Minabea ozakii n. gen. et n. sp., a New Remarkable Alcyonarian Type with Dimorphic Polyps[1)]

By

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(*With 4 Text-figures*)

In an earlier paper (Utinomi, 1952), I described a curious dimorphic Alcyonarian, *Carotalcyon sagamianum* n. gen. et n. sp. from Sagami Bay. Another new type of dimorphic Alcyoniids which forms the object of the present paper was recently obtained by trawlers from deep waters in Kii Suido, eastern entrance to the Seto Inland Sea, middle Japan. A closer examination revealed that it belongs to the family Alcyoniidae in having dimorphic polyps on the cylindrical capitulum. However, it cannot be referred to any of the hitherto known genera of this family but evidently forms the type of a new genus. Superficially it resembles the monomorphic genus *Bellonella* (formerly included under *Nidalia*), but appears to be closely related to the dimorphic genus *Anthomastus* in detailed structure of polyps and spiculation.

It is a pleasure to dedicate this curious species to Mr. Mitunosuke Ozaki, noted amateur naturalist at Minabe, who has contributed indeed much in collecting marine invertebrates.

Minabea, gen. nov.

Fleshy Alcyoniid of unbranched, cylindrical colony, arising from a short sterile stalk spreading over other objects. Dimorphic polyps on all sides of capitulum; autozooids large, non-spiculiferous, completely retractile; siphonozooids small, in minute verrucae, containing gonads within. Spicules of cortex of stalk and capitulum as spiny capstans and spindles; of interior of capitulum as slender rods thickly arranged transversely.

Type Species: *Minabea ozakii*, n. sp. (monotypy).

Minabea ozakii, n. gen. et n. sp.

DESCRIPTION OF THE TYPE: The holotype is about 45 mm high. The sterile stalk is strongly contracted, short, and attached by a thin, membranous expansion to a dead shell of the mussel *Glycymeris* (*Veletuceta*) *albolineata* (Lischke). It measures in a contracted condition about 10 mm in height and 22–26 mm in diameter at the basal expansion, not strictly round in contour. The capitulum

1) Contributions from the Seto Marine Biological Laboratory, No. 297.

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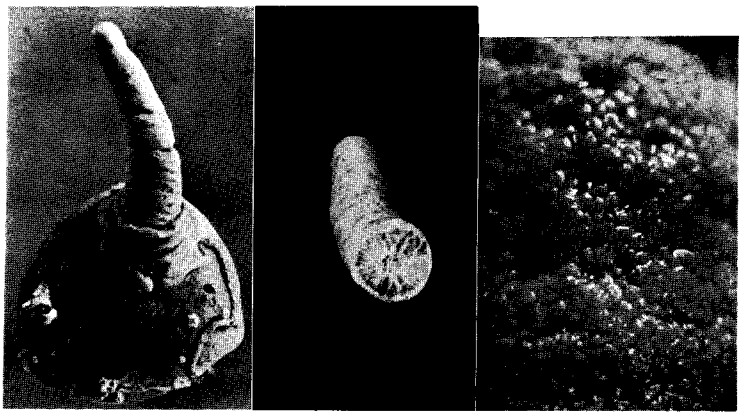
is finger-like in shape, gradually tapering toward the rounded tip; its height is about 35 mm, and the diameter about 12 mm at base where it passes into the stalk, and about 5 mm at the distalmost tip.



A B C

Fig. 1. *Minabea ozakii*, n. gen. et n. sp. A, holotype. ×ca 2/3. B, cross section in the middle of capitulum. ×ca 1. C, surface of the capitulum. ×ca 7.

The color of the whole colony in alcohol is uniformly dull orange or cinnamon.

The surface of the capitulum is wholly covered with small siphonozooids and between them autozooids in lesser number. The siphonozooids form a low verruca, with a slight opening in the center and colored dull orange due to covering of the same colored spicules; they measure about 0.4 mm across.

