

BRITISH ANTARCTIC SURVEY
FALKLAND ISLANDS DEPENDENCIES
LONDON, S.W.1

FALKLAND ISLANDS DEPENDENCIES SURVEY

SCIENTIFIC REPORTS

No. 4

LOWER CRETACEOUS GASTROPODA,
LAMELLIBRANCHIA AND ANNELIDA FROM
ALEXANDER I LAND (*Falkland Islands Dependencies*)

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LONDON: PUBLISHED FOR THE COLONIAL OFFICE
BY HER MAJESTY'S STATIONERY OFFICE: 1953
FIVE SHILLINGS AND SIXPENCE NET

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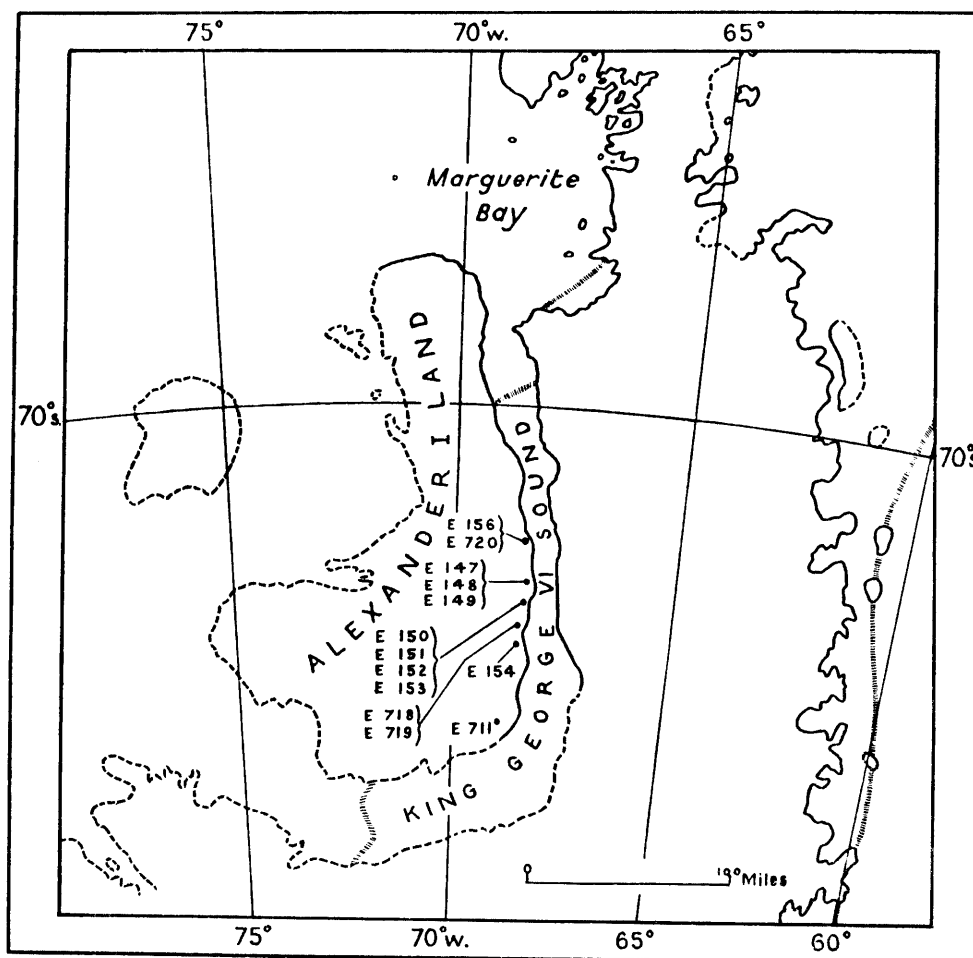
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I. INTRODUCTION

THIS report deals with part of the collection of fossils made by Dr. V. E. Fuchs and Mr. R. J. Adie during their reconnaissance of the eastern coast of Alexander I Land carried out from 1948–50. A narrative of this survey has been published by Dr. V. E. Fuchs (1951). Dr. L. F. Spath has made a preliminary examination of the ammonites collected from the same beds as the fossils here described, and has allowed me to refer to the evidence which they give as to the age of these beds. Belemnites, now with Mr. L. Bairstow, were also among the fossils obtained. The collecting stations are referred to by numbers, their positions being shown on the accompanying text-map. The specimens described are deposited in the Department of Geology of the British Museum (Natural History) and are referred to by their departmental registration numbers. I am indebted to Professor E. Feruglio, of Turin, for examining a typical specimen of the fossiliferous rock and for a note (see p. 5) comparing it with the matrix in which some of the same species occur in Patagonia.



II. LIST OF COLLECTING STATIONS AND SPECIES

- E.147. Small moraine 12½ miles north of Fossil Bluff (lat. 71° 10' S., long. 68° 19' W.). Not *in situ*.
Aucellina radiato-striata Bonarelli and Nágera.
- E.148. 11 miles north of Fossil Bluff (lat. 71° 11' S., long. 68° 19' W.). The following were *in situ*, associated with ammonites identified as Aptian.
Aucellina radiato-striata Bonarelli and Nágera.
Aucellina andina Feruglio.
Sphaera ? *striata* (Richter).
- E.149. ½ mile north of E.148 and lower in the succession. *In situ* and associated with ammonites identified as Aptian.
Aucellina andina Feruglio.
- E.150. Fossil Bluff, south end of cliff face (lat. 71° 21' S., long. 68° 21' W.).
Aucellina radiato-striata Bonarelli and Nágera.
Aucellina andina Feruglio.
Thracia sp. indet.
- E.151. Fossil Bluff, sedimentary succession above E.150 and E.152. The following, associated with ammonites identified as Aptian.
Aporrhais (*Tessarolax*) *antarctica* sp. nov.

Indeterminate bivalve (Pl. 2, fig. 7).

Rotularia australis sp. nov.

Rotularia sp.

E.152. Fossil Bluff, north end of cliff face. Beds of the same age as those at E.150.

Rotularia australis sp. nov.

E.153. Moraine $\frac{1}{2}$ mile south of Fossil Bluff. Not *in situ*, but presumed to be derived from the sediments at E.150, E.151 and E.152.

Aucellina radiato-striata Bonarelli and Nágera.

Aucellina andina Feruglio.

"*Pecten*" cf. *argentinus* Stanton.

Rotularia sp.

E.154. Cliffs, 16 miles south of Fossil Bluff (lat. 71° 34' S., long. 68° 20' W.). From thrust and folded sediments from which an Aptian ammonite was also obtained.

Aucellina radiato-striata Bonarelli and Nágera.

Aucellina andina Feruglio.

