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Taxonomic Status of the Octocoral Genus *Bathyalcyon*
 (Alcyoniidae: Anthomastinae),
 with Descriptions of a New Subspecies from the Gulf of Mexico and
 a New Species of *Anthomastus* from Antarctic Waters
 (Plates 1-9)
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Abstract

Two specimens of the remarkable octocoral *Bathyalcyon* are reported from the northern Gulf of Mexico, and the relationship of *Bathyalcyon* to *Anthomastus*, *Paragorgia* and other genera of Octocorallia is discussed. *Bathyalcyon* is reduced to a subgenus of the morphologically similar genus *Anthomastus* and the specimens from the Gulf of Mexico are described as a new subspecies of the Indo-west Pacific *Anthomastus (Bathyalcyon) robustus* Versluys. A new species of *Anthomastus* from Antarctic waters is described.

On 26 August 1899 the Dutch *Siboga* Expedition at station 170 east of Ceram at 3° 37.7' S, 131° 26.4' E brought up from 924 m of water one of the most remarkable octocorals yet known. It was first mentioned in print as "une nouvelle espèce de la famille des Haimeiidæ" by Weber (1902: 78, fig.) and by Hickson (1906: 342) before it was formally described as *Bathyalcyon robustum* nov. gen. nov. spec. by Versluys (1906: 549).

The second record of *Bathyalcyon* was by Kinoshita (1911: 121), who reported a specimen collected in Sagami Bay, Japan, at a depth of 400 *hiro* (about 660 m) on 20 February, 1902.

Subsequently, A. K. Totton (1933) briefly reported two specimens, one taken at a depth of 400 fathoms (732 m) at 8° 46' S, 114° 44' E in the Malay Archipelago, and the other in 150 fathoms (274 m) at an unspecified locality in the Philippine Islands.

Th. Mortensen and Sixten Bock aboard the Hayatori-maru trawled five specimens from 135 and 220 fathoms (247 and 402 m) off Bonomisaki, south of Kagoshima, Kyushu, Japan, on 13 May, 1914 (Bock, 1938). Bock summarized the history of this remarkable octocoral and described the morphology, anatomy and histology of his Japanese material in admirable detail, greatly supplementing the rather sketchy information provided by Versluys (1906) about the type specimen.

Specimens attributable to the genus *Bathyalcyon* have now been taken for the first time in Atlantic waters by the submersible *Johnson Sea Link I*. Two specimens attached to iron-stained calcareous-argillaceous siltstone were obtained at a depth of 274 m in Green Canyon, south of Atchafalaya Bay, Louisiana, on 7 September, 1989.

All of the specimens collected so far are similar in regard to gross morphology. Although only three sclerites of the original type specimen were illustrated by Versluys (1906: 553, figs. 3, 4), they agree in all recorded features with those of the Japanese specimens described and illustrated in somewhat greater detail by Bock (1938: 24, fig. 6). Small

differences were pointed out by Bock, but these can hardly be considered taxonomically significant.

Versluys recognized a close relationship of *Bathyalcyon* with the alcyoniid genus *Anthomastus* Verrill through Hickson's (1904) account of *Anthomastus grandiflorus* Verrill (sensu Hickson), a species now recognized as distinct from *A. grandiflorus* and named *A. hicksoni* by Bock (1938: 44).

Bock (1938: 43 et seq.) concurred with Versluys's opinion that *Bathyalcyon* is closely related to *Anthomastus* Verrill, 1878, later placed in a distinct family Anthomastidae by Verrill himself (1922). The sclerites of the two genera are remarkably similar, as can be seen from the accompanying illustrations of the principal forms that occur in the type species, *Anthomastus grandiflorus* Verrill (Plate 1). The predominant forms in the outer layer of coenenchyme are 6-, 7- and 8-rayed capstans (Plate 1, a) closely resembling those of *Bathyalcyon* in size and shape. The capstans of the outer layer of capitulum are virtually indistinguishable from those of Totton's *Bathyalcyon* (Plate 10, a). The capstans of the surface layer of stalk (plate 1, b) seem to be somewhat more compact and have rays somewhat shorter than those of the capitulum, but this difference may be more apparent than real. The capstans are accompanied by spiny spindles (Plate 1, c), some of which become clublike through enlargement of one end (Plate 1, d). Such clublike forms are rare in *Bathyalcyon*. The spongy inner coenenchyme contains many long, slender rods with sparse, low thorns (Plate 1, e), which are longer and thinner than the inner spindles of *Bathyalcyon*, but the shorter, stouter spiny spindles (Fig. 1g) closely resemble the spindles of *Bathyalcyon*.

