

Pamphilius basilaris, a Leaf-rolling Sawfly (Hymenoptera, Pamphiliidae) Associated with the Juglandaceae

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Abstract The Japanese Walnut, *Juglans mandshurica* subsp. *sieboldiana*, is newly recorded as a host plant of a rare leaf-rolling sawfly, *Pamphilius basilaris* Shinohara. This is the first record of the Juglandaceae as a host plant of the Pamphiliidae. Brief notes are given for the adult behavior, eggs, larvae, and larval leaf-rolls.

Key words: Hymenoptera, Pamphiliidae, *Pamphilius basilaris*, immature stages, host plant, Juglandaceae, Japanese Walnut

Introduction

Pamphilius basilaris Shinohara, 1982, is a very peculiar and rare pamphiliid sawfly previously known only from four specimens from Honshu, Japan (Shinohara, 2000). The host plant and immature stages were unknown. *Pamphilius basilaris* represents a species-group of its own (Shinohara, 1982, 2002a). A tentative cladistic analysis by Shinohara (2002a) suggested that it might be a sister-group of a large monophyletic group comprising *Onycholyda* and *Pamphilius* excluding the *P. sylvarum* and *P. basilaris* groups.

Mr. M. Sakamoto of the Hiroshima City Forest Park, Hiroshima, has informed me of a recent capture of a female specimen of this species in the suburbs of Okayama City in Okayama Prefecture, western Honshu. The female was swept from a high branch of a Japanese Walnut tree (*Juglans mandshurica* Maxim. subsp. *sieboldiana* (Maxim.) Kitamura) growing on an open field at Tamakashi close to the Asahikawa River on May 25, 2000 by Mr. H. Kawahara. Inspired by this rarely obtainable information, I visited the site on May 1–3, 2003, and captured a series of adults from a small group of walnut trees. I was also able to confirm the Japanese Walnut as the host plant of this sawfly by briefly observing the oviposition and collecting a deposited egg. On

May 28, 2003, I visited the site again, and found seven pamphiliid larval nests, though three of them were already empty.

In this paper, I will report on this discovery. This is the first record of the Juglandaceae as a host plant of pamphiliid sawflies.

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Observations

Study site

The locality is at Tamakashi (34°42'N, 133°57'E) in the northern part of Okayama City, western Honshu. It is in an open field or a river-bank very close to the Asahikawa River. Walnut trees are not numerous and some are too large for searching sawflies. Collections and observations were chiefly made at a small group of medium-sized walnut trees (about 6–7 m high), which will be referred to as the main study site below.

Adult behavior

On May 1–3, 2003, I was able to collect two females and 34 males, all but one female at the main study site. The weather was very good during the three days, the highest temperature going up to 25°C, and the adult sawflies found were very active. They were mainly met in the morning and in late afternoon, few sawflies being found in a couple of hours around noon. All the specimens collected at the main site were visiting leaves of high branches (5–6 m), as observed in the males of many other *Pamphilius* species (Shinohara, 2002b). A net with a long rod (extended up to 9 m) was necessary to capture them.

On another walnut tree about 200 m west of the main collecting site, I came across an ovipositing female. When I found the sawfly on the under surface of a small young leaflet (about 5 cm long), about 1.5 m above the ground, it was seemingly finishing the oviposition by touching the leaflet surface with the apex of its abdomen, a characteristic brushing behavior completing the oviposition (Hara, 1993; Vikberg, 2002). After the sawfly left the leaflet, one deposited egg was found (Fig. 1A).

Egg

All of the eggs examined (one living egg and five remains of hatched egg shells) were found in the basal part of the undersurface of the leaflet, not on the veins, one egg each on a leaflet (Fig. 1A). One egg just laid was about 1.3 mm long, creamy white, long oval (Fig. 1Ab), just as in other *Pamphilius* species.