E.156. Ablation Valley (lat. 70° 48' S., long. 68° 21' W.).

Aucellina sp. indet.

E.711. Nunatak in the south-east of Alexander I Land (Lat. 72° 10' S, long. 69° 10' W.).

Fragment of indeterminate ribbed bivalve (*Trigonia* ?).

E.718. Sedimentary block on west coast of King George VI Sound (lat. 71° 33' S., long. 68° 18' W.).

Ammonites indicate an Aptian age.

Aucellina radiato-striata Bonarelli and Nágera.

Aucellina andina Feruglio.

E.719. Same sedimentary block as E.718. With Aptian ammonites.

Thracia sp. indet.

E.720. North face of the hook at Ablation Valley (lat. 70° 47' S., long. 68° 22' W.). Ammonites of Upper Jurassic age were obtained from this locality, but the following invertebrates described in the present paper seem to be of Aptian age. The section is complicated by a series of thrusts.

Aucellina radiata-striata Bonarelli and Nágera.

Aucellina alexandri sp. nov.

Inoceramus sp. indet.

"*Pecten*" sp. indet.

"*Pecten*" cf. *argentinus* Stanton.

Cyprina sp. indet.

Rotularia sp.

III. GEOLOGICAL AGE OF THE FOSSILS DESCRIBED

DR. L. F. SPATH'S preliminary conclusions regarding the geological age of the ammonites found at some of the same collecting stations as the fossils here described are referred to in the above list of localities. Ammonites from E.720 are all of Upper Jurassic age, while those from other localities are of Aptian age. Both Jurassic and Aptian ammonites are preserved in the same type of hard rock (which Mr. P. M. Game informs me may be described as a dark-grey, fine-grained greywacke) as has yielded most of the invertebrates here described.

The most striking characteristic of this assemblage of invertebrates is the abundance of the lamellibranch genus *Aucellina*, which is known to occur only in the Aptian, Albian and Cenomanian stages of the Cretaceous, and is distinguished from the very similar Upper Jurassic and Neocomian genus *Buchia*

(formerly called *Aucella*) by certain well-defined differences, notably the presence of a very deep, narrow byssal notch below the right anterior auricle. The identification of this genus suggests, therefore, that Cretaceous beds are present at all the localities at which it was collected. The fossils now described include no species with a very wide geographical distribution. Among them, however, are certain species which have previously been found in Tierra del Fuego, Patagonia, and South Georgia, suggesting that the beds from which they came are of the same age as those present in these regions, and possibly once continuous with them. The two species *Aucellina radiato-striata* Bonarelli and Nágera and *A. andina* Feruglio (regarded by Wilckens as synonymous) occur in all three areas. *Sphaera?* *striata* (Richter) is found in Tierra del Fuego and *Rotularia australis* sp. nov. in Patagonia. The two species recorded as "*Pecten*" cf. *argentinus* Stanton and "*Pecten*" sp. indet. may also be identical with forms found in the last area, although their determination is less definite.

Several authors, notably Bonarelli and Nágera (1921) and Feruglio (1935, 1938, 1944, 1949), have described the deposits in Patagonia in which the species mentioned occur. The succession and fossil contents of about 1000 metres of beds in the Lake San Martín area were investigated in some detail by the first two authors cited, and the sequence has been summarised (with certain revisions) by Feruglio (1949, vol. 1, p. 173) as follows:

(Top)

6. Zone with *Actaeonella patagonica* Feruglio.
5. Zone with *Sanmartinoceras patagonicum* Bonarelli and Nágera.
4. Zone with *Aioloceras*.
3. Zone with *Gaudryceras*.
2. Zone with *Leptoceras* and *Crioceras*.
1. Zone with *Belemnopsis*.

(Base)

Zone 1, yielding *Belemnopsis patagonensis* Favre and various lamellibranchs, is considered to be of Tithonian age, and Zone 2, with *Leptoceras* of the group of *L. silesiacum* Uhlig and *Crioceras* sp., is referred to the Berriasian or Hauterivian. Zone 3 contains the ammonite *Gaudryceras desmoceratoides* (Stolley) and is notable for the incoming of *Aucellina* (*A. andina* Feruglio). The ammonite does not enable this zone to be dated very precisely, but its presence is compatible with an Aptian age.

Zone 4 contains ammonites belonging to several species of *Beudanticeras*, of which *B. flindersi* (McCoy) is particularly cited by Feruglio, and a species described by Bonarelli and Nágera as *Cleonoceras argentinum*, which Whitehouse (1926, p. 206) has made the type of a genus *Aioloceras*. Bonarelli and Nágera referred this assemblage to the Albian; Whitehouse (1926, p. 206), however, considered *Aioloceras* to be of Aptian age, although he referred *B. flindersi* to the Albian. Dr. L. F. Spath informs me that the various ammonites from this zone figured by Bonarelli and Nágera could (so far as can be seen from the illustrations) belong either to the Aptian or to the Albian. It is evident from what will be said about the age of the overlying Zone 5 that they must be Aptian. The following invertebrates of other groups were also recorded by Bonarelli and Nágera from these beds:

- Nerinea* sp. indet.
- Aucellina hughendenensis* (Etheridge) [= *A. andina* Feruglio of the present paper].
- Inoceramus concentricus* Parkinson.
- Gryphaea* (*Mimetostreon*) cf. *corbiensis* (Moore).
- Ostrea* sp. indet.
- Isocardia* ? sp. indet.
- Sphaera* (*Sphaeriola*) ? sp. indet.
- Tubulostium discoideum* Stoliczka.
- Tubulostium* cf. *kitchini* Bonarelli and Nágera [= *Rotularia australis* sp. nov. of the present paper].

Zone 5 is characterised by the ammonite genus *Sanmartinoceras* Bonarelli and Nágera, which was first described from this locality but is very widespread. Dr. L. F. Spath informs me that, although considered by its authors to be Cenomanian, it is undoubtedly of Aptian age*—a conclusion previously reached by Stolley (1912, p. 5) when discussing species later included in it. The *Sanmartinoceras* beds also yielded lamellibranchs identified by Bonarelli and Nágera as follows:

*See L. F. Spath, 1952, pp. 7, 32.

Ostrea (Exogyra) sp. indet.
Avicula (Oxytoma) raricosta sp. nov.
Astarte (Eriphyla) cf. *corrugata* Stanton.
Nucula cf. *cecileana* d'Orb.
Aucellina coquandiana d'Orb. var. nov. *radiato-striata* [= *A. radiato-striata* of the present paper].
Cardium sp. indet.
Lima (Radula) sp. indet.
Cucullaea (Idonearca) aff. *harttii* Rathbun.
Arca sp. indet.

