

8. The crinoids of the „Gazelle“-Expedition.

By Austin Hobart Clark.

eingeg. 24. Februar 1909.

Among the marine invertebrates brought back by the German steamship »Gazelle« was a number of comatulids, taken on the west and northwest coast of Australia, and on the opposite coast of Timor. Although few in specimens and in species, this collection is one of more than ordinary interest in that it gives us some idea of the faunal relations, in so far as the crinoids are concerned, of the unknown territory along the shores of west Australia. From King George's Haven in the southwest corner *Comanthus* and *Ptilometra*, both tropical genera, are known, *C. trichoptera* and *P. macronema* having been described from there by Professor Johannes Müller over sixty years ago; and it was, of course, to be supposed that the coast line between King George's Sound and the Timor Sea would also prove to support a tropical fauna, progressively more and more intense as one proceeded northward, comparable to the conditions found on the east coast; but the entire absence of data prevented any such assumption, for it was quite possible that *Comanthus* and *Ptilometra* had reached King George's Sound by creeping down from the Arafura Sea, along the eastern and southern coasts, and that the west coast either had no crinoids at all, or was inhabited by peculiar local formes. We are now enabled to state however, that the crinoid fauna of all the coasts of Australia is purely tropical; the northwestern, northern, and northeastern coasts exhibit the most intense faunal conditions, while to the southward, both on the east and on the west coast, the fauna becomes progressively more and more attenuated, reaching its minimum intensity along the southern shore, and not extending to Tasmania or New Zealand, so far as known.

The present collection was sent to the late Dr. Philip Herbert Carpenter, the author of the magnificent »Challenger« reports upon the crinoidea; he tentatively identified most of the specimens, but was unable to complete a report upon it. After his death, the collection was returned to Berlin. In the course of my studies on the recent crinoids, I came across references to the collection in the report by Professor Th. Studer on the zoology of the »Gazelle« expedition, and it is due to his kindness, and to the courtesy of Drs. W. Weltner and R. Hartmeyer of Berlin that an opportunity has been accorded me of making some very interesting observations.

Genus *Capillaster* A. H. Clark.*Capillaster multiradiata* (Linnaeus).

A critical examination of a very large amount of material has convinced me that to this species must be referred the *Comatula fimbriata* of Lamarck, the *Actinometra borneensis* of Grube, and the *Actinometra coppingeri* of Bell; indeed, Carpenter himself doubted the validity of the two last, and was uncertain in regard to several specimens he tentatively assigned to the first.

One specimen of this species was dredged by the »Gazelle at Dirk Hartog Island in 7 fathoms of water; it has twenty-one arms, due to the presence of two III Br 3 (2 + 3) series, developed inwardly in 1, 2, 2, 1 order, and the absence of one II Br series. It has six functional cirri of twenty to twenty-two joints, and thirteen rudimentary cirri of various lengths. The brachials are of the exceedingly short discoidal type characteristic of fully developed examples. The mouth is considerably nearer the center of the disk than usual, and the anal area bears numerous scattered calcareous granules. About the margin of the disk there are several large round openings leading into blind cavities, usually occurring at the base of the large oral pinnules; in the largest of these cavities, which has two openings, there is an ambulacral groove in the interior. Were this subtegminal excavation to extend uniformly under the entire disk, the result would be an internal disk, a replica of the external, in other words a sort of camerate condition. This is the first suggestion of a camerate tendency to be observed among the recent crinoids. The disk is further peculiar in possessing two mouths, a supplementary mouth, not quite so large as the true mouth, being situated just to the right of it.

Dr. Carpenter noted on the label that this specimen was »near *fimbriata*«, the qualification being no doubt due to the presence of the two III Br series. He mentions a similar specimen (of »*fimbriata*«) from the Philippines, but appears to consider the condition abnormal. The examination of a large series from those islands shows that III Br series are usually present, at least on one ray; this, taken in connection with the fact that the »discoidal« brachials appear to be solely the result of individual maturity, being rather more frequent in specimens with more than twenty arms than in specimens with less than that number, prevents us from recognizing *fimbriata* and *multiradiata* as distinct species.

The arms of this specimen are 100 mm long, the cirri 15 mm; the colour is light grayish brown.

Genus *Comaster* L. Agassiz.*Comaster typica* (Lovén).

