

## Collection and Characteristics of the Wild Silkmoth, *Samia cynthia pryeri*, in Korea

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The wild silkmoth, *Samia cynthia pryeri*, was firstly collected at Miryang, Korea. The development and quantitative characters of *S. cynthia pryeri* in the laboratory condition were analysed. The larval body color of dark yellow green or light yellow green of the *S. cynthia pryeri* was changed into white color during the molting period, and the yellowish bristles in younger larvae were changed into fade green color in advanced stage larvae. *Aralia elata* and *Zanthoxylum piperitum* were newly identified as host plants to *S. cynthia pryeri*. Cocoon weight and cocoon shell percentage were average 2.14 g and 12.3%, respectively. In addition, the morphology of the silk gland was different from that of the domestic silkworm, *Bombyx mori*, but was identical with that of the wild silkmoth, *Antheraea yamamai*.

**Key words** : *Samia cynthia pryeri*, Wild silkmoth, Body color, Color change

### Introduction

The wild silkmoth, *Samia cynthia pryeri* (Saturniidae), is widely distributed in many countries; Korea, Japan, China, Taiwan, Malaysia and India (Nam, 1998). The wild silkworm, *S. cynthia pryeri*, and *S. cynthia ricini* (Eri-silkworm) belong to a same species, but are classified into different subspecies each other. Eri-silkworm is mainly reared in India due to its domestic characteristics, multi-

voltinism and industrial benefits. The eri-silkworm, feeding mainly castor leaves (*Ricinus communis*), can produce a brick red or white eri silk of India. The chadar, the most popular traditional fashion of India, can be made of the eri-silk (Jolly *et al.*, 1974).

Although the wild silkworm, *S. cynthia pryeri*, is widely distributed in east Asia, detailed information on the physiology and molecular aspect of *S. cynthia pryeri* is yet very poorly understood. In Korea, no report has been published concerning the collection and characteristics of *S. cynthia pryeri* from the wild field.

In the present study, we firstly collected *S. cynthia pryeri* at Miryang located in the southern part of Korea, and reared on the host plants in the laboratory condition to understand its development and quantitative characteristics. We report here some developmental features and quantitative characters of *S. cynthia pryeri* based on the data obtained from the indoor rearing.

### Materials and Methods

#### Collection and indoor rearing of *Samia cynthia pryeri*

The *S. cynthia pryeri* was collected in Miryang, Gyeongsangnam-do, Korea during August, 2000. The larvae were reared on the leaves of *Aralia elata* or *Zanthoxylum piperitum* in the laboratory condition (25 $\pm$ 1, 14L:10D). The larvae, pupae and cocoons of the wild silkmoth were used as materials in this study.

#### Developmental characteristics

Development and quantitative characters such as body colors, bristles, body weight, cocoon color, cocoon weight, cocoon shapes and silk gland were evaluated. The body weight, cocoon weight and cocoon shell weight

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were measured separately. The silk gland of the 5th instar larva of *S. cynthia pryeri* was dissected and observed.

## Results and Discussion

The larvae and cocoons of the wild silkworm, *S. cynthia pryeri*, were collected from the mountainous area in Miryang, Korea. The worms were feeding on the leaves of *A. elata* or *Z. piperitum*, and we also collected the cocoons from two host plants (Fig. 1). The collection of *S. cynthia pryeri* from the wild habitat in Korea was firstly reported in this study. The collected wild silkworm larvae were reared on the leaves of *A. elata* or *Z. piperitum* in the laboratory condition. Up to this time, the above two plants were not reported as host plants to the *S. cynthia pryeri*. *Ailanthus altissima* was mainly known as a common host plant to *S. cynthia pryeri* (Nam, 1998).

The body color of *S. cynthia pryeri* larvae was dark yellowish green in young larvae and light yellowish green in advanced stage larvae (Panels A, B, and C of Fig. 1). The body color of the molting larvae was, however, always white due to white colored-powder covering the surface of

larval integuments (Fig. 1A, black arrow).

The number of segments in the larvae was eleven plus the postsegmental telson which bears the anus, and more than 6 bristles with special features were observed on each segment. Especially in the advanced larvae, the bristles comprised beautiful fade green parts (Panels B and C of Fig. 1).

The mature larvae spun dark brown or grey brown cocoons with a shape of spindle by using the small twigs and their leaves of the host plants as foothold. In the silkworm, *Bombyx mori*, the cocoon fibres used as a foothold until the time of the cocoon shape appears, are known as cocoon cotton or floss, but in this wild silkworm it was not observed (Veda *et al.*, 1997).