The overlying beds need not be referred to here.

It will thus be seen that three of the species recorded in the present paper (*Aucellina andina*, *A. radiato-striata*, and *Rotularia australis*) occur in beds in the Lake San Martín area which, although attributed by Bonarelli and Nágera to the Albian and Cenomanian, appear, from our present knowledge of the ammonite genera which they contain, to be Aptian in age. The same two species of *Aucellina* are represented among the fossils from the Lake Argentino region of Patagonia described by Feruglio (1937). In his later work (1949, p. 170) he remarks that their presence there points to the occurrence of the Aptian *Aioloceras* horizon of Lake San Martín.

The occurrence in Tierra del Fuego of beds containing the species here described as *Aucellina andina*, *A. radiato-striata*, and *Sphaera ? striata* has been recorded in papers by Richter (1925) and Camacho (1949). Richter considered these beds to be Albian in age, while Camacho was of the opinion that they could be even younger. No ammonites have been described from them, but Richter's paper (1925, p. 541) included an account by Stolley of a new species of belemnite, *Parahibolites fuegensis*, which belongs to a genus ranging from the Aptian to the Cenomanian. It is most probable that these beds in Tierra del Fuego, like those in the Lake San Martín and Lake Argentino areas, are Aptian in age.

Fossils collected by L. Kohl-Larsen on Annenkov Island, South Georgia, were described by Wilckens (1947) and shown to include *Aucellina radiato-striata*, together with an assemblage of ammonites, one of which was identified as *Sanmartinoceras* cf. *patagonicum* Bonarelli and Nágera. Wilckens (p. 62) discussed their geological age and concluded that it was Aptian, and most probably Upper Aptian (Gargasian). He thought that Bonarelli and Nágera had been wrong in referring the fossils from Patagonia which they had described to the Albian and Cenomanian.

Since opinions once held that the *Aucellina* beds of Patagonia and Tierra del Fuego are of Albian or Cenomanian age seem therefore incorrect, their age being in fact Aptian, there is no reason to think that those lamellibranchs now described which came from collecting stations yielding Aptian ammonites are from later beds than those in which the ammonites occur. Ammonites considered by Dr. Spath to be of Upper Jurassic age were obtained from the station E.720, their matrix being a dark, fine-grained greywacke of exactly the same appearance as that of most of the Aptian fossils. The lamellibranchs and annelids from this station include the forms *Aucellina radiato-striata*, "*Pecten*" cf. *argentinus* and *Rotularia* sp., which have also been found at the stations yielding the Aptian ammonites, and there is no doubt that they indicate the presence of Aptian beds at E.720 in addition to those of Jurassic age. Other species found at this locality are the peculiar new *Aucellina*, *A. alexandri*, which, in view of the known range of its genus, must also be of Lower Cretaceous age, together with specifically indeterminate specimens of "*Pecten*" and *Cyprina*, and an *Inoceramus* collected from a scree. Among these forms there is nothing clearly suggestive of a Jurassic age, and their descriptions are, therefore, included with those of the Aptian fossils.

It seemed of interest to learn to what extent the most prevalent type of rock yielding the Aptian fossils resembles that in which the same species are found in Patagonia. Professor E. Feruglio, of Turin, whose researches have so greatly extended our knowledge of Patagonian geology, has very kindly examined a specimen of hard dark-grey rock with *Aucellina* from the station E.718, and has sent me the following note on it:

"La roche, sans doute, est très semblable par composition et aspect à celles du même âge de la Cordillère de la Patagonie australe (Lago Argentino et Lago San Martín), qui, cependant, ont un grain plus fin, sont plus compactes et dures, silicifiées, à cassure esquilleuse, gris-noirâtres. Je les ai définies comme roches schisto-argileuses, et les plus silicifiées comme roches phanérotiques (Feruglio, 1944, pp. 45, 48, 49, 52; 1949, pp. 168, 173-4)."

SYSTEMATIC DESCRIPTION OF THE SPECIES

CLASS GASTROPODA

FAMILY APORRHAIIDAE

Genus *Aporrhais* da Costa, 1778Subgenus *Tessarolax* Gabb, 1864*Aporrhais* (*Tessarolax*) *antarctica* sp. nov.

Plate 2, figs. 9–11

Material: External moulds of six specimens, all more or less incomplete. Holotype, Brit. Mus., G.69799 (fig. 9).

Description: Shell of medium size (height about 45 mm.) and stoutness, with a moderately long, narrow, straight anterior rostrum. Earlier whorls obtusely angular in the middle, the angle bearing small tubercles. Penultimate whorl with a prominent rounded keel, without tubercles, continuing this angle, and with a second rounded keel just visible above the lower suture. Last whorl with two conspicuous, rounded keels which continue those of the penultimate whorl and are separated by a strongly concave band; a third keel, less prominent, lies below them. Faint spiral threads are present on the whole surface of the shell, including the base. Outer lip with two long and very narrow digitations continuing the main keels, the upper one curving upwards to a slight extent. The upper edge of the last whorl stands out as a thin ridge bordering the suture and bends upwards at the termination of the whorl, suggesting that there was a digitation adhering to the spire. The external mould in which this feature is observable is, however, broken away so that the impression of the digitation itself is missing.

Remarks: In view of the probable presence in complete specimens of a posterior labral digitation adhering to the spire it appears that this species should be referred to a subgenus of *Aporrhais* rather than to the genus *Dicroloma*, in which this feature is absent. The spire much resembles that of some species of *Dicroloma*, a Jurassic group not recorded from the Cretaceous.

No very closely comparable species can be cited. *Aporrhais* (*Tessarolax*) *moreausiana* (d'Orbigny) (1843, p. 301, pl. 211, figs. 1, 2), from the Neocomian of France and other European countries, has similarly unicarinate early whorls and two main carinae on the last whorl, with a third and weaker one below them, but the carina on its early whorls is not tuberculate.

Occurrence: Station E.151, Fossil Bluff (lat. 71° 21' S., long. 68° 21' W.), in a dark-grey, fine-grained greywacke.

CLASS LAMELLIBRANCHIA

FAMILY BUCHIIDAE*

Genus *Aucellina* Pompeckj, 1901*Aucellina andina* Feruglio

Plate 1, figs. 1–6

Aucellina hughendenensis (Ether.), Bonarelli and Nágera, 1921, *Minist. Agric., Direc. Gen. Minas, Buenos Aires, Bol. No. 27* (Ser. B), p. 21, pl. 2, figs. 7, 8 (*non* Etheridge sp.).

?*Aucellina caucasica* v. Buch var. *striata* Richter, 1925, *Neues Jb. Min. Geol. Paläont., Beil.-Bd. 52*, Abt. B, p. 539 (in part), pl. 8, fig. 15 only.

