A PROBABLE CRETACEOUS INVERTEBRATE FAUNA FROM CRABEATER POINT, BOWMAN COAST, GRAHAM LAND

By M. R. A. THOMSON

ABSTRACT. A fauna of crinoids, gastropods, lamellibranchs, ammonites and trace fossils is described from Crabeater Point, Bowman Coast. Because the fossils are not well preserved, no precise specific identification is made. Although none of the genera has a closely restricted time range, a Cretaceous age for the fauna seems most likely. A brief description of the sediments is given and they are compared with black shales deposited in a restricted environment. It is suggested that the fossils were transported into the depositional basin by wave action.

CRABEATER POINT (lat. 68°45′S., long. 64°08′W.) is situated at the north-west extremity of a rounded ridge lying between Kenyon Peninsula and the mainland of the Antarctic Peninsula (Fig. 1). Kenyon Peninsula was first crossed in 1947–48 by a joint British–American survey party, but Crabeater Point was not visited until 1960–61 when P. H. Grimley found poorly preserved lamellibranchs and ammonite fragments in the mudstones which crop out there. These fossils were submitted to the British Museum (Nat. Hist.) for identification. The late Dr. L. R. Cox identified one of the lamellibranchs as *Inoceramus* (?) sp., and Dr. M. K. Howarth, referring to one of the ammonite fragments, said "that there are vague indications that it might be a Lower Cretaceous heteromorph". A. G. Fraser re-visited the locality in 1961–62 and collected a few gastropod and lamellibranch fragments, together with a scree specimen containing *Chondrites*. The author visited Crabeater Point in 1965 and was able to spend several days searching the outcrops and screes for fossils. Several additions were made to the fauna, including crinoid fragments, lamellibranchs, trace fossils and some fragmentary plant material.

Although the fauna as a whole is poorly preserved, it is of special interest because of its location on the southern east coast of the Antarctic Peninsula. The nearest known occurrence of fossil invertebrates of similar age on this coast is about 450 km. to the north at Cape Marsh, Robertson Island, Seal Nunataks (Fleet, 1966). A Cretaceous fauna also occurs in south-east Alexander Island, but this is separated from Crabeater Point by the high mountainous Palmer Land plateau, composed of volcanic, intrusive plutonic and metamorphic rocks. Other sediments which are believed to be of a similar age (although there is no fossil evidence to prove it) crop out near Cape Keeler about 35 km. south-east of Crabeater Point. Because the sediments at Crabeater Point are preserved as an isolated block which has been down-faulted with respect to the older sedimentary, volcanic and igneous rocks to the west, and because they are not seen in contact with any other rock types, the age relationships are based on similarities of lithology and structural position. In particular, the sediments of Cape Keeler and Crabeater Point both contain bent biotite flakes, a feature which has not been observed in any other sediments in this area, and therefore its presence here is regarded as significant (personal communication from A. G. Fraser). The sediments forming Cape Keeler are also preserved as a down-faulted block, and the geomorphology of the whole of Kenyon Peninsula further suggests that a more extensive succession of similar sediments may be concealed beneath its ice cap.

The dominant rock type at Crabeater Point is a black mudstone, which usually contains small amounts of detrital quartz and feldspar, but it may become moderately silty in places. Most of the rock matrix is indeterminate under the microscope. It is generally brownish in thin section due to iron staining and the presence of organic debris in the form of finely comminuted carbonaceous material. Iron pyrites is present as microscopic grains, ragged or spongy masses, and euhedral tabular crystals which have grown *in situ*. The quartz and feldspar grains are generally angular. The feldspar varies in degree of alteration from fresh and albite-twinned to strongly sericitized, so that its original composition cannot always be determined. Associated with the detrital minerals are small ovate to angular aggregates of quartz and feldspar, and minute grains of a greenish to amber-coloured mineral with a high relief and birefringence (possibly sphene). These aggregates range in size to about 0·2 mm. across and it is suggested that they could be of volcanic origin. Although hand specimens of

