

Larva and Life History of *Onycholyda minomalis* (Hymenoptera, Pamphiliidae) in Honshu, Japan

Akihiko Shinohara¹ and Shin-ichi Ibuki²

¹Department of Zoology, National Museum of Nature and Science,
4-1-1 Amakubo, Tsukuba, Ibaraki 305-0005, Japan

E-mail: shinohar@kahaku.go.jp

²Wami 1355-13, Nakagawa, Tochigi 324-0612, Japan

E-mail: banbi-fa@ktd.biglobe.ne.jp

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Abstract A leaf-rolling sawfly, *Onycholyda minomalis* (Takeuchi, 1930), was reared from larvae in Nakagawa Town, Tochigi Prefecture, central Honshu, in 2012–2014. This is a univoltine sawfly, the larva of which feeds solitarily in leaf rolls on *Rubus parvifolius* L. (Rosaceae). Brief description of the larva and notes on its life history are given.

Key words: Hymenoptera, Pamphiliidae, *Onycholyda minomalis*, larva, life history.

Introduction

Onycholyda minomalis (Takeuchi, 1930) (Hymenoptera, Pamphiliidae) is a leaf-rolling sawfly distributed in Hokkaido, Honshu and Shikoku, Japan (Shinohara, 1987). Okutani (1967) listed *Rubus parvifolius* L. (Rosaceae) as a host plant based on his own rearings or observations of the oviposition, as he indicated by two asterisks attached to the plant name in the paper. However, Okutani did not publish descriptions of the immature stages or observations on the life history, and his 1967 paper is still the only published source of information about the biology of *O. minomalis*.

In Nakagawa Town and Nasukarasuyama City, Tochigi Prefecture, central Honshu, Ibuki recently found pamphiliid larvae solitarily feeding on *Rubus parvifolius* and succeeded rearing adults. The adults were subsequently identified as *O. minomalis*. Here we give rearing records and briefly describe the larvae.

Materials and Methods

The material used in this work is kept in the

National Museum of Nature and Science, Tsukuba. The larvae collected in the field were reared in a room at Bambi Farm (230m alt., N36-46-58 E140-10-29) in Wami, Nakagawa Town, Tochigi Prefecture. The temperature and day length were not controlled in the room, but the light was usually on for about 16 hours a day. All the photographs were taken by Ibuki with digital cameras Panasonic DMC-FZ28, Sony DSC-H7 and Ricoh Caplio CX100. The digital images were processed and arranged with Adobe Photoshop® Elements 9 software. For the larval morphological terminology, we follow Viitasaari (2002).

Results

Reared specimens examined. 1 ♂, Wami, 230m, N36-46-58 E140-10-29, Nakagawa, Tochigi Pref., larva coll. 25. V. 2013, mat. 1. VI., em. 11. IV. 2014; 1 ♂, same locality, larva coll. 31. V. 2013, mat. 1–2. VI., em. 10. IV. 2014; 2 ♀ 1 ♂, same locality, larva coll. 2. VI. 2013, mat. 9–10. VI., em. 8. IV. 2014; 1 ♀, same locality, larva coll. 2. VI. 2013, mat. 9. VI., em. 15. IV. 2014.

Table 1. Records of rearing of the larvae found in Nakagawa Town (Wami and Koisago) and Nasukarasuyama City (Kobana) in 2012–2014.

Larva found	Locality	Number	Matured (number, others died)	Emergence of the adults (number and sex)
May 30, 2012	Wami, 230m	5	unrecorded	None
May 31, 2012	Koisago, 180m	5	June 4–9 (3), June 19 (1)	None
May 25, 2013	Wami, 230m	1	June 1 (1)	April 11 (1 male), 2014
May 31, 2013	Wami, 230m	2	June 1 (1), June 2 (1)	April 10 (1 male), 2014
June 2, 2013	Wami, 230m	5	June 9 (4), June 10 (1)	April 8 (2 females, 1 male), April 15 (1 female), 2014
June 9, 2013	Kobana, 110m	3	June 10 (1), June 16 (1)	None

Field observations and rearing records.

Table 1 summarizes the rearing records. A total of 10 larvae were collected on May 30 and 31, 2012, and eight larvae in the period from May 25 to June 9, 2013, in Nakagawa Town (180–230m) and three larvae were collected on June 9, 2013, in Nasukarasuyama City (110m), Tochigi Prefecture. All the larvae were found feeding on the leaves of *Rubus parvifolius* and no other species of *Rubus*. The larvae found in 2012 matured in the period from June 4 to 19 but they all died thereafter. The larvae collected in 2013 matured in the period from June 1 to 16 and three female and three male adults emerged on April 8 to 15, 2014 (see the *specimens examined* above). Others did not survive.

