A BRIEF OBSERVATION OF OSSICLES IN A SEA CUCUMBER, *ILYODAEMON IJIMAI* MITSUKURI[1)]

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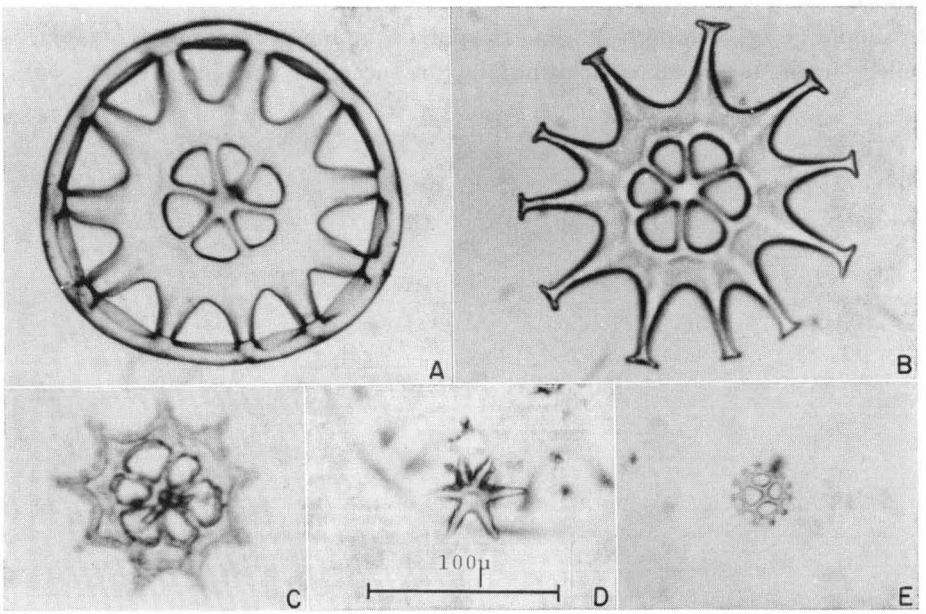
With Text-figures 1–3

I happened to examine the ossicles of a gelatinous sea cucumber, *Ilyodaemon ijimai* Mitsukuri, obtained on July 12, 1974 from the 300 m depth off Teuchi of Shimokoshiki Island off the west coast of Kyushu. The specimen was 100 mm long in the fixed state. In addition to the typical wheels (Fig. 1, A) characteristic to this species, there were found a small amount of ossicles of the other types (Fig. 1, B–D) which seemed to me to represent respective developmental stages of the wheel. Then, I naturally thought the wheels were being constructed in that specimen.



Text-fig. 1. Wheels of *Ilyodaemon ijimai*. A: Completed large wheel. B–D: Rudimentary or vestigial stage of ? large wheel. E: Small wheel.