A single example of this species was dredged in $19^{\circ} 42,1'$ S. lat., $116^{\circ} 49,8'$ E. long, north of Port Walcott, Western Australia, in 50 fathoms. The axillaries are five or six on each ray, the arms being in the vicinity of one hundred in number. All the II Br series are 4 (3 + 4), almost all the subsequent series 2 (1 + 2), with a few 4 (3 + 4); the I Br₁ are laterally united, but the I Br axillaries are widely separated. The specimen is rather small (arm length about 70 mm) and the centro-dorsal is rounded-pentagonal, discoidal, rising to a height of 0,5 mm above the dorsal surface of the radials, and bearing a marginal row of but partially obliterated cirrus sockets. The brachials have slightly prominent, finely spinous, distal ends, and the pinnule joints have spinous dorsal surfaces, the terminal four or five with long recurved dorsal spines. Terminal combs occur at intervals on the distal pinnules, as usual. The colour in spirits is white, the disk and perisome light brownish. The mouth is subcentral.

Specimens from Fiji and the Philippine Islands were at hand for comparison.

Genus *Comanthus* A. H. Clark.*Comanthus rotalaria* (Lamarck).

Two specimens, each with about forty arms 80 mm long, were collected at Timor; one has one, the other two of the II Br series 2 instead of 4 (3 + 4); the remaining division series are all 4 (3 + 4).

Two additional specimens, each with apparently twenty arms, are in the collection, but there is no record of locality with them; one of these has two of the II Br series 2, the remainder 4 (3 + 4), the other has six 2 and four 4 (3 + 4). In both specimens the centro-dorsal is much reduced with only one or two rudimentary cirri remaining.

A detached arm fragment from one of these specimens exhibits a peculiar condition, one of the distal pinnules being replaced by a perfect arm, slightly smaller than the arm from which it springs. On this supernumerary arm both the first and second, as well as the following, brachials bear pinnules, and the third and fourth, eighth and ninth, and thirteenth and fourteenth are united by syzygy.

Comanthus briareus (Bell).

The »Gazelle« dredged a specimen of this interesting species in $19^{\circ} 42,1'$ S. lat., $116^{\circ} 49,8'$ E. long (north of Port Walcott, Western Australia) in 50 fathoms of water. It has nearly one hundred arms

about 100 mm long; the II Br. series are 4 (3 + 4), the III Br. series are about equally 2 and 4 (3 + 4), the IV Br. series are almost always present, 4 (3 + 4), rarely 2; V Br series are common, and VI Br series occur, all 4 (3 + 4). The centro-dorsal is irregularly rounded-pentagonal, countersunk to the level of the radials, the periphery somewhat notched with obsolete cirrus sockets.

Dr. Carpenter indicated on the label that this specimen was »near *peronii*«, which species has been, and I believe correctly, placed in the synonymy of *bennetti* by Dr. Hartlaub. But *peronii* and *bennetti* are remarkable for their massive centro-dorsals, numerous stout cirri, and large lower pinnules, characters quite the reverse of those found in the present example.

In determining this specimen, we find that the rudimentary centro-dorsal and the absence of cirri at once eliminate from consideration *Comanthus quadrata*, *C. trichoptera*, *C. japonica*, *C. grandicalyx*, *C. duplex*, *C. imbricata*, *C. robustipinna*, *C. regalis*, *C. schlegelii*, *C. solaster*, *C. serrata*, and *C. decameros*; the very large number of arms distinguish it from *C. rotalaria*, *C. intricata*, and *C. littoralis*, the absence of strong dorsal processes on the joints of the lower pinnules from *C. belli*, and the separation of the rays from *C. magnifica*; passing over the species in which the II Br are regularly 2, the possibilities narrow down to *C. polynemis*, *C. alternans*, *C. briareus*, *C. divaricata* and *C. nobilis*; the similarity of the III Br series on each distichium eliminate *C. nobilis*, and the IV Br and following series of 4 (3 + 4) show that it cannot be *C. polynemis* or *C. alternans*. It is, therefore, either *C. briareus* or *C. divaricata*. Now Carpenter gives as the only difference between these two that the former has »fifteen to twenty small cirri«, while the latter has the »centro-dorsal stellate, without cirri«; later he says of *C. briareus* that its »centro-dorsal is evidently undergoing reduction to the *Phanogenia* — like condition«. There appear to be no other differences and, as the only distinguishing character given is one quite without value, we are forced to consider the two nominal species as one, a course which is the more justified in that the centro-dorsal of the present specimen is exactly intermediate in its condition between that of the type of *briareus*, and that of the type of *divaricata*.

