

## REAPPRAISAL OF THE MESOZOIC MICROSPORE GENUS *AEQUITRIRADITES*

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ABSTRACT. The Mesozoic form-genus *Aequitriradites* Delcourt and Sprumont is emended with the consequent assignment to it of four species previously referred to the Palaeozoic form-genus *Cirratriradites* Wilson and Coe.

IN 1958 three species of microspores from Australian Lower Cretaceous sediments were referred by us to the Palaeozoic form-genus *Cirratriradites* Wilson and Coe although their close agreement with the Mesozoic form-genus *Aequitriradites* Delcourt and Sprumont was then fully recognized (Cookson and Dettmann 1958, p. 112). Recently, largely as the result of information from M. Delcourt concerning additional examples of the Belgian species *A. inconspicuus* Delcourt and Sprumont, it became evident that this species and the three Australian species referred to *Cirratriradites* all had certain features which are not found in *Cirratriradites*.

The removal of the Australian Mesozoic species from *Cirratriradites* to *Aequitriradites*, thus necessitated, is the main object of the present note. At the same time a broader definition of the genus *Aequitriradites* is proposed and the Russian Cretaceous species *C. interruptus* Bolkhovitina is transferred to *Aequitriradites*. It is apparent from the species now recognized within the genus that *Aequitriradites* has wide distribution, both laterally and vertically, in Mesozoic strata.

*Comments.* The species *Cirratriradites verrucosus*, *C. tilchaensis*, and *C. spinulosus*, described by Cookson and Dettmann in 1958, are each characterized by a membranous equatorial flange or zona, and by either an opening in or modification of sculpture of the exine at and around the distal pole. This distal opening was considered to have been formed 'by the natural breakdown of the exospore in a circumscribed preformed area' and we still hold 'that as it is a developmental feature neither its presence nor absence can be used for the characterization of individual species' (loc. cit., p. 112). In consequence, specimens with and without a distal opening were referred to each of the three species. Specimens having entire exines (Pl. 52, figs. 3, 4) usually show a distinct, strongly developed sculptural pattern at and around the distal pole. This area of prominent sculpture corresponds in size, shape, and position to the opening in the wall of spores in which a localized breakdown of the distal wall had occurred (Pl. 52, figs. 6, 8, 9, 12). When the opening is not complete both partially and wholly detached sculptural elements can usually be seen about its margin (Pl. 52, figs. 5, 6, 11, 12).

Although the exine opening was not regarded by us as a specific character it was used to determine the generic position of the three Australian species. However, the opening was erroneously regarded as a 'fovea', so that the Australian spores were referred to *Cirratriradites* and not to *Aequitriradites* which differs from the former genus in the absence of foveae. The term 'fovea', as used by Potonié and Kremp (1956, p. 125, fig. 55) in their definition of *Cirratriradites*, refers solely to a sculpture pattern which consists of thinner depressed areas of the exine surrounded by raised, thickened muri

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(Schopf, Wilson, and Bentall 1944, p. 42; Potonié 1956, p. 66). The exine in the region of a fovea, although relatively thin, is always entire. On account of the distinction between foveae and distinct exinous openings it is clear that the Australian Mesozoic spores are not conformable with *Cirratriradites*.

That they conform to *Aequitriradites* is evident from their close resemblance to the species of this genus, particularly *A. inconspicuus* which includes spores with a distal exinous opening. The figured type of this species shows such an opening (Delcourt and Sprumont 1955, pl. 2, fig. 6), but originally M. Delcourt considered that this opening was accidental (Cookson and Dettmann 1958, p. 112). Recently, however, M. Delcourt kindly informed us that, after an examination of a large number of specimens of *A. inconspicuus* showing a distal opening, he now regards the opening as a natural exinous breakdown. In order, therefore, to facilitate future identification of spores showing this character we are including a somewhat broader diagnosis of the genus *Aequitriradites*.

#### SYSTEMATIC SECTION

Infraturma ZONATI Potonié and Kremp 1954  
Genus AEQUITRIRADITES (Delcourt and Sprumont) emend.

*Diagnosis.* Trilete microspores with a membranous zone. Laesurae distinct or only faintly represented especially towards the proximal pole. Exine entire or perforated distally. When perforated, the opening is formed as the result of a natural exinous breakdown about the distal pole. Sculptural elements various.

