A NEW *Pycnolepas* (CIRRIPEDIA) FROM THE (?) LOWER APTIAN OF ALEXANDER ISLAND

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ABSTRACT. A new species of cirripede, *Pycnolepas articulata*, is described from the (?) Lower Aptian of Alexander Island. It represents the first sessile barnacle to be described from Antarctica and is the earliest known Cretaceous member of the genus. Comparisons are made with other forms and the phylogeny of the group is briefly discussed.

PREVIOUS knowledge of thoracic cirripedes from the Cretaceous of Antarctica has been limited to *Euscalpellum antarcticum* Withers from the Lower to Middle Campanian of James Ross Island and Humps Island (Withers, 1951), *Zeugmatolepas georgiensis* Withers (*in* Wilckens, 1947) from the Upper Aptian of Annenkov Island, and *Cretiscalpellum aptiensis* Withers var. *antarcticum* Taylor (1965) from the Aptian of Alexander Island.

The recent discovery by Dr M. R. A. Thomson of *Pycnolepas* in the Fossil Bluff Formation of Alexander Island (Fig. 1) is of importance, because not only does it represent the earliest known Cretaceous sessile barnacle but it considerably extends the range of what (apart from a single species from the Upper Cretaceous of the USSR) has hitherto been an essentially European genus.

Although possibly represented in the Upper Jurassic (Tithonian) of Stramberg, Moravia, by the species *P.* (*?*) *fimbriata* (Withers) and *P.* (*?*) *tithonica* (Withers), it forms the commonest and most widespread of the symmetrical sessile cirripedes in the Cretaceous. Valves of *P. rigida* (J. de C. Sowerby) occur by the thousand in the Red Clay seam of the *Leymeriella tardefurcata* Zone and it is a common species in other sub-zones of the Gault (Albian) (Collins, 1974); it ranges into the Cambridge Greensand and (?) *H. subglobosus Zone* of the Cenomanian, and also occurs in the Albian of France. *P.* (*?*) *scalaris* Withers is known by four valves from the Cenomanian of Cambridge, and in 1966 Kolosváry described *P. orientalis* from the Upper Cretaceous of Kuznataj, USSR.

When considering *P. orientalis*, however, the misinterpretation of the valves by Kolosváry and the subsequent effect this had on the reconstruction (Kolosváry, 1966, fig. 7) must be taken into account. In his fig. 2, "a" is clearly a tergum, whereas "d" is a scutum. That this was intentional is indicated by his reference (Kolosváry, 1966, p. 130) to "The tergum especially with curved apex like to the recent species of *Scalpellum columbicum*", and the juxtaposition of the two valves in his reconstruction on p. 133. The error is repeated for the valves of *Cretiscalpellum unguis* (J. de C. Sowerby) and to a certain extent for those of *P. rigida* in his fig. 3. Unfortunately, Kolosváry gave no explanation why his reconstruction of the species should contain three pairs of lateral valves, which is at variance with the single pair Withers (1914) attributed to the genus. Indeed, there would be ample grounds for generic distinction if three pairs of lateral valves are accepted for "*orientalis*".

P. brunnichi Withers, a fairly common Danian species from Faxe, occurs doubtfully in the Maestrichtian of Holland and Belgium, and was recorded by Darwin from the *A. mammillatus* beds of Ignaberga, Scania (Withers, 1935).

The genus is represented in the Thanetian (Palaeocene) of Belgium by *P. landenica* Withers and the Miocene of Italy by *P. paronai* (De Alessandri).

The specimens in the present collection from station KG.1657, northern Hyperion Nunataks (Fig. 1), are preserved as natural moulds, showing internal and external impressions in a hard, dark grey mudstone. An accompanying fauna of ammonites (*Eulytoceras*, *Aconeceras* and *Theganeceras*) and the brachiopod *Prochlidonophora muirwoodae* (Thomson and Owen, 1979)