From the above results, an interesting things are definite color change in the surface of integument of molting larvae and bristle of advanced stage larvae. Color changing of the larvae from dark yellowish and/or light green to white color during their molting is considered a short-term reversible change which do not involve the production of new pigment. On the contrary, the changes in the color of bristles on the advanced stage larval integuments are considered a long-term change which results from the for-



**Fig. 1.** Photographs of larvae and cocoons of the wild silkworm, *S. cynthia pryeri*. A, young larvae (The black arrow indicates a molting larva); B, advanced stage larvae feeding on the leaves of *Aralia elata*.; C, advanced stage larvae feeding on the leaf of *Zanthoxylum piperitum*; D, dark brown or grey brown cocoons of the wild silkworm spun.

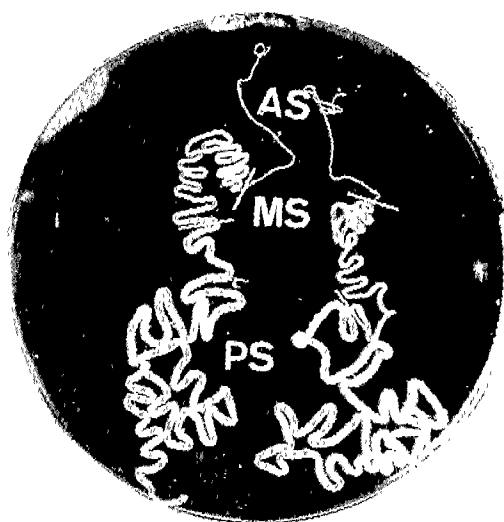


Fig. 2. The silk gland of the wild silkmoth, *S. cynthia pryeri* larva in the 5th instar. AS, anterior silk gland; MS, middle silk gland; PS, posterior silk gland.

mation of new pigments and are not reversible (Chapman, 1998).

To compare the silk gland between lepidopteran silkworms, the silk glands of the *S. cynthia pryeri* larva were dissected out (Fig. 2). Morphology of the silk gland of the *S. cynthia pryeri* was considerably different from that of the domestic silkworm, *B. mori* (Doira *et al.*, 1978; Veda *et al.*, 1997). The gland of the wild silkmoth was consisted of three parts (same with the *B. mori*), that is, anterior part, middle part and posterior part, and the posterior part was the fattest among the three parts. In *B. mori*, on the contrary, the fattest part of the silk gland is middle part which can synthesize sericin protein and comprise only two courses. However, the morphology of the silk gland of the *S. cynthia pryeri* was identical with that of the wild silkmoth, *Antheraea yamamai* (Akai and Shigeharu, 1990).

To get further fundamental data on *S. cynthia pryeri*, the body weight during larval development was measured (Table 1). The body weight of a full-grown larva was average 5.5 g, and the body weight was significantly increased during the 5th instar. The body weight of *S. cynthia pryeri* was similar to that of the domestic silkworm, *B. mori*.

The result of the cocoon characters is shown in the Table 2. Cocoon weight for female and male was approximately 2.59 g and 1.69 g, respectively. However, cocoon shell percentage for female and male was 11.8% and 12.8%, respectively. Cocoon weight and cocoon shell weight were higher in female than in male, but cocoon shell percentage was higher in male than in female. As

Table 1. Body weight of *S. cynthia pryeri* larvae during the developmental stages

Larval stages (instar)	1	2	3	4	5
Body weight (g)	-	0.048	0.440	1.228	5.500

Table 2. Cocoon characters of the wild silkmoth, *S. cynthia pryeri*

Sex	Cocoon characters	Cocoon weight (g)	Cocoon shell weight (cg)	Cocoon shell percentage (%)
Female		2.59	30.8	11.8
Male		1.69	21.5	12.8
Mean		2.14	26.1	12.3

most industrial lepidopteran silkworms, such as *B. mori*, *A. yamamai* and *A. pernyi*, also exhibit cocoon characters with a sexual difference to female and male (Wakabayashi *et al.*, 1984; Lee *et al.*, 1985).

In the present study, we reported some characteristics on the wild silkmoth, *S. cynthia pryeri*. These are fundamental findings for further study on the wild silkmoth, *S. cynthia pryeri*. Therefore, the subsequent detailed study for physiological, biochemical and molecular aspects will provide a good information for understanding the wild silkmoth, *S. cynthia pryeri*.

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