APTIAN CIRRIPEDES FROM ALEXANDER ISLAND

By BRIAN J. TAYLOR

ABSTRACT. Two new varieties of cirripede, a pedunculate *Cretiscalpellum aptiensis* Withers var. *antarcticum* and an acrothoracican, *Brachyzapfes elliptica* Codez var. *gigantea*, are described from the Upper Aptian of Alexander Island. The acrothoracic cirripede is exclusive to belemnite rostra.

Two forms of cirripede occur in the Upper Aptian of the east coast of Alexander Island. Pedunculate cirripedes are few in number and they are confined to two horizons, whereas the acrothoracic cirripedes occur in belemnite rostra throughout the succession. Both forms of cirripede are described separately below.

PEDUNCULATE CIRRIPEDES

Withers has described cirripedes from both Graham Land (Withers, 1951) and Annenkov Island, South Georgia (*in* Wilckens, 1947). *Euscalpellum antarcticum* Withers was collected from the Upper Cretaceous (Lower to Middle Campanian) of The Naze (James Ross Island) and Humps Island. The species was founded on five incomplete but proportionately large peduncles. Capitular plates were not found. *Zeugmatolepas georgiensis* Withers, from the Upper Aptian of Annenkov Island, is of particular interest; according to Withers (*in* Wilckens, 1947, p. 18), it is the only cirripede from the Aptian outside England and also the only known species of *Zeugmatolepas* Withers from the Aptian. The species was founded on two incomplete capitula and a number of separate plates.

According to Withers (1935), few cirripedes have been recorded from the Lower Cretaceous. In Britain, Neocomian cirripedes are represented by *Zeugmatolepas* (?) *hausmanni* Koch and Dunker, whereas from the Aptian four cirripede species have been described, namely *Cretiscalpellum aptiensis* Withers, *Scalpellum* (*Arcoscalpellum*) *simplex* Darwin, *Scalpellum* (*Arcoscalpellum*) *accumulatum* Withers and *Scalpellum* (*Arcoscalpellum*) *comptum* Withers. Only *Zeugmatolepas georgiensis* and *Cretiscalpellum aptiensis* are well preserved and the others occur as separate plates. Because Aptian cirripedes are comparatively rare, those from Alexander Island are of particular geological and geographical interest.

ORDER THORACICA
SUBORDER LEPADOMORPHA
FAMILY SCALPELLIDAE PILSBRY

Genus *Cretiscalpellum* Withers

Type species: *Cretiscalpellum unguis* J. de C. Sowerby

Cretiscalpellum aptiensis Withers 1935 var. *antarcticum* var. nov.

Figs. 1, 2a, b

Material

Four specimens, three from Mount Ariel and one from locality N on the east coast of Alexander Island, represent approximately 25 detached plates. The majority of the plates, which are preserved as moulds, are left- and right-handed terga. Specimen KG.11.29 from locality N may represent a separate species.

Measurements

Specimen Number	*Length of Scutum* (mm.)	*Width of Scutum* (mm.)	*Length of Tergum* (mm.)	*Width of Tergum* (mm.)	*Length of Carina* (mm.)
KG.3.142	5	5	—	—	—
KG.3.143	—	—	5	2·8	—
KG.3.143	—	—	7·2	4	—
KG.11.29	—	—	—	—	11 (incomplete)

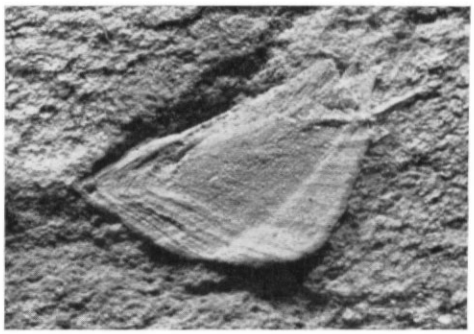

Fig. 1. A latex cast from the natural mould showing the scutum of *Cretiscalpellum aptiensis* Withers var. *antarcticum* var. nov.; ×7, coated. (KG.3.142)

