles. Y-mark distinct, rays ending at the inner margin of a crassitido. Exine covered with separated or confluent coni.

Description — Roundly triangular, dark-brown miospores, having rounded angles, straight to slightly convex sides with toothed outline due to the presence of coni. Proximal side has a prominent triradiate mark, apex and vertex of rays elevated, labra thick or thin but prominent, ending at the inner margin of a thick, 6-10 μ broad crassitido (TEXT-FIGS. 2a, b). Exine on the distal side ornamented with coni which are irregular and sometimes confluent to form short

ridges. Exine appears to be fairly thick, shows no folds.

Comparison — In view of the crassitidinous nature of the spores, they have been referred to *Infraturma Cingulati* Pot. & Kl. The ornamentation of the exine is comparable to that of *Camptotriletes* Naum., which distinctly lacks a crassitido so prominent in *Aggerispora*. *Aggerispora* distinguishes from *Crassispora* Bhard., in its better differentiated Y-mark and in its pronounced ornamentation which sometimes resembles that of *Camptotriletes*. *Gravisporites* Bhard., though having a well-developed crassitido has a massive trilete apparatus and lacks the typical ornamentation. *Bullaspora* differs from *Aggerispora* in the nature of its exine ornamentation.

Though having a similar ornamentation as that of *Camptotriletes*, the presence of a crassitidinous thickening appears to be a very significant feature in *Aggerispora*; hence these spores have been placed in a new genus under *Infraturma Cingulati* along with such crassitidinous genera as *Crassispora*, *Gravisporites* and *Bullaspora*.



TEXT-FIG. 3 — *Cymbospora magna*. Polar view,

Aggerispora campta sp. nov.

Pl. 1, Figs. 2-4

Holotype — Pl. 1, Fig. 2

Diagnosis — Roundly triangular with rounded angles, 70-90 μ , holotype \pm 72 μ . Y-mark prominent, rays going up to the inner margin of the crassitudo, apex and vertex slightly raised, labra 6-8 μ thick. Spore body with an equatorial, 8-10 μ thick crassitudo, proximal side bearing sparse coni, distal side bearing confluent coni.

Description — Dark-brown, roundly triangular miospores, with rounded angles and straight to convex sides, surrounded equatorially by a thick crassitudo. The extrema lineamenta is toothed due to the presence of coni. Tetrad mark prominent, going up to the inner margin of the crassitudo, labra up to 6-8 μ thick, on either side of the suture.

Turma *Monoletes* Ibr. 1933
Subturma *Axonomonoletes* Lubert 1935

Cymbospora gen. nov.

Pl. 1, Figs. 5, 6

Generotype — *Cymbospora magna* sp. nov.

Generic diagnosis — Monolete spores, equatorially the contour oval and meridionally bean-shaped. Monolete mark prominent, bent in the middle and about two-thirds the length of the spore. Extrema lineamenta uneven due to the ornamentation of the spore consisting of irregular muri on the exine running from the equator towards the monolete suture and anastomosing near the monolete mark to form a coarse network (TEXT-FIG. 3).

Description — The spores are among the largest of the monolete spores hitherto de-

scribed. Usually oval, generally flattened with monolete mark in the centre which runs to about two-thirds the length of the spore. Monolete mark is bent in the middle like a bow, labra is little developed. Exine golden yellow, translucent and rarely folded. The exine is ornamented with irregular muri, which anastomose and form a network enclosing irregular meshes (TEXT-FIG. 3). At the two lateral ends of the spore this ornamentation is less pronounced. Extrema lineamenta uneven due to the presence of irregular muri.

Comparison — None of the hitherto described monolete spore genera show such an ornamentation. *Striatosporites* Bhard., though approaches this spore in size, distinguishes itself by possessing canaliculate striations on the exine and has a straight monolete mark. In possessing a bent monolete mark, *Cymbospora* compares with certain *Latosporites* Pot. & Kr.; however, those do not agree in size as well as in ornamentation. *Schoepfpollenites* Pot. & Kr. is bigger in size and differs much in its overall organization.

