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Hydractinia antonii sp. nov.: a new, partially calcified hydractiniid (Cnidaria: Hydrozoa: Hydractiniidae) from Alaska

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A new partially calcified hydroid species of the family Hydractiniidae, was found in offshore waters of the Aleutian Islands (Alaska), dredged from the bottom at 139–145 m depth. This is the third known species of extant calcified Hydractiniidae, and it shows a unique colony structure. The base is heavily calcified and the distal parts are ramified and have a solid chitinous structure. Branches are all in one plane and the colony reaches up to 18 cm in height.

INTRODUCTION

The family Hydractiniidae is one of the three hydrozoan families that have species with calcified skeletons. While all the species of the families Stylasteridae and Milleporidae are calcified, only two extant genera and two known species of Hydractiniidae (*Hydrocorella africana* Millard, 1975 and *Janaria mirabilis* Stechow, 1921) are known to have a calcareous skeleton. The morphology of the colonies formed by the two genera is quite similar. They both have completely calcified skeletons encrusting gastropod shells inhabited by hermit crabs. Their geographical distribution is extremely disjunct, *Janaria* being found only in the east Pacific, and *Hydrocorella* only in the east African coast. A new, undescribed species with a calcified base and unique colony morphology is here added to this list. It has been found in neritic waters off the Aleutian Islands (Alaska). The present species is unique in the branching pattern and arrangement of polyps, and in having a heavily calcified base while the

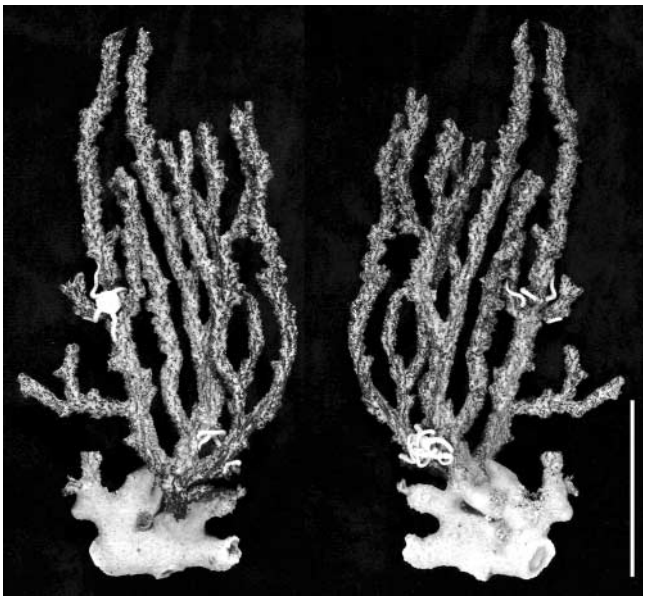

Figure 1. General appearance of the colony of *Hydractinia antonii*: holotype. Scale bar: 5 cm.

Figure 2. Image of the paratype.