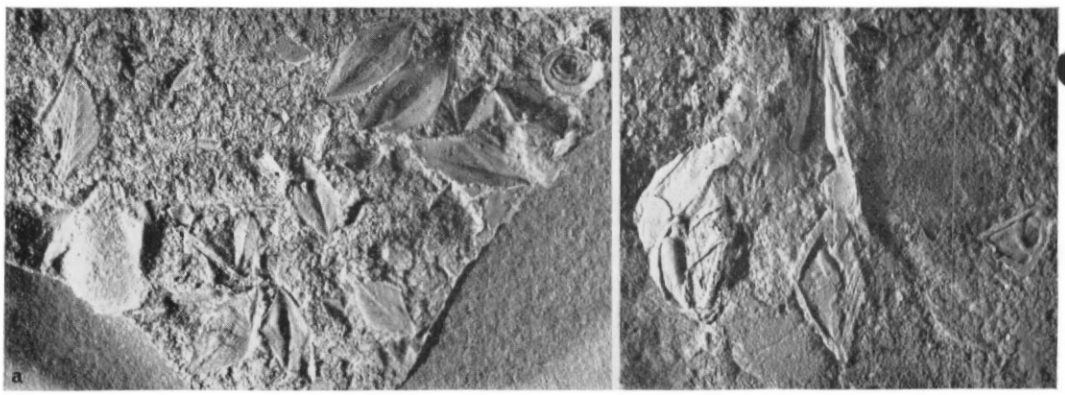

Fig. 2. a. A latex cast from the natural mould showing internal and external impressions of terga of *Cretiscalpellum aptiensis* Withers var. *antarcticum* var. nov.; ×2·5, coated. (KG.3.143)
b. A latex cast from the natural mould of a specimen from locality N. Note the internal impression of the carina; ×2·5, coated. (KG.11.29)

Description

Carina oblong, narrowing apically and widening basally. Inner surface thickened apically and crossed by slightly oblique growth lines. Outer surface not seen.

Scutum sub-rhomboidal (Fig. 1), moderately convex transversely with a rounded apico-basal ridge and a similar though less pronounced ridge extending from the apex to the middle of the basal margin. The basi-lateral angle is acute, while the lateral margin appears to be relatively straight. The apex is incomplete and the occludent margin and rostral angle are obscured. Growth lines are fairly prominent. No internal moulds showing the adductor muscle scars are preserved. The terga (Fig. 2a) are lozenge or sub-rhomboidal in outline, feebly convex transversely and acutely terminated apically and basally. The apices are curved towards the assumed position of the scutum. A rounded, sub-medial and slightly curved apico-basal ridge, which narrows apically, divides each plate. A second broader and more elevated ridge follows the occludent margin before joining with the scutal margin. The scutal margin, which is approximately the same length as the occludent margin, is straight. The upper carinal margin, which is longer than the lower carinal margin, joins the lower carinal margin in a rounded obtuse angle. Both halves of each tergum are ornamented with upwardly inclined growth lines and longitudinal ribs. Where growth lines and ribs intersect, small tubercles are occasionally developed. No ribbing can be seen in specimen KG.11.29 (Fig. 2b) but several of the growth lines are thickened. The inner apical margins of several terga are ornamented with growth lines. According to Withers (1928, p. 10), these growth lines are

caused by recession of the corium. As a result, the apices of the plates project freely beyond the capitulum.

Discussion

In specimen KG.11.29 the prominence of the tergum's apico-basal ridge, the absence of longitudinal ribbing and the variable thickness of the growth lines suggest that this may represent a separate species. An adjacent tergum and scutum may form part of the right side of a capitulum.

The Alexander Island cirripedes are distinguished from *Zeugmatolepas georgiensis* on the basis of the relative proportions of the terga (those of *Z. georgiensis* being much broader than the plates described), the relative lengths of all four tergal margins, the prominence of the tergal apico-basal ridge and the presence of an apico-basal and occludent ridge on the scutum.

The pedunculate cirripedes of Alexander Island differ from *Scalpellum* (*Arcoscalpellum*) *comptum* in lacking prominent longitudinal ridges on the carinal side of each tergum. Moreover, the occludent ridge terminates at the scutal angle, whereas in *Scalpellum* (*A.*) *comptum*, the ridge extends to the middle of the scutal margin. Since *Scalpellum* (*A.*) *simplex* and *Scalpellum* (*A.*) *accumulatum* are each represented by a solitary carina, they are unsuitable for comparison.

In *Cretiscalpellum aptiensis* (Withers, 1935) the tergal half of the scutum is wide and comparatively flat, whereas in the Alexander Island cirripedes the tergal half of the scutum is narrow and steeply inclined. Therefore, this difference has been accorded varietal status. No reconstruction of the complete capitulum of each specimen from Mount Ariel and locality N has been attempted.

Acrothoracic Cirripedes

The Acrothoracica, a small group of boring cirripedes, have not previously been described from Antarctica, although they have been recorded from: the Frodingham Ironstone of England (Hallam, 1963), a beach boulder derived from the Chalk of the Isle of Wight (Joysey, 1959), the Permian, Jurassic, Cretaceous and Neogene of France (Codez and Saint-Seine, 1957), the Campanian and Maestrichtian of the Mielnik region of Poland (Pugaczewska 1965), the Permian and Cretaceous of Texas (Schlaudt and Young, 1960) and the Pennsylvanian and Lower Permian of Kansas, Texas and Oklahoma (Tomlinson, 1963). More doubtful occurrences are also known from the Triassic and Upper Devonian. Borings made by cirripedes have been observed in belemnites, lamellibranchs, echinoids, corals, gastropods, brachiopods and solid rock (Häntzschel, 1962). The Alexander Island acrothoracic cirripedes are exclusive to belemnite rostra. Many of the infilled cavities have been eroded and the apertures destroyed.

