



## *Carybdea alata* auct. (Cubozoa): rediscovery of the *Alatina grandis* type

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Numerous nominal species have been considered synonymous with *Carybdea alata* Reynaud, 1830 (cf. Gershwin 2005). A recent revision concluded that several of the species collectively referred to as *C. alata* are valid and indeed separate species (Gershwin 2005; but see also Bentlage *et al.* 2010). Additionally, these species (including *C. alata*) were moved into the genus *Alatina* Gershwin 2005 (family Alatinidae Gershwin, 2005) because of stark morphological differences they display compared to the other species of *Carybdea*. In particular, *Alatina* species possess crescentic phacellae and a rhopalial niche ostium that is covered by a single upper and two lateral scales (t-shaped *sensu* Gershwin 2005; cf. Bigelow 1938) compared to a single upper covering scale (heart-shaped *sensu* Gershwin 2005; cf. Bigelow 1938) and epaulette-like or linear phacellae in the corners of the stomach in *Carybdea* species. Recent molecular phylogenetic analyses support the separation of *Carybdea* and *Alatina* (Bentlage *et al.* 2010). *Alatina grandis* posed a problem in Gershwin's (2005) revision, as the type of this species appeared to be lost to science, preventing a closer investigation of its identity. I located a type specimen of the species in the collections of the National Museum of Natural History, Smithsonian Institution (USNM). The purpose of this letter is to draw attention to this important specimen, and highlight directions for future studies on the evolutionary history of the genus *Alatina*.

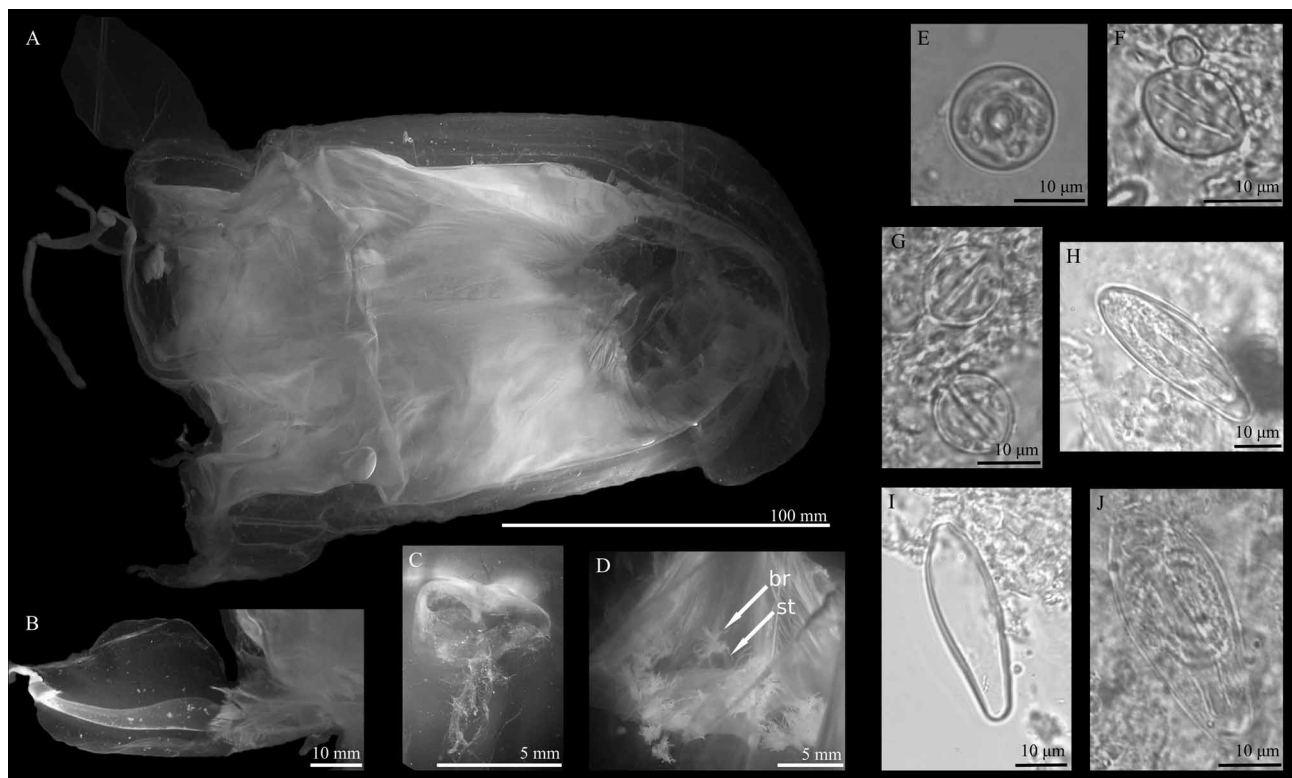
***Alatina grandis* (Agassiz & Mayer, 1902).** Agassiz & Mayer (1902) described *A. grandis*, the largest known nominal species of *Alatina*, from material collected by the steamer Albatross off Fakarava and Anaa Island in the Tuamotu Archipelago (Paumotu Islands at the time; see also Mayer 1910). Even though the authors included much detail in their description, a reinvestigation of this species seems necessary in light of recent taxonomic work. Agassiz & Mayer (1902) clearly investigated multiple specimens and observed a large variation in size among individuals, the largest one having a bell height of 230 mm. A single large specimen, USNM 42114, agrees well with the description given by Agassiz & Mayer (1902) and the labels contained in the jar clearly show that it was collected at the water surface off Anaa Island on board the steamer Albatross on October 15, 1899, matching the collection data in the original description of the species. Additionally, the original labels appear to bear A.G. Mayer's handwriting.