The autozooids are completely retractile within the pit-like depression which measures about 1–1.2 mm across; these openings are not elevated as verruca above the capitulum surface, unlike in other dimorphic Alcyoniids, but around their edge there are eight small projections which can completely close the opening over the retracted polyp. Between two autozooids, 1–1.5 mm apart, there are 3–4 siphonozooids.

The anthocodiae, when extruded, are very feeble, wholly transparent and quite devoid of spicules. The tentacles are about 1.5 mm long and have the slender, cylindrical rachis which is proximally about 0.17 mm wide and distally about 0.05 mm wide. The pinnules which number about 12 pairs are uniformly slender, the longest one measuring 0.25 mm long and 0.035 wide.

A transverse section through the capitulum indicates obviously the distribution of spicules and the canal system. In Fig. 3 somewhat schematically drawn, we see that the canal system resembles apparently that of the Scleraxonian

families Briareidae and Paragorgiidae (*cf.* Verseveldt, 1940). In the Scleraxonia, the colonial coenenchyme is usually divided into two layers, the outer "cortex" and the inner "medulla", between which the boundary canals are either present or absent; the former case is universal, while the latter exists only in the above-mentioned families.

In most of the ordinary Alcyoniidae, however, such demarcation does not occur in the more fleshy coenenchyme. In Figs. 1B and 3, we find such a demarcation within the coenenchyme, apparently dividing into an outer and an inner layer. In the outer layer, the large autozooids and smaller siphonozooids are arranged

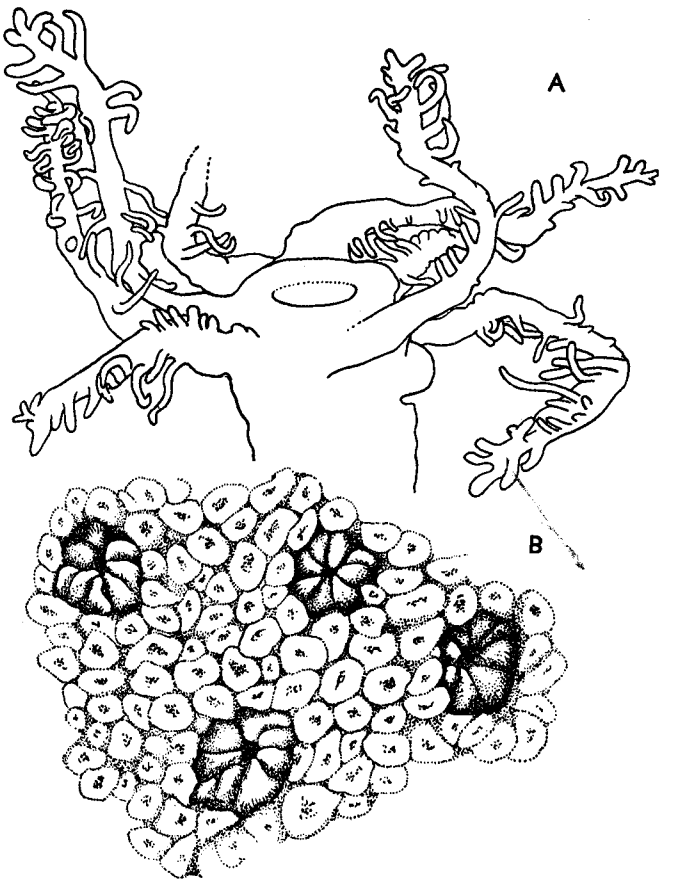


Fig. 2. *Minabea ozakii* n. gen. et n. sp. A, fully expanded anthocodia of autozooid. ×40. B, part of outer surface of capitulum, showing four retracted autozooids surrounded by smaller siphonozooids. ×10.

transversely or obliquely and tightly attached to one another with thin partition-walls. In the medulla-like inner region there is a close meshwork of spacious canals, lengthened in a longitudinal direction ; in each of the canals eight mesenteries are clearly seen. In cross section the outer layer is about 3 mm in thickness and the inner layer is about 3 mm in diameter. At the boundary between them there is nothing to be observed of any ring of boundary canals.