Larva

Four larvae, each making a leaf-roll, were found at the main study site on May 28. The four larvae (probably all matured) are characterized as follows (Fig. 1D–E, terminology generally follows Viitasaari, 2002): Length 12–14 mm when

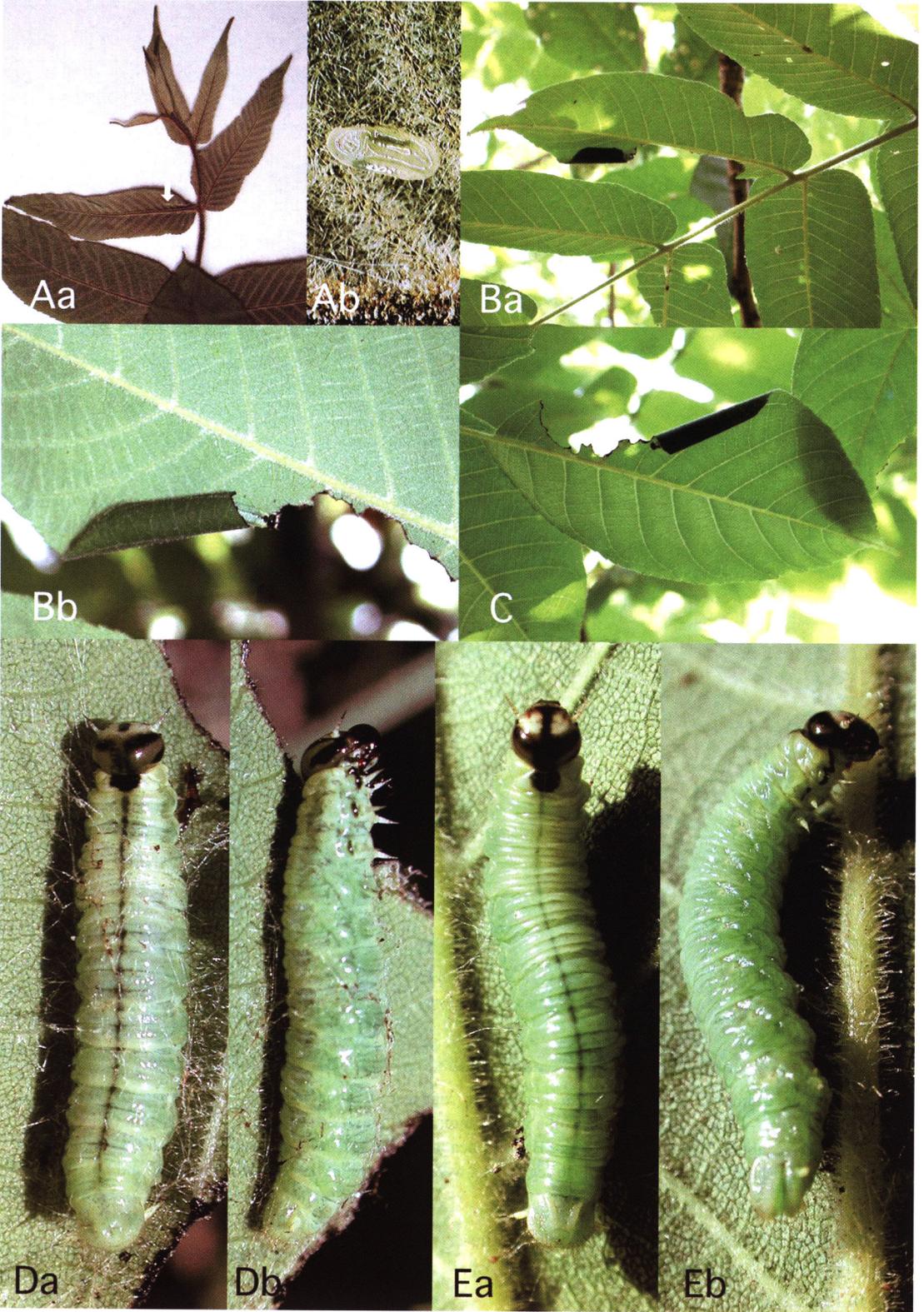
extended; head black to blackish brown, with most of parietal region and lateral part of vertex pale brown, and large spot covering anterior part of parietal region and lateral part of frons creamy white (those lateral spots connected in dorsal part in one specimen, Fig. 1Da); blackish area, particularly in ventral part of parietal region, with some small pale brown spots; clypeus blackish brown, with anterior part (preclypeus) creamy white; antenna creamy white, with apical segment blackish; labrum pale brown, darkened medially; mandible brown, becoming blackish at apex. Trunk pale green; prothoracic shield with large rounded blackish spot dorsally; lateral shield concolorous with trunk; cervical sclerite and ventral part of posthypopleurite (Eidt, 1969, p. 10, fig. 15) of all thoracic segments black; thoracic legs all pale green; suranal hook and setae on anal segment brown; subanal appendage pale green, with apical segment blackish.