Fig. 1A shows the habitus of the specimen, a large individual of more than 200 mm bell height. The gelatinous substance of the bell seems rather thick compared to other species of *Alatina*. The bell is broken in the upper quarter and the specimen is generally in poor condition. Exumbrella and pedalia appear void of nematocyst warts. The pedalia are large and possess a prominent keel (Fig. 1B; cf. Plate 6 in Agassiz & Mayer 1902). The rhopalial niche ostium is covered by one upper and two lateral covering scales like the rhopalial niche ostia of all other members of the family Alatinidae (Fig. 1C). The rhopalia are either missing (cf. Fig. 1C) or quite deteriorated. I did not investigate the rhopalia closer in order to count the number of eyes present, so as not to damage the fragile specimen further. Agassiz & Mayer (1902) report a varying eye number, but they are not explicit as to whether they observed the eyes in live specimens or after these had been fixed for some period of time. In the latter case the pigment of the eyes may have faded and the lenses deteriorated leading to inaccurate counts. The velarium is nearly completely missing in USNM 42114 and the number and shape of velarial canals cannot be determined. Agassiz & Mayer (1902) report three velarial canals per octant and well-developed frenulae. The phacellae, described as crescentic and lining the stomach in the interradii, are only preserved in one stomach corner in USNM 42114. Individual gastric cirri seem to arise from a single trunk that then branches in a tree-like fashion (Fig. 1D).

Nematocysts were not reported from *A. grandis* before. I investigated both the cnidome of the tentacles and gastric cirri. The following measurements are given as Min-Mean-Max in  $\mu\text{m}$  and identifications follow Mariscal (1974); heteronemes displaying a v-shaped notch in the undischarged shaft were classified as "p-" following Östman (2000). The tentacles contained small spherical isorhizas (length: 13.3-14-14.6, width: 12.7-13.5-14, n=5; Fig. 1E), small oval p-heteronemes (length: 12.7-14.3-15.7, width: 11.1-11.9-12.9, n=15; Fig. 1F-G), and large cigar-shaped p-heteronemes

(length: 39-40.4-41.7, width: 12.9-15.2-17.4, n=8; Fig. 1H-J). Gastric cirri contained the same large p-heteronemes as the tentacles (length: 40.7-43.6-45.1, width: 14.6-15.8-17.1, n=8). A small oval capsule (length: 15.6-16.3-16.9, width: 10.8-12.6-13.9, n=2) was also contained in the cirri, but the internal structure of all capsules observed was highly damaged. Given the shape and size it is likely identical to the small p-heteroneme found in the tentacles. The observed nematocysts were generally undischarged, but several of the large capsules were discharged. However, all discharged nematocysts lacked shaft and tubule, making more detailed identification of nematocysts impossible.

**Remarks.** With conflicting views over the validity of some *Alatina* species (compare Gershwin 2005 with Bentlage *et al.* 2010 concerning *A. moseri* and *A. mordens*), the specimen described above may prove valuable in future studies. Currently, Gershwin (2005) considers many regionally restricted species of *Alatina* valid, whereas Bentlage *et al.* (2010) suggest that several of these nominal species of *Alatina* may actually represent single widespread species. In particular, Bentlage *et al.* (2010) showed that *A. mordens* Gershwin, 2005 from the Coral Sea and *A. moseri* (Mayer, 1906) from Hawai'i likely represent the same species based on molecular genetic data (the mitochondrial 16S gene). In this context, *A. grandis* is of great interest. *Alatina grandis* was discovered somewhat in between these two geographic locations and may also be part of this potentially widespread species (cf. Mayer 1910 who considered *A. moseri* a small variety of *A. grandis*). Future work on *Alatina* should involve reevaluating the variability of morphological characters currently employed for species delineation in light of additional molecular data to decide upon the nature of the nominal *Alatina* species.



**FIGURE 1.** A: habitus of the specimen (note the break in the upper portion of the bell); B: pedaliar; C: rhopalium with a single upper and two lateral covering scales (the rhopalium is missing and only the stalk remains); D: gastric phacellus with individual cirri in the stomach cavity (br: branching part of cirrus, st: stalk of cirrus); E: spherical isorhiza; F & G: small oval p-heteroneme; H-J: large cigar-shaped p-heteroneme (H & J undischarged; I: discharged).

### Acknowledgements

I wish to acknowledge the Smithsonian Institution for awarding a pre-doctoral fellowship to me. Additionally, my research is funded through US NSF Assembling the Tree of Life grant EF-053179 to Pauly Cartwright, Allen G. Collins, and Daphne Fautin, and US NSF Doctoral Dissertation grant DEB-0910237.

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