The disk of the present specimen is lost, but it was evidently very large for the size of the arms and pinnules, as noticed by Carpenter in *C. divaricata*.

The colour is light brownish, as in numerous specimens at hand from the Philippine Islands.

Genus *Zygometra* A. H. Clark.*Zygometra microdiscus* (Bell).

One specimen was secured, at Mermaidsk, northwestern Australia. It has about eighty-five arms, and is deep purple in colour, the cirri and enlarged lower pinnules being lighter.

Zygometra elegans (Bell).

Four specimens from Mermaidsk, northwestern Australia, appear to belong to this species as described by Professor Bell; they possess thirty-five to eighty arms; the II Br series are 4 (3 + 4), the III Br and IV Br usually 2, more rarely 4 (3 + 4). In cases where III Br 4 (3 + 4) series are developed they are usually external in relation to the I Br series as in *Himerometra*, and there is also usually one more axillary on the inner side of each II Br series than on the outer, also as in *Himerometra*; furthermore, the brachials are exceedingly short and discoidal as in *Himerometra*, so that, at a casual glance, it might very well be mistaken for a member of that genus.

I cannot agree with Dr. Carpenter in regarding his *fluctuans* as a synonym of this species. Judging from a very large series from Singapore and the Philippine Islands, *fluctuans* has uniformly about thirty arms with wedge-shaped brachials, and comparatively short cirri with not more than thirty-five joints; it is a smaller and more delicate species, with the III Br series always 2, developed internally, and bears a very close resemblance to the species of *Heterometra*.

Genus *Dichrometra* A. H. Clark.*Dichrometra protectus* (Lütken).

Two specimens of this species from Bougainville Island, in the Solomon group, agree perfectly with a series from Singapore in the collection of the University of Copenhagen. Each has forty arms and is dark brown in colour.

Another specimen was collected on the coral reef at Salawatti, near New Guinea.

Dichrometra palmata (Müller).

Two specimens from the coral reef at Salawatti, off the north-western corner of New Guinea, agree perfectly with Dr. Hartlaub's excellent description of the species. One has thirty arms the other thirty-four, in each about 100 mm long; the cirri are XXVIII, 27—28, 20 mm long, and XL, 24—27, 16 mm long respectively; the polar area of the centro-dorsal is flat, 3 mm to 4 mm in diameter. The colour is dull pinkish, blotched with bluish gray.

This species is one of the best known of all the comatulids of the Indo-Pacific-Japanese region. First reported from the Red Sea by Heusinger in 1828, it has subsequently been found about Ceylon and southern India, at Singapore, Amboina, and among the Tonga Islands. Its discovery at New Guinea was, therefore, to have been expected.

Genus *Cyllometra* A. H. Clark.

Cyllometra sp.

A small mutilated ten-armed individual of some species of *Cyllometra*, related to *C. manca* though with perfectly smooth cirri, was found in the southern Indian ocean, but the exact locality and depth is not recorded.

Cyllometra studeri (A. H. Clark).

The single known specimen of this species was dredged at Dirk Hartog Island, western Australia, in 7 fathoms.

Genus *Oligometra* A. H. Clark.

Oligometra bidens (Bell).

A very small specimen with arms only 8 mm long appears to belong to this species as redescribed by Professor Döderlein, but it is so small that positive identification is not possible. It was taken in northwestern Australia.

Genus *Ptilometra* A. H. Clark.

Ptilometra dorcadis A. H. Clark.

The only specimen so far known of this species was found at Dirk Hartog Island in 7 fathoms, at the anchorage in Turtle Bay. Professor Studer records that this species lives clinging to masses of seaweed, and that the colour in life is flesh colour, the pinnules yellow.

Chronological list of books and papers dealing wholly or in part with the recent crinoids of Australia and with their faunal relations.