Aucellina andina Feruglio, 1937, *Palaeontographica Patagonica, Mem. Ist. Geol. R. Univ. Padova*, vol. 11, p. 22, pl. 1, figs. 12–16.

Aucellina andina Feruglio, 1938, *Physis, B. Aires*, vol. 12, pp. 299, 301, 305 (listed).

Aucellina radiatostriata Bon. and Nág., Wilckens, 1947, *Abh. Senckenberg. naturf. Ges.*, No. 474, p. 30 (in part).

Aucellina andina Feruglio, Camacho, 1949, *Revist. Asoc. geol. Argentina*, vol. 4, p. 252, pl. 1, fig. 5.

Material: About twelve specimens.

Description and Remarks: Although many of the specimens which I refer to this species are distorted or incomplete, the material includes a well-preserved external mould of a full-sized right valve from which

*Aucellidae Lohsen, 1897, changed for nomenclatorial reasons, since *Buchia* Rouillier, 1845, was a prior name for *Aucella* Keyserling, 1846.

a plasticine "squeeze" (fig. 5) reproducing the exterior of the original shell very clearly has been prepared. This valve is still associated with the corresponding left valve, but is slightly displaced from its normal position, with the result that the internal marginal region of the left valve projects (on the plasticine "squeeze") well beyond and above its margin on the posterior side.

The right valve in this species is flat or of feeble convexity and obliquely ovate, with its length almost equal to or slightly exceeding its height. In the specimen just mentioned the beak is very strongly prosogyrous, with the hinge-margin short and convex and the margin below the auricle very strongly excavated, meeting the anterior part of the ventral margin in an abrupt bend. The anterior auricle is broadest at the middle of its length and appears to be rounded at its extremity. A posterior wing is scarcely defined. The surface of the valve has a very delicate ornament, consisting of fine radial threads, best seen in early growth-stages and on the anterior part of the valve, and of closely spaced concentric imbrications of the surface-layer of the shell. In other specimens the hinge-margin is rather more elongate and a narrow posterior wing is rather better defined. The surface, moreover, may bear irregular concentric undulations in addition to the delicate imbrications, while the radial threads may be more persistent than in the specimen first described. The largest right valve is 38 mm. long and 30 mm. high.

The available specimens of the left valve are not complete and have mostly been distorted by pressure. This valve is of moderately strong convexity and is obliquely ovate in outline, with the umbo broadly rounded. In some specimens the surface bears broad, irregular concentric folds, but in others, as in the right valve, such folds are almost absent and the ornament consists of rather close-spaced concentric imbrications. Radial threads are well developed in some specimens, but inconspicuous in others.

There is little doubt that these specimens are referable to Feruglio's *Aucellina andina*, although the right valves which he figures (*loc. cit.*, figs. 15, 16) are incomplete and do not show the strongly prosogyrous character of the beak so clearly as does the best right valve now described. The left valves agree well with those represented in his figs. 12-14. His specimens came from three localities in the Lake Argentino basin of southern Patagonia. Camacho (1949) has figured an incomplete left valve of *A. andina* from Tierra del Fuego. The species seems to be the same as that from the Lake San Martín basin of southern Patagonia identified by Bonarelli and Nágera with the Australian Albian species *A. hughendenensis* Etheridge, although the right valve which they figure is too imperfect for the strongly prosogyrous character of the beak to be visible in their illustration (fig. 7). Well-preserved specimens of the Australian species are in the collection of the British Museum (Natural History) and have been compared with those now recorded. The general proportions of the shell are much the same, but in the Australian species the beak is not prosogyrous, the hinge-margin is straight, and the posterior wing is much better defined than in the specimens now described. Feruglio stated that *A. andina* differs from *A. hughendenensis* in the broader form of its umbones, its more numerous and more strongly developed concentric costae, and its less pronounced radial striations, but these points of distinction do not apply to all the specimens now recorded.

Richter (1925), when describing his *Aucellina caucasica* var. *striata*, mistook (fig. 15) the external mould of a right valve (the preservation of which was apparently very similar to that of several external moulds in the material now described) for the exterior of a left valve, his supposed right valve (fig. 14) belonging to an entirely different genus, perhaps *Sphaera*. It seems very probable that the first specimen belonged to the species now described, although the prosogyrous character of the beak is not shown in the figure. The varietal name "*striata*," advanced to specific status, is appropriated in the present paper for the species represented in Richter's fig. 14, and so does not affect the status of Feruglio's name *andina*. Richter's specimens came from rocks in Tierra del Fuego considered to be of Albian age. According to the original figure (Abich, 1851, pl. 2, figs. 1 a-c), the species *Aucellina caucasica* differs from *A. andina* in the less orbicular outline of the right valve and the fact that the beak of this valve is not appreciably prosogyrous. The concentric undulations are more evenly spaced than in those specimens of *A. andina* in which any are present, and the close-spaced concentric imbrications present in *A. andina* are absent. Camacho (1949, p. 252, pl. 1, fig. 6) has referred a right valve from Tierra del Fuego to Richter's "var. *striata*" with a query. Its elongate hinge-margin and more equilateral shape appear to distinguish it from the species now recorded.

Wilckens (1947, p. 30), in dealing with a series of specimens of *Aucellina* from the Aptian of South Georgia, has united *A. andina* with *A. radiato-striata*, recorded below.

Occurrences: Station E.150, south end of cliff face, Fossil Bluff (lat. 71° 21' S., long. 68° 21' W.); Station E.148, 11 miles north of Fossil Bluff (lat. 71° 11' S., long. 68° 19' W.); Station E.149 (½ mile north of E.148);

Station E.153, moraine $\frac{1}{2}$ mile south of Fossil Bluff; Station E.154, cliffs 16 miles south of Fossil Bluff (lat. $71^{\circ} 34' S.$, long. $68^{\circ} 20' W.$); Station E.718, sedimentary block on west coast of King George VI Sound (lat. $71^{\circ} 33' S.$, long. $68^{\circ} 18' W.$). The matrix of all the specimens is a dark-grey, fine-grained greywacke.

Aucellina radiato-striata Bonarelli and Nágera

Plate 1, figs. 7–10

Aucellina coquandiana (d'Orb.) var. *radiato-striata* Bonarelli and Nágera, 1921, *Minist. Agric., Direc. Gen. Minas, Buenos Aires, Bol. No. 27* (Ser. B), p. 27, pl. 5, fig. 1.

Aucellina bonarellii Feruglio, 1937, *Palaeontographica Patagonica, Mem. Ist. Geol. Univ. Padova*, vol. 11, p. 24, pl. 1, figs. 17, 18.