When disturbed, the larva secretes sticky blackish red substance from the mouth (Fig. 1Db).

Larval abode

Each of the seven leaf-rolls examined was on the undersurface of a leaflet (Figs. 1B–C, 2), four of them containing one seemingly mature larva, respectively, and three of them empty. They were on the branches of 1.5–2.2 meters above the ground. In five cases, remains of an empty egg shell were found on the basal part of the undersurface (arrowed in Fig. 2Ab, Bb), whereas in the remaining two cases (Fig. 2C, D), no egg shell was found, probably because the oviposited part of the leaflet had been consumed by the larva. The roll was a simple one and made from the base of the leaflet towards the apex. The seven leaf-rolls were found on the first to the fifth leaflets from the apex of the compound leaf; one on the first (Fig. 2Ca), one on the second, two on

Fig. 1. Immature stages of *Pamphilius basilaris*. — Aa–b, An egg (arrowed in Aa), length about 1.3 mm, deposited on the underside of a leaflet of the Japanese Walnut, collected on May 1, 2003, and photographed on May 7, half-dried; Ba–b, a larval leaf-roll and feeding larva; C, another leaf-roll and feeding larva; Da–b, a mature larva, length about 13 mm, living in a leaf-roll shown in Fig. 2B, reddish black liquid secretion on mouth shown in Db; Ea–b, another mature larva with more black area on the head, length about 12 mm.