Bock (1938: 44) saw in Hickson's *Anthomastus grandiflorus* from South Africa a colonial form intermediate between *Bathyalcyon* and *Anthomastus*, and correctly pointed out that Hickson's material is not *Anthomastus grandiflorus* Verrill but a distinct new species that he named *Anthomastus hicksoni* (Bock 1938: 44). Bock (1938: 46) concluded that *Bathyalcyon* and *Anthomastus* "show a clear relationship to the Alcyoniidae and ought to be ranged in that family" but placed both in a special subfamily Anthomastinae.

Broch & Horridge (1957: 158), in the course of discussing the relationships of a new species of *Solenopodium*, remarked that "it is rather astonishing that nobody seems to have observed the evident relationship between *Paragorgia* and *Anthomastus*." The reason, of course, is that the relationship is exceedingly remote. Broch & Horridge concluded that *Bathyalcyon* and *Anthomastus* should be included with *Paragorgia* and *Sibogagorgia* in one family, Paragorgiidae, on the basis of dimorphism and similarity of sclerites. They maintained that *Anthomastus* differs anatomically from *Paragorgia* only in the absence of horny material, a character they considered of negligible importance compared with dimorphism and similarity of sclerites.

Although it is true that some, but not all, of the 8-rayed capstans of *Paragorgia* are similar to those of *Bathyalcyon* and *Anthomastus*, virtually identical capstans occur in many genera and families of Octocorallia as do the corresponding 6- and 7-rayed forms. These must be regarded as a very generalized type of sclerite not reflecting close relationship. Moreover, the 6-rayed capstans of *Paragorgia* are quite unlike those of *Anthomastus* and *Bathyalcyon*. Consequently, it is clear that Broch & Horridge's classification is untenable.

Bathyalcyon is distinguished from *Anthomastus* only by the reduction of the number of autozooids to a single one. Elsewhere in the Octocorallia a parallel modification has already been described in detail. In the pennatulacean genus *Umbellula* which, like *Anthomastus*, usually has numerous very large autozooids (as few as 8 but up to 50, depending on species and size of colony), one species with only a single large autozoid is known:

Umbellula monocephala Pasternak, 1964 (= *U. thieli* Grasshoff, 1972; see also Grasshoff, 1973). Another example of reduction in number of autozooids is *Kophobelemnon biflorum* Pasternak, 1960, which has only two, whereas other species of *Kophobelemnon* have as many as 25 or more large autozooids, or as few as 3.

As a tendency to reduce the number of autozooids is present also in *Anthomastus*, in which the type specimen of *A. hicksoni* Bock has only 5, and fully developed *A. grandiflorus* may have as few as 7, it is not justifiable to maintain *Bathyalcyon* as a genus distinct from *Anthomastus*. However, as colonies of *Bathyalcyon* do not develop a sterile stalk, and the autozoid body wall contains the siphonozooids and therefore is coenenchymal, it is retained as a subgenus within *Anthomastus* pending the availability of sufficient material for detailed morphological studies that may clarify its status in the Alcyoniidae.

Alcyoniidae Lamouroux, 1812

Diagnosis: Alcyonacea with fleshy, membranous, massive, bushy or arborescent colonies, often with a basal stalk, commonly barren, and a distal polyparium bearing the anthocodiae; sclerites monaxial, spindles or capstans, usually smaller than 1 mm in length but in some cases longer, sometimes developed as clubs; polyps monomorphic or dimorphic.

Anthomastinae Verrill, 1922

Anthomastidae Verrill, 1922: 40 (nom. transl. Broch, 1938: 46).

Diagnosis: Dimorphic Alcyoniidae with autozooids very large and not very numerous (from only 1, up to about 20) in comparison with the small siphonozooids; sclerites in the form of 6-, 7- and 8-rayed capstans, commonly very short and forming "double stars" or "Maltese crosses," and slender spindles, sometimes needle-like.

Remarks: The association of the dimorphic genera *Carotalcyon* Utinomi and *Minabea* Utinomi with the Anthomastinae, as suggested by Utinomi (1952: 455; 1957: 145) is complicated by the fact that in neither case is the size discrepancy between autozooids and siphonozooids so great, even though the capstans and spindles are not unlike those of *Anthomastus* and *Bathyalcyon*. Moreover, the sclerites of the second known species of *Minabea*, *M. robusta* Utinomi, are exclusively 6-rayed capstans. This caused Utinomi to abandon his position relating these genera to *Anthomastus*.