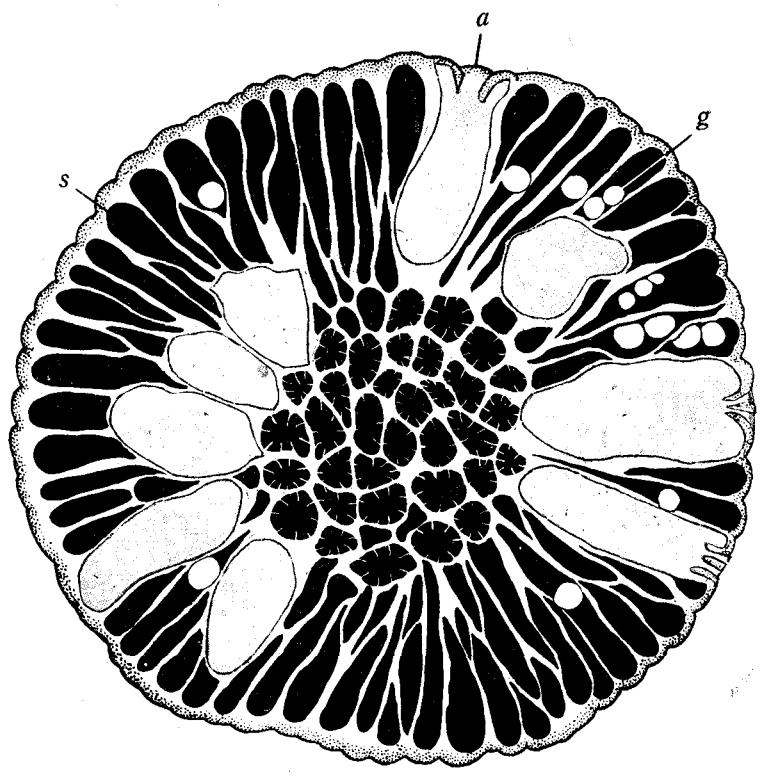


Fig. 3. *Minabea ozakii* n. gen. et n. sp. Cross section through the stem showing the canal system. *a*, autozooid; *g*, gonad; *s*, siphonozooid. ×10.

The lateral autozooids lying transversely or obliquely in the outer layer are shown as bag-shaped gastric cavities with a broad rounded base which contain the retracted polyps. They reach as far as the medullar region and, then turning downward and gradually narrowing in a longitudinal direction, pass into the medullar canals. The siphonozooids between autozooids are more numerous and evenly narrow throughout. Further they may pass into the medullar canals

directly or indirectly. These medullar canals bearing eight mesenteries are almost uniform in size and as wide as the siphonozooidal cavities in the outer layer. Only the siphonozooids carry genital products, usually 1–3 ripe gonads being found in one cavity; they, if present, are confined to the peripheral part and not in deeper part.

As mentioned above, the retractible anthocodiae of the autozooids lack entirely spicules. The outer surface of the cortex contains abundant, pale yellow, warty spicules. The typical sclerites are small capstans, chiefly octoradiates. In somewhat deeper layer are contained also warty spindles, a little longer than capstans, though few in number. These cortical spicules are somewhat larger in the sterile stalk than in the capitulum, as shown in Fig. 4 and the following measurements (in mm).