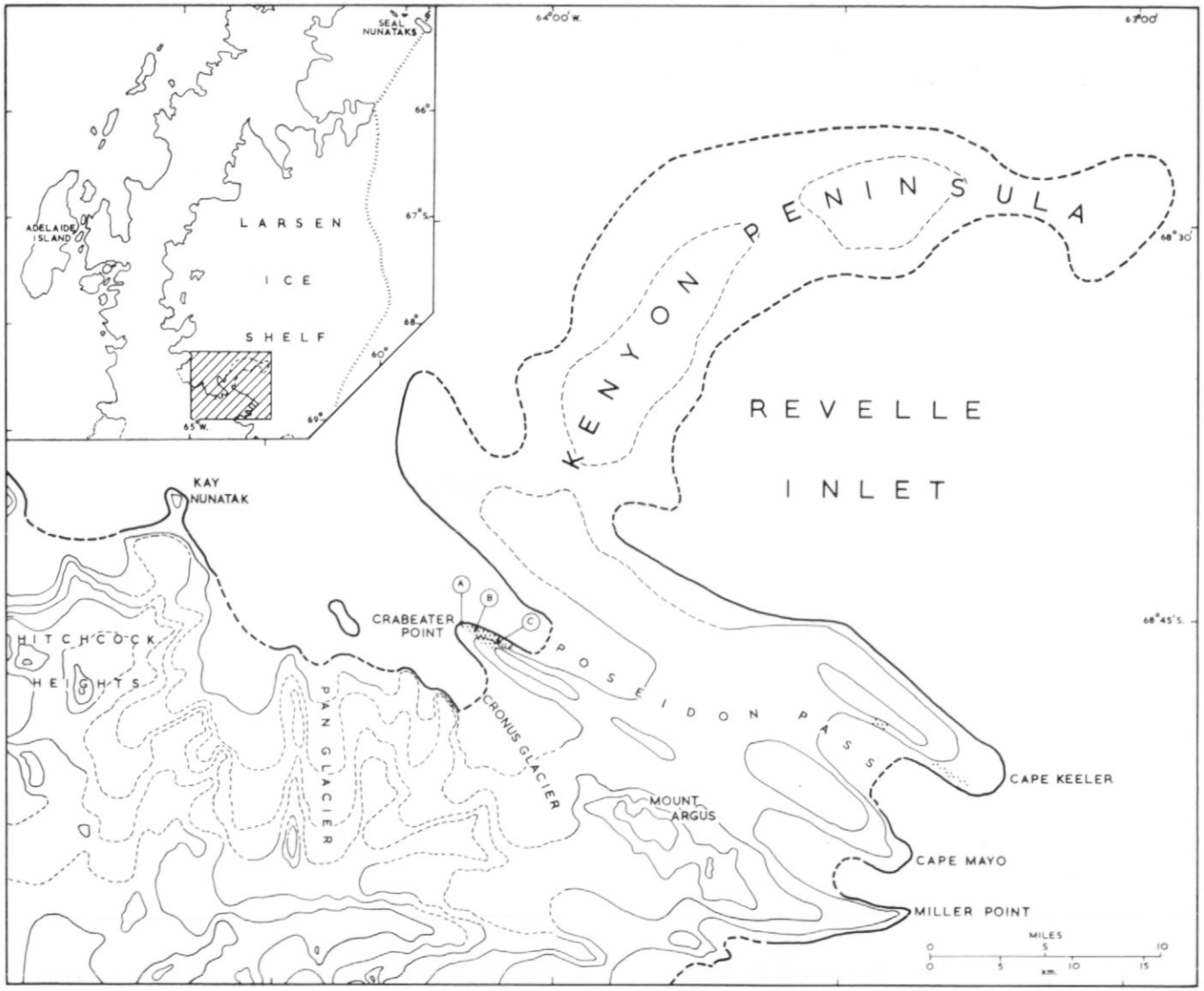


Fig. 1. A map showing the location of Crabeater Point and the outcrops (stippled) of (?) Cretaceous age in the vicinity of Kenyon Peninsula. The fossil localities are marked A, B and C. Unfossiliferous sediments near Cape Keeler are believed to be of a similar age to those at Crabeater Point, because of lithological similarities and similar structural position. The form lines are at 250 m. intervals.

the mudstones do not normally react with dilute hydrochloric acid, calcite is often present in thin sections as small ragged patches and ovate blebs. Microgranular quartz and feldspar are locally abundant in thin lenses which are often strongly contorted.

Interbedded with the mudstones are a few beds of calcareous arkose with bent biotites and a high feldspar content. A modal analysis of this rock revealed only 9 per cent of quartz and 40 per cent of feldspar. 35 per cent of the remainder was "matrix", but much of the feldspar is so highly altered that it is difficult to distinguish it from the matrix, and the original feldspar content must have been appreciably higher. Lime-mud nodules are common at certain horizons and they may reach a size of 0·5 m. in diameter. Small ovate carbonaceous concretions around clots of plant debris may also be present, and bands of "beef" occur at some horizons.

The total thickness of these beds is unknown and it is not easy to make a reasonable estimate of its value. At Crabeater Point, where the ridge is about 40 m. high, the mudstones are vertical and strike approximately east–west. However, at the south-easterly limit of the outcrop the cliffs are about 450 m. high and the average dip is between 40° and 50° to the south. Further complications are introduced here by a recumbent isoclinal fold half-way up the cliff face and it is not known how much repetition this fold has caused. The base of the sediments is not exposed.

Conditions of deposition

The amount of carbonaceous material and iron pyrites in these sediments imparts a very dark colour to them even in thin section. They are similar in appearance to the classic black shales generally assigned to a stagnant environment. However, the presence of various forms of burrow-like trace fossils shows that the environment was not toxic enough to exclude all forms of life. The patchy and restricted distribution of the molluscs and the crinoids (below) seems to indicate that they are not in the environment in which they lived. It is therefore possible that they were washed into a restricted depositional basin by storms or high tides, in the manner described by Woolnough (1937, p. 1121), and then were unable to survive the hostile conditions. Alternatively, the restricted conditions may have been intermittent, allowing colonization by more resistant forms from time to time. The absence of variation in size of the various species recovered from the black shales, however, shows that the fossil remains are not representative of a living community.

Feldspar is a commoner detrital mineral in these sediments than quartz and much of it is very fresh and angular, suggesting a volcanic source. Feldspar grains and quartzo-feldspathic blebs (p. 1), similar to the ones in these sediments, occur in the volcanic sediments at Mount Argus which are much older than the sediments at Crabeater Point (personal communication from A. G. Fraser). At Mount Argus, volcanic quartz is characteristically rare, whereas in the sediments at Crabeater Point it is always present in small quantities. This observation, together with the freshness of the feldspars, suggests a penecontemporaneous volcanic source for the material in the Crabeater Point sediments, rather than its being derived from the volcanic sediments at Mount Argus.

