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Notes on the Life History of *Callicaria superba* MULSANT (Coleoptera, Coccinellidae)

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Synopsis The life history of *Callicaria superba* MULSANT living on the mulberry tree in the west areas of Tokushima was investigated. The overwintering adults of *C. superba* emerge from their hibernation quarters in the mulberry field in mid-April and May, and as it gets warm, they begin to oviposit soon after feeding on the larvae of *Anomoneura mori* SCHWARZ.

The hatched larvae of this ladybird were reared with supply of larvae of *A. mori* at a constant temperature of 25°C. In so far as the laboratory rearing is concerned, they required three times in moulting to complete larval development.

Introduction

Callicaria superba MULSANT is one of the largest species of coccinellid beetles in Japan, and the larvae and adults of this ladybird usually feed on the larvae of *Anomoneura mori* SCHWARZ. This insect accordingly seems to be an important natural enemy of *A. mori*, a pest of the mulberry tree, *Morus bombycis* KOIDZUMI. Since, the biology of this species is little understood till now, laboratory and field investigations were undertaken to accumulate as many biological data as possible.

Materials and Methods

Field studies:

To know the seasonal sequence population trend, the adults, larvae and eggs of *C. superba* were each sampled from March 1976 to January 1977 in several plots of the mulberry field at Kamojima, Tokushima Prefecture. The hand sampling of this ladybird was taken on all twigs and foliages of 5 trees in each of the plots at an interval of about 15 days.

Insectary studies:

The overwintered female adults of *C. superba* were collected on the leaves of mulberry tree on May 11, 1976. They were confined individually in the box (6×13×20 cm) and kept under the condition of 25±2°C, 60% R. H., and a photoperiod of 13 L: 11 D. Through the rearing they were supplied with *A. mori* larvae of various stages. A single female oviposits about 20 eggs at a time on the leaves near by the colony of *A. mori* in the box. The newly hatched larvae were similarly reared individually with dialy supply of an excess number of *A. mori* at a constant temperature of

25±2°C, for evaluating the duration of larval development.

Results and Discussion

Seasonal prevalence:

Seasonal population trend of various stages of *C. superba* is shown in Fig. 1. That is, the overwintered adults of this ladybird left their hibernation quarters on warm days from mid-April to May. They were observed to be active and abundant during May–June on the mulberry trees, in accordance well with the increase of the prey, *A. mori*. Shortly after this time, they fed on the larvae of *A. mori* and laid eggs on the lower surface of the leaves of mulberry trees. Meanwhile, the newly hatched larvae of *C. superba* appeared in middle of May, while some of the parental generation were still living. Some of the larvae developed normally, and completed pupation and emergence on mulberry tree. However, the spring shoots of mulberry tree usually were cut down in late July as food supply for the silkworm culture, and they were forced to move toward the mountainous districts in order to search for their food. Incidentally, the summer shoots of mulberry tree were not infested with the larvae of *A. mori*.

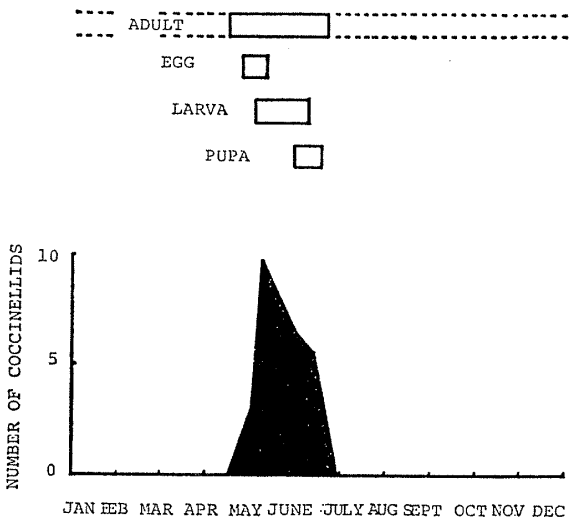

Fig. 1. Seasonal fluctuation of the populations of *Callicaria superba* in the mulberry field at Kamojima, Tokushima.

Developmental stages:

The duration of each stage in the growing course of *C. superba* is given in Table 1 and Fig. 2. The time required for the development of egg, larval, prepupal and pupal stages was 3.0, 12.6, 1.3 and 5.6 days respectively. Accordingly the total developmental period of *C. superba* from the egg laying to the adult emergence is 22.7 days under the laboratory condition. In this case the longest period for larval devel-

Table 1. Duration in days of developmental stages of *Callicaria superba* reared with larvae of *Anomoneura mori* in the laboratory.