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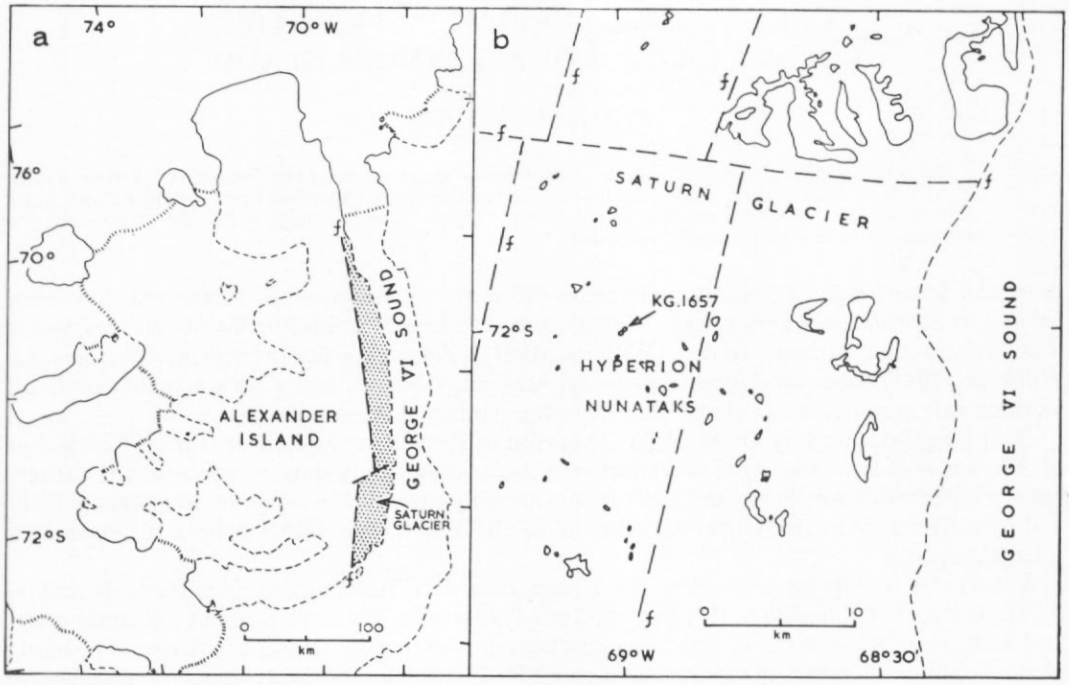


Fig. 1. a. Sketch map of Alexander Island showing the distribution of the Upper Jurassic–Lower Cretaceous Fossil Bluff Formation (stippled).
b. Detailed map showing the position of the fossil locality (KG.1657) in the Hyperion Nunataks, from which the *Pycnolepas* specimens were obtained.

suggest an approximate correlation with the succession at Fossil Bluff, for which a probable Lower Aptian age has been suggested (Thomson, 1974, p. 37).

Evidently, the barnacles (Figs 2 and 3), which are all lying with their left sides uppermost, underwent very little agitation after death. The left tergum is seen to be overlying the right in all three cases. The left scutum of "c" is missing, but its loss reveals the inner surface of the right valve. Two carinae are represented by internal impressions (that belonging to "b" has been acid developed) and a fragment of the valve overlies the bases of the terga of "a". Two rostra "aR" and "cR" are also present. The absence of an upper latus is not altogether surprising, since this valve is not known in *P. landenica* or *P. paronai* and is not particularly common in the Gault species *P. rigida*.

Order Thoracica Darwin, 1851
Suborder Brachylepadomorpha Withers, 1923
Family Brachylepadidae Woodward, 1901

Genus *Pycnolepas* Withers, 1914

Pycnolepas articulata sp. nov.

Figs 2 and 3a and b

Material

The holotype (KG.1657.8b), an almost complete capitulum, seemingly attached to the same (unknown) substrate as paratypes (KG.1657.8a and c); (?) Lower Aptian of northern Hyperion Nunataks, south-eastern Alexander Island.

Diagnosis

A moderately large species with thin, strongly ridged valves. The carina is sub-cylindrical with rounded parietes; the scutum is elongate-triangular with a longitudinal ridge more prominent than the other ridges on the occludent side of the apico-basal ridge; the tergum is sub-rhomboidal.

