

SOME OBSERVATIONS ON THE SWIMMING OF LABIDOPLAX DUBJA (SEMPER)

著者	Hoshiai Takao
journal or publication title	The bulletin of the Marine Biological Station of Asamushi, Tohoku University
volume	11
number	3
page range	167-170
year	1963-03-28
URL	http://hdl.handle.net/10097/00131161

SOME OBSERVATIONS ON THE SWIMMING OF
LABIDOPLAX DUBIA (SEMPER)¹⁾

By

TAKAO HOSHIAI

星合孝男

Marine Biological Station of Asamushi, Aomori Prefecture, Japan

It has been generally considered that an adult synaptid is a benthic animal and hardly shows swimming behaviour during its bottom life. Clark (1907) scarcely realized that synaptids swam and he mentioned that young synaptids were sometimes found floating in the water. So far as the writer knows, the fact that young *Leptosynapta inhaerens* swam, which was reported by Costello (1946), may be the only one adequate record concerning the swimming of synaptids.

On the night of June 10th, 1957, two swimming synaptids were collected from the shallow part of the rocky shore in front of the Marine Biological Station of Asamushi. As in June and July of the successive five years swimming synaptids have been observed, it should be considered that the swimming of the synaptid is not an accidental phenomenon. Therefore, some notes on the swimming of the synaptid will be described in the present paper.

Dr. Elisabeth Deichmann identified these swimming synaptids as the young of *Labidoplax dubia* (Semper).

The writer thanks Dr. Elisabeth Deichmann for her kind identification of the material and Dr. Chitaru Oguro, who informed him of Costello's paper. He is also indebted to Professors Mutsuo Katô and Eturô Hirai and Dr. Makoto Toriumi for their valuable criticism.

Swimming behaviour

Labidoplax, as well as *Leptosynapta* (Costello, 1946), swims only in extended state. The body of the swimming individual is transparent and no sand grains are found in the digestive tract of the swimming animal.

Costello (1946) illustrated that *Leptosynapta* swam showing the alternate criss-crossing. Clark (1907) described that floating synaptids seemed to move partly by the aid of the tentacles and partly by undulatory movement of the body. The writer observed that *Labidoplax* swims undulating its body both in the sea and in

1) Contributions from the Marine Biological Station of Asamushi, Aomori Ken, No. 305.

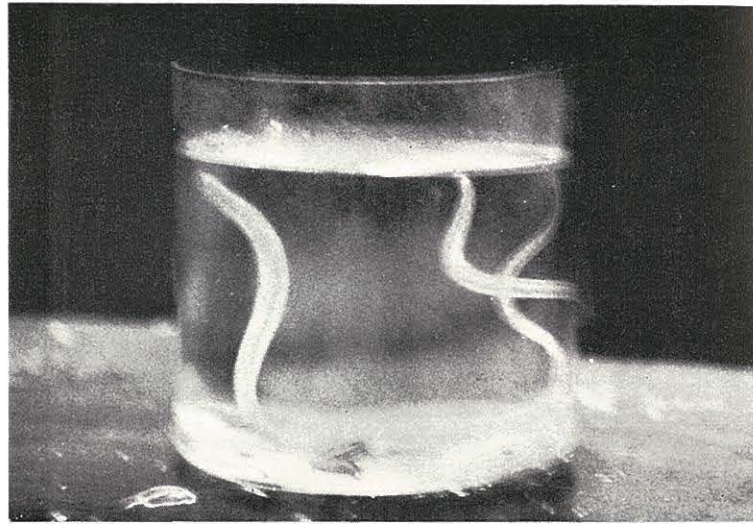


Figure 1. Swimming *Labidoplax* in the laboratory under natural dark condition. ($\times 0.5$) Detailed explanation in text.

the laboratory (Fig. 1). However, the function of the tentacles in the swimming of *Labidoplax* is not so remarkable as Clark stated (1907).