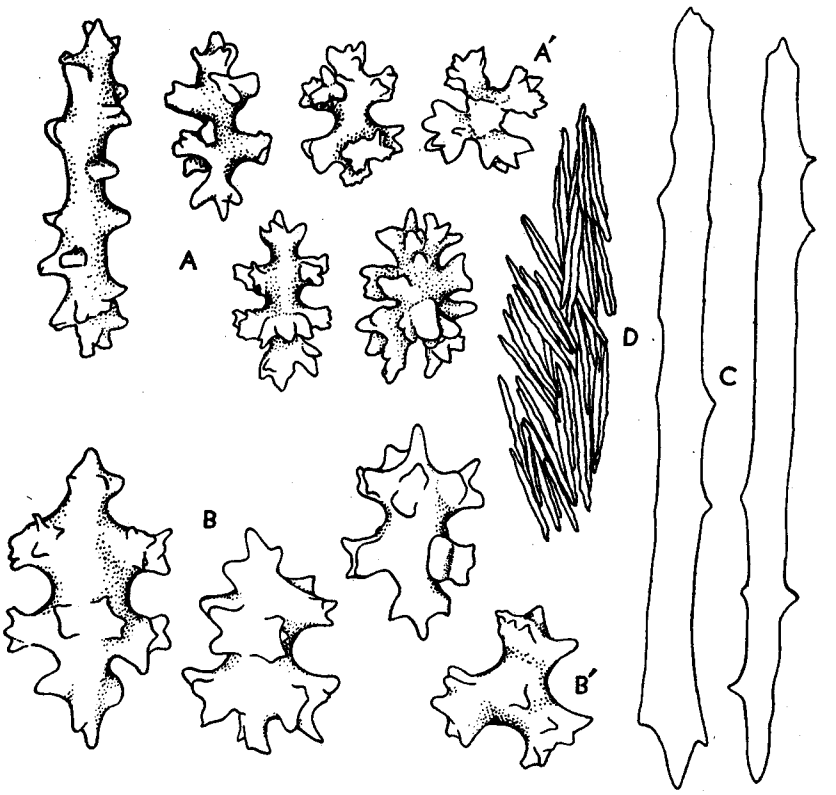


Fig. 4. *Minabea ozakii* n. gen. et n. sp. Spicules of : (A-A′) outer cortex of capitulum, (B-B′) outer cortex of stalk, (C) coenenchyme of capitulum, side and end views. ×400. D, clusters of spicules in the canal-walls. ×65.

Capitulum : 0.037×0.028; 0.047×0.037; 0.056×0.037 (capstans). 0.067×0.033; 0.08×0.028 (spindles).
Stalk : 0.07×0.042; 0.075×0.047; 0.1×0.056 (capstans).

In the interior of the capitulum, the partition-walls between the coelenteric cavities or canals are rather thin, as compared with other fleshy Alcyoniids, and are densely packed with larger, colorless, slender, almost smooth, needle-like rods, measuring 0.17×0.009 mm, 0.23×0.01 mm, 0.26×0.011 mm, and rarely crosses. They are always arranged horizontally in both of the outer and medullar layers.

HOLOTYPE : S.M.B.L. Type No. 163. Kii Strait, southwest of Minabe, probably about 250 m in depth. March 1950. Taken by a trawler at Minabe.

PARATYPES : (1) Two specimens (44 mm long and 32 mm long respectively, without stalk), deposited in S.M.B.L. Kii Strait, 25 miles southwest of Minabe; Long. E. 134°54′, Lat. N. 33°40′, 250-260 m. Nature of bottom, mud. Found by Mr. M. Ozaki from bottom samples taken by a trawler *Kaiun-maru*, on January 22, 1957.

(2) Three specimens (52 mm, 38 mm and 35 mm in length respectively, without stalk), deposited in S.M.B.L. Kii Strait, 4 miles southwest of Susami; Long. E. 135°27′, Lat. N. 33°30′, 250-270 m. Nature of bottom, shell shingles. Found by Mr. M. Ozaki from bottom samples taken by a trawler *Kaiun-maru* April 6, 1957, together with a typical specimen of red-colored dimorphic Alcyoniid *Bathyalcyon robustum* Versluys, 35 mm long.

REMARKS : It is well known that most of the genera of Alcyoniidae show a dimorphism of the polyps. Among those with dimorphic polyps, *Anthomastus*, *Acrophytum*, *Malacacanthus*,[1] *Bathyalcyon*, *Nidaliopsis* and *Carotalcyon* are all deep-water forms and have a small number of autozooids. In the present *Minabea*, the autozooids are not so few in number and not so large in size as in the hitherto known genera mentioned above. The siphonozooids, on the other hand, appear to be comparatively rather more developed, though similar in the internal structure.

In the spiculation, this new genus appears to be related most closely to *Anthomastus* (*cf.* Kükenthal, 1906, 1910). In particular, long, slender, needle-like rods contained in the coenenchyme resemble most closely those found in *A. fisheri* Bayer (1952), though their arrangement in the canal-walls seems to be quite different.

