

Nematocysts of the Sea Anemone Worn by the Egg Capsules of Its Predator Snail—A Preliminary Note

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Alexania (formerly *Habea*) *inazawai*, described originally by Kuroda in 1943, is a little epitoniid snail semiparasitic on the intertidal sea anemone, *Haliplanella luciae* (see Habe, 1943). A single specimen of this snail was found casually in summer 1973, infesting the said species of anemone which were kept in one of our small laboratory aquaria. It was likely to have been brought in unnoticed in association with the anemones from Hashirimizu Beach on Miura Peninsula. Actually several more individuals were collected later at the same beach among colonies of *Haliplanella* and joined the first one in the laboratory.

In the laboratory it was observed that the snails stuck usually on the column of anemone bodies toward the base, boring into the body wall, and would stay there even all day long seemingly ingesting the flesh or fluid, just as stated by Habe in the section in Japanese of his 1943 paper. While thus devouring the anemones they were found to lay numerous capsules of egg masses on the substratum nearby (Figure 1, A). In fact, it was even felt that there might be some kind of association between the feeding on the anemone and the egg-laying activity.

The number of the egg capsules laid at one spot was ten or a little more. Each of the capsules, ellipsoid in shape, contained more than hundred eggs of yellowish white color as described by Habe, but it was a surprising finding indeed that there were in most of the cases a type of nematocysts, all naked and in still undischarged state, attached abundantly over the surfaces of the outer jelly layer of the capsules (Figure 1, B and C). While these nematocysts were arranged there in a random fashion, they were much similar in appearance to the microbasic p-mastigophores contained in the acontia of *Haliplanella luciae*, which were objects so familiar under microscope to any member of this laboratory, and it is most likely that they were derived actually from this source somehow in the course of feeding of the mother snail. The situation of the nematocysts on the egg capsules was examined by fixing these with Bouin's fluid for some two hours and staining the sections with Delafield's iron haematoxylin and eosin.

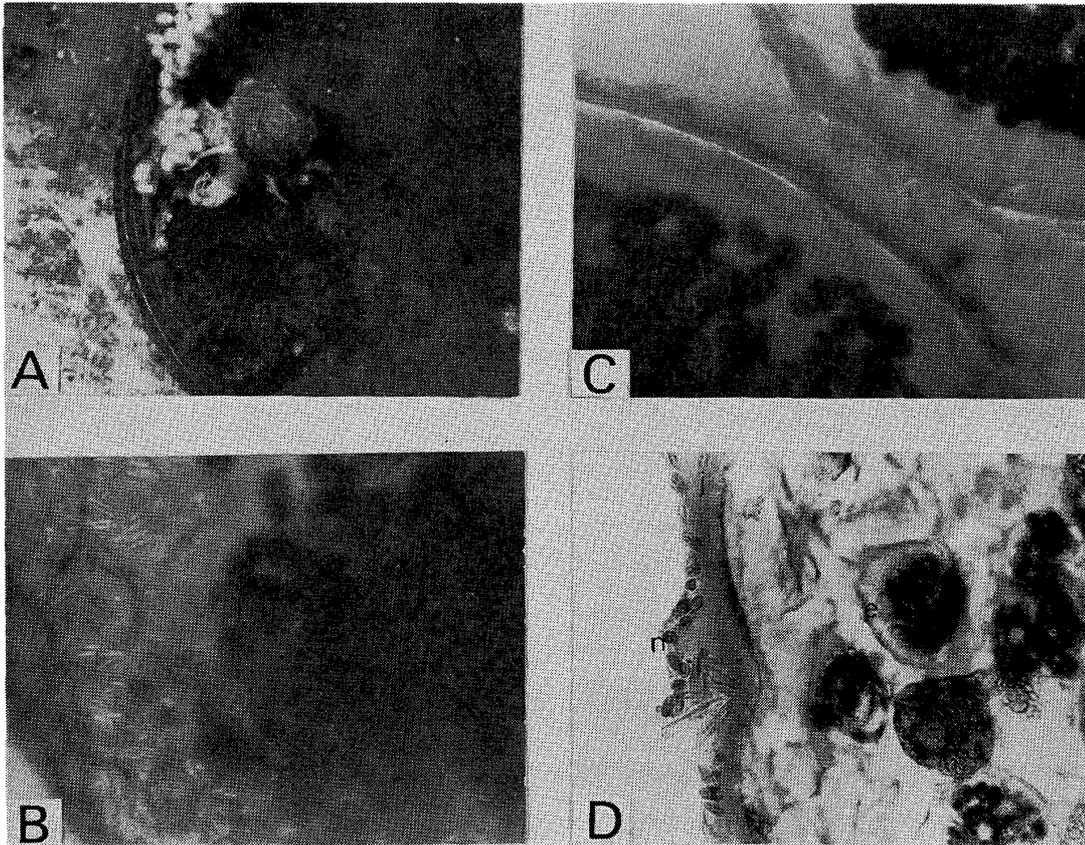
It may be seen from Figure 1, D that the nematocysts lie there in a state half-buried in the jelly surface. The peculiar reticulate sculpture on the jelly surface as described by Habe is also to be noticed.