As no material of *Carotalcyon sagamianum* Utinomi, 1952, and *Minabea ozakii* Utinomi, 1957, is available to me for examination, I am unable to reach an objective decision about the assignment of those genera to the subfamily Anthomastinae. Therefore, for the present time I consider it preferable to restrict the subfamily to *Anthomastus* and its subgenus *Bathyalcyon*, the two taxa that share the most characters.

Genus *Anthomastus* Verrill, 1878

Anthomastus Verrill, 1878: 376.—Kükenthal, 1910: 1.—Verrill, 1922: 40.—Deichmann, 1936: 52.—Bayer, 1956: 188; 1981: 913 (in key only).

Diagnosis: Alcyoniid colonies composed of several large autozooids and numerous minute siphonozooids forming a distinct capitulum borne at the top of a roughly cylindrical stalk devoid of polyps and attached to the substrate by a membranous expansion or anchored in mud by root-like lobes and projections. Autozooids sterile, siphonozooids fertile. Tentacles of autozooids with numerous small, rodlike sclerites in rachis and pinnules; anthocodial wall with 6-, 7- and 8-radiates, the shorter forms as double stars; pharyngeal wall with rodlets similar to but generally smaller than those of the tentacles; coenenchyme

of capitulum with numerous radiates, often concentrated in the outermost layer, as well as slender, more or less thorny rods and intermediate forms; outer layer of stalk with abundant radiates, deeper layer also with slender rods; coenenchyme between gastric cavities in interior of capitulum and stalk with slender rods and needles, radiates absent. Color ranging from whitish or gray through reddish yellow, orange, and red to dark purplish red.

Type species: *Anthomastus grandiflorus* Verrill, 1878, by monotypy.

Remarks: *Anthomastus* is sharply distinguished from other dimorphic genera of Alcyoniidae, such as the reef-dwelling *Sarcophyton* Lesson and *Lobophytum* Marenzeller, by the great discrepancy in size between autozooids and siphonozooids; the characteristic sclerites in the shape of capstans, often short and star-like, and slender, sparsely thorny spindles; and its deeper bathymetric range.

Anthomastus differs from *Bathyalcyon* only in its numerous large autozooids and the location of the siphonozooids in a fleshy coenenchymal capitulum rather than in the autozooid body wall.

Subgenus *Anthomastus* s. s.

Diagnosis: Anthomastinae forming colonies comprised of several large autozooids retractile within a coenenchymal capitulum borne on a distinct sterile stalk; numerous siphonozooids embedded in coenenchyme surrounding autozooids.

Type species: *Anthomastus grandiflorus* Verrill, 1878, by monotypy.

Anthomastus grandiflorus Verrill, 1878

Plate 1

Anthomastus grandiflorus Verrill, 1878: 376; 1833: 41, pl. 1, figs. 7-10b; 1922: 40, pl. 14, figs. 5-7, pl. 17, figs. 1-1d. —Kükenthal, 1910: 4. —Deichmann, 1936: 52, pl. 1, figs. 8-9, pl. 3, figs. 8-13. —Bayer, 1956: 188, figs. 138 (1a-c).

Not *Anthomastus grandiflorus*.—Hickson, 1904: 217, pl. 7, fig. 2 (= *Anthomastus hicksoni* Bock, 1938: 44; ?= *Anthomastus giganteus* Tixier-Durivault, 1954: 526, figs. 1, 2.)

Description: see Verrill, 1883; Deichmann, 1936.

Remarks: Illustrations of the sclerites of this well-known species, type species of the genus, are presented here (Plate 1) for comparison with those of the new species described below, and with those of *Bathyalcyon*.

Verrill (1922) considered it likely that *Sarcophyton purpureum* Koren & Danielssen (1883: iv, 7, pl. 4, figs. 1-25) is this species, but Deichmann (1936) rejected that suggestion. Bock (1938) with good reason considered Hickson's record of *Anthomastus grandiflorus* Verrill from South Africa to be based upon misidentification, and recognized it as a distinct new species, *A. hicksoni*.

Anthomastus bathyproctus n. sp.