The Fauna

Fossils are distributed sporadically throughout the scree material but in the outcrops they are largely confined to three localities: locality A at Crabeater Point, locality B on the crest of the ridge about 200 m. south-east of Crabeater Point, and locality C in the folded beds on the edge of the cirque wall 2·8 km. south-east of Crabeater Point (Fig. 1). The dip of the sediments has a gentle south-easterly component along the length of the ridge and therefore the beds at locality A are stratigraphically lower than those at locality B. The relative stratigraphical position of locality C is unknown as the structure is not yet understood. At these localities the fossils are further restricted to certain bedding planes and isolated occurrences. The state of the present collections suggests that each locality has its own typical faunal assemblage. At locality A ammonites are found together with *Inoceramus* sp. and other lamellibranchs which are too poorly preserved to be identified even generically. The fauna of locality B appears to be limited to *Procerithium* (*Rhabdocolpus* ?) sp. and an arcid-like lamellibranch, and the fossils from locality C, *Isocrinus* (?) sp. and possible fragments of *Inoceramus*, are known only from one hand specimen. A *Nucula* was found on the screes between localities B and C, but its

exact source is not known. Trace fossils in the form of irregularly branched burrows are abundant in the outcrops along the top of the ridge and on the edge of the cirque. *Chondrites* is known from a single scree specimen and vermicular structures are frequently seen in thin sections. There are occasional fragmentary plant remains but nothing identifiable has yet been recovered.

The most abundant remains of life are micro-fossils. Poorly preserved Foraminifera have been found in several thin sections of the mudstones, and the lime-mud nodules are full of minute ovate tests of problematical affinities (*Oligostegina* ?) and calcite-replaced Radiolaria. A few of the Radiolaria still show traces of the delicate lattice-work structure of the test. The micro-fauna will be described separately in a later paper.

CRINOIDEA

Genus *Isocrinus* von Meyer
Isocrinus (?) sp.
Fig. 2a, b

Material

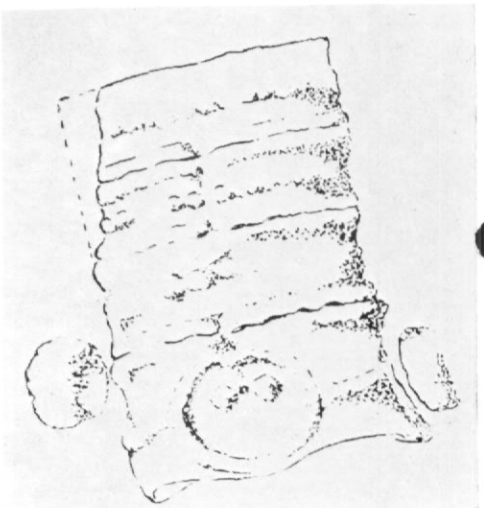
External moulds of stem fragments, which show details of the articular and lateral surfaces of the columnals (TL.310.17a, b).

Description

The columnals (Fig. 2a) are pentalobate to pentagonal with well-rounded edges and shallow re-entrant angles. Each columnal is pierced by a small round lumen and the articular surface bears broadly ovate to rhomboidal inter-radial petals. Each petal is bounded by a well-rounded row of strong crenellae along the pentamere and there is a single row of smaller granular crenellae along each radius. Adaxially, the crenellae on the radius are straight but towards the re-entrant angle they become V-shaped and finally separate into two rows.

The lateral surfaces of the columnals (Fig. 2b) are slightly concave and carry a median band of granules which tend to coalesce into a ridge. The upper and lower edges of each columnal have a marked raised rim bordering the sutures. The nodals are slightly higher than the

a



b

Fig. 2. a. A photograph of the articular surface of *Isocrinus* (?) sp. showing the arrangement of the crenellae; ×18, coated. (TL.310.17b)
b. A sketch of a fragment of the column of *Isocrinus* (?) sp. from a photograph; ×20. (TL.310.17a)

internodals and they have five elliptical cirrus sockets which are situated low down and just encroach on the infranodals. Each cirrus socket is bounded by a raised rim and has a slightly concave floor area, in the upper third of which are two minute sub-triangular tubercles placed laterally about a small foramen. The cirrus sockets are set at an angle to the stem and direct the cirri slightly upwards.

Associated with the stem fragments are single smooth cirrals opposite some of the cirrus sockets. There is also a small fragment (2·5 mm. long and 9 mm. in diameter) consisting of five smoothly rounded pentameral segments. The articular surface of these is ornamented with crenellae, arranged in a similar way to those on the columnals described above, and each has a minute axial foramen. This segment may be part of a cirrus or, alternatively, another part of the stem.

Dimensions

Diameter of stem, 2·5 mm.; height of internodal, 0·75 mm.; height of nodal, 1·0 mm.; maximum diameter of cirrus socket, 1·1 mm.; height of cirrus socket, 0·85 mm.; diameter of lumen, 0·19 mm.

Remarks

Following Rasmussen, these crinoid fragments are generically identified as *Isocrinus* (?). Rasmussen (1961, p. 20, 21, 110) has pointed out that where there are no details of the arms and their articulation the identification *Isocrinus s.s.* cannot be made. In particular, *Neocrinus* Wyville Thomson and *Nielsenicrinus* Rasmussen are isocrinids, which are differentiated from *Isocrinus* on the differences in the articulation in their arms.

