A New Psilid Species from Japan Injurious to the Root of Carrot (Diptera: Psilidae)¹

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Phytopsila carota n. gen. and n. sp. injurious to the root of carrot in Japan is described and illustrated. Morphological characters of the third instar larva and puparium and ecological information are also presented.

INTRODUCTION

The Psilidae is distributed in the Holarctic, Oriental and Ethiopian regions. The larvae are considered to be phytophagous, living in the roots and stems of plants or under the bark of trees. The taxonomy of the Palearctic Psilidae has been studied by many authors (FREY, 1925; HENNIG, 1941; COLLIN, 1959; WAKERLEY, 1959; Soós, 1974, 1984, 1985; SHATALKIN, 1983). The Nearctic and Oriental species were listed by SHEWELL (1965) and COGAN (1977), respectively. However, very little has been known of the Psilidae from Japan.

In the spring of 1985, maggots of an unknown psilid species which damaged the root of carrot were found in Akan-cho of East Hokkaido. Symptoms of the damage to carrot infested with the larvae resembled that done by the larvae of the carrot rust fly, *Psila rosae* (FABRICIUS) which is an economically important pest of umbelliferous plants in Europe and North America. However, morphological features of the larvae and the adults originating from them are apparently different from those of *P. rosae*. A closer inspection proved that this species does not belong to any known genera and differs from all other described species. This species is described as a new genus and a new species with the description of the immature stages being made here.

Phytopsila n. gen.

Head: conical; both sexes dichoptic; occiput convex; gena wide; 1st and 2nd segments of antennae short, 3rd segment elongate oval, about twice as long as width; arista pubescent; 1 *oc*, 1–2 *vti*, 1–2 *vte*; *or* and *pvt* absent.

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Thorax: scutum roundly convex; mesopleuron and sternopleuron hairy; pteropleuron, hypopleuron and metapleuron bare; 1 *sa*, 1 *pa*, 1 *dc*, 1 *sc*; *n* absent.

Legs: femora in both sexes not bent and without any peculiar setae; tibiae and tarsi also without distinct setae.

Wings: hyaline; veins light brown; a transparent weak line from costal fractured point just end of subcosta reached to posterior end of second basal cell; cubical cross vein not convex; anal cell not shorter than second basal cell.

Abdomen: tergites wholly black and shiny, clothed with short hairs; male epandrium comparatively small and simple; cercus rounded; female ovipositor not sclerotized.

Type-species: *Phytopsila carota* n. sp.

Remarks: The genus *Phytopsila* belongs to the subfamily Psilinae and is closely related to the genus *Psila* MEIGEN and other genera of *Psila*-group in the sense of HENNIG (1941), viz., *Chamaepsila* HENDEL, *Oxypsila* FREY and *Synaphopsila* HENDEL, but differs from them in its lack of the notopleural setae.

The *Phytopsila* is also related to the genus *Psilosoma* ZETTERSTEDT, but differs from it by having the supra-alar setae and not having the modified hind femur in male and the sclerotized ovipositor in female.

Phytopsila carota n. sp.

(Common name=Red carrot fly; Japanese name=Ninjin-hancorebae)

♂ ♀. *Head* (Figs. 1 and 2): conical; eyes brown; frons, face and gena bright red; ocellar triangle black; occiput convex and black; 1st and 2nd segments of antennae bright reddish brown, 3rd segment reddish brown with dark marginal part and about twice as long as width; arista whitish yellow and pubescent; genal lower margin with numerous hairs; proboscis reddish brown to dark brown; 1 *oc*, 2–3 *vt* (1–2 inner vertical and 1–2 outer vertical); *or* and *pvt* absent.

Thorax (Fig. 1): mesonotum bright reddish brown, clothed with short hairs with 3 black longitudinal stripes of which middle one is distinct and complete, and lateral ones obscure and incomplete; humeral callus reddish brown; scutellum reddish brown, rounded marginally and convex dorsally; postscutellum black and shiny; propleuron reddish brown; mesopleuron and sternopleuron black and with sparsely short hairs; pteropleuron and metapleuron reddish brown to dark brown and bare; hypopleuron and metanotum dark brown to black and bare; 1 *dc*, 1 *sa*, 1 *pa*, 1 *sc*; *h*, *m* and *n* absent.

Wings (Fig. 1): hyaline; veins light brown; a transparent weak line from costal fractured point just end of subcosta reaching to posterior end of second basal cell; distal parts of R_{4+5} and M_{1+2} slightly divergent; cubical cross vein not convex; alula not developed; halter yellowish white, darkened basally.