Cymbospora magna sp. nov.

Pl. 1, Figs. 5, 6

Holotype — Pl. 1, Fig. 5.

Diagnosis — Broadly oval, 130-180 μ long, holotype 171.6 \times 115.5 μ . Monolete mark bent and up to two-thirds the length spore. Ribbon-like ridges commence from of the the equator and extend up to the suture. The region near the two ends of the long axis is only faintly ornamented. Exine finely punctate and up to 2 μ thick.

Description — Same as for the genus.

Anteturma	<i>Pollenites</i> R. Pot. 1931
Turma	<i>Saccites</i> Erdt. 1947
Subturma	<i>Monosaccites</i> (Chitale) Pot. & Kr. 1954
Infraturma	<i>Triradites</i> (Pant) Bhard. 1955

Candidispora gen. nov.

Pl. 1, Figs. 7, 8

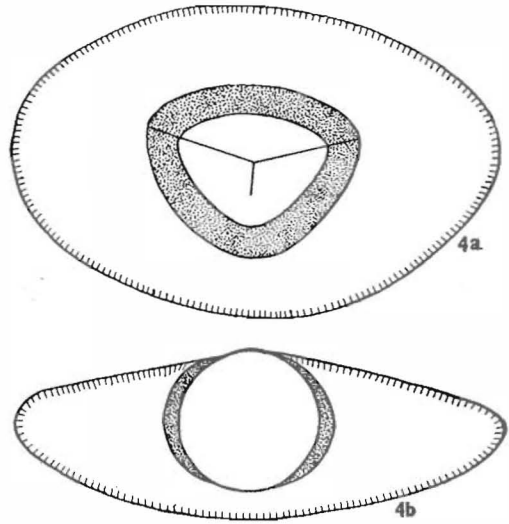
Generotype — *Candidispora candida*.

Generic Diagnosis — Oval to circular miospores, central body distinctly recognizable and subcircular to oval or roundly triangular. Proximal side of the central body free, possessing a distinct Y-mark, two of them meeting at a very much obtuse angle and their arms reaching the equator of the body and the third arm usually smaller, \pm at right angles to the other two. Body generally verrucose. Bladder infrareticulate, no indication of a limbus or thickened equatorial zone in the saccus.

Description — Broadly elliptical, oval to circular miospores, oval shape commonest and circular ones rare. Central body circular, oval to roundly triangular. In flattened specimens usually the body outline limited either with a broad and dense or a thin rim. The body bears a distinct trilete mark (TEXT-FIG. 4a). Apex and vertex of the Y-mark low, labra thin, two of the arms going up to the equator of the body making an obtuse angle and the other smaller in length, ending short of or at the inner margin of the rim. The body has a distinct verrucose sculpture. The bladder is uniform in shape and laevigate on the surface and infrareticulate on the inner surface, enclosing broad meshes. No limbus present.

Reconstruction — The proximal side of the spore bearing the trilete apparatus seems to be free from the bladder, which only covers the distal side. The presence of folds along the margin of the flattened body suggests curvature of the body laterally as well as distally. The probable shape and organization of the spores in unflattened condition is given in Text-figs. 4a, b.

Comparison — *Endosporites* Wils. & Coe, though possessing a prominent trilete mark, distinguishes by its equiangular rays and the equatorial thickening or limbus. *Guthörli-sporites* Bhard., distinguishes by possessing equiangular rays in its trilete mark and regularly darkened central body. *Nuskoi-sporites* Pot. & Kl. differs in its organization



TEXT-FIG. 4 — *Candidispora candida*. a, polar view, b, vertical section.

and distinguishes by the presence of a limbus (POTONIÉ & KLAUS, 1954); *Wilsonites* Kos., differs in possessing a less prominent body. The genus *Microsporites* Dijkstra (1946), supposed to contain miospores resembling the spores of *Spencerites insignis* Scott. (CHALONER, 1951), differs considerably in its size (270-440 μ) and possesses a well-defined limbus. *Potonieisporites* Bhard., differs in possessing a perfect monolete mark.

