TWO CRISTATE MEGASPORES FROM THE LOWER CARBONIFEROUS OF SCOTLAND

by K. L. ALVIN

ABSTRACT. A new megaspore described under the name *Triletes pannosus* sp. nov. resembles in its crest of anastomosing hairs *T. subpalaeocristatus* Alvin from the same locality. A new specimen of this latter species has yielded further details of its structure. Comparison is made between the two species.

SOME fifteen specimens of a new megaspore were obtained from samples of shale collected at Oxroad Bay, East Lothian. The shale contains abundant seed megaspore membranes, microspores, and fragmentary carbonized plant remains. It was collected and macerated in the hope that it might yield whole specimens of a megaspore described recently from petrified material from the same locality under the name *Triletes subpalaeocristatus* Alvin (1965). This latter spore was so closely associated with the cone of the lycopod *Oxroadia gracilis* Alvin that it was almost certainly borne by this plant. It was described only from serial peel sections and was of interest because of its unusual morphology in possessing a crest of hairs along the lips of the trilete ridge. Oddly enough the new megaspore also possesses a crest, but appears genuinely distinct.

A new specimen of *T. subpalaeocristatus* has been found in the original block containing *Oxroadia*. This has been macerated out from the matrix and has yielded some new information about this species for which an emended diagnosis is now given.

SYSTEMATIC DESCRIPTIONS

Genus TRILETES Bennie and Kidston ex Zerndt

Triletes pannosus sp. nov.

Plate 76, figs. 1–6; text-fig. 1 A–D

Diagnosis. Megaspore spheroidal; mean equatorial diameter 1,360 μ (range for nine spores measured 1,180–1,580 μ); mean height (excluding crest) 1,260 μ (range for ten spores measured 1,100–1,440 μ). Wall about 30–50 μ thick. Arms of trilete ridge extending about three-quarters the radius of the spore. Wall (except for contact areas) bearing numerous spines about 200 μ long, sometimes up to 400 μ and up to 200 μ wide at the base. Spines simple or forked near the tip, straight or commonly curved; base expanded and buttressed; buttresses often forming separate 'legs'. Papillae and simple hairs up to 100 μ long also present among the spines. Papillae, 10–20 μ in diameter, usually present on contact areas. Lips of trilete ridge bearing a prominent crest up to 660 μ high at the apex (mean height for twelve spores 525 μ), diminishing to about half this at the ends of the trilete arms. Crest resembling a series of anastomosing hairs, but sometimes forming a more or less continuous membrane with free teeth distally; hairs or teeth of very varied thickness, generally 5–20 μ.

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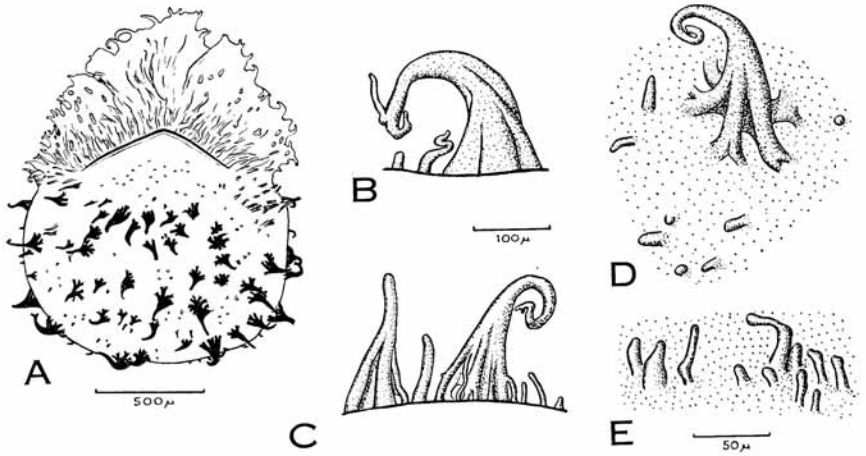
Locality and horizon. Oxroad Bay, East Lothian, Scotland. Cementstone Group (Upper Tournaisian), Calciferous Sandstone Series, Lower Carboniferous.

Holotype. British Museum (Natural History), Palaeontology Department, V52016a. The specific name is derived from the ragged appearance of the crest.

Discussion. The new spore most closely resembles *Triletes echinoides* Chaloner (1954), a species described originally from the Beaver Bend Limestone of the Mississippian of Indiana, but one which has since been recorded from a number of localities including



TEXT-FIG. 1. A–D, *Triletes pannosus* sp. nov. E, *Triletes subpalaeocristatus* Alvin. A, Specimen showing the general features. The crest, part of which is shown in Plate 76, fig. 6, shows an especially high degree of fusion among the hairs so as to form a more or less continuous membrane. Slide V52016e. B, C, Spines, short hairs, and papillae in profile. Slide V52016 f, g. D, Part of the spore wall in surface view showing a single buttressed spine and papillae. Slide V52016e. E, Part of the wall in surface view. Slide V51513z.

