CRINOIDEA

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INTRODUCTION.

The collection of Crinoids consists of three species, one of which is stalked, and was made at four points not far removed from one another to the west of Graham Land in 1898. It is of historical interest as being the first from south of the Antarctic circle and near the coasts of the continent. It has the intrinsic importance of including the only known specimens of *Ptilocrinus antarcticus,* the single stalked crinoid known from comparatively shallow water in the Antarctic. A second species of this genus, *Pt. brucei*, was taken from deep water (4545 metres) in the mouth of the Weddell Sea by the « Scotia » ; it has been figured (1) but no description of it has yet been published. The only other, and the type, species of *Ptilocrinus, Pt. pinnatus* A. H. Clark, is from deep water off British Columbia.

The two comatulids of this collection, *Promachocrinus kerguelensis* and *Anthometra adriani*, are the commonest Antarctic crinoids. The latter is confined to the coasts of the continent but the former is known also from Heard Island, Kerguelen and South Georgia.

The material, with the exception of specimen D of *Pt. antarcticus* which has been presented to the British Museum (Natural History), is in the Musée Royal d'Histoire Naturelle de Belgique, to the Director of which, Dr V. Van Straelen, the author is grateful for permission to study it.

(1) Wilton, Pirie and Brown, 1908. Sci. Res. Scott. Nat. Exp., IV Zool., part. I, pl. xxiii, fig. 70.

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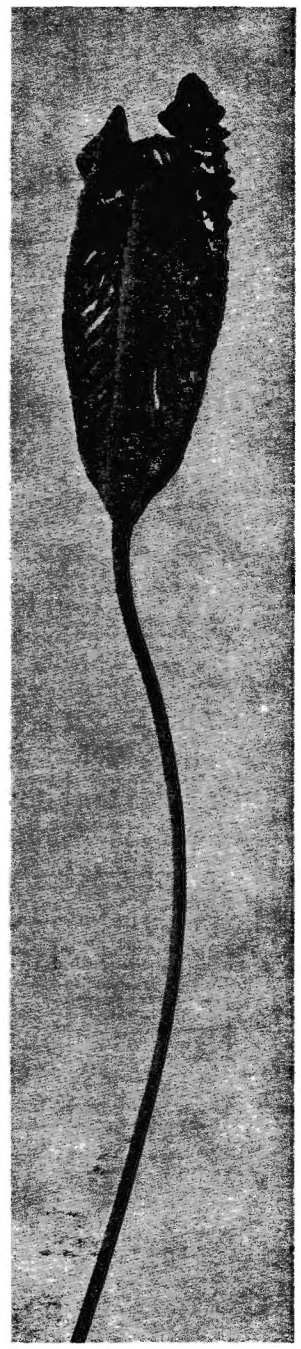

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Fig. 1. *Ptilocrinus antarcticus.* Specimen C, x 2½.
Fig. 2. *Ptilocrinus antarcticus.* Specimen A, x 1.

Family PLICATOCRINIDAE.

Genus PTILOCRINUS A. H. CLARK.

Ptilocrinus antarcticus BATHER (Pl. I, figs. 1 & 2, Text-figs. 1-3) Bather, 1908, pp. 296-299, 1 fig.

It is necessary to say something of the history of the specimens of this species before describing them. They were sent to the late Dr F. A. Bather, who described the material as consisting of : three specimens, all numbered 589, which he lettered A, B and C ; and two dried columns numbered 688. He published a diagnosis of the species, choosing B as the holotype.

There are actually five specimens, and it is difficult to understand how Bather came to omit two, for one of them is the largest specimen of all, and the other a very small and young stage. The former is from the same station as A, B and C and will be referred to as D. The young stage bears a different number and is from another locality.

No further specimens of the species have been taken since the « Belgica », the first of the recent scientific expeditions to the Antarctic, found it.