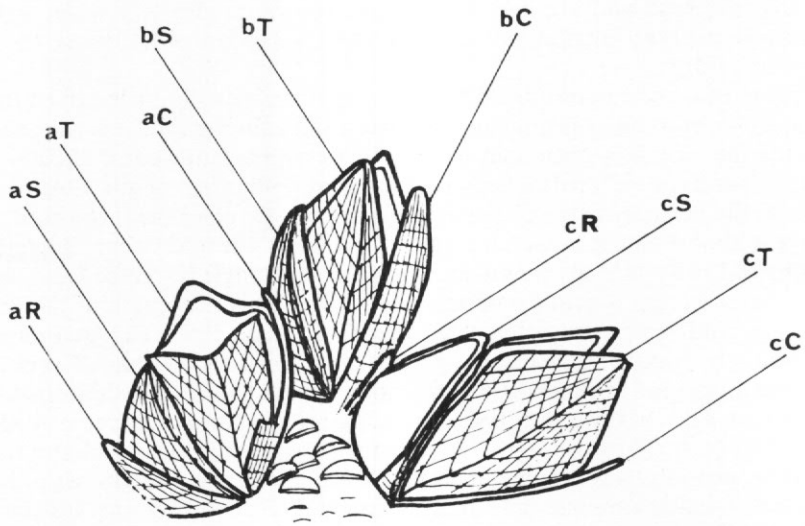
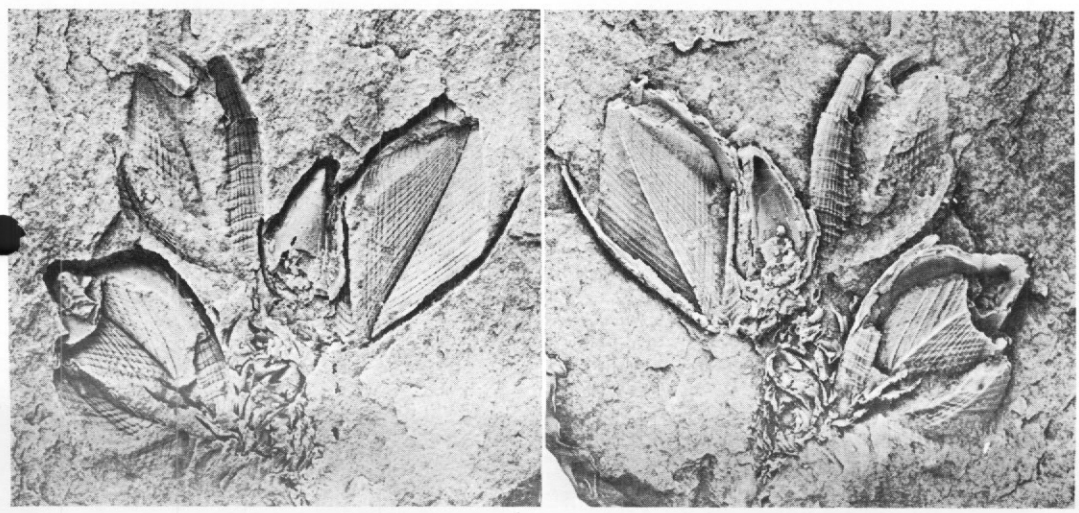


Fig. 2. *Pycnolepas articulata* sp. nov.; diagrammatic sketch of the barnacles to show the positions of the valves on the holotype (KG.1657.8b) and paratypes (KG.1657.8a and c), ×1.5. C, carina; R, rostrum; S, scutum; T, tergum (cf. Fig. 3a); prefixes a, b and c distinguish the three individuals.



a b

Fig. 3. *Pycnolepas articulata* sp. nov.
a. Actual specimen, an external mould, ×1.5.
b. Latex cast, ×1.5, coated.

Derivation of name: From the associated preservation of the valves.

Description

Carina thin, approximately five times longer than wide, widening gradually from the apex to the basal margin. It is a little bowed inwards, almost sub-cylindrical in transverse section and apparently not carinated. The apex is projected freely for about one-fourth of its length. The outer surface is ornamented with prominent transverse ridges which become rather more frequent towards the base and are a little upturned on the moderately wide, well-rounded parietes. Numerous weaker longitudinal ridges present a beaded effect where they intersect with the transverse ridges.

Scutum elongate-triangular in outline. The apex is accuminate and much curved towards the tergum. The apico-basal ridge is prominent with steep sides; in the type it is rounded near the top, but towards the base it is composed of two ridges with a flattened or slightly depressed area between; in paratype "c", it is evenly rounded throughout its length. One of the longitudinal ridges on the occludent side of the apico-basal ridge is thickened. Between these two ridges the valve is almost flat; it is rounded on the occludent side and steeply depressed on the tergal side. Longitudinally, it is gently convex. The basilateral angle is rounded and very slightly produced. The basal margin is gently sinuous, about two-thirds the length of the very convex occludent margin, and meets the latter at an angle of about 105°. The basi-tergal margin appears to be strongly concave in the upper part and convex in the lower part. The outer surface is ornamented by numerous transverse (growth) ridges which flare out as they cross the apico-basal ridge. On both sides of this ridge, fine longitudinal ridges form a beaded ornament where they are intersected by the growth ridges. On the inner surface, the occludent and tergal edges are flattened with, possibly, a groove extending half-way along their length; as preserved, the tergal edge is only weakly sinuous, indicating a rather shallow pit for the adductor muscle.