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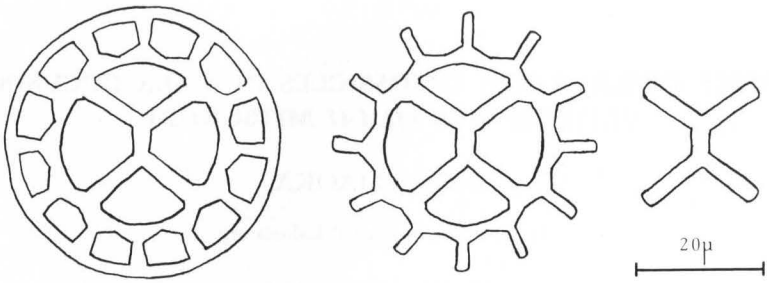
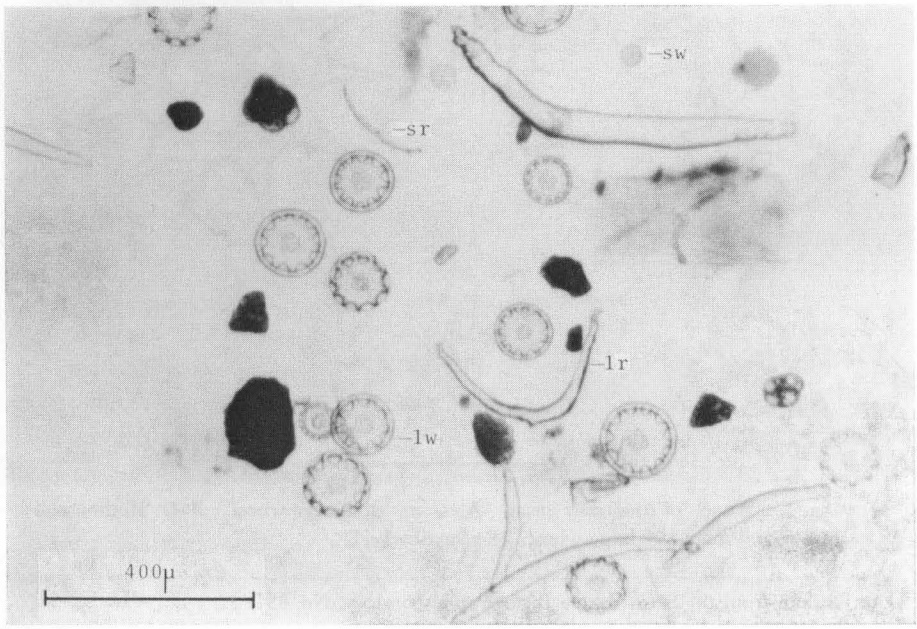


Text-fig. 2. Small wheels of *Ilyodaemon ijimai*. A small wheel (left) and two successive stages, developing or degenerating.

In consulting the literature, however, I met with a paper of Mitsukuri (1897) reporting that the tables of the Japanese edible sea cucumber, *Stichopus japonicus* Selenka, would break down with age and therefore the maximal size and the most complicated configuration of tables were seen in the individuals of 10–30 mm long and then the size was reduced with the growth. Thus, five reduction stages of the table were shown by the author in 10–250 mm long specimens of that species. Although *Stichopus* belongs to the family Stichopodidae and *Ilyodaemon* is included in a different family Laetmogonidae, the wheels in *Ilyodaemon ijimai* might follow the case of *Stichopus japonicus*. If this is the case, the wheels in that specimen are not being constructed but should be being broken down. In spite of the importance of the ossicular morphology in the taxonomy of holothurians, the successive changes of ossicles with the



Text-fig. 3. Rods of *Ilyodaemon ijimai*.

growth, as far as I am aware, have been little reported. Thus, I tried to see whether the wheels increase, or decrease or are reduced with the growth in three further specimens of different sizes of *I. ijimai*.

Material and Method

The following three specimens were submitted to study; viz., a 42 mm long specimen collected on July 18, 1975, from the 300 m depth, around the Koshiki Islands off the west coast of Kyushu, and 94 mm and 146 mm long specimens collected on November 9, 1975, from the 400 m depth in the same area.

These three specimens were each cut into lateral halves; one half was used for the examination of ossicles, while the other half for the estimation of the total amount of calcium as mainly calcium carbonate in respective individuals. The observation and measurement of ossicles were made on the photographs of the ossicles collected from one half of the specimen macerated in a solution of sodium hydroxide. The ossicles included in the other half and collected in the same way were dissolved in a solution of hidrochloric acid and the quantity of calcium contained in them was measured by the chelatometry method.