The following species belong to *Candidispora*:

1. *Candidispora candida* sp. nov.
2. *Candidispora* (*Florinites*) *trileta* (Kos.) comb. nov. (For holotype, diagnosis and description — see KOSANKE, 1950, p. 50, PL. 12, FIGS. 3, 4).

Candidispora candida sp. nov.

Pl. 1, Figs. 7, 8

Holotype — Pl. 1, Fig. 7.

Diagnosis — Oval, 120-150 μ , holotype 126 \times 120 μ , body prominent, with an equatorial, darkened rim. Y-mark prominent, two of the arms going up to the equatorial thickening forming an obtuse angle and the third stopping at or before the inner margin of the rim. Body verrucose, bladder infrareticulate.

Description — Though the shape met with generally is oval, circular to sub-circular ones

are not rare. The body is generally roundly triangular in shape with convex sides; however, sub-circular ones are also frequent. The ornamentation of the body consists of closely set verrucae, the verrucae being irregular, sometimes not round but longish in nature. The equatorial exine of the body is thickened,

of the nature of a crassitudo which in flattened specimens lends the denser outline of the body. The bladder is infrareticulate with large meshes.

The author is deeply indebted to Dr. D. C. Bharadwaj for his constant help and guidance throughout the progress of the work.

REFERENCES

- ALPERN, B. (1958). Description de quelques Microspores du Permo-Carbonifère Français. *Revue de Micropaléontol.* **1**: 75-86.
- BHARDWAJ, D. C. (1954). Einige neue Sporengattungen des Saarkarbons. *Neues Jb. Geol. Palaeontol. Mh.* **11**: 512-525.
- Idem (1955). The spore genera from the Upper Carboniferous coals of the Saar and their value in stratigraphical studies. *The Palaeobotanist* **4**: 119-149.
- Idem (1957a). The Palynological investigations of the Saar coals. *Palaeontogr. B.* **101**: 73-125.
- Idem (1957b). The spore flora of Velener Schichten (Low. Westphalian D) in the Ruhr Coal Measures. *Palaeontogr. B.* **102**: 110-138.
- BHARDWAJ, D. C. & VENKATACHALA B. S. (1957). Microfloristic evidence on the boundary between the Carboniferous and the Permian systems in Pfalz (W. Germany). *The Palaeobotanist* **6**: 1-11.
- CHALONER, W. G. (1951). On *Spencerisporites* gen. nov. and *S. karczewskii* (Zerndt), the isolated spores of *Spencerites insignis* Scott. *Ann. & Mag. Nat. Hist.*, Ser. 12, **4**: 861-873.
- KOSANKE, R. M. (1950). Pennsylvanian spores of Illinois and their use in correlation. *Illinois Geol. Surv. Bull.* **74**: 1-128.
- Idem (1959). *Wilsonites*, new name for *Wilsonia* Kosanke 1950. *Jour. Paleon.* **33**: 700
- POTONIÉ, R. (1956). Synopsis der Gattungen der *Sporae dispersae* Teil I. *Geol. Jb.* **23**: 1-103.
- Idem (1958). Synopsis der Gattungen der *Sporae dispersae* Teil II. *Geol. Jb.* **31**: 1-114.
- POTONIÉ, R. & KLAUS, W. (1954). Einige Sporengattungen des alpinen Salzgebirges. *Geol. Jb.* **68**: 517-546.
- POTONIÉ, R. & KREMP, G. (1954). Die Gattungen der Paläozoischen *Sporae dispersae* und ihre Stratigraphie. *Geol. Jb.* **69**: 111-193.
- Idem (1955). Die *Sporae dispersae* des Ruhrkarbons. Teil I. *Palaeontogr. B.* **98**: 1-136.
- Idem (1956). Die *Sporae dispersae* des Ruhrkarbons. Teil II. *Palaeontogr. B.* **99**: 85-191.
- SCHOPF, J. M., WILSON, L. R. & BENTALL, R. (1944). An annotated synopsis of Paleozoic fossil spores and the definition of generic groups. *Rept. Invest. Nr. 91, Geol. Surv. Illinois*: 1-77.

