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Leaf-mining Chrysomelids Reared from Pteridophytes*

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Abstract Pteridophytes were first recorded as host plants of leaf-mining chrysomelids. *Schenklingia hiranoi* and *S. sauteri* (Alticinae, Chrysomelidae) were found mining leaves of *Lemmaphyllum microphyllum* and *Colysis* spp. (both Polypodiaceae, Filicales), respectively. Leaf-mining habits of them and larval morphology of *S. sauteri* are described.

Key words: *Schenklingia*; Chrysomelidae; larval morphology; leaf-miner; Pteridophyte.

Leaf-mining habits on pteridophytes have been known in Diptera and Lepidoptera but not in Coleoptera (FROST, 1924; HERING, 1951). Some leaf-chewing chrysomelids feed on pteridophytes: *Manobia lewisi* JACOBY on *Cyclosorus acuminatus* (Aspidiaceae), and *Minota nigropicea* (BALY) on *Pteridium aquilinum*, *Dryopteris erythrosora* and *Cyrtonium fortunei* (all Aspidiaceae) (KIMOTO, 1984). The host plants of leaf-mining chrysomelids, however, were restricted to Angiospermes. For example, host plants of leaf-mining chrysomelids in Japan are confined to Ranunculaceae, Lardizabalaceae, Polygonaceae, Oxalidaceae, Oleaceae, Compositae, Liliaceae and Graminae (KIMOTO, 1984). I found chrysomelid larvae mining in leaves of pteridophytes in Yaku and Okinawa Islands in southwestern Japan. The adult beetles which emerged from reared leaf-mines were identified as *Schenklingia hiranoi* and *S. sauteri* (Alticinae, Chrysomelidae). There are four species of *Schenklingia* in Japan, but biology of them has been unknown.

Schenklingia hiranoi TAKIZAWA

Host plant: *Lemmaphyllum microphyllum* PR. (Polypodiaceae, Filicales).

Nine mining larvae were collected at Mt. Katsuu-dake (420 m a.s.l.), Nago, Okinawa Pref. on Dec. 23, 1989, and were reared in plastic case filled with moist vermiculite. In March, 1990, two adult beetles emerged. At the same locality, five similar larvae were found mining in leaves of *Loxogramme salicifolia* MAKINO (Polypodiaceae) whereas no adult beetles emerged from them.

Mining habit: Eggs were laid singly on a leaf. A hatched larva started to

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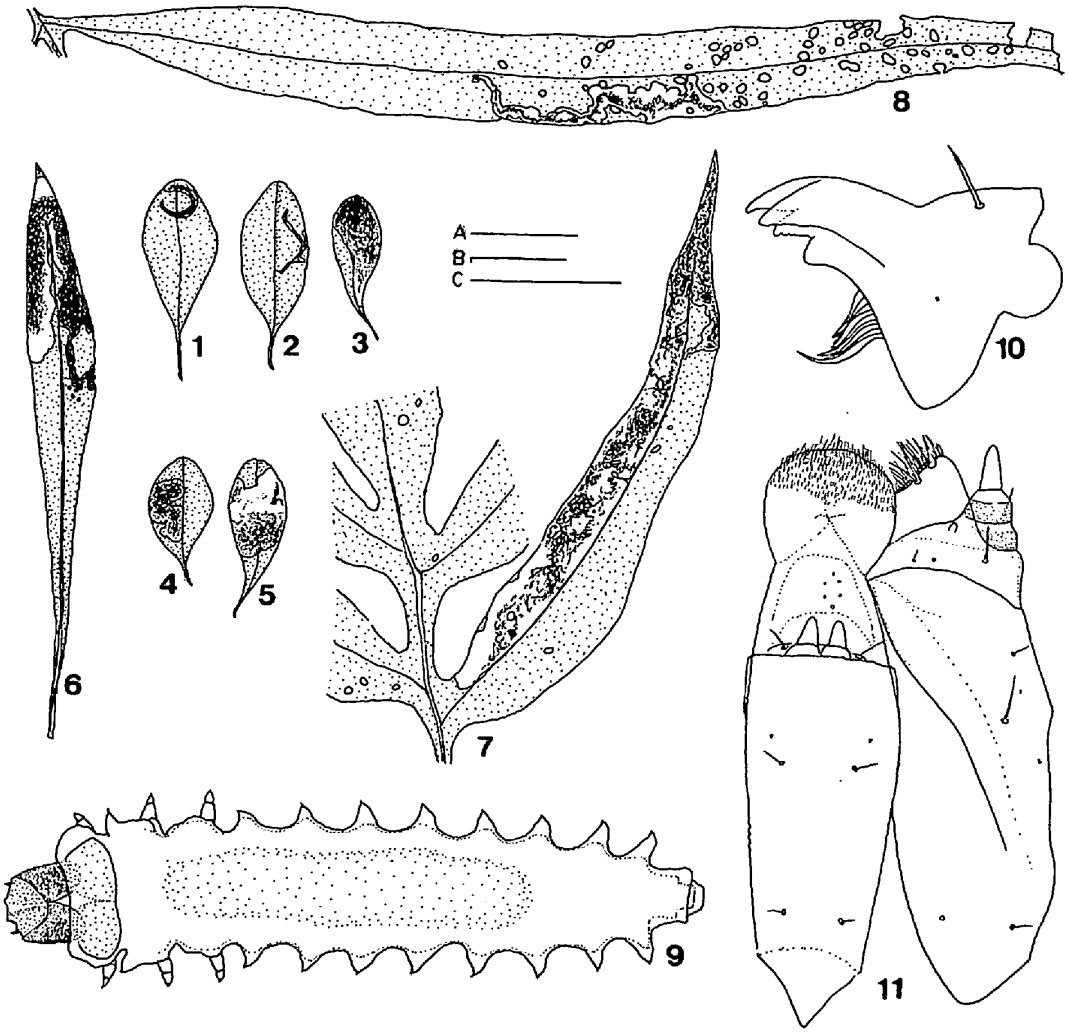
mine linearly in mesophyll of *L. microphyllum* (Figs. 1-2). The larva occasionally left the mined leaf and entered another unmined leaf. As repeting mine-removal, the mine gradually became blotch-like (Figs. 3-5). The larva disposed of its frass inside the mine cavity. The frass was distributed in fine grains through the mine. Mines on *Loxogramme salicifolia* were very similar to that on *Lemmaphyllum microphyllum* while the larvae seemed not to leave their mines (Fig. 6).