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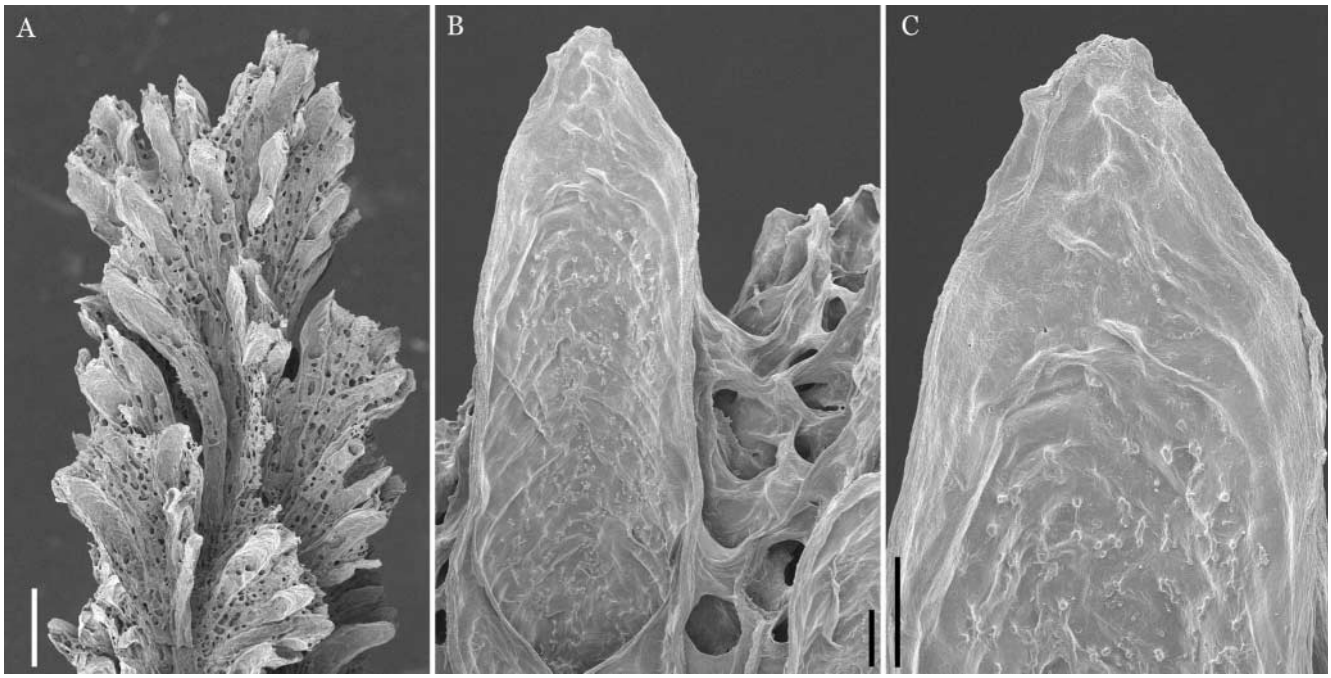

Figure 3. Scanning electron microscopy images of the chitinous structure of the colony after digestion of the soft tissue with proteinase K, with details of processes that can be considered spines. Scale bars: A, 1 mm; B&C, 0.1 mm.

rest of the colony is formed by a chitinous skeleton. The periderm covered hydrorhizal tubes running parallel to each other are covered on one side by chitinous scale-like structures. The polyps are in the upper axils of these scales. The overall appearance of the colony resembles that of Gorgonacea (see Figures 1–3).

MATERIALS AND METHODS

Sampling and identification

The two specimens described here were collected by dredging in deep waters offshore from the Aleutian Islands (Alaska, USA). One sample was collected at 137–144 m depth, coordinate 71: 52.074′N 172.567′W. The other was collected at 376–382 m depth, coordinate 84: 52.649′N 172.281′W. Both specimens were collected by dredging from Vessel 23, of a US National Oceanic and Atmospheric Administration (NOAA) cruise organized by the Alaska Fisheries Science Center in 2000/2001.

The specimens were promptly fixed in 90% ethanol. They were then properly identified as a species of Hydractiniidae by S. Cairns at the National Museum of Natural History (NMNH), Smithsonian Institution in Washington, DC (USA), and Dale Calder at Royal Ontario Museum (ROM), Toronto (Canada), and sent to the author.

Systematics

For the higher groups, the classification of Bouillon & Boero (2000) was adopted. For the generic level classification the proposal by Boero et al. (1998) of merging all the genera in *Hydractinia* was followed. The material examined has been deposited with the NMNH in Washington, DC (USA).

SYSTEMATICS

Class HYDROZOA
Subclass ANTHOMEDUSA
Order FILIFERA
Family HYDRACTINIIDAE L. Agassiz, 1862
Genus *Hydractinia* Van Beneden, 1841

Hydractinia antonii sp. nov.
(Figures 1–5)

Type material

Holotype (Figure 1): one fertile colony collected by dredging offshore from the Aleutian Islands (Alaska, USA) from Vessel 23, on a NOAA cruise organized by the Alaska Fisheries Science Center, and numbered 2000/1. Coordinate 71: 52.074′N 172.567′W. Depth: 137–144 m, bottom temperature 4.3°C. Haul number: 72, Transaction 2026552, recorded at the NOAA—Alaska Fisheries Science Center on 5 August 2002. Colony collected on 5 June 2000 and preserved in 90% ethanol by J.H. Orr. Catalogue no. 1080384.

