FIVE NEW RECENT CRINOIDS FROM THE NORTH PACIFIC OCEAN

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In 1900 the United States Fisheries steamer *Albatross* made a small collection of about three hundred specimens of crinoids in the waters about southern Japan, mostly in the vicinity of Sagami Bay; she also obtained crinoids in a single haul off the coast of Kamchatka. The material was originally assigned to Prof. Hubert Lyman Clark, of the Museum of Comparative Zoölogy at Cambridge, Mass., for study; but, owing to pressure of other work, he has been unable to turn his attention to it. After my return from Japan, he most kindly turned over to me the entire 1900 collection, to work up in connection with the much larger one made in 1906.

Although comparatively small, this 1900 collection has many points of interest. Fourteen species are represented, three of which were not found in 1906. A new *Bathycrinus,* of quite a different type from *B. pacificus,* was secured off Kamchatka; a new *Zygometra,* of which the 1906 collection contains a single example so poor I did not consider it wise to describe it, is represented by a number of specimens. There are also three new species of *Antedon,* two of which are represented by a good series. These last all belong to a small group of the genus, represented by *Antedon nana* and *A. briseis,* which appears to be characteristic of the region from Australia and the Tonga Islands northward to Japan, corresponding to the *A. hagenii* group, so abundant in the Caribbean Sea. Owing to their small size and brittle nature it is somewhat difficult to obtain specimens of these species, the smallest of all the Antedonidæ, in good enough shape to justify description. Besides those already described, there are a number of others which are known to me from the study of specimens.

BATHYCRINUS COMPLANATUS, sp. nov.

This new species of *Bathycrinus* represents in the north Pacific *B. carpenterii* (Danielssen and Koren) of the north Atlantic, to which it is closely allied. It is represented in the collection by fourteen calyces, eighteen roots with more or less of the stem attached, and many stem fragments of various lengths, all from *Albatross* Station No. 3783, approximately 40 miles S. S. W. ½ W.

of Southeast Cape, Copper Island, Commander Group; depth 1567 fathoms, with a bottom of gray volcanic sand and green mud. The bottom temperature was not recorded.

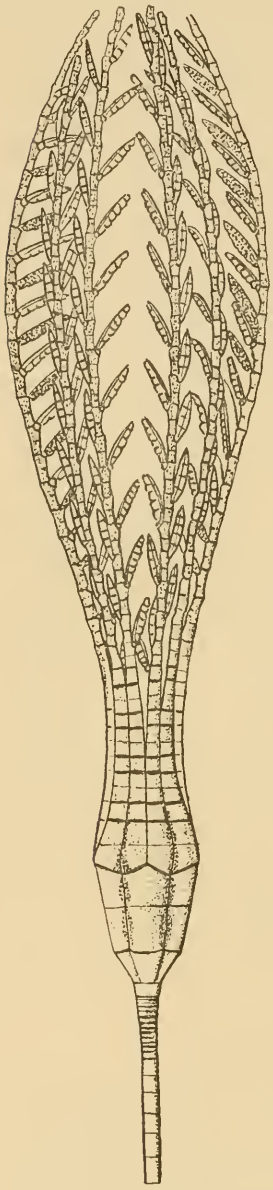

FIG. 123.—*Bathycrinus complanatus*, sp. nov.

Basals united into a smooth ring, slightly wider above than below, the superior diameter of which is equal to about twice the height; radial cup funnel-shaped, about once and a half as broad at its upper end as high, the dorsal surface of the radials rounded, but low, so that the dorsal aspect of the cup is almost circular; first costals long, trapezoidal, longer than the radials; axillaries pentagonal, slightly wider than high, the anterior angle much more produced than in *B. carpenterii;* both the costals are low and rounded, and there is no indication of a median keel.