Material. The specimens are so fragile and have already suffered so much change by fracture since Bather described some of them, that in seems worth while to describe their present state here. They are listed in order of size, and, since none is complete, the only convenient measurement — the height of the cup formed by the basals and radials — is given of each.

Young stage. (Text-fig. 3). N° 303. Faubert II, May 12th 1898, 70°14′ S, 89°14′ W. Depth not given ; it was 460 m. on the 10th. Colourless in life. Crown with broken arms only two of which are complete to beyond fourth brachial. No part of column remains. Height of cup about 3 mm. Very fragile.

Specimen C. (Pl. I, fig. 1, Text-fig. 1). Crown with portion of column about 10 mm. long attached to it ; another portion of column detached, not continuous with that attached to crown, 39 mm. long. All arms incomplete, longest of 29 brachials ; one broken off at fourth brachial and two others nearly broken off. Height of cup about 6 mm.

Four fragments of arms doubtless belonging to the specimen are with it, together with two others from a much bigger specimen — if from any of the present specimens, then probably from D.

This is the specimen described by Bather as having had an abnormal crown. The abnormality was that one of the arms bifurcated. It is now broken off (see below).

Specimen B. Holotype. Crown with small portion of stem attached. Cup nearly 7 mm. high.

Dr Bather dried this specimen and it is now so fragile and broken that it has not been removed from the box in which it was received.

Specimen A. (Pl. I, fig. 2) Crown on column, the whole measuring 240 mm. Column of about 230 joints, 180 mm. long. Longest arm of more than 65 brachials, about 60 mm. long ; one arm broken at about 16th brachial. Cup about 7 mm. high.

This is the most complete specimen.

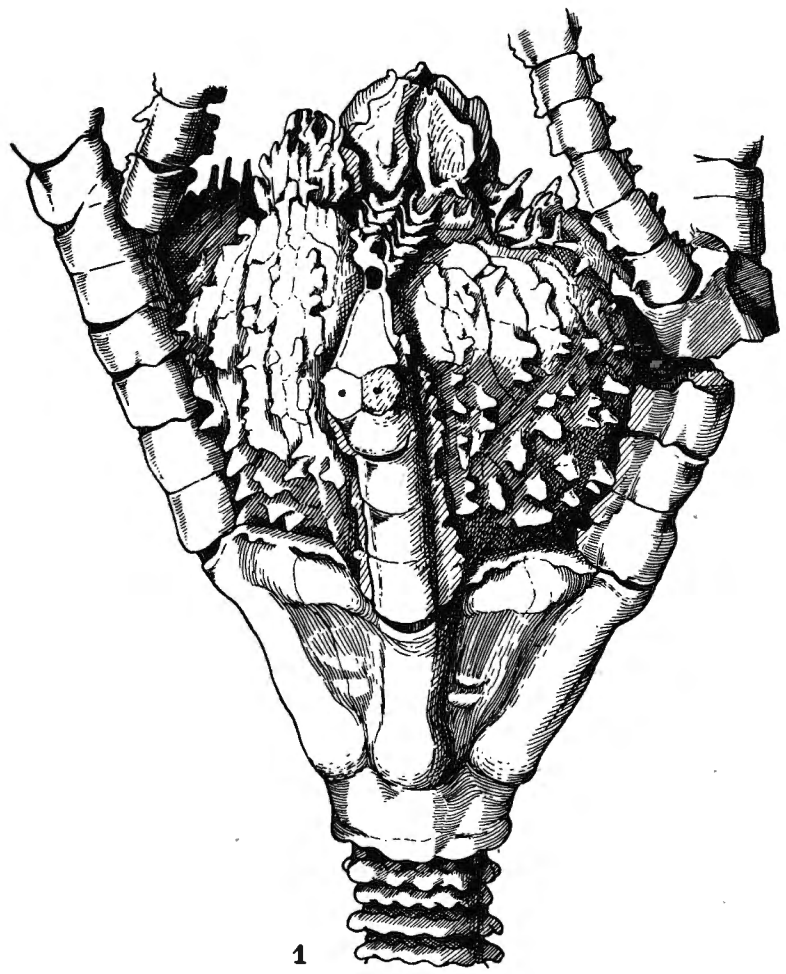
Specimen D. Crown with short piece of column attached ; four portions of detached column.