Figs. 1-11. Leaf-mines and 2nd-instar larval morphologies of *Schenklingia* spp.: 1-6, *S. hiranoi*; 7-11, *S. sauteri*. —— 1-5, Leaf-mines on *Lemmaphyllum microphyllum*; 6-8, leaf-mines on *Loxogramme salicifolia*, *Colysis elliptica* and *C. pothifolia*, respectively; 9, dorsal view; 10, left mandible (ventral view); 11, labrum and left maxilla (ventral view).
Scales: A, 2 cm (Figs. 1-8); B, 0.5 mm (Fig. 9); C, 0.05 mm (Figs. 10-11).

Schenklingia sauteri CHEN

Host plant: *Colysis elliptica* (THUNB.) CHING and *C. prothifolia* (DON) PR. (Polypodiaceae, Filicales).

Twenty-one mining larvae were collected at Segiri (120 m, a.s.l.), Yaku Island, Kagoshima Pref. on May 27, 1990, and were reared in a plastic case filled with moist vermiculite, in which pupation took place. Twelve adult beetles emerged in July, 1990.

Mining Habit: Eggs were laid singly on a pinna. The hatched larvae mined in mesophyll by extending the mine width. The frass was originally thread-like, but occasionally split into fine grains. Larvae seldom left their mines. Mining patterns were similar between the two host plants: *C. elliptica* (Fig. 7) and *C. prothifolia* (Fig. 8).

Larval morphology of 2nd instar larvae (Figs. 9–11): Body length 3.7 mm, extremely flattened dorso-ventrally, nearly glabrous, lacking setae, parallel-sided; head, prothoracic shield brown; clypeus, labrum dark brown (Fig. 9).

Head: Width 0.42 mm, longer than wide, sclerotized. Epicranial suture Y shaped. Mandible dark brown posteriorly with four distal teeth; 1 mandibular seta located on dorsal surface; penicillus well developed (Fig. 10). Maxilla lacking cardo; large rectangular stipes, with 3 setae and 2 sensilla at lateral margin and 2 setae and 1 sensillum at distal margin; maxillary palpus 3-segmented; segment 1 with 1 sensillum, segment 2 with 1 seta (Fig. 11). Lacinia distally pectinate. Galea distally armed with spine-like setae. Labium with prementum and postmentum; prementum elongated, distally pectinate and covered with many short setae, with 6 setae on middle and 1 pair of long setae at base. Labial palpus 2-segmented. Postmentum with 2 pairs of setae and 1 pair of sensilla.

Thorax: Prothorax with a large tubercle; Mesothorax with 2 tubercles at epipleural region; anterior tubercle projecting laterally, posterior tubercle weak; Metathorax with 2 weak tubercles.

Abdomen: Epipleural region with a tubercle projecting laterally.

Remarks: GRANDI (1959) demonstrated that leaf-mining chrysomelid larva has the following morphological modifications: body moderately flattened with reduced trichotaxis, head capsule prognathous, posteriorly prolonged, enlargement of the labium, expansion of the maxillolabial complex, etc. The larvae of this species had similar morphological characteristics, and contrasts well with that of free-feeding chrysomelid larvae (KIMOTO, 1962; LEE, 1990). The distinct larval morphological characteristics of this species are extreme flatness and glabrousness of the body, elongated labium, well-developed tubercles at epipleural region of each segment of thorax and abdomen.

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