The larval abode was always made on the underside of the leaf (Figs. 1–2) and contained only one larva. One egg shell, if left, was attached to the lateral vein on the underside of the basal part of a leaf (Fig. 2, arrowed).

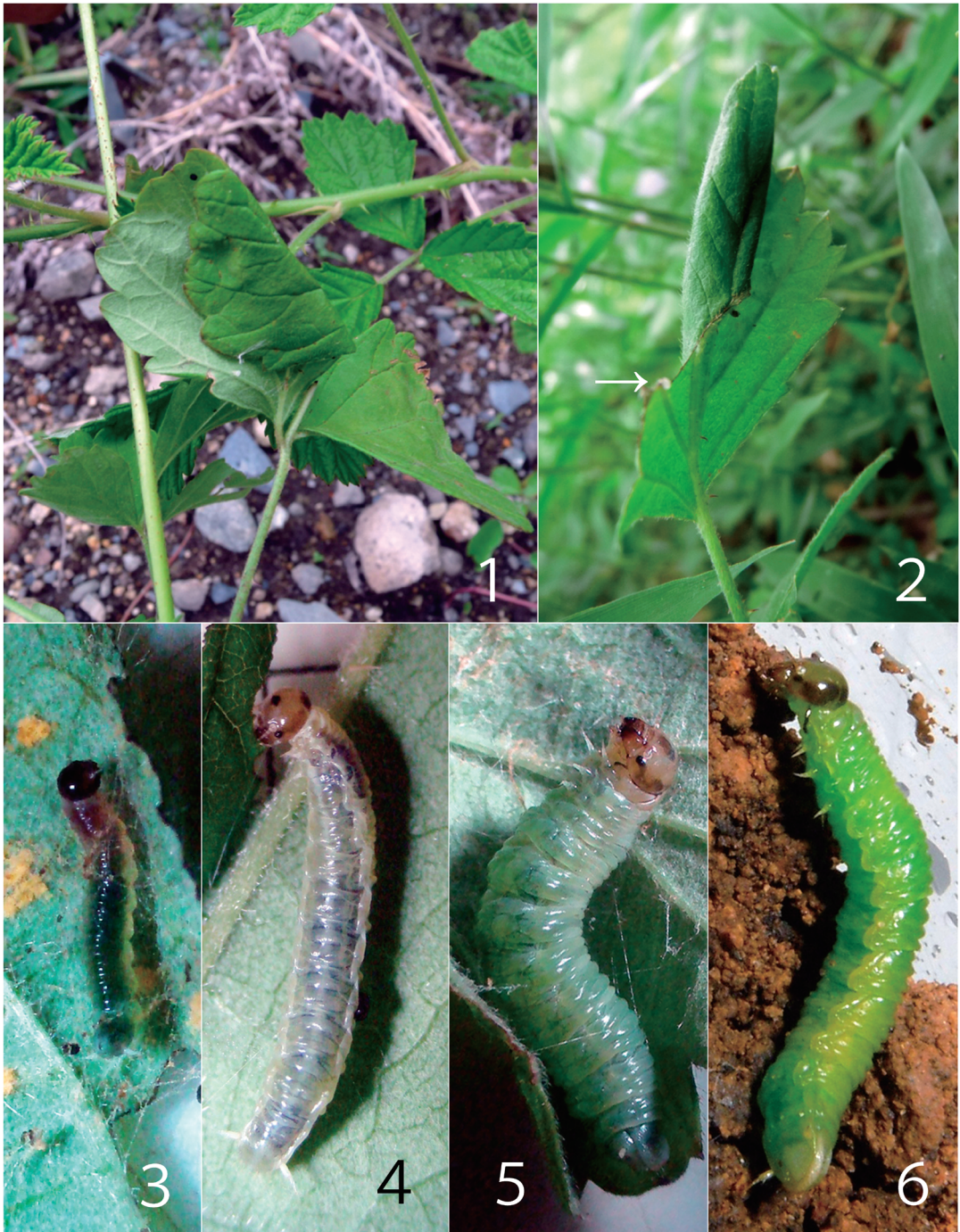
Description of the larvae. Early (probably 2nd) instar (Fig. 3): About 6mm, head black, antenna whitish; trunk creamy white, with pale reddish-brown tint inside of thorax and base of abdomen and greenish tint inside other part of abdomen. Middle instar (Fig. 4): About 10mm, head brown with round spot on upper part of frons and large transverse spot on vertex black; posterior parietal region, clypeus and mouthparts darkened; trunk creamy white; prothoracic shield slightly brownish; thoracic legs and subanal appendage creamy white. Late instar (Fig. 5): About 19mm, color pattern similar to that of middle instar, but ground color of head paler and

same color as prothoracic shield, dark marks on frons and vertex also paler and same color as dark mark in posterior parietal region, and ground color of trunk with distinct greenish tint; cervical sclerite black. Mature larva (prepupa) (Fig. 6): About 16mm, head olive green, with blackish areas on vertex, parietal area and often on frons; trunk vivid pale green; cervical sclerite black; thoracic legs, posterior part of subanal lobe and subanal appendage greenish white.