Such a case of cnida-bearing egg capsules may remind us of the eggs of the anthomedusan, *Bougainvillia multitentaculata*, which were reported by Szollosi (1969) to be spawned with an envelope consisting of a single layer of cnidocytes each housing its nematocyst. These cnidocytes were shown by Szollosi to be of maternal origin. A point of difference in the present case of *Alexania*, besides the fact that it is the egg capsules and not the individual eggs which bear the nematocysts, is that the nematocysts here must necessarily be derived from some other animals belonging to cnidarians. This point will raise a question concerning protection from stinging, a question which should be common to all the cases of "cleptocnidae" or stolen nematocysts.

As for another question of whether the eggs in the present case are really "armed" with the nematocysts as were suggested by Szollosi for the case of *Bougainvillia*, it is necessary to demonstrate an actual effectiveness of the nematocysts in protecting the eggs against the enemy. The writer can present only a casual piece of observation as yet that when some such egg capsules were thrown to a goby in a small aquarium, they were snapped at by the latter but spat out at once each time. All the egg capsules were found to be still lying there next morning. However, it may be pertinent to note in this connection that the nematocysts worn by the egg capsules of *Alexania* were found to be in a state of relative refractoriness toward external "stimuli". Dilute (0.2M) HCl solution that was known to evoke discharge of mastigophores freshly isolated from *Haliplanella acontia* (Yanagita and Wada, 1953) was found to be without effect on them. However, that the potency for explosion had not yet been lost was evidenced by a high rate of discharge induced by much concentrated (over 10 M) HCl solutions as well as of 1% pronase solution, though the discharge was somewhat anomalous one in that the threads everted were arrested halfway in the former case or of undulated shape in the latter. The desensitizing effect of an extended immersion in a salty medium (sea water) on the nematocysts in isolation (Yanagita, 1959) may be responsible for the state of refractoriness in the present case. For the moment the question mentioned above remains still open.

It is also unclear as yet how these nematocysts are derived from the acontia to be eventually taken on by the egg capsules. Even it is unknown whether they have once passed through the alimentary canal of parent snail at all. Elucidation in future of these questions as to the whole procedure of the present phenomenon is expected to throw light somehow also on the problem of its biological meaning, as well as the physiological mechanisms.

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- A. An *Alexania* snail with its snout stuck into the anemone's column, out of which the acontial filaments are seen coming extruded. Egg capsules are also shown as laid already abundantly on the snail's side. About half the life-size.
- B. Surface view of part of the egg capsule under transmitted light. Note the reticulate sculpture on the jelly surface, the glistening nematocysts, and the darkened eggs inside. $\times 50$.
- C. Same as B; there are cases, though being only few, in which the egg capsules are free from the nematocysts like this. $\times 50$.
- D. Cross-section of an egg capsule, fixed and stained. The nematocysts (n), stained with eosin, are shown in cross- as well as longitudinal sections in a state half-buried in the surface of jelly layer (j). The eggs (e) are stained with haematoxylin. $\times 190$.

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