Britain where it has been found in the sporophyll known as *Lepidostrobophyllum fimbriatum* (Kidston) (Allen 1951; Lacey 1962). Since the publication of the original description, the range in the equatorial diameter for the species has been extended to 1·2–4·0 mm., though the two original specimens were 2·66 mm. and 2·00 mm. The wide range virtually covers that for the new Scottish spore. The spines of *T. echinoides* are up to about 1 mm. long (Winslow 1959), whereas the maximum length in *T. pannosus* is only less than half this. The chief difference between the two species lies in the crest: in *T. echinoides* this has the form of a continuous fluted membrane with no indication of hairs or teeth or even of perforations.

In the general character of the ornamentation of the distal face, the new spore resembles a number of other Carboniferous spores, especially perhaps *T. crassiaculeatus* (Zerndt). However, this spore differs in the quite different form of the apical prominence.

The trilete crest of *T. pannosus*, in resembling a series of anastomosing hairs arising from the lips of the ridge, may be compared with that of *T. subpalaeocristatus* Alvin

(1965). Indeed, when the new spore was discovered it was thought that it might be identical with this species which had been based on specimens from a block of petrified plant material from the same locality. A new specimen of this spore has now been macerated from the original block and the following emended diagnosis incorporates the new information that this has yielded.

Triletes subpalaeocristatus Alvin 1965

Plate 76, figs. 7, 8; text-fig. 1E

Emended diagnosis. Megaspore nearly spherical; mean diameter 1,450 μ (range for four spores 1,250–1,750 μ); height (excluding crest) only about 50 μ less than equatorial diameter. Wall about 35–45 μ thick. Arms of trilete ridge extending the whole radius of the spore. Distal face and contact areas bearing scattered papillae and short hairs up to about 50 μ long. No distinct arcuate ridge, but contact areas delimited distally by a narrow zone of relatively dense papillae and hairs. Lips of trilete ridge bearing a crest of branched anastomosing hairs (3·5–) 6·5 (–13·0) μ thick; maximum height of crest at apex up to 405 μ, height diminishing to about half this at the ends of the trilete arms.

Discussion. This species, on the evidence of the new specimen, is rather less like *T. palaeocristatus* Chaloner than was originally believed. It differs in possessing an ornamentation of short hairs and papillae scattered over the surface and in the delimitation of the contact areas by arcuate zones of denser ornamentation. The new specimen, in being somewhat larger than the original specimens, extends the size range so that this approaches more closely that for *T. palaeocristatus.*

GENERAL DISCUSSION

The similarity in certain characters, most notably the presence of an apical crest of hairs, between *T. subpalaeocristatus* and *T. pannosus* is remarkable, especially as these are the only known megaspores from Oxroad Bay. Since the two species are based on material preserved in a different manner, the question immediately arises as to whether the difference between them might not be due either to the modes of preservation or even to the techniques used in preparing clean specimens. *T. pannosus* (Pl. 76, figs. 1–6; text-fig. 1A–D), coming as it does from the shale, is always compressed, but although some specimens are split open, the preservation is excellent. These spores were obtained by first breaking down shale samples in nitric acid and potassium chlorate, neutralizing and picking out the spores, and then freeing them from adhering mineral particles in hydrofluoric acid. The specimen of *T. subpalaeocristatus* obtained free of matrix (Pl. 76, figs. 7, 8; text-fig. 1E) was etched from the block slowly in acetic acid and subsequently freed from siliceous material in hydrofluoric acid and from pyrite in nitric acid.

EXPLANATION OF PLATE 76

Figs. 1–6. *Triletes pannosus* sp. nov. 1, Holotype; Slide V52016a, ×35. 2, Slide V52016b, ×35. 3, Spines and papillae in profile; Slide V52016c, ×80. 4–6, Portions of the crest of three different specimens showing variation in form; Slides V52016 c, d, e, ×80.

Figs. 7, 8. *Triletes subpalaeocristatus* Alvin. 7, New specimen isolated from the nodule; Slide V51513z, ×35. 8, Portion of the crest of the same spore, ×80.

It was carefully examined at every stage and the only structural damage that was observed was that some hairs protruding through patches of pyrite on the surface came away when this was dissolved at the final stage.

The most obvious difference between the two species is the presence in *T. pannosus* of large buttressed spines and their apparently complete absence in *T. subpalaeocristatus*. It has been noticed that the spines are frequently broken (Pl. 76, fig. 3, middle) and also that touching them with a needle often causes them to break away cleanly from the surface. Abrasion of the spore prior to preservation could conceivably have removed all the spines in the spores from the nodule. However, if abrasion sufficient to have removed all the spines had occurred, the short delicate hairs scattered over the wall and the hairs of the trilete crest would probably not have survived as they have. Moreover, all the known specimens of *T. subpalaeocristatus*, including the new one, were lying in close proximity to the cone of *Oxroadia* which probably bore them.