Tergum sub-rhomboidal in outline and flatly arched transversely. The length is almost twice the width. The apical portion is barely directed towards the scutum. A narrow, weakly raised and slightly sinuous apico-basal ridge, rather steeper on the carinal side is situated a little more than half the width of the valve towards the carinal margin. The valve is rounded and protuberant along the occludent margin. The occludent and somewhat longer upper carinal margins are almost straight; the lower carinal margin is weakly sinuous, longer than the upper carinal margin and about the same length as the scutal margin. Both the carinal angle and that formed by the occludent and scutal margins are broadly rounded. On the outer surface, the longitudinal ridges are as strong or stronger than the growth ridges and, as in the case of the other valves, beaded at the intersections. On the occludent side, the longitudinal ridges may be either entire or bifurcated with shorter, finer ridges intercalated; those on the carinal side are more numerous, uninterrupted and of even strength. The inner occludent and upper carinal edges are flattened and the latter (at least as far as preservation allows it to be determined) is narrowly marked with growth lines.

Rostrum is represented by a fragment of a valve partially obscuring the base of scutum "cS", and a completely detached external mould "aR", lying between scutumn "aS" and carina "bC". The base of the former is inclined downwards, thus causing the basi-scutal angle to overlap very slightly the apico-basal ridge of the scutum; the concave scutal margin is perceptibly thickened and is somewhat similar in appearance to the inner margin of the carina. Both rostra appear to reach to half the length of the scutum.

Imbricating plates. Beneath the capitulum of the central (type) specimen are the remains of three or four whorls of imbricating plates showing only the inner surface. Although many of the plates are displaced, others are overlapped to about half their height by the plate in the whorl below, rather in the fashion of roof tiles. They are all of much the same size, sub-triangular in outline with the apex broadly rounded. Each has a narrow basal ridge in which is a shallow slit-like median socket. The form is typical of plates found in *P. rigida*.

Discussion

The sub-cylindrical carina, together with the affinity of the tergum to Thanetian and Miocene species of *Pycnolepas*, serves to distinguish the new species from *Brachylepas*, the only other genus in the suborder Brachylepadomorpha. A laterally flattened capitulum, similar to that of Tithonian, Albian and Miocene forms of *Pycnolepas*, is also indicated by the narrow proportions of the carina of *P. articulata*. The rather more semi-conical carina and rostrum of *P. landenica* has a tendency towards the radially symmetrical shape generally found in *Brachylepas* (Withers, 1953).

The rounded parietes on the carina of *P. articulata* distinguishes that valve from other known species of the genus, as distinctly as does the stronger longitudinal ridge developed on the occludent side of the scutum, which latter is rather reminiscent of a similar ridge encountered in some *Cretiscalpellum* spp. of the Lepadomorpha.

Of the Jurassic species, only a fragmentary tergum of *P.* (*?*) *fimbriata* is known, on which very weak longitudinal ridges are developed. The tergum is much curved towards the scutum in *P. rigida* and, although agreeing in general outline, the tergum of *P. brunnichi* differs from *P. articulata* in having weak longitudinal ridges subdued by prominent growth lines. The tergum of *P.* (*?*) *scalaris* is unknown. In *P. landenica* the surface ornament of the terga figured by Withers (1953, pl. 60, figs 4 and 5) closely approximates to that of *P. articulata*, but in the former valves the upper carinal margin is considerably longer than the occludent margin. The apical portion of *P. paronai* figured by Withers (1953, pl. 60, fig. 10) shows longitudinal ridges present only on the occludent side.

Phylogeny

As early as 1914, Withers postulated the probable development of *Brachylepas* from *Pycnolepas* and the relationship of *Brachylepas* to *Cataphragmus* of the family Chthamalidae. He also drew attention to the similarity in structure of *Pycnolepas* to *Pollicipes* (particularly the extant species *P. mitella* (Linnaeus)), and of *Pycnolepas* being evolved from either *Pollicipes* or a *Pollicipes*-like form. Later, Withers (1927) opined a possible ancestry for *Pycnolepas* through such a form as *Eolepas* and he suggested (Withers, 1953) a *Calantica*-like ancestor for *Pollicipes*. In view of valves attributed to *Pollicipes*, now known from the Gault (Collins, 1974), an *Eolepas* ancestry for *Pycnolepas* would seem to be more acceptable.

Nothing is known, however, of *Pycnolepas* before the Tithonian and, until the scutum, upper latus and/or imbricating plates belonging to the two species "*fimbriata*" and "*tithonica*" are found, their acceptance within *Pycnolepas* remains in doubt. Meanwhile, *P. articulata* represents the earliest inequivocal brachylepadomorph, serving, by way of the similarity of its tergum, as a possible connecting link between the Upper Jurassic *P.* (*?*) *fimbriata* and the Upper Cretaceous *P. brunnichi*. The intervening Gault species, *P. rigida*, has a tergum curved towards the scutum—a character tending towards the development seen in *Brachylepas*.

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