Legs (Fig. 1): all coxae, femora, tibiae and tarsi entirely yellow; mid tibia with an anteroventral apical seta; femora and tibiae without any other distinct or peculiar setae.

Abdomen (Fig. 1): tergites wholly black and shiny, with sparsely short hairs; male epandrium comparatively small and simple, and clothed with bristles on lateral and posterior surfaces (Figs. 3 and 4); male cercus short and rounded; female ovipositor not sclerotized (Figs. 5 and 6).

Body length: ♂ ♀, 5–6 mm; wing length: 4–4.5 mm.

Distribution: Japan (Hokkaido).

Holotype: ♂, Akan-cho, Kushiro, Hokkaido, Japan, 13 May 1985, M. IWASA,

Fig. 1. *Phytopsila carota* n. sp., male adult.

Figs. 2-6. *Phytopsila carota* n. sp. 2, male head, lateral view; 3, male epandrium, lateral view; 4, ditto, posterior view; 5, female ovipositor, dorsal view; 6, ditto, lateral view.

T. HANADA and Y. KAJINO leg., bred from pupa (preserved in the Obihiro University of Agriculture and Veterinary Medicine).

Paratypes: 5 ♂♂, 10 ♀♀, same data as holotype.

Remarks: This species is closely related to *Oxyopsila abdominalis* SCHUMMEL in the chaetotaxy of head and general appearance, but differs from it by lacking the notopleural setae. This species is also similar to *Psila lineata* HENDEL in the chaetotaxies of head and thorax and general appearance, but differs from it by lacking the front-orbital and notopleural setae and having reddish 3rd antennal segment.

IMMATURE STAGES

Third instar larva

Fully mature larva about 9–10 mm in length; whitish yellow in color; anterior margins of 5th to 11th segments with microscopic ventral spinose bands; anal plate not protuberant and without any anal papillae; anterior spiracle with 12–14 branches (average 13); spiracular stalks of posterior spiracles heavily sclerotized and projected in hook-like structure (Figs. 7 and 10); posterior spiracular plate light brown, slits elongate oval in a radiating pattern, button very small; mouth hooks of cephalopharyngeal sclerite thick in lateral view and pointed apically; dental sclerite weakly pigmented; hypostomal sclerite not slender; pharyngeal sclerite heavily pigmented; dorsal and ventral cornuae same in length; ventral cornua not bifurcated; incision about half the length of the pharyngeal sclerite; pharyngeal floor heavily pigmented (Fig. 8).

Puparium

Barrel-shaped, about 6–7 mm in length; reddish brown in color; 1st and 2nd

Figs. 7–10. Third instar larva of *Phytopsila carota* n. sp. 7, lateral view; 8, cephalopharyngeal sclerite, lateral view; 9, anterior spiracle; 10, posterior spiracles.

Figs. 11–12. Puparium of *Phytopsila carota* n. sp. 11, dorsal view; 12, lateral view.

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Fig. 13. Carrot root damaged by larvae of *Phytopsisila carota* n. sp., showing the burrowing tracks.

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Fig. 14. Fully grown larva of *Phytopsisila carota* n. sp., coming out of the carrot root.

segments flattened dorsally (Figs. 11 and 12); 12th segments narrow and dark brown.

Remarks

The larvae and puparia of the Psilidae have been reported only in certain species, i.e., *Psila rosae* (FABRICIUS) (HENNIG, 1941; ASHBY and WRIGHT, 1946), *Psila nigricornis* MEIGEN (OSBORNE, 1961; BRINDLE, 1965), *Loxocera albiseta* (SCHRANK) (DE MEIJERE, 1947) and *Chyliza vittata* MEIGEN (HENNIG, 1941). The 3rd instar larva of this new species resembles that of *Psila rosae*, but differs from it by having 12 to 14 branches of anterior spiracle (5 to 6 branches in *P. rosae*). The puparium is more similar to that of a chrysanthemum stool miner, *Psila nigricornis* MEIGEN in body color and darkened anal extremity than that of *P. rosae*.

Bionomics and damage

A great many larvae and pupae were discovered from carrots harvested last autumn and stored in the underground storeroom of a farmer in March and April of 1985. In total, about 20 to 30 percent of the carrot roots were injured by the larvae, who feed only on the root of this plant. It was observed that fully grown larvae leave the roots by boring through the layer of outermost skin and pupate on the ground in the vicinity of the roots (Fig. 14). The roots were heavily damaged in the upper half part and on outer skin (Fig. 13). Detailed life cycle is unknown.

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