Plates 2-5

Material examined: Off South Shetland Islands; 62° 07' S, 55° 58' W, 1113-1153 m, USNS *Eltanin* Sta. 413, 1 Jan. 1963. 16 colonies USNM 60476, syntypes + 61 additional specimens from the same haul (USNM 92399).

Description: The colonies vary from the mushroom-shape typical of other species of *Anthomastus* (plate 2) to bluntly obconic (Plate 4), depending upon their degree of contraction, and are unusual in that not only are the autozooids fully retractile within the capitulum but also the capitulum itself is capable of complete retraction within the stalk. When the capitulum is fully inflated, its edge extends down over the widest upper part of the stalk

like the rim of a mushroom cap (Plate 2), forming a narrow groove between stalk and capitulum as in several other species of *Anthomastus*. Although this is a transitory feature that disappears when the capitulum is deflated, the margin of the capitulum even in complete retraction is clearly indicated by a distinct narrow ridge (Plate 4). In specimens preserved with the capitulum inflated, the autozooids may be fully or partially extended (Plate 2), retracted leaving only a low, superficial "verruca" about 8 mm in diameter and marked by 8 grooves radiating outward from the verrucal orifice, or even fully retracted (Plate 4) leaving only an inconspicuous 8-rayed depression on the surface of the capitulum. The tentacles can be, but usually are not, withdrawn completely within the anthocodia so the contracted but exert polyps assume a nipple-like aspect (Plate 3).

In preservation, the anthocodiae of fully extended autozooids are about 25-30 mm tall and 10 mm in diameter, marked by longitudinal furrows corresponding to the mesenterial insertions and strong transverse folds suggesting a substantially greater size in the living condition. The fully extended tentacles are about 15 mm long in the preserved condition. A single row of about 25 pinnules roughly 2 mm long extends along each side of the tentacles.

The capitulum between the autozooids is crowded with siphonozooids, which are little if at all raised above the surface. Their positions are indicated by a palisade of vertically placed rods surrounding each zooid, clearly visible in the translucent mesogloea. They are roughly 0.3 mm in diameter, so that about 3 of them with the intervening mesogloea occur in 1 mm. Their length has not been determined but, as gonads can be seen as far as 1 cm below the surface, they obviously extend deep into the coenenchyme.

The stalk is marked by numerous longitudinal grooves and ridges crossed by transverse furrows, the distinctness of which is related to the degree of contraction of the specimen. In specimens with capitulum fully inflated, these grooves and ridges extend to the margin of the capitulum and resemble the gills of a mushroom. The proximal half of the stalk is digitiform and covered with thin, flat, projecting rootlets with rounded, more or less lobed margins, which obviously serve to anchor the colonies in soft substrate.

Sclerites: The tentacles contain flattened rodlets, some tapered toward the ends, some a little wider terminally, reaching a length of about 0.17 mm (Plate 5, a); those extending into the pinnules tend to be somewhat smaller. The anthocodial wall contains octoradiates up to 0.08 mm long and double stars reaching 0.07 mm (Plate 5, b); club-like examples with one end somewhat larger than the other are uncommon. The pharyngeal wall contains flattened rodlets similar to those of the tentacles but somewhat smaller, commonly about 0.12 mm in length (Plate 5, c). The capitulum contains 6-, 7- and 8-radiates up to about 0.1 mm in length (Plate 5, d) and numerous sparsely thorny rods up to about 0.45 mm in length (Plate 5, e), some of which are arranged vertically as a sort of palisade around each siphonozooid. The outermost layer of the stalk consists of radiates like those of the capitulum, but somewhat larger; the octoradiates can be as long as 0.16 mm (Plate 5, f). The deeper layer of coenenchyme in the stalk contains nearly smooth needles about 0.3 mm long and sparsely thorny rods, some of them curved, up to 0.44 mm in length (Plate 5, g), with many intermediate forms (Plate 5, g). The walls separating the gastric cavities of the autozooids in capitulum and stalk have only rods like those of the outer layers of coenenchyme; radiate forms are absent. The flat, lobate rootlets of the lowermost stalk contain radiates like those of the outer stalk, spindles with smooth, flattened, triangular projections up to 0.3 mm in length, and intermediate forms (Plate 5, h). Only the tentacular rodlets are faintly pink in color; the sclerites in other parts of the colony are colorless, some of them opaque, some almost glassily clear.