Paratype (Figure 2): one colony collected by dredging from Vessel 23, on a NOAA cruise numbered 2000/1 offshore from the Aleutian Islands, coordinate 84: 52.649′N 172.281′W. Depth 376–382 m, bottom temperature 3.5°C. Haul number: 84. Transaction 2026552 recorded at the NOAA—Alaska Fisheries Science Center on 5 August 2002. Colony collected on 5 June 2000 and preserved in 90% ethanol by J.H. Orr. Catalogue no. 1026518.

Etymology

The species is dedicated to Antonio Miglietta.

Diagnosis

Colony erect and shrub-like branched, basally calcified and white; distal skeleton chitinous and brown, perisarc forms chitinous scales. Polyps with mostly two, sometimes

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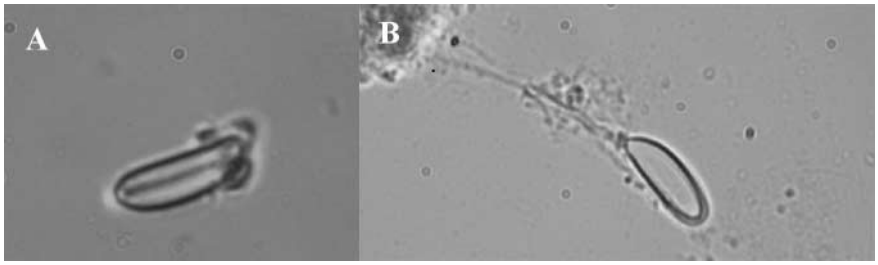

Figure 4. (A) Undischarged microbasic eurytele (magnification=100×); and (B) discharged microbasic eurytele (magnification =100×).

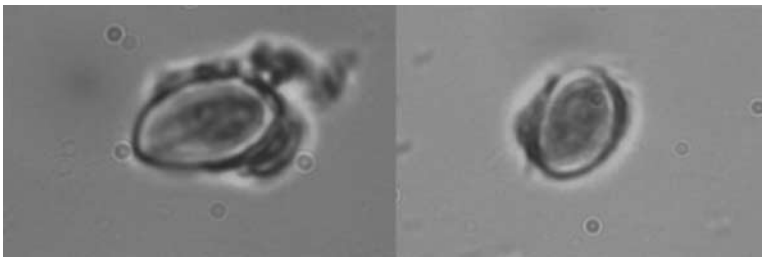

Figure 5. Third type of unidentified nematocyst (magnification=100×).

three to five thick tentacles. Reproduction by fixed cryptomedusoids (see Remarks).

Description

Base of the colony massive and heavily calcified, white, two anchoring points with substrate (probably rocks) visible. Broken base of both specimens built of calcium carbonate with the centre of the main stems orange in colour and appearing to be 'fresh' or alive, or at least harbouring living tissue. Calcified base shows a gradual transition with the upper parts. Living polyps protrude from openings in the calcified portions.

Five or more main arborescent stems arising from the base, all on the same plane and oriented in the same direction. Colony shrub-like, up to 18 cm high and 10 cm wide. Main branches divide several times. Non-calcified part of colony supported by a chitinous brownish skeleton formed by a three-dimensional meshwork and scale-like plates. Bundles of light-pink tubes of hydrorhiza running parallel (in longitudinal direction) to each other and forming a scale-like perisarc-plate toward the outer side. Hydrorhizal tubes covered with a thin periderm layer. Scales appear to be massive (Figure 3) and are distributed all over every branch. Branches formed by a complex three-dimensional meshwork and the scales. Gonozooids and gastrozooids pink, densely distributed over the whole colony. Each polyp inserted at the base of a brownish, chitinous scale that anchors and protects it.

Gastrozooids are small (1.2 mm) and have a few (two to five) thick tentacles arranged in a single row around the hypostome. Most of the polyps have only two tentacles that are almost as thick as the body of the polyp. The hypostome is very small. Tentacles are usually about 0.5 mm in length.