Aucellina radiato-striata Bon. and Nág., Wilckens, 1947, *Abh. Senckenberg. naturf. Ges.*, No. 474, p. 30 (in part), pl. 2, fig. 9, pl. 4, figs. 1–8.

Aucellina bonarellii Feruglio, Camacho, 1949, *Revist. Asoc. geol. Argentina*, vol. 4, p. 252, pl. 1, fig. 4.

Material: About twenty specimens.

Description and Remarks: Most of the specimens now recorded are incomplete or distorted, but the material is adequate to allow the distinctive characters of this species to be recognised. In addition to their larger size (their length ranges up to about 55 mm.), these specimens differ from *A. andina* in their more elongate form and more distinctly convex right valve. This valve is ovate in outline and very oblique, with the posterior and anterior margins sub-parallel. The umbo protrudes slightly above the relatively short hinge-margin, and the beak does not appear to be so appreciably prosogyrous as in *A. andina*. The anterior margin projects well beyond the umbo and the anterior extremity of the valve is more evenly rounded than in *A. andina*. The anterior auricle is not well preserved in any of the specimens, but appears to narrow gradually to an acutely pointed tip.

The left valves, although much more strongly convex than the right ones, do not appear to be so strongly convex as in many species of the genus. Both valves bear coarse, irregularly distributed concentric folds which are crossed by radial threads or riblets, sinuous in places. The radial riblets are strongest and broadest on the posterior part of the shell, and are almost absent anteriorly.

These specimens agree well with the form described by Bonarelli and Nágera as *Aucellina coquandiana* (d'Orbigny) var. *radiato-striata*. This cannot, however, be regarded as conspecific with d'Orbigny's "*Inoceramus*" *coquandianus*, a much smaller shell usually regarded as a synonym of *Aucellina gryphaeoides* (J. de C. Sowerby). It is, therefore, regarded as a distinct species for which the varietal name is adopted. The availability of this name seems to have been overlooked by Feruglio, whose *Aucellina bonarellii* is, no doubt, the same species. The specimens described by Bonarelli and Nágera came from the Lake San Martín area of Patagonia, while Feruglio's type specimens of *A. bonarellii* came from the saddle of the Cerro Cuchello, in the Lake Argentino depression. Wilckens has recorded the species from South Georgia, and Camacho from Tierra del Fuego.

Occurrences: Station E.150, south end of cliff face, Fossil Bluff (lat. $71^{\circ} 21' S.$, long. $68^{\circ} 21' W.$); Station 147, small moraine $12\frac{1}{2}$ miles north of Fossil Bluff (lat. $71^{\circ} 10' S.$, long. $68^{\circ} 19' W.$); Station E.148, 11 miles north of Fossil Bluff (lat. $71^{\circ} 11' S.$, long. $68^{\circ} 19' W.$); Station E.153, moraine $\frac{1}{2}$ mile south of Fossil Bluff; Station E.156, Ablation Valley (lat. $70^{\circ} 48' S.$, long. $68^{\circ} 21' W.$); Station E.720, north face of the hook at Ablation Valley (lat. $70^{\circ} 47' S.$, long. $68^{\circ} 22' W.$); Station E.718, sedimentary block on west coast of King George VI Sound (lat. $71^{\circ} 33' S.$, long. $68^{\circ} 18' W.$). The matrix of all the specimens is a dark-grey, fine-grained greywacke.

Aucellina alexandri sp. nov.

Plate 1, fig. 11

Material: The holotype (Brit. Mus., L.82640), a right valve, is the only complete specimen referred to this species, but a broken bivalve specimen is preserved in the same matrix.

Description: Right valve very narrow and oblique, having almost the shape of a parallelogram, the longer sides of which are more than twice the length of the shorter sides; it is more strongly convex than in other species of the genus. Hinge-margin very short; no posterior wing. Anterior margin projecting rather

prominently below the narrow, acutely pointed anterior auricle, and meeting the straight, oblique antero-ventral margin in an abrupt curve. Surface with close-spaced, irregular concentric folds, but without radial ornament. Left valve (known only by its lower half) of slightly greater convexity than the right.

Measurements of Holotype: Length (approximate, measured parallel to hinge-margin) 49 mm.; height (approximate, measured perpendicular to hinge-margin) 44 mm.; oblique measurement of valve 55 mm.; maximum breadth of valve (perpendicular to the last measurement) 25 mm.; convexity (i.e. right valve) 8.5 mm.

The convexity of the left valve, in the specimen in which part of this is preserved, is about 10 mm.

Remarks: Its very narrow, parallel-sided form and its relatively strongly convex right valve distinguish this from any other described species of *Aucellina*.

Occurrence: Station E.720, north face of the hook at Ablation Valley (lat. 70° 47' S., long. 68° 22' W.). The matrix is a hard grey felspathic grit.

FAMILY ISOGNOMONIDAE

Genus *Inoceramus* J. Sowerby, 1814

Inoceramus sp. indet.

Plate 2, fig. 1

Material: A single compressed fragment of a valve.

Description and Remarks: The specimen, which measures about 55 mm. in height and width, consists only of the ventral part of the shell; when complete, it must have been 80–100 mm. high. It bears strong, irregular concentric folds.

This fragment cannot be determined specifically. It is not unlike the specimens of *Inoceramus* from Patagonia which Feruglio (1937, p. 26, pl. 2, figs. 3–11) recorded as *Inoceramus* cf. *steinmanni* Wilckens, but the specimens in question apparently came from the same locality and horizon as Neocomian ammonites described in the same paper. Even a qualified identification of Neocomian specimens with *I. steinmanni*, a Senonian species, seems, moreover, unsatisfactory. Bonarelli and Nágera (1921, p. 22, pl. 2, fig. 9) identified an *Inoceramus* from the beds in Patagonia which yielded the species *Aucellina andina* (recorded above) as *I. concentricus* Parkinson. Their figure, however, represents a much smaller specimen than the one now recorded, and it appears to have belonged to a different species.

Occurrence: Station E.720, north face of the hook at Ablation Valley (lat. 70° 47' S., long. 68° 22' W.). The matrix is a hard shale with alternating dark and light-coloured layers.

FAMILY PECTINIDAE

Genus *Pecten* Müller, 1776

"*Pecten*" sp. indet.

Plate 2, fig. 2

Material: One imperfect valve, consisting mainly of the internal mould, but with a certain amount of decayed test adhering to it.

Description and Remarks: The specimen is subtrigonal in shape, very slightly inequilateral, and of moderately strong convexity. The auricles are not preserved. There are eight broadly rounded ribs with interspaces of about the same width. The height and length are about 9 mm.