First brachials wedge-shaped, wider (usually much wider) than long; second brachials slightly longer and more oblong; following brachials approximately square, gradually becoming elongated toward the tips of the arms; the brachials up to the sixteenth or seventeenth are deep, and are strongly flattened laterally, exhibiting that character called "wall-sidedness" by Dr. Carpenter to a very marked degree. The first two brachials, the fourth and fifth, and the seventh and eighth are closely united by trifascial articulation, after which the ninth and twelfth are the only single brachials, all the others being united in pairs by the alternation of bi- and trifascial articulations; in other words, the third, sixth, ninth, and twelfth brachials are single segments, all the others being united in pairs.

The first pinnule is usually on the twelfth brachial, but may occur as early as the tenth.

The stem appears to contain about one hundred segments, of which the first twelve or fifteen are wider than high, most of them

very short and discoidal, those immediately below the basals being slightly wider than the somewhat thicker ones on which they rest; the columnars increase in length rapidly at first, then more gradually, reaching a maximum of somewhat over 3 mm. in length about the middle of the stem, after which the length gradually decreases again until near the bottom, the last ten or twelve columnars being long and very stout, with greatly expanded ends, ending in a rather large branching root.

The largest specimen measures 60 mm. from the basals to the tips of the arms, the stem being 225 mm. long; the smallest crown is about 30 mm. long. The color in spirits is delicate brownish or dull yellowish white, the disk dark brown.

Type.—Catalogue No. 22,662, U. S. N. M., from the locality given.

This species comes nearest to *B. carpenterii* (Danielssen and Koren) of the northeast Atlantic; but the stem is composed of very much longer and more slender segments, while the lower brachials, which in *B. carpenterii* are longer than wide, are wider than long, frequently very much so. The arms and pinnules appear to be more slender and delicate than those of *B. carpenterii,* and, lastly, it is about double the size of that species.

ZYGOMETRA KŒHLERI, sp. nov.

Centro-dorsal a flat disk with about twenty marginal cirri; these are short and rather stout with ten to fifteen segments, the first two short, the others longer than wide, somewhat constricted centrally; terminal claw short and curved; opposing spine very small.

Radials just visible, free distally; first costals nearly three times as wide as long, united to the low triangular axillaries by syzygy, both rounded and widely free laterally; ten arms 45 mm. long with sixty-five to eighty brachials, the first seven oblong or slightly wedge-shaped, wider than long, then quadrate and as long as or longer than wide, becoming elongate distally; syzygia in the third, eighth, and twelfth brachials, and distally at intervals of 3 or 4.

First pinnule long and slender with more than twenty segments, the basal three or four wider than long, the remainder elongate; pinnule on the third brachial distinctly (often much) shorter with fewer segments; second pinnule the longest with about twenty-five elongated segments; following pinnules not much shorter, but very much more slender. The anal tube and area about it is heavily plated, but the rest of the disk is almost naked.

Color in life, bright yellow.

Type.—Catalogue No. 22,660, U. S. N. M.; from *Albatross* Station No. 3717, Sagami Bay, Japan; 63-100 fathoms.

The small number of arms, combined with the number of cirrus segments and long second pinnule, readily distinguish this species from all the other forms of *Zygometra.*

ANTEDON ADRESTINE, sp. nov.

Centro-dorsal more or less hemispherical, bearing about forty cirri; these are 10 to 12 mm. long with twelve to fifteen segments, all longer than broad, the proximal two-thirds very much so, and constricted centrally with prominent distal edges; no dorsal spines; terminal claw very small.

Radials just visible; first costals very short, deeply incised by the rhombic axillaries, and with a transversely elongate tubercle on each side; axillaries rhombic, slightly wider than high, with a median keel in the posterior half; ten arms 35 mm. long, with about ninety segments; first brachial very short, incised by the much larger and irregular second brachial; third brachial squarish; following brachials to the eighth oblong or slightly quadrate, wider than long, becoming longer than wide after the twelfth and more elongate distally; syzygia in the third, eighth, and twelfth brachials, and distally at intervals of two. The costals and first brachials are in apposition laterally.