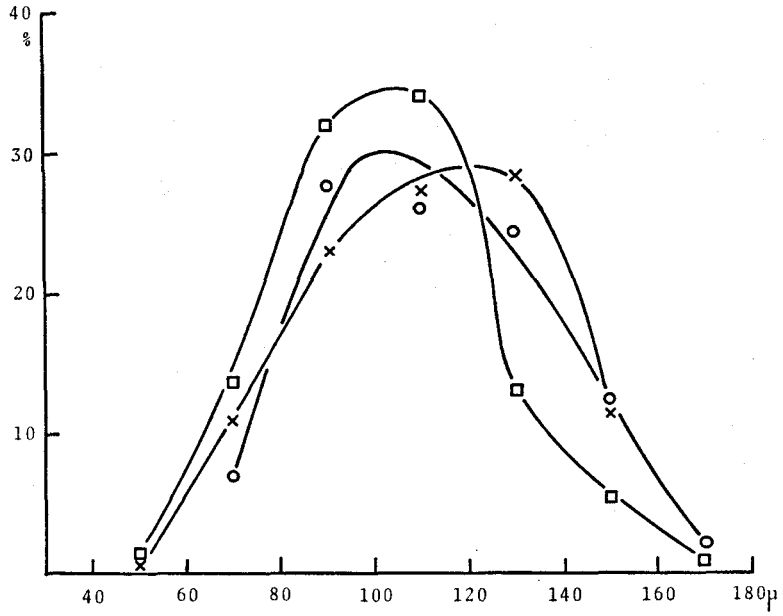
Generally, there are three kinds of ossicles in the present species; wheels, rods and minute granular deposits. Two kinds of wheels are definable, larger wheels (Fig. 1, A) are generally 60 to 150 μ in diameter, with distinct rim, and distributed nearer the surface than smaller wheels (Figs. 1, E; 2) which are 40 to 60 μ in diameter. In the smaller wheel shown in the figure the rim is seen very faintly, but there are also found a number of small wheels which are wholly devoid of the rim, and a small number of ossicles which are regarded as showing the stages of either developing or degenerating process of the small wheel (Fig. 2). There are two kinds of rods, too; larger rods are 280 to 1100 μ in length (Fig. 3) and contained in the wall of tube feet, while smaller rods are only 60 to 210 μ and included in tentacles.

It was planned to learn whether the larger wheels are constructed continuously throughout the growth, increased, or decreased by reduction of completed wheels, by reading the percent of the larger wheels to the total ossicles, but excluding the small rods and granular deposits, and by estimating the total amount of calcium as calcium carbonate in respective specimens; the calcareous ring was included in the latter estimation.

Results of Observations

The range of the size fluctuation of the larger wheel in the three specimens is shown in Fig. 4; that seemingly shows no significant difference between the 42 mm and 146 mm long individuals. The percent of larger wheels to the total ossicles (large and small wheels and larger rods) remains nearly constant throughout the growth (Table 1). The amount of calcium as calcium carbonate increases with the growth and the ratio of estimated calcium to the wet body weight is nearly the same in the 146 mm long specimen as in the 42 mm long one.

From these, it is evident that the reduction of the tables with the growth as



Text-fig. 4. Size fluctaction of large wheel in 42 (cross), 94 (square) and 146 (circle) mm long specimens of *Ilyodaemon ijimai*.

Table 1. Percent of large wheels to the total ossicles, but exclusive of small rods and granular deposits, and amount of calcium as mainly calcium carbonate in 42, 94 and 146 mm long specimens of *Ilyodaemon ijimai*.

Sp. no.	Large wheel	Small wheel	Large rod	Ca in total ind.	Ca/body weight
L- 44	25.9%	48.1%	26.0%	8.8 mg	1.38 mg/g
L- 94	26.0	56.0	18.0	15.0	1.55
L-146	24.4	47.8	27.9	40.6	1.38

suggested for *S. japonicus* can not be the case for *I. ijimai*. It is very strange, but none of the rudimentary or vestigial wheels which were observed in the 100 mm long individual obtained in July, 1974 occurred in all the three specimens collected in 1975. At present, I can not explain this in any way. The stable ratio of larger wheels to the total ossicles may indicate the increase of wheels with the growth, though this can never reject the breakdown of very old wheels. Therefore, a series of ossicles from simple stellate one to complete wheel, found in the 100 mm long individual, might show the course of reduction as well as the stages of formation.

Before closing the present preliminary note, I wish to express my hearty thanks to Prof. Tomoyuki Kubota of the Liberal Arts College of Kagoshima University for his suggestions and kind advices and also to Prof. Takasi Tokioka of the Seto Marine Biological Laboratory for his kindness in reading the manuscript.

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