Stanton (1901, p. 14, pl. 4, figs. 2, 3) described a *Pecten octoplicatus* from the Belgrano beds of Patagonia, regarded by him as "not later than Gault." It was of about the same size as the specimen now recorded and had the same number of ribs, which were, however, obtusely angular. Its outline was slightly less trigonal than that of the specimen now recorded. It is not possible to say if this specimen belongs to the same species.

Occurrence: Station E.720, north face of the hook at Ablation Valley (lat. 70° 47' S., long. 68° 22' W.). The matrix is a dark-grey, fine-grained greywacke.

"Pecten" cf. *argentinus* Stanton

Plate 2, figs. 3, 4

Cf. *Pecten argentinus* Stanton, 1901, *Repts. Princeton Univ. Exped. Patagonia*, vol. 4, Part 1, p. 13, pl. 4, fig. 5.**Material:** Two specimens.

Description and Remarks: The specimens consist of a much decorticated valve, about 18 mm. in diameter, partly overlapping a second valve of which the interior is visible, and of an ill-preserved external mould of about the same diameter. Both specimens are of rather feeble convexity. They are orbicular in outline, the dorsal margins of the disc meeting at an angle of about 110°. In the first specimen the two auricles can be seen to be obtuse-angled; one is larger than the other, but both are relatively small. The single auricle preserved in the second specimen is also small and obtuse. If the larger auricle is the anterior one, the first specimen would appear to be a left valve. The other specimen may be a right valve with its anterior auricle missing.

A plasticine "squeeze" taken from the second specimen shows a few very faint radial threads at the umbo, but these extend for a distance of only about 2 mm. and the rest of the surface is almost unornamented. It bears, however, a series of inconspicuous, close-spaced imbrications of the surface-layer and a few faint, irregularly distributed, linear radial grooves.

These specimens much resemble Stanton's figure of *Pecten argentinus*, but this species needs more adequate description and illustration. In the type-specimen the two auricles were, apparently, sub-equal and obtuse, and the surface was described as "smooth and polished, with very fine lines of growth, occasional more prominent impressed concentric lines, and very faint indications of fine radial lines." Feruglio (1938, pp. 302, 309) has recorded *P. argentinus* from the Lake San Martín district of Patagonia, where it occurs in rocks which, although at first attributed by him to the Cenomanian, are now known to belong to the Aptian (see p. 4).

Occurrences: Station E.153, moraine $\frac{1}{2}$ mile south of Fossil Bluff (lat. 71° 21' S., long. 68° 21' W.). Station E.720, north face of the hook at Ablation Valley (lat. 70° 47' S., long. 68° 22' W.). The matrix of both specimens is a dark-grey, fine-grained greywacke.

FAMILY CYPRINIDAE

Genus *Cyprina* Lamarck, 1818*Cyprina* sp. indet.

Plate 2, fig. 5

Material: The internal mould of a right valve.

Description: The specimen is of large-medium size, trigonally ovate, somewhat longer than high, and strongly inequilateral, with well inflated, terminal umbones. The postero-dorsal margin is slightly convex and rather steeply sloping. The ventral margin is strongly convex. A narrow radial sulcus is present on the internal mould a short distance below the postero-dorsal margin. No trace of the dentition is visible.

Measurements: Length c. 44 mm., height c. 40 mm., convexity (single valve) 11 mm.

Remarks: Of the internal moulds of Lower Cretaceous Cyprinidae figured by Pictet and Campiche (1864-7), *Cyprina orbensis* (pl. 114, figs. 7 a, b), from the Urgonian, is most similar to the one now described, but is less strongly inequilateral.

Occurrence: Station E.720, north face of the hook at Ablation Valley (lat. 70° 47' S., long. 68° 22' W.). The matrix is a dark-grey, fine-grained greywacke.

FAMILY FIMBRIIDAE

Genus *Sphaera* J. Sowerby, 1822*Sphaera* ? *striata* (Richter)

Plate 2, figs. 8 a, b

Aucellina caucasica v. Buch var. *striata* Richter, 1925, *Neues Jb. Min. Geol. Paläont.*, Beil.-Bd. 52, Abt. B, p. 539 (in part), pl. 8, fig. 14 only.

Material: A single specimen, probably a right valve.

Description: The specimen, which is 19 mm. long and 18 mm. high, is suborbicular in outline, with a broadly rounded, prominent umbo which is slightly anterior to median. The postero-dorsal and posterior margins meet in a rounded-off, prominent, shoulder-like angle. The anterior extremity of the shell occupies a relatively dorsal position, and below it the anterior margin is flattened or of feeble convexity. The ventral margin is strongly convex. Although the specimen is an internal mould, its surface has a fine reticulate ornament composed of concentric ridges and radial striations which are well marked near the margins. There are also a few strong, unevenly spaced concentric folds.

Remarks: A specimen (probably a left valve) from Tierra del Fuego which clearly belonged to the same species as the one now described was regarded by Richter (loc. cit., fig. 14) as the right valve of an *Aucellina*, and a supposed left valve considered to belong to the same species was represented in his fig. 15. He considered this *Aucellina* to be a variety of *A. caucasica* (v. Buch) and gave it the varietal name *striata*. It is, however, obvious from the known characters of the genus *Aucellina* that the supposed left valve, with a small auricle separated from the body of the shell by a deep notch, must have been the impression of the exterior of a right valve, reproducing its characters in negative. Richter's supposed right valve, which the specimen now recorded resembles, was quite unlike either valve of an *Aucellina* in shape, and it is now suggested that, although its generic affinities must remain uncertain as we have no knowledge of its hinge-structure, it would be better referred to the genus *Sphaera*. Richter's varietal name *striata* is available either for this species or for the one represented by his fig. 15, and may now be appropriated for this species by selecting the original of his fig. 14 as lectotype of his variety, now elevated to specific rank. It seems probable, from the general resemblance of Richter's figure to the specimen now recorded, that the lectotype was also an internal mould.

The preservation of a fine reticulate pattern on the surface of an internal mould is unusual, although radial markings related to the marginal corrugations may sometimes be observed on the interior of shells of the related genus *Fimbria* [= *Corbis*]. It seems probable that in the process of fossilisation traces of the external ornament of the original shell have become impressed on the internal mould. The adductor scars and the pallial line, which can be seen to have been entire, as just visible.

Wilckens (1947, p. 39, pl. 4, fig. 9) has described an ill-preserved specimen from South Georgia as "*Thetironia* ? sp. inc.," suggesting *Sphaera* as an alternative genus to which it might belong. It is not unlike the specimen now recorded, but has more evenly convex anterior and posterior margins.