References to *Isocrinus* in the Southern Hemisphere are rare. South American forms, which might be expected to show close similarities to specimens from the Antarctic Peninsula and Alexander Island, are particularly poorly documented and are generally referred to as *Pentacrinus* sp. Feruglio (1949*a*, *b*, 1950) has quoted only one record of *Pentacrinus* sp., and that is the material collected by Darwin in 1834 from Mount Tarn near Port Famine, Tierra del Fuego. The column of *Isocrinus aptiensis* Taylor (1966) from Alexander Island is too poorly known for comparison. It is, however, possible to show similarities between the Crabeater Point specimens and European Cretaceous isocrinids.

I. (?) *dentatogranulatus* Wollman from the Albian of Germany has a very similar ornament on the lateral surfaces of the columnals, while that on the articular surface is quite different. No nodals appear to have been described so the form of the cirrus sockets is not known. *I.* (?) *arduennensis* Valette from the Albian of France has almost exactly the same ornament on the articular surface of the columnals but that on the lateral surface is different.

However, these similarities should be interpreted with caution because there is often a wide variation in the ornament of the columnals in the column of one individual. It is possible that the columnals from two different species could show greater similarities than two columnals from different parts of the column of the same individual.

Gastropoda

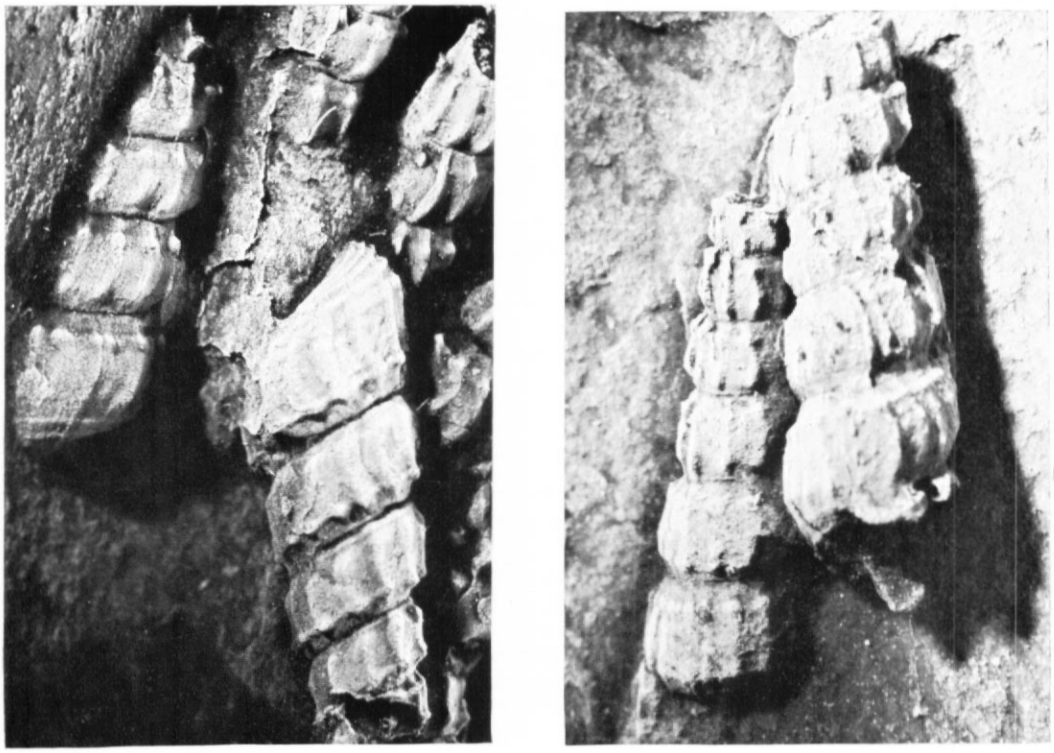
Genus *Procerithium* Cossmann
Subgenus *Rhabdocolpus* Cossmann
Procerithium (*Rhabdocolpus* ?) sp.
Fig. 3a, b

Material

Nine rock specimens from locality B at Crabeater Point contain external moulds of *Procerithium* (*Rhabdocolpus* ?) sp. The best examples, on which the description is based, are specimens TL.310.19 and 25.

Description

All the specimens are incomplete in that the most apical whorls are always missing and the aperture is not preserved. The shells are small and very attenuate. No more than six whorls



a b

Fig. 3. a. A latex cast from a natural external mould of a group of *Procerithium* sp. The largest individual shows spiral, as well as axial, ornament on the body whorl; ×9, coated. (TL.310.19)

b. A latex cast of two specimens of *Procerithium* sp. Typically, the apical whorls are broken off; ×9, coated. (TL.310.25)

are preserved on any of the specimens, but the narrow apical angle of 10–12° suggests that originally several more whorls were present in the apical part of the shell. The whorls have flattened sides and are separated by impressed sutures set in wide grooves. The ornament on the surface of the whorls is usually confined to strong axial costae, of which there are about eight or nine to a half whorl in the later growth stages. Near their extremities the costae bear small tubercles. On the largest example (TL.310.19) (Fig. 3a), these tubercles are present where the costae are crossed by two spiral riblets. The body whorl of the same example bears a series of fine spiral threads between these two riblets. The costae are opisthocyrt and may, or may not, be aligned with corresponding ones on the adjoining whorls. The basal disc is ornamented with a series of concentric carinae and sometimes also with very faint axial threads.

