

DISCOVERY OF A HYMENOPTEROUS ECTO-PARASITE OF *OLIGOTOMA JAPONICA* OKAJIMA (EMBIOPTERA)

By Atsuo Yokoyama and Masami Tsuneyoshi
Educational Department, Kagoshima University, Kagoshima

I. Introduction

In the forest at Shiroyama, Kagoshima city, on June 25, 1956, the authors discovered the three females of *Oligotoma japonica* Okajima, parasitized by hymenopterous ectoparasite larvae which were hovering inside their nest over a trunk of *Machilus Thunbergii* Sieb. et Zucc. *Oligotoma japonica* was first discovered in 1917 at Tanegashima in southern Kyushu, and was described as new to science in the "Jour. Coll. Agr., Imp. Univ. Tokyo, 7 (4) pp. 411-432, 1926" by Prof. Ginji Okajima. In this country this species has been known to be the only one representative of the Embioptera Shiple, 1904, and to occur at several restricted places in Kyushu and Shikoku.

So far as the authors are aware, the parasitized *Oligotoma japonica* has been unrecorded from Japan and no special attention has been paid on the parasite of this species by any entomologist. This is the first record of the parasite of the Embioptera from Japan. The parasite was kindly determined by Dr. Keizô Yasumatsu as *Caenosclerogibba japonica* Yasumatsu (Family Sclerogibbidae).

II. Observations

Caenosclerogibba japonica is an ectoparasitoid of *Oligotoma japonica* Okajima, and oviposits upon the body of the adult insect. Several host adults with parasitoid eggs which were deposited within 24 hours were under our observation. All of them were dissected every day during June 25 to July 30, 1956, and the stages and the postembryonic development were observed.

Oviposition.

The eggs of this species are deposited on the sides of each abdominal sternum of the mature host female (Fig. 1). The data on dissection are presented in Table 1.

Table 1. Number and the position of the parasite-eggs on the abdominal sternites in each host.

No. of host	Abdominal sternites	I	II	III	IV	V	VI	VII	VIII	IX	X	Total number of eggs
1	Left Right		1	1	1	1	1	1	2			7 1 8
2	Left Right		1	1	1	1	1	2	1	1	2	5 13 18
3	Left Right		1	1	1	1	2	1	1		1	4 8 12
4	Left Right			1	1	2	1 1	1		2		8 2 10
5	Left Right			1	1 1	1 1	1 1	1 2		1	1	6 7 13

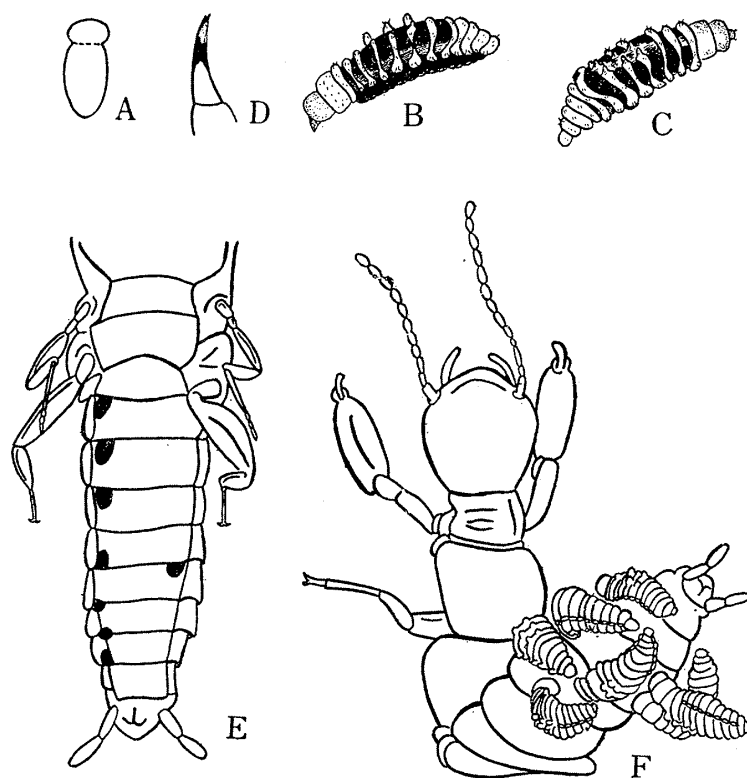


Fig. 1. *Caenosclerogibba japonica* Yasumatsu.