A total of 290 columnals measuring 304 mm. None of the arms complete ; longest of 32 original and some regenerated brachials, about 45 mm. Cup about 8.5 mm. high.

Columns, dried. N° 688. Nine fragments, the longest 90 mm.

When Bather described these they were « two columns ».

The specimens A, B, C and D all bear the number 589 and their colour in life was described as « flavus brillant ». They and the dried columns, number 688, came from the same locality : Faubert VII, October 8th 1898, 70°23′ S, 82°47′ W. Depth not given ; circa 480 m.



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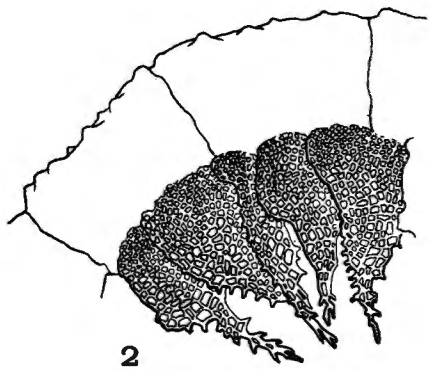

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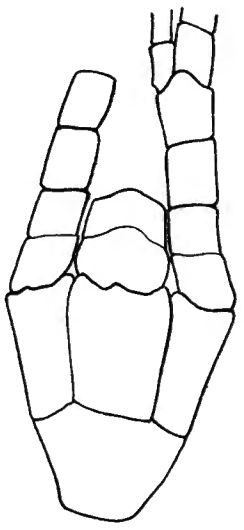

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1. *Ptilocrinus antarcticus.* Specimen C. x c. 6. 6.
2. » » Side-plates of a pinnule form specimen C, x c. 58.
3. » » Young stage, x c. 87.

Description of the adult specimens. Only A has a considerable portion of the column attached to it ; it is not complete. The first fifty columnals are short and strongly tuberculate ; at intervals of eight to ten there are larger columnals (of greater diameter), easily seen with the naked eye. There are 14 to 16 tubercles on each columnal, those of successive columnals in line with one another so that the proximal part of the stem has a ribbed appearance. It is not until beyond the hundredth that the columnals attain their full length and are perfectly smooth and cylindrical ; the first hundred measure 46 mm., the second hundred 108 mm.

Single columnals may be 1.2 to 1.4 mm. long. The circular articulating faces are marked by strong radiating ridges, some of which may branch before reaching the circumference. The opening of the central canal is circular.

The height of the basal cup is about half its diameter at the basi-radial suture and about half the height of the radials, which are about as wide as high. The proximal end of the basal cup is wider than the first columnals. The radial is raised into a strong median longitudinal ridge, in line with the arm ; it is narrower distally than the arm, but it is wider proximally and is continued along the distal half of the basal cup. In its wider proximal portion the ridge may consist of two to six smaller, roughly parallel, ridges. Just before the arm facet a broad ridge runs transversely from either side of the median longitudinal ridge to the lateral edge of the radial ; proximal to it are one to four similar but much smaller ridges. The median and transverse ridges are stronger, and the latter more numerous, in the larger specimens. In one specimen (C) there are one or two tubercles, similar to those on the adjoining interbrachial plates, near the outer distal corner of the radial.

The radials are deeply incised for more than half their distal width for the reception of the first brachials.

The first and second brachials are a little longer than broad, the second more so than the first. The remaining brachials are all slightly broader than long ; their dorsal surfaces are raised into a ridge in the transverse midline.