When *Labidoplax* swims, it directs its anal end toward the progressive direction, and is usually lifted higher than the oral end. If a swimming animal is touched with a plankton net, it ceases the swimming movement and sinks toward the bottom. When it reaches the bottom and touches it with the tentacles, it shrinks quickly. If a swimming individual is deposited on the sandy bottom by adding artificial stimulus, it begins to dig into the sand with its tentacles and becomes buried within two or three minutes.

When the burrowing animals, which were experimentally prepared, are brought into the darkroom, all of them project the oral end expanding their tentacles in the water from the bottom surface within a few minutes after darkening, and some of them begin to swim.

The season, in which Labidoplax swims

From July, 1961 to the end of June, 1962, collecting of the swimming synaptids was done between 8.00 p.m. and 9.00 p.m. twice or at least once a month in a definite area in front of the Station. It was ascertained that the period, in which the swimming synaptids were found at Asamushi, continued from early June to late July.

Relation between the swimming of Labidoplax and the lunar phase

From June 20th to July 20th, collections were performed at relatively close intervals and the following results were obtained;

Date	Number collected	Note
June 20	7	half moon, cloudy two days after full moon, windy and rainy
21	18	
30	3	
July 5	8	new moon
6	14	
10	2	
13	10	
15	5	
20	3	

As shown above, it may be said that the young *Labidoplax* swims during any lunar phase. To clarify the relationship between the lunar phase and the swimming of *Labidoplax* further observations are necessary.

Nocturnal swimming of Labidoplax

Throughout the afore-mentioned six years observations, it was noteworthy that *Labidoplax* could be observed to swim only in the nighttime. Therefore, the nocturnality of the swimming of *Labidoplax* became a problem. All swimming animals found in a definite area in front of the Station, were collected for 20 minutes every one hour.

The individuals collected are shown below;

Time	Number collected	Note
July 13 5.00 p.m.	0	
6.00	0	
7.00	0	sunset
8.00	2	dark
9.00	10	"
10.00	5	"
11.00	2	"
12.00	20	"
July 14 1.00 a.m.	13	"
2.00	9	"
3.00	0	"
4.00	0	dim light
5.00	0	sunrise

As swimming *Labidoplax* appeared one hour after sunset and disappeared one hour before sunrise, namely, it swam only during the dark period, it was expected that *Labidoplax* swam relating to the dark conditions during the so-called swimming season.

Simple tests on the response of Labidoplax to the dark- or light-condition

Costello (1946) pointed out that the swimming of *Leptosynapta inhaerens* might be a dark-conditioned phenomenon but he could not find swimming leptosynaptids in the darkroom during the day, except for only one individual swimming in the laboratory at 10.00 a.m. on August 16th, 1944.

In *Labidoplax*, swimming was easily induced in the darkroom even during the

day. Namely, 20 individuals of *Labidoplax*, which were collected at 12.00 p.m. on July 13th, 1961, and kept in the lighted laboratory, were divided into two equal groups. One was brought into the darkroom at 10.00 a.m. on July 14th and the other was left in the laboratory. By ten minutes after darkening, in the former, one individual began swimming and nine expanded and undulated their bodies. About 30 minutes later, three swam; and two hours later, six were observed swimming. In the latter group, no individual showed any apparent change.

When swimming *Labidoplax* was continuously lighted with a torch lamp in the sea, it sank to the bottom within about five minutes. *Labidoplax*, likewise, which was swimming in a glass vessel under natural dark condition, sank to the bottom by lighting with 100 watt lamp. Under artificially lighted condition, *Labidoplax* did not swim during the night, though the other specimens swam under natural dark condition.

Judging from the above-mentioned facts, it seems that the swimming of *Labidoplax* may be evoked by darkness and prevented by lightness.

SUMMARY

1. *Labidoplax dubia* swims showing undulatory movement of the body.
2. Swimming *Labidoplax* is found only in the night of June and July.
3. The swimming of *Labidoplax* must be a dark-conditioned phenomenon.

LITERATURE CITED

- CLARK, H.L., 1907. The apodous holothurians. *Smith. Contr. Knowl.*, 35: 1-231.
COSTELLO, D.P., 1946. The swimming of *Leptosynapta*. *Biol. Bull.*, 90: 93-96.