Gonozooids of same size as gastrozooids. Usually one, but sometimes two or three gonophores developing from each gonozooid, in the upper half of the body and arranged in one whorl. Gonophores apparently in the form of cryptomedusoid, with four radial canals. The fertile colony examined (holotype) had female gonophores each containing numerous small eggs. Dactylozooids present in form of tentaculozooids, very numerous and evenly distributed throughout the whole colony; their appearance is variable, from short and thick, to long and thin. No spiralozooids were found.

Nematocysts: desmonemes, microbasic euryteles, and a third type of unidentified nematocysts (Figures 4 & 5).

DISCUSSION

The present species has a unique structure. Its main characteristic is the presence of a massive calcified base and ramified chitinous erect parts, which make *Hydractinia antonii* one of the tallest hydractiniid species ever described.

The family Hydractiniidae is one of three families within the class Hydrozoa that is able to produce a calcium carbonate skeleton. There were so far only two known species of Hydractiniidae that are able to build a calcium carbonate skeleton, namely: *Janaria mirabilis* Stechow 1921 (rediscribed by Cairns & Barnard, 1984), found from California to Panama and off Fiji, and *Hydrocorella africana* Millard, 1975 from South and West Africa. These two species have completely calcified colonies, and grow on hermit crab shells, encrusting them with a calcium carbonate coating, within which the polyps lie (for a comparison between these two species see Cairns & Barnard, 1984).

The present species is the third known calcified Hydractiniidae and the only one being only partially calcified. It also clearly differs from the above mentioned species in the complex architecture of the colony and its big size. The substratum on which the colony was found is not known, as the colony was obtained by dredging, but it can be safely assumed, given the size of the colony, that it was rock and not a hermit crab shell.

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Given the unique colony shape, the mitochondrial 16S gene of *Hydractinia antonii* was sequenced and a molecular analysis confirmed it belongs to the family Hydractiniidae. A phylogenetic discussion on the evolution of this calcified species and the other calcified Hydractiniidae is beyond the scope of this work and will be discussed in a separate paper, currently in preparation by the author.

A species that resembles *Hydractinia antonii* in colony structure is *H. bayeri* (Hirohito, 1984), described from the Bay of Panama. *Hydractinia bayeri* does not show any calcified parts, but has a shrub-like structure with a basal part from which dichotomously branching stems depart in one plane. The hydrorhiza is coenosarc-covered and chitin is the support of the entire colony. *Hydractinia bayeri* and *H. antonii* are the only two species within the family Hydractiniidae that have a branching complex architecture that can reach several cm in height.

Despite their general resemblance, the differences between the two species are conspicuous. *Hydractinia bayeri* does not have any calcified structures, and the base of the colony is chitinous as is the rest of the colony. The polyps of *H. bayeri* are also taller (2 mm in length) than polyps of *H. antonii*. They also have up to 16 tentacles and the sporosacs lack radial canals.

The unique morphological traits that characterize this new species, the bush-like form of the colony and the combination of a calcified base and a chitinous complex branching morphology, justify the designation of *Hydractinia antonii* as a new species.

Remarks

The general appearance of the colony strongly resembles a gorgonian due to its shape and dark colour. Furthermore ophiuroids are found on the branches of *H. antonii*, which is quite common for gorgonian corals. The ophiuroids were identified as *Ophiolebes brevispina* by Cindy Ahearn (personal communication).

Due to the preservation in ethanol, not ideal for the preservation of morphological details, the identification of the gonophores as cryptomedusoids remains somewhat uncertain.

The chitinous scales can be considered homologous to the spines that are present in most other species of Hydractiniidae.

I am grateful to Steve Cairns (Smithsonian Institution, NMNH, Washington, DC, USA) and Dale Calder (Royal Ontario Museum, Toronto, Canada) who sent me the specimens of *Hydractinia antonii*. I also owe sincere thanks to the entire Cunningham Laboratory (Duke University, NC, USA) and I am especially thankful to Alberto Lindner (Duke University) for discussion and suggestions and for providing the scanning electron microscopy pictures of *Hydractinia antonii*. Steve Cairns (NMNH, Washington, DC, USA) provided useful comments and discussion. This manuscript was greatly improved by the comments of Anuschka Faucci (Hawaii University, HI, USA) and two anonymous referees. This work was supported by the National Science Foundation PEET Grant No. DEB-9978131 A000.

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