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New psyllids (Insecta: Homoptera: Psylloidea) from Canada

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Psylla kananaskensis **sp. nov.** and ***Psylla subspiculata*** **sp. nov.** are described from specimens collected off *Salix* sp. in the Kananaskis Valley, Alberta, Canada. *Psylla kananaskensis* is close to *P. arcuata* Loginova; *P. subspiculata* is close to *P. spiculata* Jensen and *P. parallela* Crawford. A new dioecous subspecies of *Psylla myrtilli* is also described from specimens collected off *Vaccinium myrtillus* L. in the same locality. In addition the following species are recorded from Canada for the first time: *Aphalara nubifera* Patch, *Craspedolepta alaskensis* (Ashmead), *C. minutissima* (Crawford), *C. subpunctata* (Foerster), *Trioza obtusa* (Patch) and *T. pletschi* Tuthill.

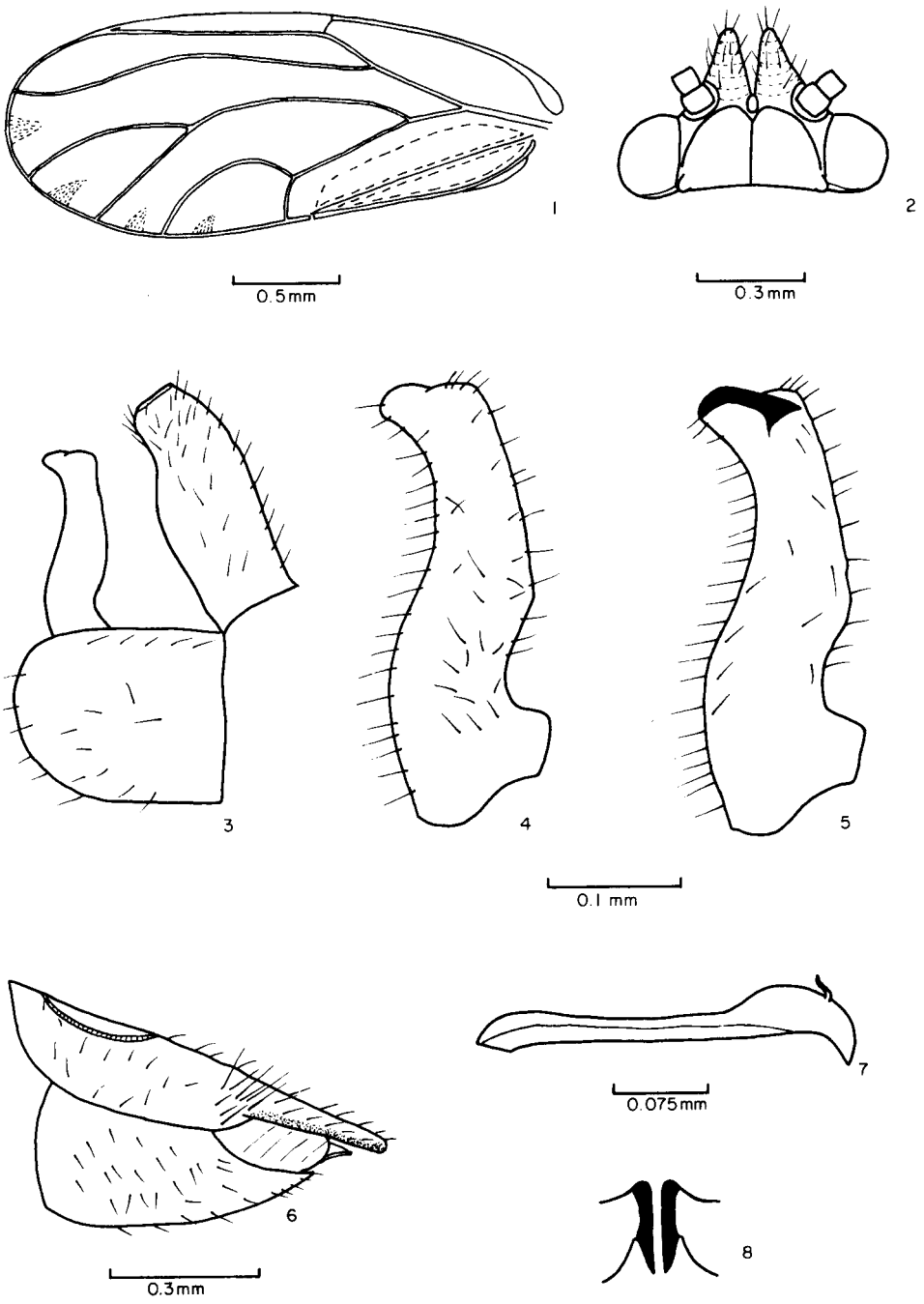
CONTENTS

INTRODUCTION

The psyllid fauna of Western Canada is poorly known but sufficient evidence exists to indicate strong faunal affinities with the Palaearctic region. This paper represents the results of two years' intensive collecting in Alberta.