	Egg period	Larval period				Total larval period	Prepupal period	Pupal period	Total developmental period (egg to adult)
		1st	2nd	3rd	4th				
No. of insects examined (n)	21	15	15	15	15	15	14	14	14
Range	3–3	3–4	1–3	2–3	4–5	12–13	1–2	5–6	22–24
Mean	3.0	3.5	2.0	2.5	4.7	12.6	1.3	5.6	22.7
±S.D.	±0.00	±0.50	±0.52	±0.50	±0.47	±0.50	±0.47	±0.48	±0.60

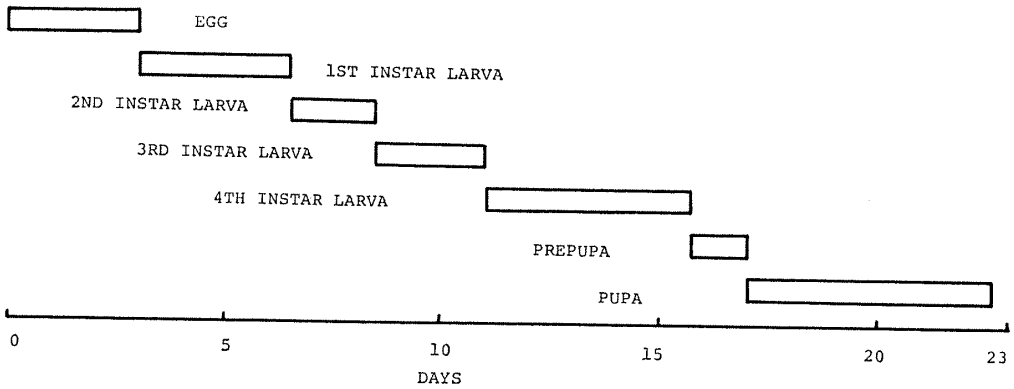

Fig. 2. Duration in days of developmental stages of *Callicaria superba* reared with larvae of *Anomoneura mori* in the laboratory.

opment was about 2 weeks, during which the larvae moult three times. Namely, they passed through four larval instars.

Contrary to this result, IWATA (1932) had been pointed out that the larvae of *C. superba* moult four times, based on the result of his rearing experiment where the 1st instar larvae were fed on *Anuraphis mume* HORI, the 2nd instar larvae on *A. mume* and *Macrosiphum rosae* L., the 3rd instar larvae on *M. rosae*, the 4th instar larvae on *Pterochlorus tropicalis* VAN DEN GOOT and *Lachnus uiminalis* FONSCOLMBE and the 5th instar larvae on *M. rosae* and *Macrosiphoniella* sp. In this context, it is well known that the larvae of many species of Coccinellidae pass through 4 instar stages to complete their development with a few exceptions. This pattern of development is always true for the case of *C. superba* reared with *A. mori*. Generally speaking, the number of moults is known to be somewhat variable according to the living conditions of insects, and the discrepancy between IWATA's and my own results may be due to the effects of different nutritional conditions.

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Reference

IWATA, K., 1932. On the biology of two large ladybird in Japan. *Trans. Kansai ent. Soc.*, **3**: 13–26.

新 刊 紹 介

A Compendium of the Biographical Literature on Deceased Entomologists. By Pamela GILBERT. xiv+455 pp., +28 figs. British Museum (Natural History), London, 1977.

著者 GILBERT 女史は大英自然史博物館の昆虫部門の図書館員(現在はその主任) として 20 年間, 文献の充実, 整理および昆虫学者へのサービスに従事してきた. その間, 生物研究者たちが, 先人の業績ばかりでなく, 伝記にひじょうな関心をもっていることに, むしろ驚かされ, ことに昆虫研究者 のあいだでは, 先人の足跡や伝記を求めることに, 他の生物学者より熱心であることを知った. これは, 恐らくアマチュア昆虫家のはたして来た役割りが, 他の生物グループにおけるより大きいからであろう. そんなわけで, 図書館員に対し, ある昆虫家の追悼文, 伝記あるいは死亡記事の載っている文献の処在を問い合せる人がひじょうに多いことが動機となって表記の本を編纂することになった.

本書には, 1975 年末までに出版された物故昆虫家約 7,500 人に関する文献的な引用約 17,000 が, 人名のアルファベット順にリストアップされている. 世界で最も文献の充実した博物館なので, 今までに生物学の成書や 連続刊行物に掲載された 物故昆虫家に関する記事は, 少くとも 90 パーセント収録されたものと著者は信じている. 但し生物学の出版物でない新聞や通俗雑誌は含まれていない. 本書で使われている entomologist という言葉の意味は, 昆虫の研究あるいは採集など, 何らかの形で直接または間接に昆虫学に関与した人のことなので, ここには昆虫家と訳した. 収録された人は, 紀元前七世紀から 1975 年末までのこうした昆虫家たちである. 日本人の場合は, 大部分が, 長谷川, 1967, 昆虫 35 (3) (補遺), からの引用で, 一部が他の出版物からひろわれている. ローマ字綴りの誤りもあれば, 引用もれのあることは止むを得まい.

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