*Distinction.* *Aequitriradites* differs from *Cirratriradites* in the absence of foveae and the presence, in some species, of an opening in the distal exine. It is distinct from *Styxisporites* Cookson and Dettmann in the nature of the laesura.

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#### EXPLANATION OF PLATE 52

All photographs are from unretouched negatives. Registered numbers are those of the palaeontological collection of the National Museum of Victoria, Melbourne. Precise locality details are given in Cookson and Dettmann (1958).

Figs. 1, 2, 5. *Aequitriradites verrucosus* (Cookson and Dettmann) comb. nov. P17825, Robe Bore, South Australia, 1,400 ft. 1, 2,  $\times 500$ , proximal and distal views; 5,  $\times 1,250$ , showing polar perforation of distal verrucose exine.

Figs. 3, 4. *Aequitriradites verrucosus* (Cookson and Dettmann). P17826, Robe Bore, South Australia, 1,400 ft. Distal views. 3,  $\times 500$ ; 4,  $\times 1,250$ , showing verrucose sculpture pattern around pole.

Fig. 6. *Aequitriradites verrucosus* (Cookson and Dettmann). P17827, Robe Bore, South Australia, 1,400 ft.,  $\times 1,250$ . Distal view showing verrucae at margin of polar perforation.

Figs. 7, 8. *Aequitriradites spinulosus* (Cookson and Dettmann) comb. nov. P17828, Gellibrand River (Devil's Kitchen), Victoria. Proximal and distal view  $\times 500$ .

Fig. 9. *Aequitriradites spinulosus* (Cookson and Dettmann). P17829. Optical section of specimen,  $\times 500$ , from Gellibrand River (Devil's Kitchen), Victoria.

Figs. 10, 11. *Aequitriradites spinulosus* (Cookson and Dettmann). P17830, Gellibrand River (Devil's Kitchen), Victoria. Distal views. 10,  $\times 500$ ; 11,  $\times 1,250$ , showing perforated exine and broad-based spinules.

Fig. 12. *Aequitriradites spinulosus* (Cookson and Dettmann). P17818, Gellibrand River (Devil's Kitchen), Victoria.  $\times 1,250$ , showing regular arrangement of sculptural elements at margin of perforation in distal exine.

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*Type species.* *Aequitriradites dubius* Delcourt and Sprumont 1955, p. 45; pl. 3, fig. 7. Occurrence: Hainaut, Belgium; Wealden.

*Other species.* *A. inconspicuus* Delcourt and Sprumont 1955, p. 45; pl. 2, fig. 6. Occurrence: Hainaut, Belgium; Wealden.

*A. salebrosaceus* (Maljavikina 1949, p. 65; pl. 13, fig. 14) Nilsson 1958, p. 47; pl. 3, fig. 8. Occurrence: Russia; Lias, Bjuv, Sweden; Rhaetic.

*A. sp.* A Nilsson 1958, p. 47; pl. 3, fig. 9. Occurrence: Bjuv, Sweden; Rhaetic.

*A. verrucosus* (Cookson and Dettmann 1958, p. 112; pl. 28, figs. 2–6) comb. nov. Occurrence: eastern Australia; Lower Cretaceous. Viliuisk basin, Russia; Upper Cretaceous (Bolkhovitina 1959).

*A. tilchaensis* (Cookson and Dettmann 1958, p. 113; pl. 28, figs. 7, 8) comb. nov. Occurrence: eastern Australia; Lower Cretaceous.

*A. spinulosus* (Cookson and Dettmann 1958, p. 113; pl. 28, figs. 9–13; pl. 29, figs. 1, 2, 5–7) comb. nov. Occurrence: eastern Australia; Lower Cretaceous. Viliuisk basin, Russia; Lower and Upper Cretaceous (Bolkhovitina 1959).

*A. interruptus* (Bolkhovitina 1959, p. 128; pl. 8, fig. 117) comb. nov. Occurrence: Viliuisk basin, Russia; Lower and Upper Cretaceous.