Remarks

The morphological features of these specimens agree with those of the genus *Procerithium* as defined by Cossmann (Chartron and Cossmann, 1902, p. 177), except that the spiral ornament is not very well developed. However, this might well be only apparent and it is likely that much of this ornament was lost by corrosion of the test before fossilization. The affinity with the subgenus *Rhabdocolpus* Cossmann is suggested with reservation, because the number of axial ribs in the present material is rather more than is normal for the subgenus.

LAMELLIBRANCHIA

Genus *Nucula* Lamarck
Nucula cf. *stationis* Wilckens
Fig. 4a

Material

One almost complete external mould of a right valve (TL.310.12).

Description

The example of *Nucula* cf. *stationis* on specimen TL.310.12 has an elongate rounded triangular outline. The postero-dorsal margin is broken but it is probable that it was originally straight or nearly so. That part of the shell between the postero-dorsal margin and the ventral margin is incomplete and the antero-dorsal margin has probably been distorted by a cleavage plane and rolled slightly inwards. A reconstructed outline of the shell margin is shown by the dotted line on Fig. 4a. The shell ornament consists of faint, unequally spaced, concentric lines which become more prominent with increased size of the shell. There is also a shallow but well-marked furrow extending from near the umbo to the ventral margin. Whether this is a feature of the shell or some deformity is not certain, but the writer is not aware of a similar structure on any other species of *Nucula*. Where the postero-dorsal margin is broken there are moulds of several strong chevron-shaped teeth.

Dimensions

Length, 17 mm.; height, ~12 mm.

Remarks

Several species of *Nucula* similar to this specimen have been described from the Cretaceous of Patagonia, but stronger similarities are found in *N. stationis* Wilckens (1910) from Snow Hill Island. The general shape and ornament of *N. stationis* and the specimen from Crabeater Point are closely comparable but the specimen from Crabeater Point is somewhat larger. The original and only description of *N. stationis* was from only one specimen and hence there is no indication of any degree of variation within the species.

Genus *Arca* Linnaeus
"*Arca*" sp.
Fig. 4c, d

Material

External and internal moulds of three valves, one of which still has some of the original test adhering to it (TL.310.1, 18a, b).

Description

All the specimens are incomplete and specimen TL.310.1 is somewhat distorted. The valve outline is not preserved in its entirety but probably it was originally almost trapezoidal with a convex ventral margin. On specimens TL.310.18a and b are two separate valves lying 25 mm. apart. These presumably belong to the same individual and, if so, the whole shell was equivalve and both valves were similarly ornamented. The valves are inflated with the umbo lying slightly off-centre. The ornament consists of strong angular radial ribs separated by wide, symmetrically rounded furrows. The interior margins of the shell are correspondingly crenulate. On the best specimen (Fig. 4c) there are 15 radial ribs with possibly one or two more in the less well-preserved antero- and postero-dorsal regions. The radial ribs are crossed by fine, closely spaced concentric lines, and on specimen TL.310.1 there are two coarser concentric furrows 2·5 mm. apart. The tips of the umbones and the ligamental areas are not preserved.

On the internal moulds, especially specimen TL.310.18a, there are fragmentary remains of hinge teeth (Fig. 4d). Three pits (representing teeth) and three ridges (or tooth sockets) are present at one end of a short hinge line with another less well-preserved set at the other end.