The cortical spicules on the outer surface are all typically octoradiate capstans with distinct median waist, which resemble those in *Anthomastus* and *Carotalcyon*, and also in the dimorphic Scleraxonians *Paragorgia* and *Corallium* (*cf.* Koren and Danielssen, 1883 ; Bayer, 1956). Neither star-like sclerites nor typical spindles are met with. Further the anthocodiae lack spicules at all, as in *Carotalcyon*.

The canal system apparently resembles that of the Scleraxonian genus *Paragorgia* on account of the medulla-like formation of the coelenteric canals

1) In my previous paper (Utinomi, 1952, p. 445), *Malacacanthus* is erroneously regarded as a genus with monomorphic polyps. This genus is peculiar in lacking spicules and lives in sand in shallow water, but has been recorded from depths of 11, 41 and 51 fathoms (J. St. Thomson, 1910, 1921, 1923.)

which have to be considered as direct continuations of the coelenterons concentrated into the central part of the stem. However, the spicules occurring everywhere in the canal-walls are, as noticed above, uniformly long, slender rods which are quite different in form as well as size from the spicules of the outermost cortical layer.

In *Paragorgia*, on the other hand, the spicules of the cortex and medulla are more or less different to one another according to different layers, although the cortex and medulla are not distinctly separated by such boundary canals as seen in other Scleraxonians. Anyhow, the coenenchyme in this new genus is homogeneous in structure and never differentiated into a cortical and a medullar layer, usually called as such in the Scleraxonia. The canal system is essentially the same as that of the allied monomorphic genus *Bellonella* (*Nidalia* auct.)[1] which has a cylindrical stem ; in *Bellonella*, however, the coelenteric canals within the capitulum are about as large as the autozooidal gastric cavities and not narrowed downward (Kükenthal, 1906).

On account of the polyp dimorphism, Verrill (1922) established a family Anthomastidae which was later placed by Bock (1938) in the family Alcyoniidae s. str. as subfamily. I can wholly agree with the latter opinion. But if it is to be established, the subfamily Anthomastinae may comprise two natural groups; one is the deep-water forms such as *Anthomastus* and allies, and the other the tropical shallow-water forms such as *Sarcophyton* and allies. In the former group, the colony is vividly colored red or orange and rather simple or monocentric in growth form, with comparatively well developed siphonozooids, whereas in the latter group the colony is dull colored and rather polymorphous or irregularly folded, sometimes growing to a large size, with comparatively weakly developed or rudimentary siphonozooids. *Minabea* of course belongs to the former group. Such subdivision of the family into two subfamilies, viz. Alcyoniinae and Nidaliinae, as made by Kükenthal (1906) seems to be little significant.

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1) As regards the dissimilarity between the genera *Nidalia* and *Bellonella* and their systematic positions, another paper will be devoted after the revised examination of the species.

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Postscript : While this paper was in press, Hj. Broch and A. Horridge's paper "A new species of *Solenopodium* (Stolonifera : Octocorallia) from the Red Sea" has been published in Proceedings of Zool. Soc. of London, Vol. 128, pt. 2, pp. 149-160, April 1957. In this (pp. 157-159), Dr. Broch commented upon the systematic relationship between the Alcyonacea and Scleraxonia, and paid attention to the similarity of cortical spicules between *Anthomastus* and *Paragorgia* as I have mentioned above. He states that "It would be a remarkable example of convergency, if this were not due to a very close relationship." This viewpoint may be certainly correct, but it seems to me to be in conflict with his following argument, that is "We must include *Paragorgia, Sibogagorgia, Anthomastus,* and *Bathyalcyon* in one family, the Paragorgiidae."

At all events, the limitation between the three orders, Stolonifera, Alcyonacea and Gorgonacea is not very clearly defined in the primitive forms. For all reasons, especially practical purposes, however, it would seem more advisable to retain both the Briareidae and Paragorgiidae among the primitive Scleraxonia, separating them from the dimorphic Alcyoniidae among the Alcyonacea, as before.