The Acrothoracica, which represent a form of "commensal parasitism" (after the definition by Hopkins (1957, p. 413)), live in burrows and the organism is virtually flush with the host's surface except during feeding when the appendages are extended. The boring technique of the young cirripede is not known, although softening of the substrate by acid secretion probably takes place before excavation. The organism is equipped with chitinous teeth. Joysey (1959, p. 399) has compared cirripede burrows made in the shell of an *Echinocorys* with those made by the living species *Alcippe lampas* Hancock.

Codez and Saint-Seine (1957), who reviewed fossil Acrothoracica, recognized the two families, Zapfellidae and Rogerellidae. Tomlinson (1963) has also described fossil Trypetesidae.

Order Acrothoracica
Family Zapfellidae Codez and Saint-Seine

Genus *Brachyzapfes* Codez

Type species: *Brachyzapfes elliptica* Codez

Brachyzapfes elliptica Codez 1957 *B. elliptica* var. *gigantea* var. nov.

Figs. 3a, b, c.

Material

Eleven belemnite rostra collected from localities F, L and K on the east coast of Alexander Island. Four cirripede burrows (represented by infilled casts) have been extracted from specimen KG.13.8.

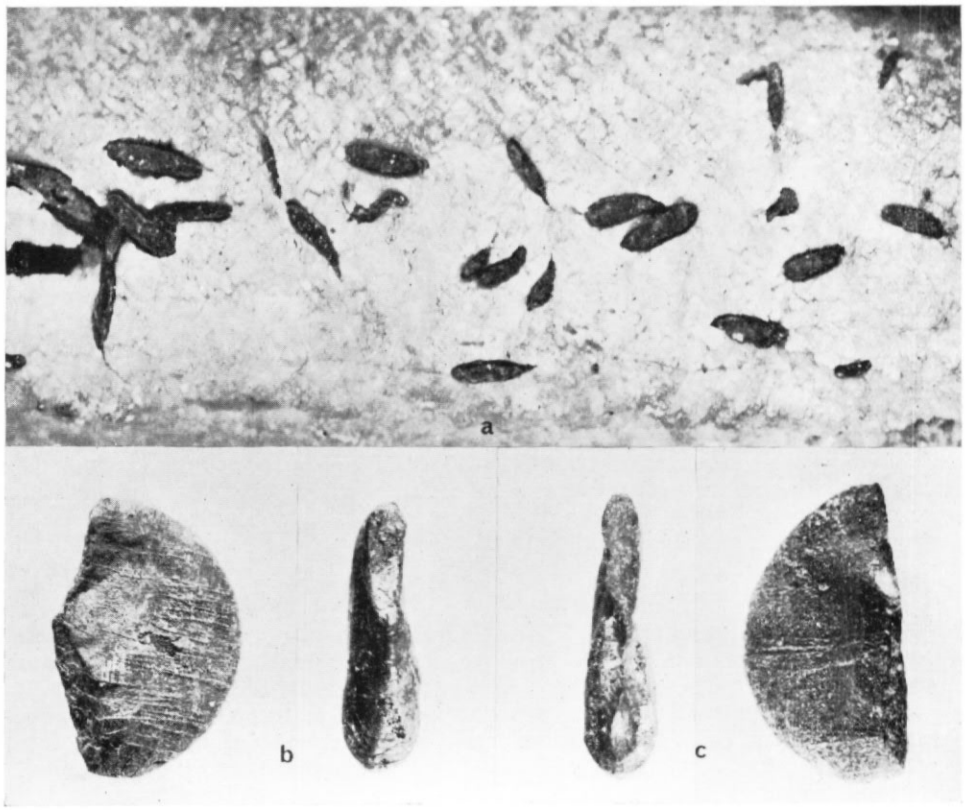

Fig. 3. a. Casts of cirripede burrows in a belemnite rostrum; ×3. (KG.13.8)
b. Cast of a cirripede burrow viewed from the side and from above; ×5. (KG.13.8(a))
c. Cast of a cirripede burrow viewed from the side and from above; ×5. (KG.13.8(b))