Disregarding the spiny character, there are other differences between these two kinds of spores which seem quite sufficient to indicate that they are genuinely distinct species. These are: (1) the greater length of the arms of the trilete ridge in *T. subpalaeocristatus*; (2) the finer hairs of the crest and the lesser degree of fusion among them; (3) the arcuate zones of papillae and hairs of which there is no indication in *T. pannosus*; (4) the presence of some short hairs on the contact areas, particularly near the tips of the ridge which again are entirely lacking in the species from the shale where in fact the lips are very sharply delimited from the contact areas.

The coincidence at the same locality of these two spores sharing the very unusual character of a trilete crest of anastomosing hairs is remarkable. The fact that one is apparently confined to the shale bands and the other is known only from a nodule may be of no significance. On the other hand, it may indicate an ecological difference between the two plants, possibly related lycopods, that they represent. Nothing is yet known of the composition of the microfossil flora of the shales, and of the nodule flora, only a small number of macrofossil species have been described.

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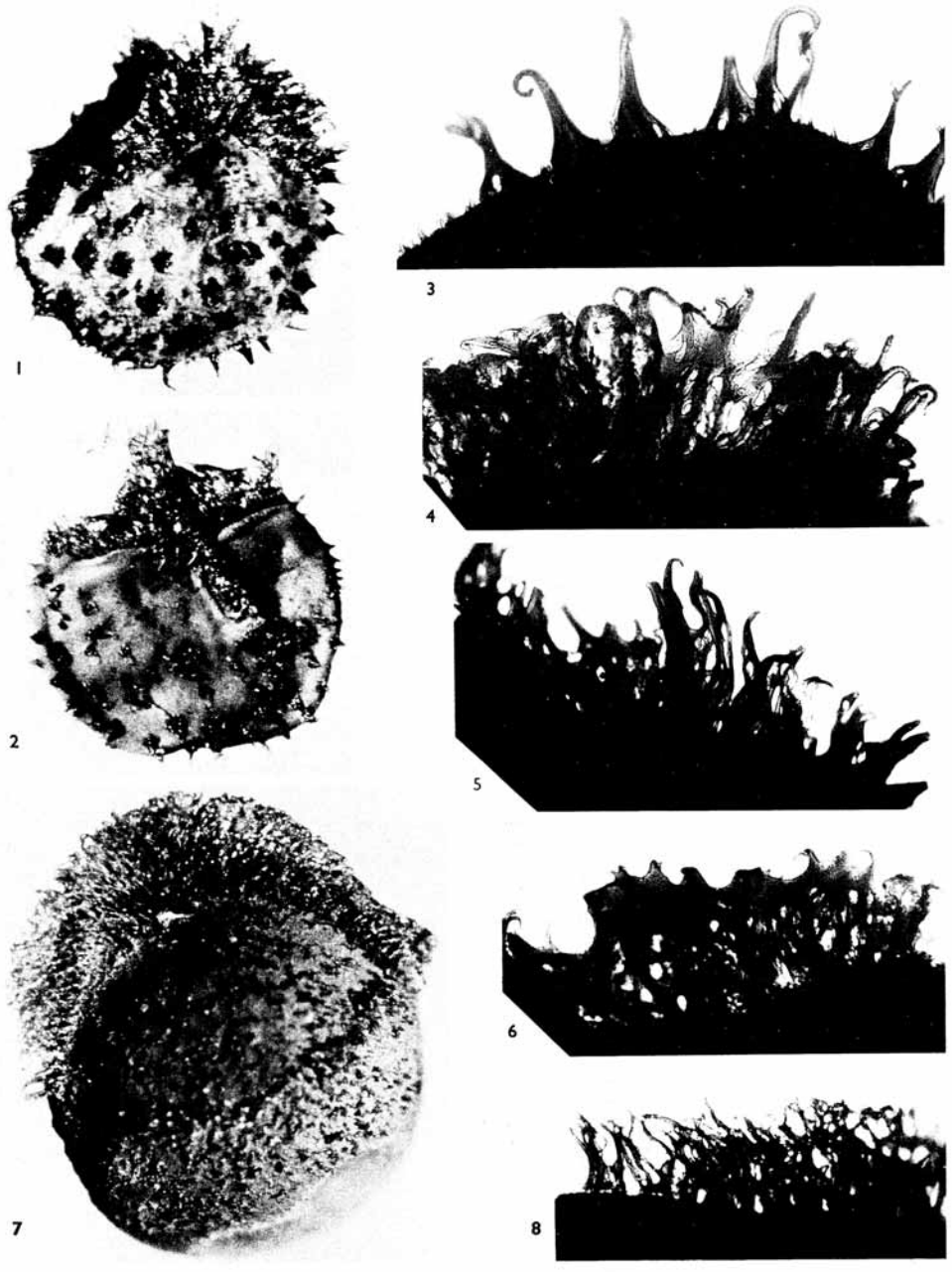

ALVIN, Lower Carboniferous megaspores