ON THE BREEDING OF A PERIWINKLE, LITTORIVAGA ATKANA (DALL)

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ON THE BREEDING OF A PERIWINKLE, *LITTORIVAGA ATKANA* (DALL)[1,2,3]

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(With one figure and one plate)

Littorivaga atkana (Dall) is a common periwinkle on the rocky coast in the neighborhood of the headland of Tachimachi in Hakodate, Hokkaidô, Japan. The writer observed the breeding of *Littorivaga atkana* (Dall) in February, 1957, at the headland of Tachimachi and found that it liberates and deposits eggs on the stones.

Here the writer thanks Dr. Eturô Hirai, Director of the Marine Biological Station of the Tôhoku University at Asamushi, Aomori Prefecture, Japan, for his supervision during the course of this investigation, and Mr. Seiji Ishikawa, of the Hakodate Municipal Museum, and Mr. Tatsuo Yusa, of the Hokkaidô Regional Fisheries Research Laboratory, for their kind aids given to the writer in collections.

MATERIAL AND METHOD

From December, 1956, to May, 1957, specimens of *Littorivaga atkana* (Dall) were collected from high to low tide of the rocky coast in the neighborhood of the headland of Tachimachi in Hakodate. The materials were cleaned carefuly with fresh water and 10~15 animals were placed in each separate glass bottle, each containing about 30 cc sea water. During the breeding season after the bottles containing the animals were filled with sea water, the liberated eggs were found on their bottoms. The liberated egg masses were also observed in the field at the headland of Tachimachi.

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1) Contributions from the Marine Biological Station of Asamushi, Aomori Ken, No. 238.

2) The Japanese name is Kurotamakibigai.

3) Acknowledgements are due to Dr. Tadashige Habe, of the Amakusa Marine Biological Laboratory of the Kyushu University at Amakusa, Kumamoto Prefecture, Japan, for his kind identification of this species. On February 5th, Dr. Habe informed to the writer that *Littorivaga atkana* (Dall) must be included in the genus *Neritrema* Recluz, 1869, mainly based on its mode of reproduction mentioned in the present paper.

OBSERVATION

The specimens of *Littorivaga atkana* (Dall) which were collected from rocky coast of the headland of Tachimachi (Fig. 2), from high to low tide on January 25, 1957, were received by the writer on January 26th. The animals were placed in a bottle, and on January 27th four separated eggs with faeces were found on the bottom of the bottle. The liberated egg capsule was covered by a thin membrane and surrounded by an oval, colorless and transparent capsule which was about 550 μ in diameter, and about 400 μ in thickness (Fig. 1). The egg was about 200 μ in diameter, and only one egg was found in each capsule. On February 3rd and 5th the animals which were placed in a bottle, liberated many eggs among which six eggs gathered in a mass (Fig. 6) in the laboratory. On February 3rd, the writer found the same deposited eggs in the ootheca of this species on the sides of stones at a place about 25 cm higher than the datum sea water level of the coast of Tachimachi (Fig. 5). The side of an ootheca is about 37×25 mm and includes about 120 egg capsules, and several oothecas gather to form larger masses. On March 31st, the largest masses were found on the coast of Sumiyoshi-cho in the neighborhood of the headland. The size of the masses is about 380×120×40 mm, and many animals were observed gathering near the egg masses (Fig. 3). Then on May 25th, the animals were observed which migrated to the high water level or a higher level from near low water tide. The liberated eggs required about four weeks to hatch from the capsules, and the young larvae did not swim in the bottles, but creeped on the bottom surfaces. The breeding continued from January to March on the rocky coast of Tachimachi.

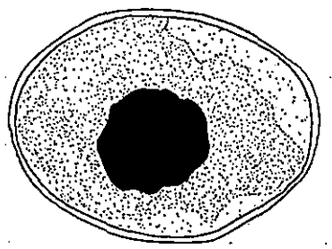

Fig. 1. The egg and capsule of *Littorivaga atkana* (Dall). ×78.

CONSIDERATION

Littorivaga atkana (Dall) liberates the deposited egg masses on the rocks. The egg mass consists of many capsules in ootheca, and its egg capsule is oval. According to Lebour (1937) *Littorina* (*Littorivaga*) *saxatilis* (Olivi) (=*L. rudis*) is viviparous, Thorson (1946) states that *Littorina saxatilis* (Olivi) var. *tenebrosa* Maton is viviparous, while Seshappa (1947) observed that *Littorina saxatilis* (Olivi) liberates egg masses. *Littorivaga brevicula* (Philippi) is oviparous and liberates helmet-shaped planktonic eggs (Kojima 1957). The common liberation type of the deposited egg masses is found in *Littorina* (*Neritoides*) *littoralis* (L.) (=*L. obtusata*) (Lebour 1937), *Littorina obtusata* Linné (Thorson 1946), while the latter species liberates the egg masses on the sea weed, and the egg capsule is elongate-

oval or of kidney shape. The migration of *Littorivaga atkana* (Dall) after the breeding season will suggest its seasonal migration.

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Plate VI. Breeding of *Littorivaga atkana* (Dall).

Fig. 2. The headland of Tachimachi in Hakodate, Hokkaidô, Japan.
Fig. 3. Largest egg masses of *Littorivaga atakna* (Dall) on a stone at Sumiyoshihama, Hakodate.
Fig. 4. The adult specimens of *Littorivaga atkana* (Dall).
Fig. 5. The egg masses of *Littorivaga atkana* (Dall) collected from the field.
Fig. 6. The liberated egg mass of *Littorivaga atkana* (Dall) in the laboratory.

Fig. 2.

Fig. 3.

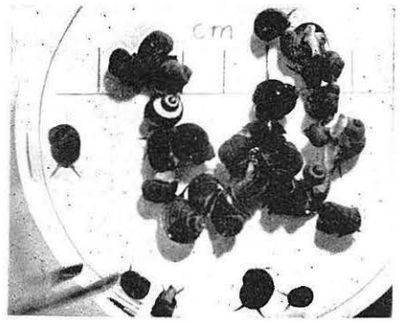

Fig. 4.

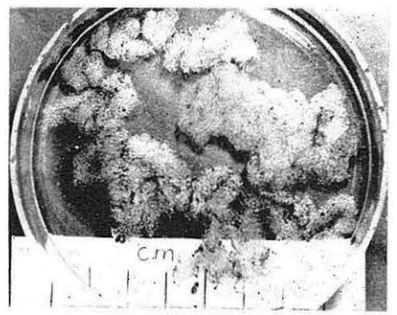

Fig. 5.

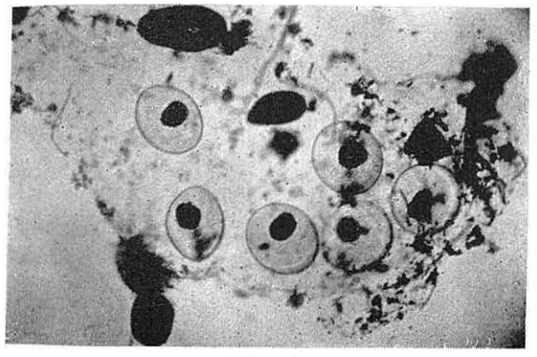

Fig. 6.