Lower pinnules very long; first pinnule 10 mm. long with 19 long segments; pinnule on the third brachial 10 mm. long with 18 elongated segments; second pinnule slightly longer, with eighteen segments; pinnule on fifth brachial similar; third pinnule 11 mm. long, with twenty elongated segments; pinnule on seventh brachial about 7 mm. long, with about fifteen segments; the eighth and following pinnules bear genital glands; distal pinnules moderately long, very slender, the first segment short, the second and following very long.

Color (in spirits) dirty white, a broad median band of brown on each arm; cirri light brown, white at the articulations; or white, a broad median band of purple on each arm; cirri white.

Type.—Catalogue No. 22,659, U. S. N. M.; from *Albatross* Station No. 3713, off the southern coast of Hondo, Japan; 45-48 fathoms.

The great length of all the lower pinnules, combined with the few cirrus segments, is sufficient to distinguish this species from all the others of the genus *Antedon.*

ANTEDON MINUTA, sp. nov.

Centro-dorsal a low hemisphere, nearly covered with about twenty cirri; these are 5 mm. long, with ten to fifteen segments, all somewhat longer than wide, but the basal not specially longer than the distal; terminal claw rather large; opposing spine small; the articulations of the cirrus segments are prominent, and there is a slight ventral overlap.

Radials visible; first costals oblong, about twice as wide as high; axillaries pentagonal, about as wide as high; ten slender arms, 30 mm. long, with about fifty brachials, long-quadrate, with the first seven roughly squarish; syzygia in the third, eighth, and twelfth brachials, and distally at intervals of two, sometimes three; rays widely separated.

First pinnule 3 mm. long, with about eighteen segments; second pinnule similar, but very slightly longer; the following pinnules become more slender, but do not increase much in length; the two proximal segments of the lower pinnules are enlarged, short, and squarish, the rest somewhat longer than wide, although not especially elongated.

Color (in spirits) pinkish, light brownish, or dull white, with the pinnules brown.

Type.—Catalogue No. 22,661, U. S. N. M.; from *Albatross* Station No. 3725, off the southern coast of Hondo, Japan; 13 fathoms.

This species is more closely related to *Antedon briseis,* from which, however, it is readily distinguishable by having the rays well separated, with no lateral projections, and the lower pinnules composed of short segments. It is also a much smaller species.

ANTEDON ORIENTALIS, sp. nov.

Centro-dorsal low-conical, bearing thirty to fifty cirri, almost none of the pole bare; cirri 13 mm. long, slender, with thirty to thirty-five segments, the proximal two-thirds or more of which are somewhat longer than wide, the distal becoming short; the longer segments are more or less "dice-box shaped," and the distal are strongly carinate dorsally; the two or three apical ("small mature") cirri are 3 or 4 mm. long, very slender and delicate, with twelve to fifteen elongated segments, much constricted centrally; opposing spine well developed.

Radials short, crescentic; first costals short, about three times as wide as long, with lateral dentate processes, and in apposition laterally; axillaries triangular, slightly wider than high, free laterally;

ten arms 45 mm. long; first five brachials roughly oblong, then quadrate, longer than wide, becoming elongated distally; syzygia in the third, eighth, and twelfth brachials, and distally at intervals of three to five (usually four) segments.

First pinnule the longest, about 4 mm. long, with ten segments, the first short, the others much elongated; the following pinnules become shorter, then increase again distally.

Color (in spirits) dull yellow; probably yellow in life.

Type.—Catalogue No. 22,663, U. S. N. M.; from *Albatross* Station No. 4933, off Kagoshima Gulf, Japan; 152 fathoms.

This species comes nearest to *Antedon pumila* Bell, from which it differs in the much greater number of cirrus segments (which are much shorter distally), the much greater length of the cirri, and in having the rays in close lateral apposition, not widely separated and rounded, as in that species. The costals and lower brachials also have more or less tubercular edges, while in *A. pumila* the edges are smooth. Numerous specimens of the latter from Port Jackson were used for comparison.