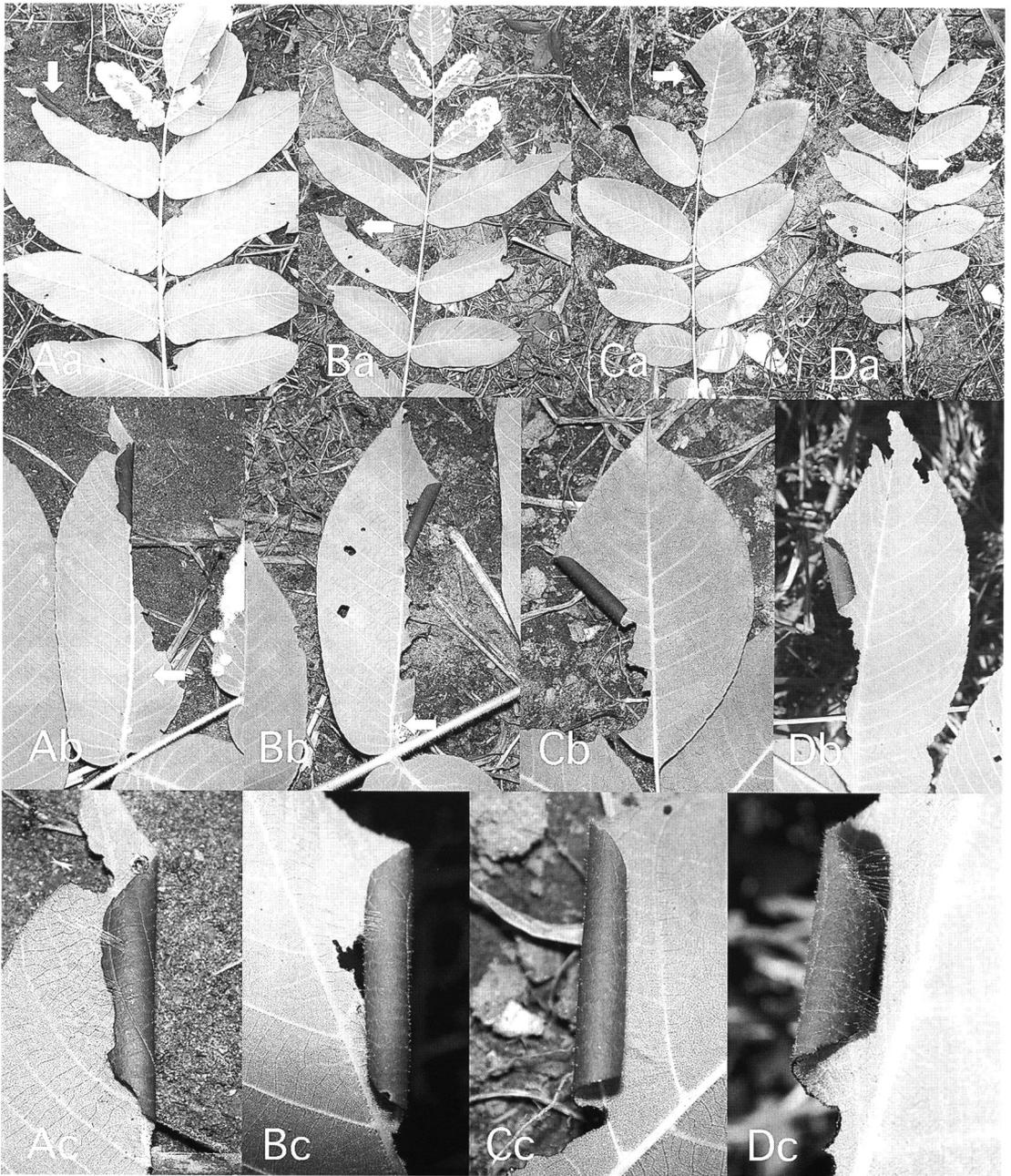


Fig. 2. Four examples of leaf-rolls on leaflets of Japanese Walnut made by the larvae of *Pamphilius basilaris*. — Aa–c, Length of the roll about 32 mm; Ba–c, about 26 mm; Ca–c, about 28 mm (same as Fig. 1C); Da–c, about 21 mm (same as Fig. 1Ba–b). Location of the leaf-rolls arrowed in Aa, Ba, Ca, Da; location of the egg shells arrowed in Ab and Bb (egg shells were not found on the leaflets shown in C and D).

the third (one of them in Fig. 2Aa), one on the fourth (Fig. 2Da), and two on the fifth (one of them in Fig. 2Ba).

Discussion

Before the discovery of the Okayama popula-

tion, *P. basilaris* was one of the least known species of pamphiliine sawflies in Japan. Only four specimens from widely separated localities were available for study, namely, a female from Iwate Prefecture, a male from Toyama Prefecture (holotype), a female from Hyogo Prefecture, and a female from Hiroshima Prefecture (Shinohara, 2000). The host plant, Japanese Walnut, is common and widely distributed in Japan. An extensive search for this species on walnut trees in various localities will reveal actual distribution patterns of this peculiar sawfly.

This is the first host plant record for pamphiliid sawflies from the Juglandaceae. The previously known host plants of the Pamphiliinae are the Rosaceae (*Prunus*, *Rosa*, *Rubus*, *Sorbus*, etc.), Betulaceae (*Alnus*, *Corylus*, *Betula*), Salicaceae (*Populus*, *Salix*), Aceraceae (*Acer*), Caprifoliaceae (*Viburnum*, *Lonicera*), Fagaceae (*Quercus*), and Cornaceae (*Cornus*) (Shinohara, 2002a).

Few species of sawflies are known to feed on the leaves of the Juglandaceae and almost all are the species of the genera *Megaxyela* (Xyelidae) and *Eriocampa* (Tenthredinidae) from North America and eastern Asia. No sawflies are known to feed on the Juglandaceae in Europe. In North America, *Megaxyela aviingrata* (Dyar, 1898), *M. major* (Cresson, 1880), and *Eriocampa juglandis* (Fitch, 1857) feed on the plants of this family, besides the polyphagous pergid *Acordulecera dorsalis* Say, 1836 (Smith, 1979; Smith & Schiff, 1998). In eastern Asia, *Megaxyela gigantea* Mocsáry, 1908, and *Eriocampa kurumivora* Togashi, 1980, were known to feed on *Juglans* (Togashi, 1980; Shinohara, 1992). At the study site in Okayama, *E. kurumivora* was fairly common.

As discussed by Shinohara (1982, 2000, 2002a), *P. basilaris* is an isolated species in the genus *Pamphilius* and its phylogenetic position is still to be investigated. Unfortunately, the newly acquired information about the immature stages and biology of this species is not useful for solving the problem, because most of the features clarified appear to be common to the other species of *Pamphilius*. The larval host associa-

tion with walnut is unique to *P. basilaris* within the family, thus giving no clues for revealing its relationship.

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