EXPLANATION OF PLATE 1

(The slides and photographs are preserved at the Birbal Sahni Institute of Palaeobotany, Lucknow, India)

1. *Bullaspora implicata* gen. et sp. nov. × 500. Photo No. 46/31.
- 2-4. *Aggerispora campta* gen. et sp. nov. × 500. Photo Nos. 168/2 & 168/4.

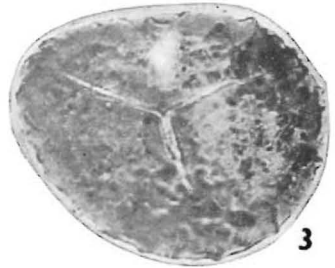
- 5-6. *Cymbospora magna* gen. et sp. nov. × 500. Photo Nos. 107 & 147/1.
- 7-8. *Candidispora candida* gen. et sp. nov. × 500. Photo Nos. 57/35 & 49/16.



1



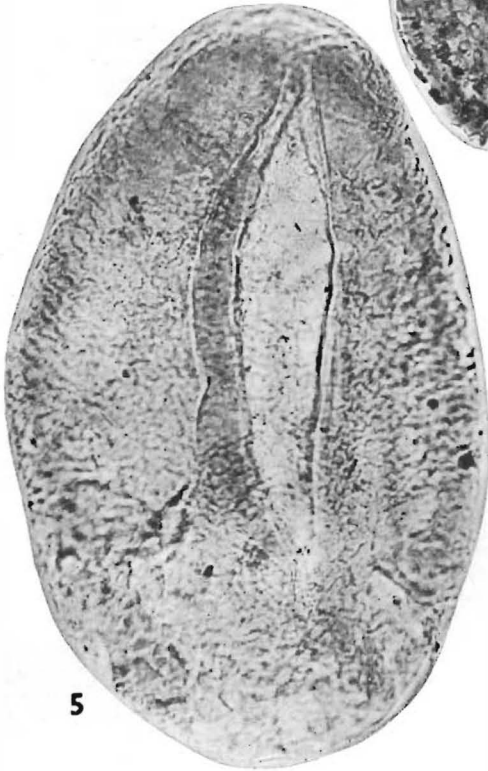
2



3



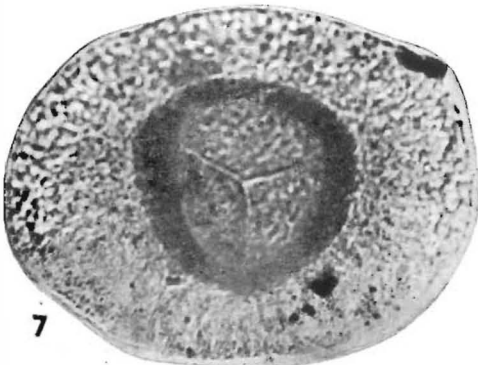
4



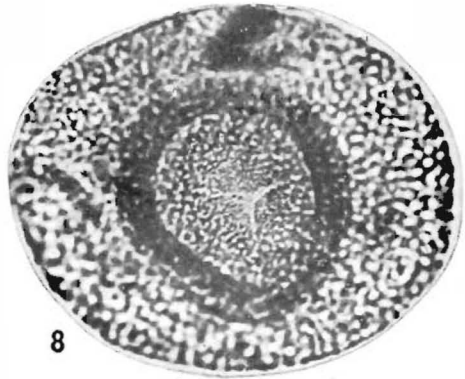
5



6



7



8