A. Ventral view of an early stage larva. B. Latero-dorsal view of a full-grown larva. C. Dorso-lateral view of a full-grown larva. D. Mandible of a full-grown larva. E. Eggs deposited on the sides of the abdominal sternites of a mature host female, *Oligotoma japonica*. F. Larvae attacking the female of *Oligotoma japonica*.

From the above table, the number of parasite-eggs deposited on each host can be roughly estimated, that is, about 8 to 20 eggs.

The Immature Stages

Egg stage.

The egg is minute, light yellowish white in colour, with a smooth surface, circular in outline, slightly pointed at one end, and 0.3 mm in diameter. The egg of this species hatches within 1 to 2 days after oviposition.

Early larval stage (Fig. 2 A).

The newly hatched larva is oblong ovate, slightly tapering toward the posterior end, and becomes 0.4 mm long and 0.31 mm wide in a day after hatching, and grows gradually, continuously attaching to the abdominal sternum of the host.

After 2 or 3 days, the young larva becomes rapidly longer, the whole body



Fig. 2. *Caenosclerogibba japonica* Yasumatsu.

- A. Early stage larvae attacking their host insect.
- B. Full-grown larvae, some of which are attacking their host insects.

being strikingly swollen. And on 5th day after the hatching it measures 0.69 mm long and is clear yellow in colour; the body segmentation is hardly visible, but the head is fairly distinguishable, forming 30 per cent of the whole body and is dark brown in colour. The above-mentioned larval stage within 5 days after hatching is provisionally called as the early larval stage.

This young early stage larva steadily increases in body size and becomes finally full-grown larval stage, provisionally called the late larval stage as against the former stage. The young larva is attaching to the ventral surface of the host abdomen by fixing its head; it has sharp mandibles to make entrance holes through the body wall of the host. And whatever may happen, it never separate from the host and constantly continues to suck up the light brownish juices of the host. Therefore, in the mature parasite larva,

the body colour changes from clear yellow to a light brown, deeper along the median part of the body where exists the alimentary canal of the parasite. But the parts along the body margin and the head are slightly white in colour.

Late larval stage.

The late stage larva is perfectly full-grown in size, measuring 1.8 mm long and 0.465 mm wide. The body is somewhat flat dorso-ventrally, tapering both anteriorly and posteriorly, with well-defined segmentation, and ten abdominal segments are recognizable. The first thoracic segment is larger than the others. Each of the body segments is provided with a distinct and remarkable crenulation on its dorsal side, and those of the second, third and fourth abdominal segments are distinctly interrupted at the medio-dorsal portion, and each of the dorsal end of the crenulation is highly tuberculated as shown in the text-figure. The mouth

parts are very developed and distinct. The mandibles are very large, $120\mu \times 40\mu$ in dimension, with acutely and sharply pointed tooth which is brown in colour at its tip in particular (Fig. 2 C).

Within 7 or 8 days after the hatching, the late stage larva develops to the full-grown size, entirely consuming the host body, and pupates.

Pupal stage.

This species makes protective coverings to protect the pupa during the period. This protective coverings are spun by the full-grown larva. But the larva, without fail by that time, prosperously feeds upon the viscous spun webs which have been spun by the host, and if the larva can not find the spun webs around itself, it can never spin a cocoon and fails to pupate and soon die. Accordingly, it seems that the materials to spin its cocoon is obtained by this regurgitated viscous spun webs. The length of the pupal stage is about 15 days.

In the following the measurements of the two immature stages are presented in Tables 2 and 3.

Table 2. Duration of the two immature stages (in days).

	Egg	Early stage larva	Late stage larva	Pupa
Average	1.5	4.5	3.5	15
Maximum	2	5	4	17
Minimum	1	4	3	13

Table 3. Average measurements of the two immature stages (in mm).

	Egg	Early stage		Late stage	
		Newly hatched	Full grown	Young	Full grown
Length	0.3	0.4	0.69	1.17	1.8
Width	0.3	0.31	0.31	0.463	0.465

Effect of parasitism upon the host

For a period of six days after the hatching of the parasite, the host does not show any abnormal appearance or behaviour. But, the first effect of parasitism can be seen about one day before the parasite larva develops to its full grown size; in such cases the host displays excitability as if the parasite gives pain to the host, wriggles from place to place and becomes immovable. The size of the host body steadily reduced, and soon the host is killed. Finally the contents of the host body are completely consumed by the parasite.

The field population data indicates that the first parasitized host appears in late May. Because the oviposition period of the host is from late May to early July and the mature host female during this period affords adequate nutrient to the parasite-larva.

The percentage of parasitism by this parasitoid in the field was very low, being about 2~3 per cent in the seasons of this year (1956).