Measurements of representative colonies

Specimen	1	2	3	4	5
Capitulum diameter (cm)	6.7	6.7	6.5	4.3	3.3
Capitulum height (cm)	3.0	3.0	1.5	1.0	0.8
Distal diam. of stalk (cm)	5.0	5.0	5.8	3.5	2.8
Proximal diam. of stalk (cm)	2.0	2.5	2.5	1.5	1.4
Number of autozooids	18	17	14	12	5

Etymology: Greek βαθύς, deep + πρωκίος, fundament. Noun in apposition.

Comparisons: The retractile capitulum is unique among species of *Anthomastus* known so far, and distinguishes this species from all others.

Remarks: As a single specimen does not adequately represent the various degrees of expansion and contraction demonstrated by the many colonies obtained at *Eltanin* station 413, I have selected a suite of 16 specimens representing the full range from completely retracted to fully inflated with anthocodiae extended, to stand as syntypes rather than designating a single specimen as holotype.

Subgenus *Bathyalcyon* Versluys, 1906 (nom. transl.)

Bathyalcyon Versluys, 1906: 551.—Kinoshita, 1911: 121.—Totton, 1933: 107.—Bock, 1938: 4.—Bayer, 1981: 912.—Tixier-Durivault, 1987: 6, 10, 35, 37, 154.

Type species: *Anthomastus (Bathyalcyon) robustus* Versluys, 1906 (comb. nov.), by monotypy.

Diagnosis: *Anthomastus* forming colonies comprised of a single large, sterile autozoid having an anthocodia scarcely if at all retractile within a cylindrical anthostele with numerous fertile siphonozooids embedded in its thick coenenchymal wall. Anthostele attached to solid substrate by a membranous basal expansion devoid of siphonozooids, but stalk not developed. Sclerites in the form of 6-, 7- and 8-rayed capstans ("crosses") and thorny spindles. Anthocodial sclerites not organized as crown and points.

Remarks: The sclerites of the Atlantic material show differences from those of the Indo-west Pacific specimens heretofore described, which can be regarded as significant in view of the great distance separating the present individuals from the Indonesian and Japanese specimens. Consequently, I here propose the two specimens from the Gulf of Mexico as representing a subspecies distinct from the Indo-west Pacific population on geographical as well as morphological grounds.

Distribution: Ceram Sea, Malay Archipelago, Philippines, Japan, Gulf of Mexico. 247–924 m.

Anthomastus (Bathyalcyon) robustus delta n. subsp.

Plates 6–8

Material examined: Gulf of Mexico, at the southeast end of a mud ridge in Green Canyon, south of Atchafalaya Bay, Louisiana; 27° 50.37' N, 91° 22.56' W, 274 m, coll. H. Roberts and T. Neurauder, *Johnson Sea Link I Sta. 2587* dive 6, 7 Sept., 1989. Two specimens, holotype (USNM 92069) and paratype (USNM 92070).

Description: The larger of the two specimens, here designated as the holotype (Plate 6, a), measures 25.5 mm from the margin of the basal attachment to the edge of the faintly tapered, cylindrical anthostele, which is slightly compressed (perhaps artificially) and 14.7 × 12.3 mm in diameter; its surface is marked by a few obscure wrinkles, possibly the result

of contraction. The anthocodial wall between the anthostelar margin and the bases of the tentacles is inverted within the aperture of the anthostele and in all probability is capable of extension. Except for the basal holdfast and a narrow margin along the distal edge, the anthostele is covered with siphonozooids forming small, wart-like protuberances about 0.6 mm in diameter, each with a pore-like aperture at its summit. The holdfast spreads over the substrate asymmetrically from the base of the anthostele, extending from one side as a broad lobe about 1 cm long, but elsewhere as only a narrow margin without siphonozooids. The tentacles are about 2 cm long in the preserved state, bearing along each side a single row of 9 or 10 pinnules, the longest of which are about 3.5 mm in length.

In general appearance, the paratype (Plate 6, b) closely resembles the holotype, differing mainly in its smaller size. The anthostele measures 22 mm in height and 8.8 mm in diameter, not noticeably compressed, and its surface is marked with wrinkles possibly resulting from contraction. The anthocodial wall between the margin of the anthostele and the bases of the tentacles is about 4 mm high, but is much folded and evidently capable of greater extension. The margin of the anthostele is folded into shallow lobes, usually 2 below each tentacle. The entire surface of the anthostele, save for a narrow margin below the introvert and the spreading basal holdfast, is covered with siphonozooids as in the holotype. The basal holdfast spreads irregularly over the substrate and is at most about 6 mm wide, becoming very narrow where it grows around an adjacent bivalve mollusk (*Dimya argentea* Dall). The tentacles are about 11 mm in length along the free rachis and about 15 mm from the lower edge of their common base.