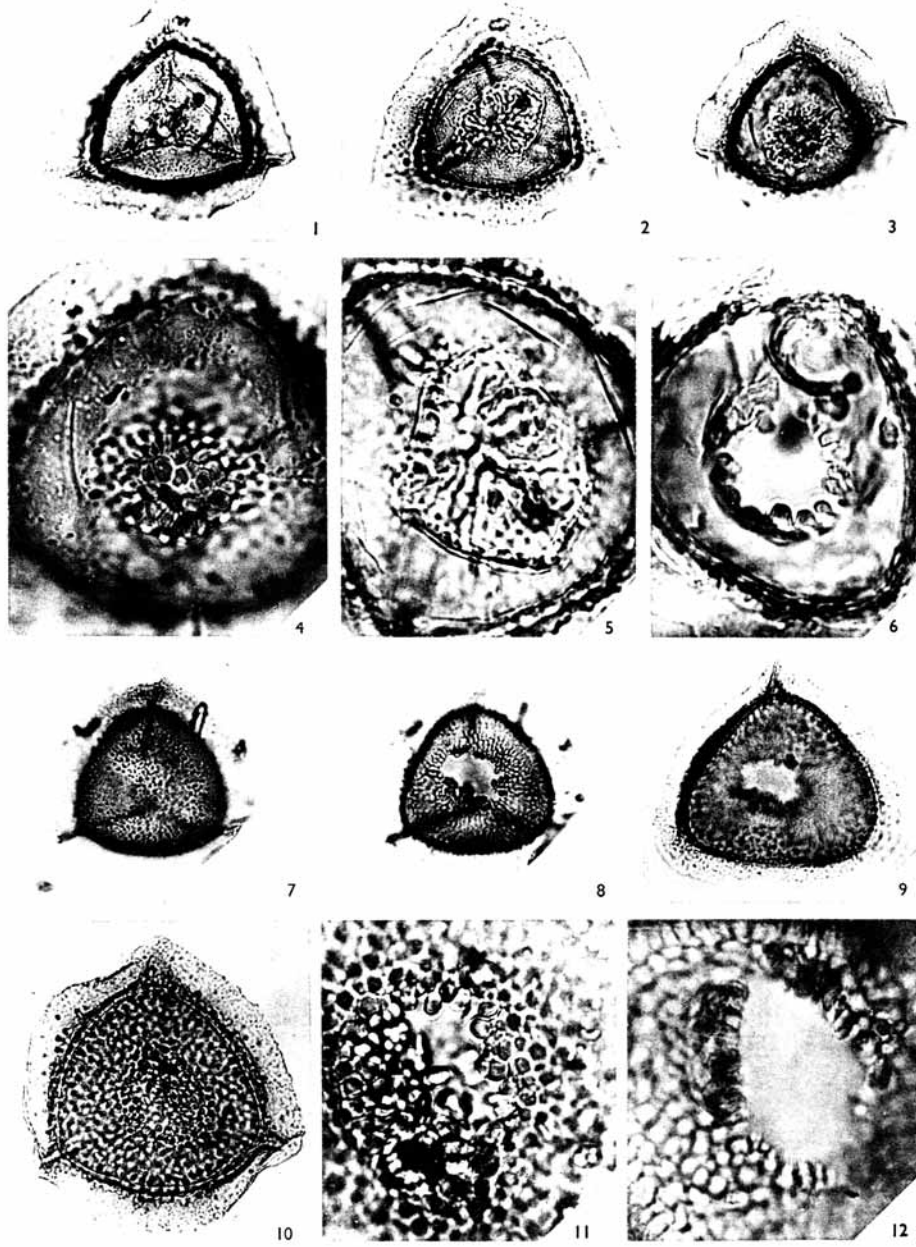
*A. infrapunctatus* Lantz 1958a, p. 36; pl. 1, fig. 20, from the Purbeck of L'île d'Oléron, France, subsequently recorded (Lantz 1958b, p. 924; pl. 3, fig. 31) from Purbeck strata of Dorset, England, appears to be a very doubtful representative of *Aequitriradites*. Both specimens figured by Lantz appear to possess a bladder rather than an equatorial zona, suggesting probable conformity with *Zonalapollenites* Pflug.

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COOKSON and DETTMAN, Mesozoic microspores