1816. Lamarck, M., le Chevalier de, Histoire naturelle des animaux sans vertèbres. vol. 2.
1841. Müller, Johannes, Über die Gattungen und Arten der Comatulen. Monatsber. d. k. preuß. Akad. d. Wiss. Berlin 1841. S. 179—189; also Wiegmanns Archiv für Naturgeschichte 1841. I. S. 139—148.
1845. [Anonymous], L'Institut, 1845. p. 292. (Description of a supposed crinoid from the Hunter River, near Newcastle).
1846. Müller, Johannes, Nachtrag zu der Abhandlung über die Comatulen. Monatsber. d. k. preuß. Akad. d. Wiss. Berlin 1846. S. 177—179.
1849. — Über die Gattung *Comatula* Lam. und ihre Arten. Abhandl. d. k. preuß. Akad. d. Wiss. Berlin 1847. S. 237—265.
1862. Owen, Sir Richard, Note on the occurrence at King George's Sound, Western Australia, of a recent stalked crinoid; (possibly, however, the stalked larva of some comatulid). Ann. and Mag. Nat. Hist. [3] vol. 9. p. 486.

1868. Lovén, Sven, *Hyponome sarsi*. Förhandl. Skand. Naturf. Christiania, 1868. vol. 10. p. LIV; reprinted in Ann. and Mag. Nat. Hist. [4] vol. 4. p. 159, 160.
1869. Lütken, C. F., *Hyponome sarsi*, a recent Australian echinoderm, closely allied to the palaeozoic Cystidea, described by Prof. Lovén; with some remarks on the mouth and anus in the Crinoidea and Cystidea. Canadian Naturalist (N.S.), vol. 4. p. 267—270.
1877. Wright, E. P., On a new genus and species of sponge [*Kallispongia archeri*; in reality the stalked larva of some comatulid]. Proc. Roy. Irish Acad. [2] vol. 2. p. 754—756, pl. XL.
1879. Carpenter, P. Herbert, Preliminary report upon the Comatulæ of the »Challenger« expedition. Proc. Roy. Soc. vol. 28. p. 383—395.
1880. — Feather Stars, Recent and Fossil. Popular Science Review (N.S.), vol. 4. p. 193—204. pls. V, VI.
1882. — The Comatulæ of the Hamburg Museum. Journ. Linn. Soc. (Zoology), vol. 16. p. 501—526.
1884. Bell, F. Jeffrey, Report on the zoölogical collections made in the Indo-Pacific Ocean during the voyage of H. M. S. »Alert«, 1881—1882. (Crinoidea p. 177—216. pls. X—XVII).
1885. Carpenter, P. Herbert, On the geographical and bathymetrical distribution of the Crinoidea. Report British Association for 1884 (Montreal). p. 758 bis 760.
1885. Bell, F. Jeffrey, Notes on a collection of echinodermata from Australia. Proc. Linn. Soc. New South Wales, vol. 9 (1884), p. 496—507.
1888. Bell, F. Jeffrey, Notes on the echinoderms collected at Port Philip by Mr. J. Bracebridge Wilson. Ann. and Mag. Nat. Hist. [6], vol. 2. p. 401—407.
1888. Carpenter, P. Herbert, Report on the scientific results of the voyage of H. M. S. »Challenger« during the years 1873—76. Zoölogy; vol. 26. Report upon the Crinoidea. Part II. The Comatulæ.
1889. Bell, F. Jeffrey, Note on *Antedon pumila* and *A. incommoda*. Ann. and Mag. Nat. Hist. [6], vol. 3. p. 292.
1889. Studer, Th., Die Forschungsreise S. M. S. »Gazelle« in den Jahren 1874 bis 1876. III. Theil. Zoologie und Geologie.
1890. Carpenter, P. Herbert, Preliminary report on the Crinoidea obtained in the Port Philip Biological Survey. Proc. Roy. Soc. Victoria (N.S.), vol. 2. p. 135, 136.
1891. Hartlaub, Clemens, Die Comatulidenfauna des Indischen Archipels. Nova Acta Acad. German. vol. 58. No. 1.
1893. Bell, F. Jeffrey, On a small collection of crinoids from the Sahul Bank, North Australia. Journ. Linn. Soc. (Zoölogy), vol. 24. p. 339—341. pls. XXIII—XXIV.
1894. — On the echinoderms collected during the voyage of H. M. S. 'Penguin', and by H. M. S. 'Egeria', when surveying Macclesfield Bank. A. — List of echinoderm of Northwest Australia. B. — Echinoderms of the Arafura and Banda Seas. Proc. Zool. Soc. London 1894. p. 394, 395.
1898. Döderlein, Ludwig, Bericht über die von Herrn Prof. Semon bei Amboina und Thursday Island gesammelten Crinoidea. In Semon, Zool. Forschungsreise in Australien, Vol. 5. Lief. IV. S. 117—124. Denkschr. Ges. Jena, Vol. 8. p. 475—480, pl. XXXVI.
1907. Clark, Austin Hobart, New Genera of Recent Free Crinoids. Smiths. Miscell. Coll. (Quarterly Issue), vol. 50, part 3, p. 343—364.
1908. — New Genera of Unstalked Crinoids. Proc. Biol. Soc. Washington. vol. 21. p. 125—136.
1908. — Descriptions of new species of crinoids. chiefly from the collections made by the U. S. Fisheries Steamer »Albatross« at the Hawaiian Islands in 1902; with remarks on the classification of the *Comatulida*. Proc. U. S. Nat. Mus. vol. 34. p. 209—239.