In specimen C the arm complete only to the fourth brachial has the second and third as well as the first and second brachials united by syzygy. That it was bifurcated is shown by the shape of the fourth brachial which is that of an axillary. An unpublished drawing prepared for Dr Bather shows the arm bifurcating at the fourth brachial, and that the two branches were of equal size.

Syzygies constantly occur between the first and second and the fifth and sixth brachials. Those beyond are irregular but not infrequent ; they are usually separated by one to six, but exceptionally by up to 15, brachials. Examples of those in two arms of specimen A, the first of 40, the second of over 60, remaining brachials, follow :

First arm, syzygies between brachials : 1+2, 5+6, 14+15, 17+18, 20+21, 27+28, 34+35....

Second arm, » » » 1+2, 5+6, 8+9, 25+26, 28+29, 41+42, 48+49, 53+54, 58 + 59....

Two other arms in this same specimen have syzygial pairs with no intervals between them. In the first arm there is one pair of contiguous syzygial pairs, the pairs being brachials 30+31 and 32+33 ; in the second arm there are two examples, the contiguous syzygial pairs being 11+12 and 13+14, and 32+33 and 34+35. In each of the three examples the epizygal of the lower syzygial pair bears two pinnules, one on each side.

The pinnules are of 25 to 30 segments and are strongly curled distally. The first arises in all arms of the four specimens from the left-hand side of the fourth brachial. The lower pinnulars are longer than broad. Their side-edges are produced laterally into strong protuberances, one to three on each side, or into continuous flanges with broken edges, which may be half as wide as the pinnular. They give a characteristic appearance to the species. They are absent from the outer segments which are somewhat shorter and are evenly

rounded. Two abnormalities occur : in specimen A the first pinnule on the right-hand side of one arm bifurcates beyond the fifth segment ; in D the second pinnule on the right of one arm bifurcates beyond the second segment.

The tegmen is about as high as, or slightly higher than, the cup. Its heavy plates unite the arms as far as the fourth brachials. They are raised into strong knobs or ridges. The most proximal plate, resting against the radials, is usually the largest. The heavily plated anal cone lies mid-way between the margin of the disk and the mouth. The oral plates can be seen in specimen C only (Text-fig. 1). They are roughly triangular with the apices bent over in a beak-like way to meet one another, so that together they form an irregular dome. They are of great thickness ; a depression runs along each side, and a broader one along the surface, of the free apices.

The disk ambulacra are protected by two parallel walls of high, vertical and contiguous plates. Each carries on its top a pair of long horn-like processes, the inner protruding over the ambulacra and interlocking with its fellows of the other side, the outer protruding obliquely over the inter-radius. The pinnule ambulacra are protected by a single series of side-plates on either side, two to each segment (Text-fig. 2). They are very long, as long as or longer than the pinnulars from which they arise, and are easily seen with a hand lens. Each plate has a wide triangular base from the apex of which there arises a long slender bar ; the slender distal portions of the plates of opposite sides interlock over the ambulacra. The plates are set at an oblique angle to the long axis of the pinnule : the distal corner of the base of one is exterior to the proximal corner of the base of the next.

Description of the young stage (Text-fig. 3). The basal cup is damaged at the apex, more on one side than the other. Its height is about four-fifths of that of the radials and about three-fifths of its diameter at the basiradial suture. The proximal width of the radials is more than three-quarters of the distal width, which is nearly equal to the height. The radials are not raised into longitudinal ridges but there are shallow depressions along the sutures between them. Their distal edges are only faintly concave and are in contact for nearly the whole of their length with the first brachials — in striking contrast to those of the adult.

The first and second brachials, united into pairs by syzygy, may be regarded as units. They are longer than broad and narrower distally than proximally. They slope inwards towards one another and have their lateral edges in contact. No sign of a visceral mass can be seen between them and, if it is present, it does not extend beyond the distal edges of the radials.