Discussion

The rearing records given above strongly suggest that *Onycholida minomalis* has a univoltine life cycle as in other pamphiliine species. Details of the life history still remain unknown, but the adult emergence of this sawfly is in April and the larval feeding period is in May to mid-June in Nakagawa Town (180–230m), Tochigi Prefecture, central Honshu. This is quite a common general life cycle pattern of univoltine sawflies inhabiting this area, including the Pamphiliidae such as *O. lucida* (Rohwer, 1910) and *Pamphilius volatilis* (Smith, 1874), which also occur there (Ibuki, unpublished data).

The larva of this species is a solitary leaf-roller on *Rubus parvifolius* and has been found only on this plant. *Onycholyda minomalis* is most closely related to *O. similis* Shinohara, 1987, from Honshu, Shikoku and Kyushu and *O. yezoensis* Shinohara, 1987, from Hokkaido and Sakhalin (Shinohara, 1987). The host plants of *O. similis* are *R. subcrataegifolius* (H. Lév. et Vaniot) H. Lév. and *R. crataegifolius* Bunge (Shinohara and



Figs. 1–6. *Onycholyda minomalis*, larval abodes on *Rubus parvifolius* (1–2) and larvae (3–6).—1, Wami, Nakagawa, May 30, 2012; 2, Koisago, Nakagawa, May 31, 2012, white arrow showing remains of egg shell; 3, early instar, Koisago, 31 May, 2012; 4, middle instar, Koisago, 31 May, 2012; 5, late instar, Wami, 30 May, 2012; 6, mature larva (prepupa), Wami, 9 June, 2013. All digital images taken by S. Ibuki.

Kojima, 2013) and those of *O. yezoensis* are unknown. The larva of *O. minomalis* is closely similar to that of *O. similis* (Shinohara and Kojima, 2013), and we are not able to separate them.

Besides *O. minomalis*, no Japanese species of the Pamphiliidae are known to feed on *R. parvifolius*, whereas *O. odaesana* Shinohara and Byun, 1993, from Korea and China feeds on this plant in Korea (Shinohara and Lee, 2011). *Onycholyda odaesana* also feeds on another species of *Rubus*, *R. adenophorus* Rolfe in Hunan Province, China (Shinohara and Wei, 2010). Within *Onycholyda*, *O. odaesana*, belonging to the *luteicornis* group defined by Shinohara (2002), is rather distantly related to *O. minomalis*, which belongs to the *amplecta* group (Shinohara, 2002). However, the larvae of the two species are similar to each other, possibly separable only by the slightly different color pattern of the head (compare Figs. 4–5 with figs. 1G–H in Shinohara and Lee, 2011), which may be subject to some variation.

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References

- Okutani, T. 1967. Food plants of Japanese Symphyta (I). Japanese Journal of Applied Entomology and Zoology, Tokyo, 11: 43–49. (In Japanese.)
- Shinohara, A. 1987. The sawfly genus *Onycholyda* (Hymenoptera, Pamphiliidae) of Japan V. Kontyû, Tokyo, 55: 486–501.
- Shinohara, A. 2002. Systematics of the leaf-rolling or web-spinning sawfly subfamily Pamphiliinae: a preliminary overview. In Viitasaari, M. (ed.): Sawflies 1 (Hymenoptera, Symphyta), pp. 359–438. Tremex Press, Helsinki.
- Shinohara, A. and H. Kojima 2013. Discovery of host plant and larva of *Onycholyda similis* (Hymenoptera, Pamphiliidae) in Honshu, Japan. Japanese Journal of Systematic Entomology, 19: 107–112.
- Shinohara, A. and H.-S. Lee 2011. Host plants and larvae of two leaf-rolling sawfly species of the genus *Onycholyda* (Hymenoptera, Pamphiliidae) in Korea. Japanese Journal of Systematic Entomology, 17: 209–212.
- Shinohara, A. and M.-C. Wei 2010. Discovery of host plant and larva of *Onycholyda odaesana* (Hymenoptera, Pamphiliidae) in Hunan Province, China. Japanese Journal of Systematic Entomology, 16: 105–107.
- Viitasaari, M. 2002. The suborder Symphyta of the Hymenoptera. In Viitasaari, M. (ed.): Sawflies 1 (Hymenoptera, Symphyta), pp. 11–174. Tremex Press, Helsinki.