Occurrence: Station E.148, 11 miles north of Fossil Bluff (lat. 71° 11' S., long. 68° 19' W.). The matrix is a dark-grey, fine-grained greywacke.

FAMILY THRACIIDAE

Genus *Thracia* Leach, 1823

Thracia sp. indet.

Plate 2, fig. 6

Material: Two crushed specimens which retain only traces of the original shell.

Description and Remarks: The umbones are broadly rounded, lie at the anterior third of the length, and project only slightly above the hinge-margin. An umbonal ridge runs to the posterior end of the shell and delimits a narrow, slightly concave postero-dorsal region. The surface bears numerous narrow and not very prominent concentric folds. The more complete of the two specimens, consisting of an internal mould and the corresponding external mould, is 31 mm. long and was originally about 20.5 mm. high. These specimens do not seem to be referable to any species of *Thracia* recorded from Lower Cretaceous rocks, but are not well enough preserved for a new specific name to be assigned to them.

Occurrences: Station E.150, south end of cliff face, Fossil Bluff (lat. 71° 21' S., long. 68° 21' W.). Station E.719, sedimentary block on west coast of King George VI Sound (lat. 71° 33' S., long. 68° 18' W.). Perhaps also Station E.151, Fossil Bluff, from which a fragment of an external mould, possibly of this species, is associated with one of *Aporrhais* (*Tessarolax*) *antarctica* sp. nov. The matrix of the specimens is a dark-grey, fine-grained greywacke.

Indeterminate Bivalve

Plate 2, fig. 7

A broken specimen which cannot be identified generically deserves a brief description, as the species to which it belongs will be easily recognised if found again, even in another area. The specimen is an internal mould of an elongate, rectangularly ovate right valve, originally about 47 mm. long and 24 mm. high. The umbo is broadly rounded, subterminal and depressed; the hinge-margin rises slightly above it, but its posterior half is broken away. The ventral margin is straight and sub-parallel to the hinge-margin along the anterior two-thirds of its length, and slopes upwards in a very gentle curve towards the posterior extremity of the shell. Except at the extreme anterior end, the surface of the internal mould bears a series of irregularly spaced, linear grooves which radiate from the umbo to the lower margin. Weaker and less persistent radial striations are present between the main grooves, and a pattern of very irregular, short, branching grooves is visible at the posterior end of the mould. There are also some irregular concentric folds, the most pronounced of which marks a stage of about three-quarters of full growth. The pallial line and adductor scars cannot be distinguished; the posterior scar probably lay on the missing part of the specimen. No trace of the dentition is preserved.

This specimen may belong to a genus of the Veneridae related to *Paphia* and *Tapes*. It is uncertain if the radial striations now preserved on the internal mould correspond to elements of the external ornament. These striations rather recall the surface ornament of *Solemya*, but in that genus the shell is more narrowly elongate.

Occurrence: Station E.151, Fossil Bluff (lat. 71° 21' S., long. 68° 21' W.). The matrix is a dark-grey, fine-grained greywacke.

PHYLUM ANNELIDA

FAMILY SERPULIDAE

Genus *Rotularia* DeFrance, 1827*Rotularia australis*, sp. nov.

Plate 2, figs. 13, 14

Tubulostium cf. *kitchini* [B. and N.], Bonarelli and Nágera, 1921, *Minist. Agric., Direc. Gen. Minas, Buenos Aires, Bol. No. 27* (Ser. B), p. 20, pl. 2, fig. 3.

Material: Three specimens, of which the larger on the slab represented in fig. 14 (Brit. Mus., A.7006) is taken as holotype.

Description: A Lower Cretaceous *Rotularia* with a tube which is exactly circular in cross-section and forms a discoidal spiral until a late stage of growth, when it becomes detached and straight, projecting tangentially to the penultimate whorl of the coil. The diameter of the spiral part is about 14 mm.

Remarks: The new name *Tubulostium kitchini* was proposed by Bonarelli and Nágera (*loc. cit.*) for the species from the Lower Cretaceous Uitenhage Series of South Africa, a specimen of which had been recorded by Kitchin (1908, p. 63, pl. 2, figs. 1, 1 a) as *Serpula* cf. *concava* (J. Sowerby). It is most probable that the specimen from Patagonia which Bonarelli and Nágera recorded as *T. cf. kitchini* belonged to the same species as the specimens now described, but it seems undesirable to identify this with the species from the Uitenhage Series, which is at present known only by the single specimen figured by Kitchin. In the specimen in question the diameter at which the tube begins to become detached from its spiral part is 9 mm., compared with 14 mm. in the species now described. According to Kitchin, moreover, the tube in *T. kitchini* is "of slightly flattened cylindrical or oval section," whereas it is exactly circular in cross-section in *Rotularia australis*.

Bonarelli and Nágera (1921, p. 20, pl. 2, figs. 1, 2) identified other discoidal Serpulids from Patagonia with the Indian Cenomanian (Utatur) species *Tubulostium discoideum* Stoliczka. The species in question is characterised by the quadrangular cross-section of its tube, and, although no detailed description of the Patagonian specimens is given, it appears from the published figures that the upper and lower surfaces of the tube are flattened, if not slightly concave. R. Etheridge (1907, p. 318, pl. 57; pl. 60, figs. 1-3) described a rather similar species, of gregarious habit, from the Lower Cretaceous of Queensland under the

name *Spirulaea gregaria*. In this form the coiled portion is not quite discoidal, but is described as "concavo-sub-convex." The successive whorls of the coiled portion, moreover, increase in diameter more rapidly than in the species now described.

The last difference also distinguishes the new species from the New Zealand Upper Cretaceous species *Tubulostium ornatum* Wilckens, with which Camacho (1949, p. 250) has identified the specimens represented in all the above-cited figures of Bonarelli and Nágera.

Reasons for using the generic name *Rotularia* for the species of this group are given by Wrigley (1951, p. 183).

Occurrences: Station E.151, Fossil Bluff (lat. 71° 21' S., long. 68° 21' W.); Station E.152, north end of cliff face, Fossil Bluff; Station E.153, moraine ½ mile south of Fossil Bluff. The matrix is a dark-grey, fine-grained greywacke.

Rotularia sp.

Plate 2, fig. 12

Material: About five specimens.