Only two of the arms are complete beyond the fourth brachial ; on both of them the first pinnule arises from the fourth brachial on the left-hand side. When the specimens were received one of the arms was complete to thirteen brachials and another to ten. Both are now broken : the specimen is in so fragile a condition that it is almost literally falling apart. In each of these arms the brachials beyond the fourth were united into successive syzygial pairs, with muscular articulations between the pairs. The epizygal of each pair bears one pinnule, those of successive pairs on alternate sides — there is no abnormality in the occurrence of the pinnules comparable to that already described on the successive syzygial pairs on some arms of the adult specimen A.

The pinnules which are most nearly complete are of ten segments and are strongly curled distally. The brachials are slightly, the pinnulars considerably, longer than broad ; both are smoothly rounded.

The arm and pinnule ambulacra are lined by side-plates similar to those already described as lining the pinnule ambulacra of the adults.

Family ANTEDONIDAE.

Genus PROMACHOCRINUS P. H. CARPENTER.

Promachocrinus kerguelensis P. H. CARPENTER.

P. kerguelensis, Carpenter, 1888, p. 350, pl. I *a-d*, pl. LXX.
P. vanhöffenianus, Minckert, 1905, p. 496, figs. 1, 2.
P. joubini, Vaney, 1910, p. 158, figs. 1, 2.

Material. N° 278. Chalut I, May 11th 1898, 71°09′ S, 89°15′ W. Depth not given ; 460 m. on May 10th. Three broken specimens, one larger and two smaller ; colour in life, violaceous.

No. 636, Faubert VIII, October 18th 1898, 70°00′ S, 80°48′ W. Depth, ? 500 m. Two arm fragments ; colour in life, « lividus ».

Remarks. The three specimens are very broken, lacking any complete cirri and with all the arms broken off at or near the first syzygy. A few fragments of the arms and cirri are preserved with them.

The larger and one of the smaller specimens have 16 arms, the other has 12.

The cirrus fragments show that the longest lower segments are about four times as long as broad. The penultimate segment of an end fragment has no opposing spine.

The centrodorsals of the larger specimen and of the smaller which has 12 arms are of the usual rounded conical shape with a rounded dorsal pole ; that of the other is a strongly truncated hemisphere with a large and slightly sunken dorsal pole.

In the larger specimen and in the smaller which has the truncated dorsal pole strong projections or shoulders are formed by the incisions of the costals by the axillaries and of the first brachials by the second ; in both the axillaries and second brachials are long and narrow. In the second of the smaller specimens the division series and lower brachials have a different appearance : the axillaries and second brachials are wider and shorter and do not form shoulders where they incise the costals and first brachials respectively.

A pinnule from one of the arm fragments was cleared and mounted. Its ambulacrum has a single series of overlapping plates on either side and the tentacles are richly provided with spicules.

The elongated cirrus segments, the long and slender axillaries and second brachials of two of the specimens, and the plating of the pinnule ambulacra are among the characters by which Minckert distinguised his species *P. vanhöffenianus*. A. H. Clark (1915, pp. 131-4) regards Minckert's species and Vaney's *P. joubini* as synonyms of *P. kerguelensis*. In an account, shortly to be published in the Discovery Reports, of well over a hundred specimens taken by the Discovery Investigations in the Falkland Sector of the Antarctic, from the south of which the present material comes, the author confirms Clark's opinion and, indeed, shows that the variation of *P. kerguelensis* is wider than what is necessary to include *P. vanhöffenianus* and *P. joubini*.

Genus **ANTHOMETRA** A. H. Clark.

Anthometra adriani (Bell).

Antedon adriani, Bell, 1908, p. 4, pl. II.
Anthometra adriani, A. H. Clark, 1915, pp. 135-7, pls. VI & VII.

Material. No. 536. Faubert VII, October 8th 1898, 70°23′ S, 81°47′ W. Depth not given; circa 480 m. One very broken specimen; colour in life « incarnatus pâle uniforme ».

Remarks. The mid-dorsal carinate processes on the lower brachials are deeply cleft, and the distal part is much higher than the proximal.

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