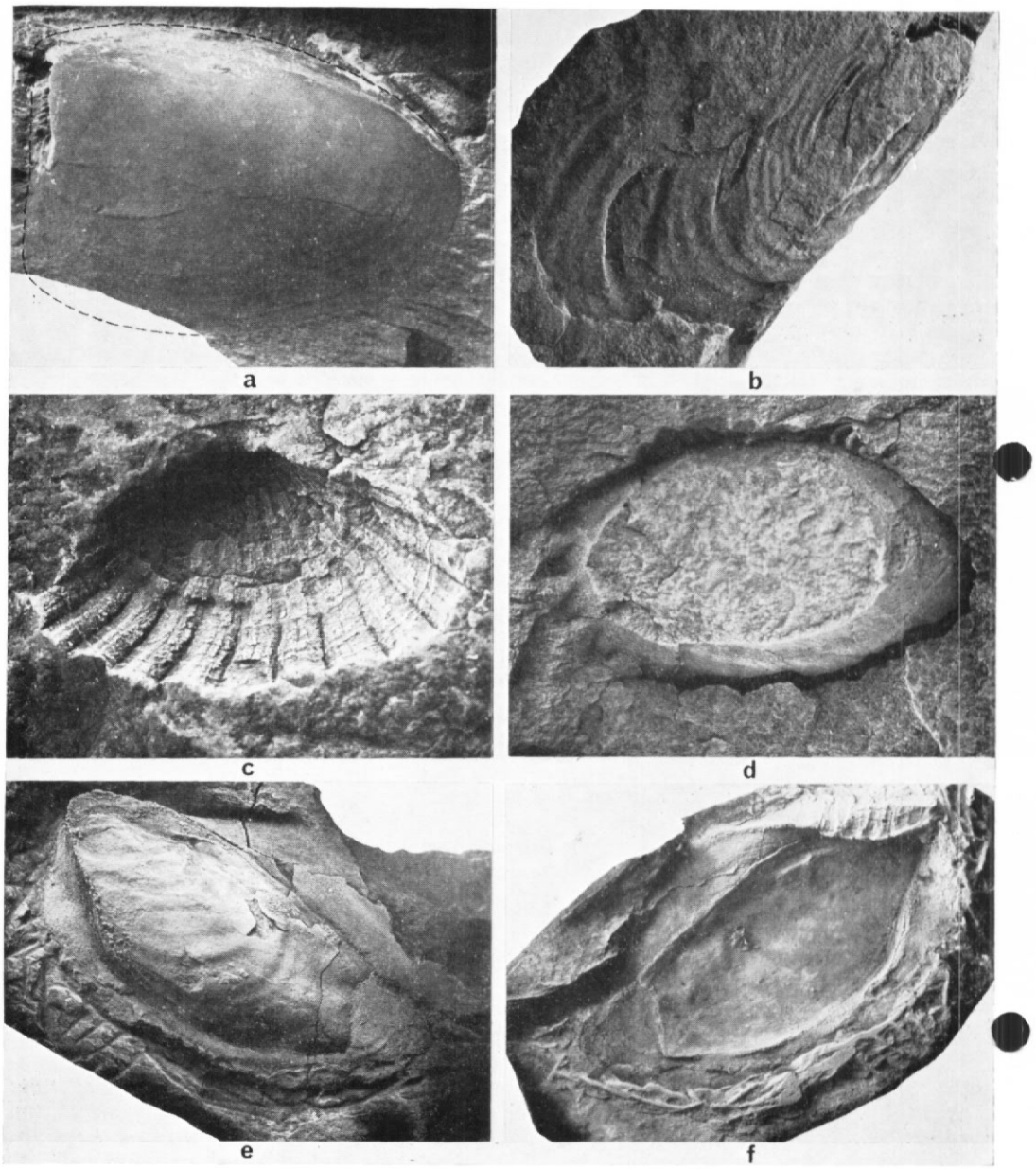


Fig. 4. a. The natural external mould of *Nucula* cf. *stationis* Wilckens; ×3·5, coated. (TL.310.12)

b. A natural internal mould of *Inoceramus* sp., showing a simple concentric ornament; ×2·5, coated. (TL.310.9)

c. A natural external mould of "*Arca*" sp. The dorsal region of the shell is not preserved; ×4·5, coated. (TL.310.18b)

d. The internal mould of the same specimen of "*Arca*" sp. ×4·5, coated. (TL.310.18a)

e. A natural internal mould of *Inoceramus* sp., showing the internal features of the shell in detail; ×1·5, coated. (E.1628.21; LL.16070)

f. A latex cast from specimen E.1628.21 (LL.16070;)×1·5, coated.

The innermost tooth is distinctly triangular and curved dorsally and outwards away from the hinge line. The second and third teeth become progressively smaller and straighter. No trace of the muscle scars can be seen on any of the specimens.

Dimensions

The external mould shown in Fig. 4c has a length of 13 mm. and an estimated height of 8 mm.

Remarks

The ornament of strong angular radial ribs is rather unusual in the Arcidae for they normally have either rounded or flattened crests. This ornament should therefore be rather distinctive but it has not been possible to identify these specimens with any species known to the author. The general characteristics of the shell, as observed in these specimens, indicate that they belong to the family Arcidae rather than to any of the related families (Reinhart, 1935). However, these specimens are not sufficiently well preserved to assign them with any confidence to either a genus or subgenus.

Genus *Inoceramus* Sowerby

Inoceramus sp.

Figs. 4b, e, f; 5

Material

At least six internal and external moulds, the best of which are specimens E.1628.21 (LL.16070*), E.1628.28 (LL.16068) and TL.310.9.

Description

Many of the specimens have been distorted but specimen E.1628.21 (LL.16070) has probably suffered less than most, and the gross morphology as well as the internal features of the shell are described essentially from this specimen (Fig. 4e, f). The shell is trapezoidal to ovate in outline, obliquely elongate and probably equivalve. The umbo is rounded and terminal, or nearly so. It is somewhat inflated and a broad ridge extends from it down to the postero-ventral margin. This ridge becomes more flattened ventrally and the postero-dorsal region is also flattened into a large wing-like area. The ornamentation is simple, consisting of irregularly spaced concentric ridges separated by rounded furrows which have an asymmetrical cross-section. On specimen E.1628.21 (LL.16070) the short anterior margin is straight, makes an angle of about 90° with the hinge line and joins the curved ventral margin in an obtuse angle.

Internally, the visceral cavity is limited by a narrow ridge beyond which are flattened areas (Fig. 4f), especially in the postero-dorsal region, and less so in the anterior region. The cavity projects well under the ligamental area. The latter is well preserved and bears several broad ligamental pits (Fig. 5), of which there are seven major ones in the space of 14 mm. with occasional interspersed triangular ones extending inwards from the dorsal edge. These are crossed by faint ridges and furrows parallel to the hinge line and faint thread-like striations perpendicular to the hinge line.

Remarks

Specimen E.1628.21 (LL.16070) is one of those sent to the late Dr. L. R. Cox for his comments. Concerning the transverse thread-like striations on the ligamental pits he said: "They may be connected with the fibrous, prismatic structure of this part of the test and have originated by corrosion before the latter dissolved away during fossilization. On the other hand, they may be a character of the particular species to which the present specimens belong." Since all the internal moulds bear the imprints of the prismatic crystals that once formed the test, the first explanation is the most likely. He also stated: "It seems most probable that the specimens belong to a species of *Inoceramus*. The oblique, rather mytiliform shape of the shell

* The numbers given in brackets and prefixed by "LL" are catalogue numbers of the British Museum (Nat. Hist.).

