

Luminous Insects of Hachijo Island, Japan

Y. HANEDA*

(With 3 Text-figures)

Hachijo Island, a small volcanic island situated 157 miles south of Tokyo at lat. 33° 2'-9'N, and long. 139° 43'-50'E, has an area of 69 squar kilometers. In spite of being situated comparatively near to Tokyo, its climate is mild and subtropical.

Prior to 1924 no fireflies appeared on this island. In June of that year, however, a Mrs. Tokuko ISHII of Nakanogoh village, set free over a rice field at her village fifty or more fireflies (*Luciola lateralis* MOTSCHULSKY) which she has brought from Asahi Village, Nakagun, Kanagawa Pref. Thereafter, fireflies have appeared on the island in June of every year, in Sueyoshi, Nakanogoh, and Kashidate villeges. In the middle of July, 1952, the author observed many aquatic glowworms of this fireflies living in the rice fields and at the bottom of small ponds near Senzu waterfall, Nakanogoh.

The more interesting self-luminous diptera of the family Platyruridae were observed at Nakanogoh village. The scietic name of this insect is *Ceroplatus nipponicus* OKADA, as identified by I. OKADA (1938).

The first observer of a luminous *Ceroplatus* was WAHLBERG (1849) in Sweden, where luminous larva of *Ceroplatus sessoides* were found living on a web of the fungus, *Polyporus formentarius*. The whole body of the larva and the pupa, but not of the adult, is luminous. PHEIFFER and STAMMER (1930), and STAMMER (1933) have reported that *Ceroplatus testaceus* DALMAN larvae live on webs on the pileus of *Polyporus unguilatus* in Germany in May and June. The light is very weak and is emitted from the whole body of larva, pupa and also from the adult. If the insect is stimulated, the light intensity will increase.

In Japan in 1948, SHIMIZU observed luminous larvae of a fungus gnat living on a web on the pileus of *Poria vaporaria* at Mt. Ryogami in Saitama Pref. The specimens were sent to ESAKI (1949) for identitication. They were identified to be *Ceroplatus nipponicus* OKADA. In September, 1950 KATO and SHIMIZU collected some pupae and adult specimens of this fungus gnat at the same place. These specimens contained two species, one being *C. nipponicus* and the other *C. testaceus* DALMAN. According to KATO (1953), these species show two kinds of fat tissue, one consisting of pure fat cells and the other of luminous fat cells. The luminous fat tissue is found around the digestive

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organs. Each cell contains a large amount of luminous granules which are various in size and stain well with eosin, erthrosin and also with thionin and haematoxylin. He suggested that the occurrence of luminous fat cells in the fungus gnat is caused by the presence of a close relation between the luminous substance and the fat metabolism.

While on Hachijo island one night in July, 1951, the author (HANEDA, 1955) and OKUYAMA collected luminous larvae living on a web on the under surface of the fungus, *Ganoderma applanatus*, grown in a hollow of big root of pasania tree (*Shiia Sieboldii*) at Nakanogoh village. The whole body of this specimens is luminous when it is in the larva and pupa stage, but not when in the adult. The larva is 16mm. in length and 2mm. in width. It has pale brown stripes in white on a translucent body. The anterior and posterior parts are transparent. The pupa is enclosed in a pure white cocoon knitted by fine threads. The cocoon has a cylindrical form and is 15mm. in length, 5mm. in diameter. In the space of one day the larva change to pupa, and in a week the pupa change to adults.



Fig. 1. *Ganoderma applanatus*, a fungus grown in a hollow of big root of passania tree (*Shiia Siebo'dii*) at Nakanogoh village.



Fig. 2. Two larvae and one cocoon of *Ceroplatus nipponicus* on web on the under surface of the fungus.

not increase the light intensity. The light of the pupae is visible through the white cocoon, but the ovary, or egg, is not luminous.

The author tested culture luminous bacteria from the body and got negative results.

The live luminous larvae or pupae were placed in a desicator containing CaCl_2 and

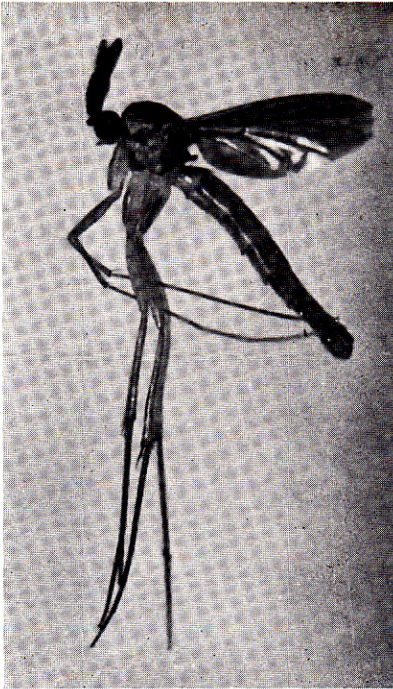


Fig. 3. Female adult of *Ceroplatus nipponicus*.

were dried. Immediately after they were ground to a fine powder with sand. This powder was luminous when water was poured on it in the dark, and the intensity of the light was stronger than that of the living larvae or pupae. The author tested luciferin-luciferase as well as ATP reactions and obtained negative results.

Acknowledgments: To the following people the author must express his sincere gratitude and appreciation:

To professor Dr. S. HATAI, Chairman of the committee on the Research of Hachijo Island, who has given him the opportunity to do this present work; to Dr. I. OKADA, Professor of Tamagawa University, who identified the specimen; to Mr. H. OKUYAMA of Nakanogoh primary school of Haclijo Island, who assisted in collecting materials.

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抄 録

八丈島の発光昆虫

羽根田 弥太

著者は1951—52年にかけて、文部省科学研究費による八丈島を中心とする生物学的、海洋学的総合研究委員会生物班の一委員として八丈島に於ける発光生物の調査を行った。茲では同島に於ける発光昆虫に就てのみ述べることにする。

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ルチフェリン、リチフェラーゼ反応、ATP 反応共に陰性であつた。この昆虫の発光は幼虫或は蛹自体の光であつて、発光バクテリア又は発光菌の菌糸等を食べた結果、或はそれ等に感染した一時的の発光ではない。

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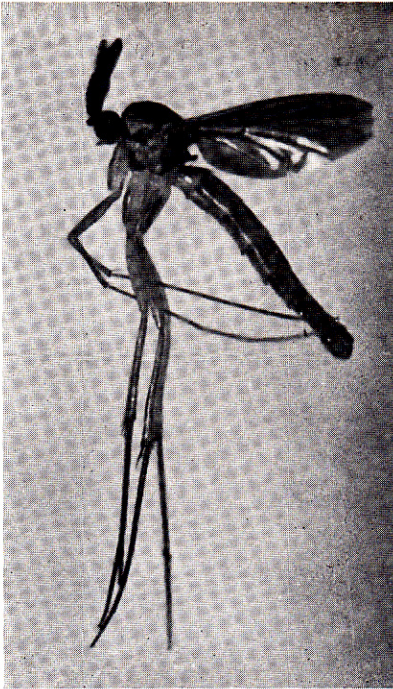


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