Description and Remarks: Besides the discoidal specimens which have been described above as *Rotularia australis*, there are some ill-preserved Serpulid worms coiled in an elevated, dextral* spiral, the apical angle of which varies considerably. On one slab of rock (fig. 12) two of these are broken across so as to be visible in axial section. In one the diameter, which measures 14 mm., considerably exceeds the height and the apex is obtuse. In the other the diameter (10.5 mm.) only slightly exceeds the height, the spire is extraconic, and the apex is acute. These specimens may belong to the species from Tierra del Fuego recently described by Camacho (1949, p. 251, pl. 1, fig. 2) as *Tubulostium andinum*, but his figure, which seems to represent a sinistrally coiled specimen, is not very clear. Another comparable species is *T. callosum* Stoliczka (1868, p. 241, pl. 18, figs. 26–32), from the Cenomanian of India.

Specimens of *Rotularia* with an elevated spire appear to be widespread in the Lower Cretaceous of Argentina. Behrendsen (1891, p. 418) referred to the presence of a form identified with the Speeton Clay species *Serpula phillipsi* Roemer (= *Vermicularia sowerbii* Phillips, 1829, pl. 2, fig. 29, non Mantell) at Portezuelo and Calqueque in Southern Mendoza, and Weaver (1931, p. 166, pl. 11, figs. 14, 15) identified a specimen from the Neocomian of Central Mendoza as this species. This specimen was coiled sinistrally and was larger than those now described. Stanton (1901, p. 30) described but did not figure a new species *Tubulostium pupoides* from east of Lake Pueyrrydon, in Patagonia.

Occurrences: Station E. 151, Fossil Bluff (lat. 71° 21' S., long. 68° 21' W.). Station E.153, moraine ½ mile south of Fossil Bluff. Station E.720, north face of the hook at Ablation Valley (lat. 70° 47' S., long. 68° 22' W.). The matrix of the specimens is a dark-grey, fine-grained greywacke.

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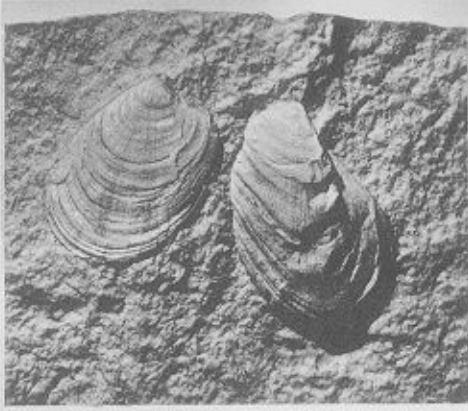
*In applying the terms "dextral" and "sinistral" the specimens are here considered with their apex uppermost, as if they were gastropods. Wrigley (1951) has argued that the terms should be used in the opposite senses.

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PLATE I

(Figures are of natural size unless it is otherwise stated)

- Fig. 1 *Aucellina andina* Feruglio (L.82614). Right and left valves, "squeeze" taken from natural mould. Station E.148
- Fig. 2 Same species (L.82608). Right valve, "squeeze" taken from natural mould. Station E.718
- Fig. 3 Same species (L.82615). Left valve. Station E.148
- Fig. 4 Same species (L.82622). Right valve, "squeeze" taken from natural mould. Station E.149
- Fig. 5 Same species (L. 82616). Right valve, "squeeze" taken from natural mould. Station E.148
- Fig. 6 Same species (L.82623). Right valve, "squeeze" taken from natural mould, x 1.5. Station E.154
- Fig. 7 *Aucellina radiato-striata* Bonarelli and Nágera (L.82612). Left valve. Station E.718
- Fig. 8 Same species (L.82627). Right valve. Station E.154
- Fig. 9 Same species (L.82617). Right valve. Station E.148
- Fig. 10 Same species (L. 82628). Left valve. Station E.150
- Fig. 11 *Aucellina alexandri* sp. nov. Holotype (L.82640). Right valve. Station E.720



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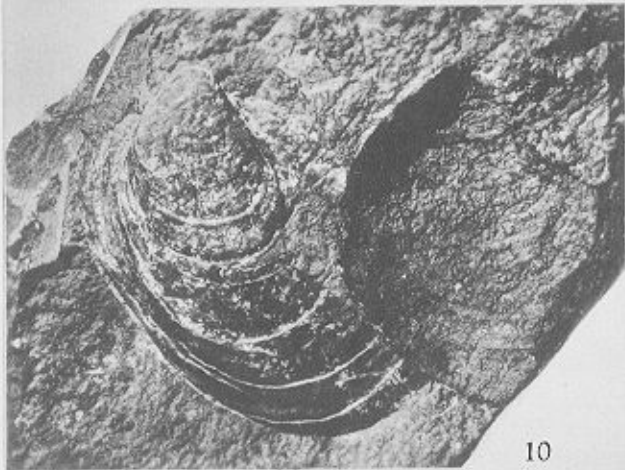
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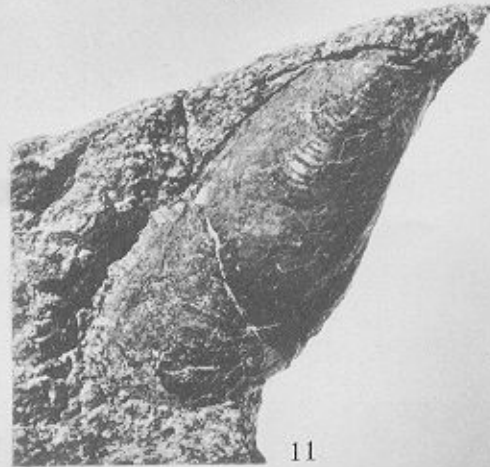
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PLATE II

(Figures are of natural size unless it is otherwise stated)

- Fig. 1 *Inoceramus* sp. indet. (L. 82650). Station E.720
Fig. 2 "*Pecten*" sp. indet. (L.82649). Station E.720
Fig. 3 "*Pecten*" cf. *argentinus* Stanton (L.82648). Station E.720
Fig. 4 "*Pecten*" cf. *argentinus* Stanton (L.82636). Station E.153
Fig. 5 "*Cyprina*" sp. indet. (L.82639). Station E.720
Fig. 6 *Thracia* sp. indet. (L.82631). Station E.719
Fig. 7 Indeterminate bivalve (L.82646). Station E.151
Figs. 8 a, b *Sphaera* ? *striata* (Richter) (L.82621), fig. b, x 1.75. Station E.148
Fig. 9 *Aporrhais* (*Tessarolax*) *antarctica* sp. nov. Holotype (G.69799). "Squeeze" from natural mould. Station E.151
Fig. 10 Same species. Paratype (G.69800). "Squeeze" from natural mould. Station E.151
Fig. 11 Same species. Paratype (G.69801). "Squeeze" from natural mould. Station E.151
Fig. 12 *Rotularia* sp. (A.7005). Station E.153
Fig. 13 *Rotularia australis* sp. nov. Paratype (A.7003). Station E.152
Fig. 14 Same species. Holotype (A.7006). Station E.151