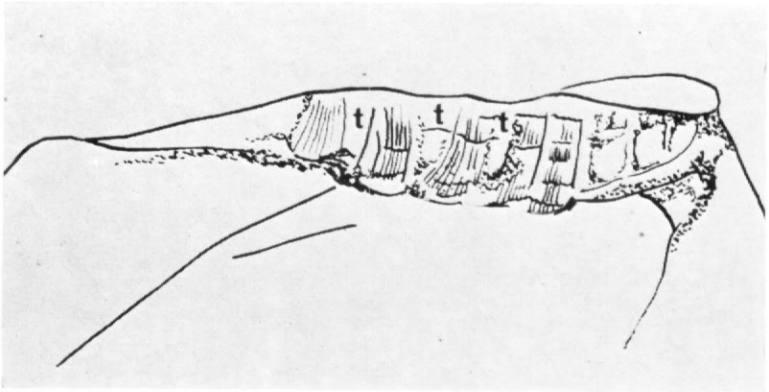


Fig. 5. A sketch from a photograph of the ligamental area of *Inoceramus* sp. The subsidiary triangular pits mentioned in the text are marked "t"; ×3·5, latex cast from specimen E.1628.21 (LL.16070).

recalls the subgenus *Mytiloides* Brongniart, the type species of which is *Inoceramus labiatus* (Schlotheim)."

The possession of subsidiary triangular pits on the ligamental area is rather unusual for this genus, although little work has been done on the exact characters of the hinge area of *Inoceramus*. An examination of several species of *Inoceramus* from the Chalk of England suggests that such subsidiary pits could result from the corrosion of the ridges separating the ligamental pits.

Indeterminate lamellibranchs

There are several specimens containing fragments of internal and external moulds of lamellibranchs which are either too fragmentary or lacking in determinative features to be even tentatively identified. However, it is possible to say that in addition to those already described at least three other species are present.

Ammonoidea

Ammonites are found only as very fragmentary and poorly preserved specimens. Two species are probably present. The first is a very badly weathered impression of a somewhat evolute and compressed form. The second is a little better preserved; specimen E.1628.24 gives indications of being an openly coiled heteromorph, but the conch is only preserved in any detail in the region of the body-chamber (Fig. 6). Here the whorl is about 35 mm. high but it has been so strongly compressed after burial that the true dimensions are unknown. The ornament on the internal mould consists of angular ribs about 2 mm. apart and separated by rounded furrows. There is no sign of any suture markings.

Trace Fossils

Branched burrows

Most of the scattered outcrops of sediments at Crabeater Point contain straight or branched orange "lines" in the plane of the bedding. They are usually about 1 mm. across and appear to represent the flattened infillings of burrows. On specimen TL.310.23 these burrows are preserved as tubes which are lined with a coating of iron oxide, possibly representing an original mucus lining of the walls. At intervals of about 1 mm. there are constrictions or annulations around the inside of the burrows, which may be either straight or sinuous and sometimes show irregular dichotomous branching. In several places there are short sub-vertical burrows, indicating that the organism responsible for these structures changed its level of habitation from time to time.

This trace fossil does not appear to fit into any of the ichno-genera discussed by Häntzschel (1962). However, in a later paper, Häntzschel (1966) has illustrated a specimen of *Megagrapton*

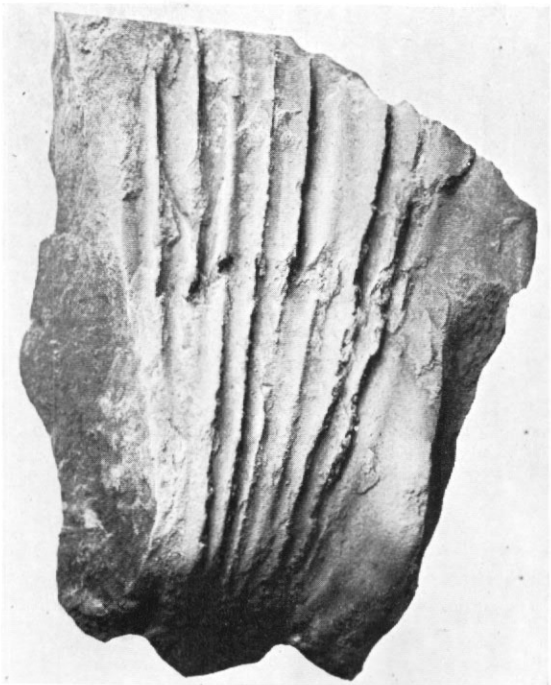


Fig. 6. The internal mould of the body-chamber of an unidentified open-coiled heteromorph ammonite; ×2, coated. (E.1628.11)

Ksiazkiewicz from the Lower Tertiary of Poland. This genus is morphologically similar to the Crabeater Point specimens preserved as flattened infillings, especially in the mode of branching, but the tube diameter of the Polish specimen is four times larger than the specimens described here, and there is no mention of the presence of short sub-vertical burrows.

Genus *Chondrites* Sternberg
Chondrites sp.
Fig. 7

Material

One small fragment (E.2129.4) from the screes, and the only record of the genus from this locality.

Description

This small fragment of fine black mudstone is cut by a series of irregular sub-parallel burrows up to 3 mm. across. On weathered surfaces they stand out as light grey markings on the dark rock. In cross-section the burrows are ovate, but this might be due to compaction or compression from an originally round form. In places the burrows touch one another but there is a distinct division between the two and there is no evidence that any burrow cuts through an earlier-formed one, suggesting that the organism formerly inhabiting these burrows was phobotaxic.