Sclerites: The coenenchymal anthostelar wall is filled with a surface layer of 6-, 7- and 8-rayed capstans up to about 0.14 mm in length (Plate 7, a), covering a deeper layer filled with abundant thorny spindles up to about 0.3 mm in length (Plate 7, b), predominantly pale red in color although a few may be pale yellowish or colorless. Capstans and spindles like those of the anthostelar wall, some colorless, some amber colored or pale red, are sparsely distributed in the anthocodial wall and extend into the rachis of the tentacles, where capstans are most densely concentrated in a narrow longitudinal tract along mid-line of the tentacles backs, flanked on each side by a row of transversely placed spindles. Shorter rods, mostly pink, reaching a length of about 0.17 mm (fig. 8c), extend into the pinnules. As a result, the pinnules appear conspicuously pink compared with the pale rachis with its paler pink median stripe. This coloration is most pronounced in the holotype. The red sclerites of the paratype are paler so the median stripe along the tentacle rachis is inconspicuous and the pinnules do not contrast so distinctly. Besides capstans (Plate 7, d), the holdfast contains rods with terminal clusters of thorny tubercles and an intervening single median whorl of 3 thorny tubercles (Plate 7, e).

The sclerites of the paratype (Plate 8) are similar to those of the holotype but the rods of the pinnules are longer (Plate 8, c) and the belted rods of the holdfast may have two median whorls of tubercles (Plate 8, e). Crosses (Plate 8, h) of the type occurring in many octocorals are present but uncommon, and spindles approaching club-like shape (Plate 8, g) owing to enlargement of one end are scarce.

Discussion: Versluys (1906) illustrated the original description of *Bathyalcyon robustum* with line drawings of only 3 sclerites; a 6-rayed capstan (1906: fig. 4b) and an 8-rayed capstan (1906: fig. 4a) from the superficial layer of the anthostele, and a spindle (1906: fig. 3) from the deeper layer. He stated that the sclerites of the basal expansion were like the capstans of his Figs. 4a and 4b, and that the tentacles had spindles of the type shown in his Fig. 3 as well as capstans. These agree in size and general appearance with the sclerites of

Anthomastus (Bathyalcyon) robustus delta. However, Versluys made no mention of belted rods of the kind present in the basal expansion of the Atlantic material and, since they are rather abundant, we can only conclude that they did not occur in the type specimen of *Anthomastus (Bathyalcyon) robustus*. He certainly would have noticed such a distinctive form.

Etymology: Greek $\delta\epsilon\lambda\tau\alpha$, fourth letter of the alphabet, applied to the triangular alluvial deposits formed at the mouths of rivers; in allusion to the locality off the delta of the Mississippi River. A noun in apposition.

Comparisons: Kinoshita (1911) identified his specimen as *Bathyalcyon robustum*. He illustrated his account with a photograph of the colony at natural size (1911: pl. 3, fig. 1) and a diagrammatic longitudinal section (1911: pl. 3, fig. 2). As photographed, the anthostele is about 60 mm tall and 25 mm in diameter, and the anthocodia is partially withdrawn. He compared the *Bathyalcyon* specimen with a colony of *Anthomastus* sp., also photographed natural size (1911: pl. 3, fig. 3) and diagrammed in longitudinal section (1911: pl. 3, fig. 4). No sclerites are illustrated so it is impossible to determine how closely they correspond with those drawn by Versluys and Bock.

Bock (1938) identified his specimens from Japan as *Bathyalcyon robustum* and provided somewhat more information about their sclerites than did Versluys. His simple drawings of capstans and spindles are consistent with Versluys's illustrations of sclerites of the holotype. Bock (1938: 26, pl. 1, fig. 11 [and 12?]) also observed blunt, narrow rods of small size exclusively in the stomodaeal tube. These were not mentioned by Versluys, who probably did not even investigate that part of his unique specimen in order not to damage it any more than necessary. For similar reason I have not searched for sclerites in the pharyngeal (i.e., "stomodaeal") wall of the two Atlantic specimens, as such sclerites are unlikely to be taxonomically diagnostic.