Measurements of casts

Cast Number	*Length of Aperture* (mm.)	*Width of Aperture* (mm.)	*Overall Length* (mm.)	*Overall Width* (mm.)	*Maximum Height* (mm.)
KG.13.8(a)	3·6	0·8	7·2	1·8	4·0
KG.13.8(b)	3·6	1·0	7·2	2·4	4·2
KG.13.8(c)	3·4	1·0	6·8	2·0	4·5
KG.13.8(d)	2·2	0·72	4·2	1·1	2·4

Description

Casts of cavities exposed on a belemnite rostral surface (Fig. 3a) reveal the outline of the aperture and, if some of the surrounding calcite has been etched, part of the broader under surface of the burrow (Fig. 3b). Joysey (1959, p. 399) has compared the shape of a cirripede burrow with that of a narrow shoe, the aperture corresponding to the laced opening of the shoe, while the inner chamber represents the broader and deeper part of the shoe. The aperture, which is approximately half the length of the complete cast, is elongate and occasionally slightly arcuate. The tapered anterior may be twisted either to the left or right, while the posterior is proportionately broader and rounded (Fig. 3b). According to Tomlinson (1955), the anterior represents the point of attachment of the cirripede larva, whereas the remainder

represents the position adopted by the adult. The anterior projects dorsally as an excentric apex that constitutes the highest part of the cast.

Below the aperture the casts expand downward and anteriorly into larger sacciform bodies (Fig. 3c). The antero-dorsal margin slopes down evenly from the apex to reach a rounded antero-lateral margin. The maximum width of the cast is at the antero-lateral margin. The postero-lateral margin slopes almost vertically downward from beneath the posterior end of the aperture. In longitudinal section the casts are virtually symmetrical half ellipses. The fairly pronounced transverse and longitudinal ribbing probably reproduces the structure of the surrounding calcite (Fig. 3c); the ornament is dissimilar from the striations described by Tomlinson (1955, p. 99) which he has attributed to the action of the boring teeth.

Discussion

Although the infilled cavities could have been made by a number of known boring organisms (notably clionid sponges), they seem to be indistinguishable from the cavities left by acrothoracic cirripedes (Codez and Saint-Seine, 1957, pls. xxxvii–xxxix). The largest of the cirripede casts from Alexander Island is considerably larger than any previously described from the Mesozoic. *Simonizapfes elongata* Codez, the largest acrothoracic cirripede described by Codez and Saint-Seine (1957), has a maximum length of 4·5 mm. and width of 1·1 mm. If the biometrical analysis of Codez and Saint-Seine is followed, this size difference could be thought of as having a specific or even generic importance. However, the author is not satisfied that figures representing the maximum dimensions of the cavities are more important than general form and outline, since such measurements probably reflect the maturity of the individual cirripede.

The Antarctic acrothoracic cirripedes most clearly resemble *Zapfella* Saint-Seine and *Brachyzapfes* Codez, two genera in the Zapfellidae. *Brachyzapfes* has been observed in belemnites and lamellibranchs, while *Zapfella* has been found boring into molluscs, brachiopods, corals and solid rock. The cavities made by the Alexander Island cirripedes are not so deep as those made by *Zapfella* and the nearest specific match is with *Brachyzapfes elliptica* Codez, a Lower Cretaceous species. The Alexander Island Acrothoracica, however, are larger than those described by Codez and Saint-Seine (1957) and therefore this difference has been accorded varietal status.

The infilled cavities are both superficial and deeply buried. They may be scattered over the rostra of belemnites or locally congregated but each perforation is discrete and, as there is no distortion of the surrounding laminae, the cavities were probably bored following the death of the host. The exclusiveness of belemnite rostra as hosts is probably due to the thickness of the shell which provided the young larva with a firm anchorage. In several specimens (notably KG.13.7) the cavities are confined to one side of the rostrum, presumably the one farthest away from the mud. Perforation of the complete rostrum (KG.13.10) suggests that the shell was rolled. Schlaudt and Young (1960) have described an interesting acrothoracic cirripede, *Rogerella cragini* Schlaudt and Young, from the Middle Albian of Texas. This species is exclusive to the gastropod *Ceritella proctori* Cragin, even though there are other gastropods and other species of *Ceritella* in the fauna. The majority of burrows are located at the sutures and Schlaudt and Young (1960, p. 905) have suggested that the individual cirripedes sought shelter in the sutures.

Although the bored belemnites described in this paper were collected from only three field stations, belemnite rostra throughout the succession were found to be similarly affected.

Conclusions

The geographical ranges of *Cretiscalpellum aptiensis* and *Brachyzapfes elliptica* are extended to Alexander Island. Slight differences between the specimens from Alexander Island and those described earlier have been given varietal status. Boring cirripedes have not been recorded previously from Antarctica.

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