A thin section cut approximately perpendicular to the bedding (Fig. 7) shows that the burrows are largely filled with calcareous material. This is generally in the form of fine calcareous mud together with ovoid blebs of microcrystalline calcite. Some of these blebs have a rather regular, almost circular outline and they have light-coloured outer rims or tests. They compare closely with calcite-replaced Radiolaria found in thin sections of lime-mud nodules from this locality. A minute ovoid test, *Oligostegina* (?), and some small Foraminifera

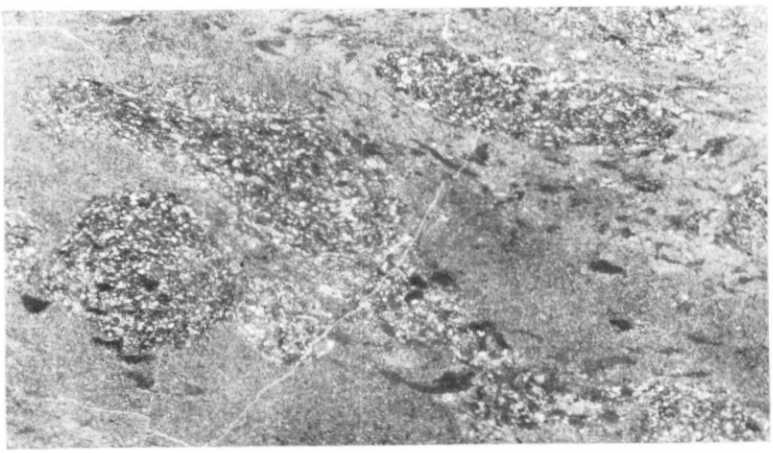


Fig. 7. A thin section of a rock fragment containing the trace fossil *Chondrites*. The dark blebs are vermicular structures; ×5·6. (E.2129.4)

are also present. Angular grains of quartz and feldspar occur in greater quantities within the burrow infillings than in the surrounding sediment. In some of the burrows there is a marked internal structure of transverse C-shaped partitions or laminae, which are best distinguished where bands of dirty sediment alternate with cleaner calcareous material.

Remarks

Although the specimen is fragmentary, B. J. Taylor (personal communication) considers that these burrows are comparable with the trace fossil *Chondrites*. This opinion is based on Taylor's (1967) detailed study of *Chondrites* from the Aptian sediments of Alexander Island. The C-shaped partitions, which are also present in the material from Alexander Island, were not recorded in the specimens examined by Simpson (1957). The greater proportion of clastic grains and micro-fossils in the burrows in comparison with the surrounding sediment suggests an outside source for this material, i.e. it was introduced into the burrow through the opening at the sediment–water interface. In the discussion on Simpson's (1957) paper, King questioned whether the organism inhabiting the burrow might "help in the emplacement [of the infilling material]". Both the presence of the C-shaped partitions and the above observations suggest that the infilling material could have filtered down the burrow as the organism withdrew in stages.

Vermicular structures

Vermicular structures, similar to those described by Taylor (1967) from the Aptian sediments of Alexander Island, have been found in some thin sections of the sediments enclosing the fossils. They are not so well developed as the Alexander Island ones and not so common. The outer aureole of clean sediment is usually poorly developed. Since all the thin sections were cut approximately perpendicular to the bedding, the dark cores of these structures exhibit the characteristic forms to be expected in such sections: ovoid, often lensoid, blebs and even occasional hook shapes. In a thin section from specimen E.2129.4 (Fig. 7) vermicular structures are associated with *Chondrites* but normally they are isolated.

Age of the Fauna and the Sediments

Because of the poor preservation of the fossils, it has not been possible to identify any of the species precisely. None of the genera has a closely restricted time range, but the evidence for the age of the fauna is summarized below and the conclusion drawn from it is given with more confidence than the evidence might suggest.

Inoceramus, *Procerithium* and the fragments of the heteromorph ammonite indicate a Mesozoic age. *Isocrinus* first appears in the Triassic and continues until the present, but the

specimen from these sediments, *Isocrinus* (?) sp., shows similarities to European Cretaceous forms. The *Nucula* bears a close resemblance to *N. stationis* Wilckens from the Lower to Middle Campanian of Snow Hill Island. Since Wilckens (1910) described this species from a single specimen, and only one specimen is known from Crabeater Point, any conclusion as to age based on this evidence must be made with reservation.

In the absence of identifiable ammonite material, the specimens of *Inoceramus* might be expected to give the most useful indication of age. The specimens of *Inoceramus* recall the subgenus *Mytiloides* Brongniart (p. 9-10), representatives of which have a world-wide distribution and are common in rocks of Turonian and Senonian age. Their presence in the Antarctic should not be unexpected.

The trace fossils referred to here as "vermicular structures" have only been described previously with any certainty from sediments of known Aptian age at Alexander Island (Taylor, 1967). However, he has pointed out that apparently similar fossils have been recorded from the Palaeozoic of Portugal. Ulrich (1910, pl. XV) has illustrated similar trace fossils from the Yakutat Formation (Upper (?) Cretaceous) of Alaska. His specimens, referred to as *Palaeodictyon singulare*, certainly do not belong to the genus *Palaeodictyon* but they bear a close resemblance to vermicular structures when seen in the plane of the bedding.

The above evidence indicates that the age of this fauna is certainly Mesozoic and that it is most likely to be Cretaceous.

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