1908. Clark, Austin Hobart, The Crinoid Genus *Comatula* Lamarck, with a note on the *Enerinus parrae* of Guérin. Proc. U. S. National Museum vol. 33. p. 683—688.
1908. — The Genus *Ptilocrinus*. American Naturalist. vol. 42. No. 500. p. 541—543.
1908. — The Recent Crinoids and their relation to Sea and Land. The Geographical Journal vol. 32. No. 6. p. 602—607.
1908. — Preliminary notice of a collection of crinoids from the Philippine Islands. Smiths. Miscell. Coll. (Quarterly Issue), vol. 52. part 2. p. 199—234.
1909. — A Revision of the crinoid families Thalassometridae and Himerometridae. Proc. Biol. Soc. Washington vol. 22. p. 1—22.
1909. — Two New Australian Crinoids. *idem*. p. 39—42.
1909. — The Type of the genus *Comaster*. *idem*. p. 87.
1909. — Systematic Position of *Oligometra studeri* *idem*. p. 88.

9. Über einige Laubheuschrecken des Breslauer Museums.

Von Friedrich Zacher, cand. zool.

(Aus dem zool. Institut der Universität Breslau.)

eingeg. 28. Februar 1909.

Das Breslauer zoologische Museum beherbergt eine sehr wertvolle Sammlung von Orthopteren-Reiseausbeuten aus dem Indomalaischen Archipel, Peru, Deutsch-Südwestafrika usw., deren Bearbeitung und Ordnung mir mein hochverehrter Lehrer, Herr Prof Dr. Kükenthal, gütigerweise übertragen hat. Eine ausführlichere Arbeit über die Dermapteren und Blattiden soll demnächst erscheinen. Hier gebe ich zunächst nur die Diagnosen einer Anzahl darin enthaltener neuer und interessanter Formen von Laubheuschrecken, deren zusammenfassende Bearbeitung erst später erfolgen soll.

I. Stenopelmatidae.

Außer den paläarktischen Gattungen *Troglophilus* und *Dolichopoda* und der aus Japan stammenden *Diestramena marmorata*, die in den Breslauer Gärtnereien bisweilen in Mengen auftritt, ist in der Sammlung nur die Gattung *Rhaphidophora* des indomalaischen Gebietes vertreten.

Rhaphidophora caligulata n. sp.

Dunkelbraun, Clypeus weiß, Tibien rotbraun, Abdominalsternite hell. Metatarsus der Hinterbeine oben glatt, ohne Dornen, viel länger als der erste innere Dorn der Tibien. Hintertibien oben zwischen den Seitenkanten flach, dunkelrot. Innenkante des Hinterfemurs mit einem kleineren und einem größeren Zähnchen. Cerci kurz und dünn. Styli sehr klein, drehrund. Die Fühler sind unvollständig, jedoch wahrscheinlich nicht viel länger als der Körper. 24—29 mm. ♂. Indomalaischer Archipel, Koll. Neisser.

Der Enddorn an den Vorderschenkeln ist kurz; der Hinterfemur hat an der Innenkante einen kleinen Dorn.

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