Totton (1933) identified the two specimens in the Natural History Museum (London) also as *Bathyalcyon robustum* but illustrated only their gross appearance (1933: fig. 1) and did not describe the sclerites in his brief text. During a visit to the Natural History Museum I cursorily examined these specimens through the kindness of Dr. P. F. S. Cornelius, scientific officer then in charge of coelenterates. I have present illustrations of the sclerites of the red specimen from the Malay Archipelago (Plate 9; BMNH register number 1917.7.23.7/8). The anthostelar wall contains 6-, 7- and 8-rayed capstans (Plate 9, a) in the outermost layer, and more or less curved, spiny rods (Plate 9, b) in the deeper layers. The pinnules contain prominently spiny rods up to 0.3 mm in length (Plate 9, c). The basal expansion contains capstans much coarser than those of the anthostele, some of them even assuming the shape of double heads (Plate 9, d), as well as spiny spindle up to 0.35 mm long and much stouter than those of the anthostele (Plate 9, e).

Versluys (1906) did not separately illustrate the sclerites of the basal expansion of the type specimen, saying only that they were of the type shown in his figure 4. Bock (1938) neither illustrated nor mentioned the sclerites of the basal expansion of his specimens from Japan. It is therefore impossible to interpret the taxonomic significance, if any, of the inferred differences of basal sclerites between the type specimen and those of the material reported by Totton (1933). Even though I share Broch's (1928: 6) and Bock's (1933: 24) objections to attributing taxonomic importance to small morphological differences among sclerites, I consider the belted rods of the holdfast expansion of the Atlantic material sufficient grounds for separation at subspecific level, especially when associated with such a wide geographic separation of the specimens.

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Explanation of Plates

Plate 1. *Anthomastus (Anthomastus) grandiflorus* Verrill. SEM micrographs of sclerites. a, Flat rodlets from pinnules; b, Capstans ("double stars") from outer surface of capitulum; c, Spindles from interior of capitulum; d, Clubs from capitulum; e, Needles from interior of capitulum; f, Capstans of outer surface of stalk; g, Spiny spindle from inner layer of stalk; h, Twinned form ("cross") from stalk.

Plate 2. *Anthomastus (Anthomastus) bathyproctus* n. sp. Colonies. Above, Side view of specimen with capitulum inflated and autozooids extended; Below, Bottom view of specimen with capitulum inflated. Scale applies also to Plates 3 and 4.

Plate 3. *Anthomastus (Anthomastus) bathyproctus* n. sp. Colonies with capitulum partly inflated and autozooids partly withdrawn. Same scale as Plate 2.

Plate 4. *Anthomastus (Anthomastus) bathyproctus* n. sp. Side view of colony with capitulum inflated and autozooids completely retracted. Top and side views of colony with capitulum and polyps fully retracted. Top and side views. Same scale as Plate 2.

Plate 5. *Anthomastus (Anthomastus) bathyproctus* n. sp. SEM micrographs of sclerites. a, Rodlets from tentacles; b, Capstans and "double stars" from anthocodial wall; c, Rodlets from pharyngeal wall; d, Capstans from capitulum; e, Rods from capitulum; f, Capstans from outer layer of stalk; g, Rods and needles from inner stalk; h, Capstans from root lobes.

Plate 6. *Anthomastus (Bathyalcyon) robustus delta* n. subsp. Holotype (above) and paratype (below).

Plate 7. *Anthomastus (Bathyalcyon) robustus delta* n. subsp. SEM micrographs of sclerites of holotype. a, Capstans of outermost anthostelar coenenchyme; b, Spindles from deeper layers of coenenchyme; c, Rods from pinnules; d, Capstans from holdfast; e, Rods from holdfast.

Plate 8. *Anthomastus (Bathyalcyon) robustus delta* n. subsp. SEM micrographs of sclerites of paratype. a, Capstans of outermost anthostelar coenenchyme; b, Spindles from deeper layers of coenenchyme; c, Rods from pinnules; d, Capstans from holdfast; e, Rods from holdfast.

Plate 9. *Anthomastus (Bathyalcyon) robustus* Versluys. SEM micrographs of sclerites of specimen in BMNH 1917.7.23.7/8. a, Capstans of outermost anthostelar coenenchyme; b, Spiny rods of deeper coenenchyme; c, Spiny rods of pinnules; d, Capstans of holdfast; e, Spiny spindles of holdfast.

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