Psylla kananaskensis sp. nov.

Head (Fig. 2) as broad as thorax; vertex 0.42-0.47 times as long as broad; genal cones slender, widely separated, 1.00-1.18 times the length of the vertex;



Figures 1 to 8. ***Psylla kananaskensis*** **sp. nov.:** 1, fore wing; 2, head dorsal view; 3, male terminalia lateral view; 4, male left paramere outer view; 5, male right paramere inner view; 6, female terminalia lateral view; 7, male penis; 8, male parameres dorsal view.

antennae 10 segmented, 1.43 to 1.59 times head width, of typical *Psylla* form, with sensorial pits on segments 4, 6, 8 and 9, two long apical setae on segment 10; ocelli small, borne on small tubercles close to the hind margin of the eye.

Thorax of typical *Psylla* form, moderately arched. Fore wing (Fig. 1) membranous, 2.38 to 2.59 times as long as broad, with typical *Psylla* venation; pterostigma long, about half the width of cell R_1; spinules confined to the radular areas and around the anal vein; height to basal width ratio of cell Cu_1 0.48 to 0.56. Hind wings membranous, of typical form, setae on either side of the costal fracture arranged 1 + 7 to 10 in ♂♂ and 1 or 2 + 7 to 9 in ♀♀. Fore and mid legs simple; hind legs saltatorial, mercanthi well developed; apex of hind tibiae with 4 or 5 (variable) black spines arranged (2 + 2), basal metatarsi with 2 black spines.

Abdomen (Figs 3 to 8) lacking diagnostic features except for terminalia. Male proctiger simple, sparsely hairy; male parameres (Figs 3 to 5) about three-quarters the length of the proctiger, posterior margins shallowly convex basally becoming shallowly concave apically; anterior margins deeply concave in basal one-third becoming shallowly convex in apical two-thirds; apex in lateral view appearing bilobed, with a rounded posterior projection formed from a large, inner, forward directed tooth, the apex of which lies below the anterior apex of the paramere; in dorsal view (Fig. 8) this tooth appears separate from the anterior apex of the paramere. Sub-genital plate (Fig. 3) large, sparsely hairy. Apical portion of penis (Fig. 7) characteristic, about three-quarters the length of the parameres.

Female terminalia (Fig. 6) as long as rest of abdomen, with dorsal and ventral valves subequal; perianal ring with two rows of oval pores. The female terminalia are very similar to those of a large number of *Psylla* species which feed on *Salix*.

Coloration. Teneral—brownish yellow throughout. Mature—vertex brick red with white streaks along the posterior margin, and the mid-line. Antennae with basal two segments dirty yellow, remainder, in fully coloured specimens, brown. Genal cones reddish yellow. Eyes and ocelli red. Pronotum brick red, often with white margins. Mesothoracic prescutum brick red with the mid-line and posterior margin streaked with white. Mesothoracic scutum red with 4 prominent and 2 indistinct longitudinal white stripes. Legs reddish yellow, often with the apical tarsal segments suffused brown. Wing membrane transparent with a brown streak along the clavus, wings often with a faint yellowish tinge; veins brownish yellow; pterostigma clear. Abdomen reddish brown to brown; terminalia reddish yellow.

Size. Length (with wings folded in resting position) ♂♂ 3.0-3.5 mm, ♀♀ 3.1-3.8 mm. Head width ♂♂ 0.70-0.79 mm, ♀♀ 0.68-0.82 mm. Antennal length ♂♂ 1.09-1.21 mm, ♀♀ 1.04-1.29 mm. Wing length ♂♂ 2.72-3.06 mm, ♀♀ 2.84-3.14 mm.

Host plant. Salix sp.

Holotype ♂♂ mounted on slide in balsam (coll. I.D. Hodkinson), from *Salix* sp., Kananaskis Valley, Alberta, Canada, 25 August 1973.

Paratypes 8♂♂, 9♀♀ (slide mounted) 25 August 1973; 1♂♂, 1♀♀ (slide mounted) 4 October 1973; 1♂♂ (slide mounted) 1 September 1973; 2♂♂, 6♀♀

(dry mounted) 24 August 1973; 2♂♂, 10♀♀ (in alcohol) 24 August 1973; 1♀♀ (in alcohol) 30 August 1973. Same locality as holotype.

Holotype and 20 paratypes are deposited in the British Museum (Natural History); the remaining paratypes are in the author's collection.

Comment

Psylla kananaskensis is closest to *Psylla arcuata* Loginova (1965), a northern Russian species which most probably feeds on *Salix* sp. (Loginova, 1967). The two species are easily separated on the form of the male parameres and the absence of spinules from the apical cells of the fore wing in *kananaskensis*. *Psylla kananaskensis* can be separated from all known *Psylla* spp. on the shape of the parameres.

Biology

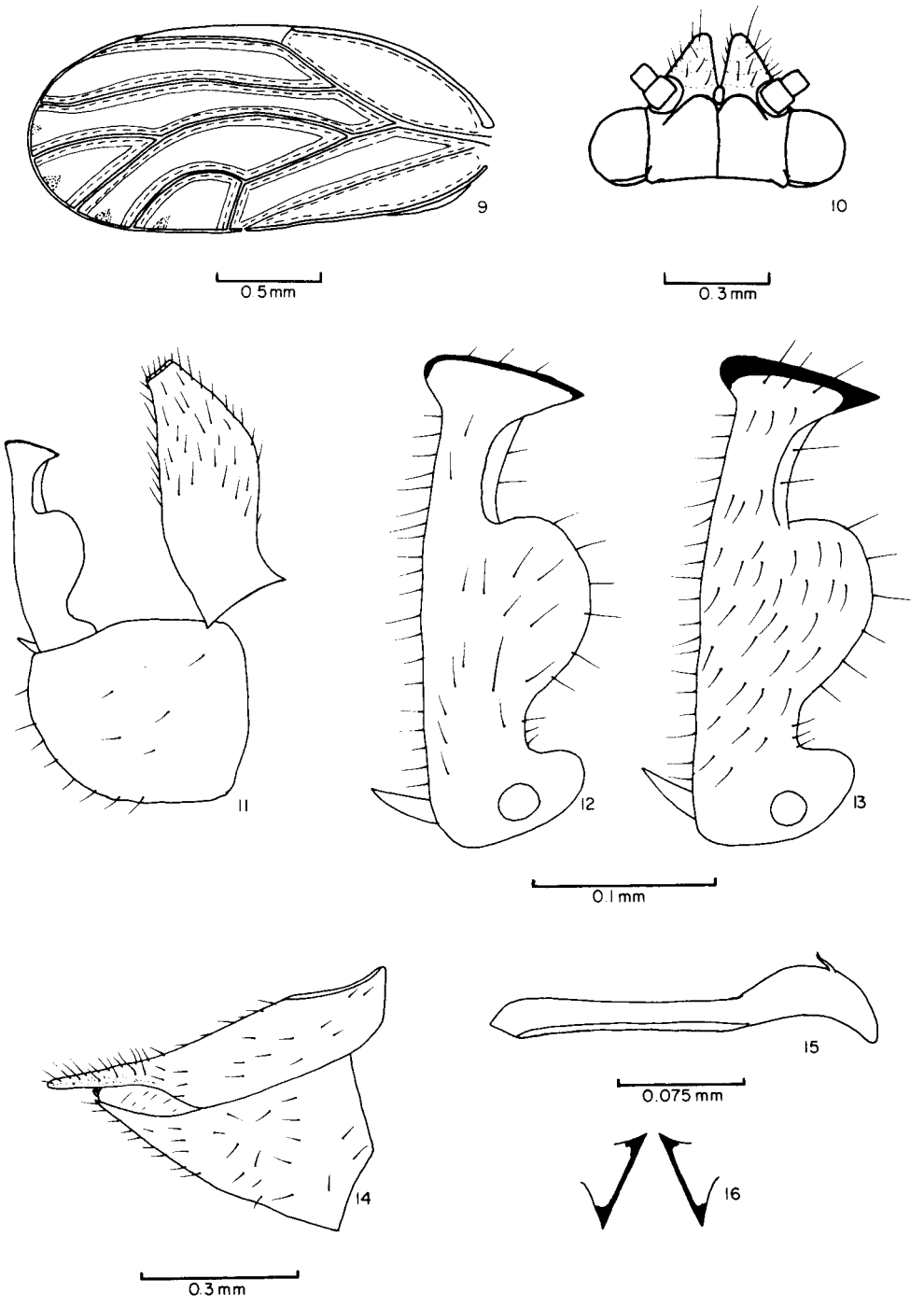
Nymphs and adults of *P. kananaskensis* were found in association with *Psylla sinuata* Crawford, *Psylla minor* Crawford and *Psylla* sp. near *fibulata* Crawford. However, despite extensive searches, no overwintering nymphs or adults of *P. kananaskensis* could be found, and this suggests that it overwinters in the egg stage, undergoes nymphal development during June and July and emerges as an adult during August.

***Psylla subspiculata* sp. nov.**

Head (Fig. 10) slightly narrower than thorax; vertex 0.44-0.54 times as long as broad; genal cones blunt, 0.83-0.94 times the length of the vertex, convergent basally. Antennae of typical *Psylla* form, 10 segmented, 1.47-1.63 times head width, with sensorial pits on segments 4, 6, 8 and 9, and two long apical setae on segment 10; ocelli small, borne on small tubercles close to the hind margin of the eye.

Thorax of typical *Psylla* form, moderately arched. Fore wing (Fig. 9) membranous, 2.38-2.72 times as long as broad, of typical *Psylla* venation; pterostigma long but narrow, about one quarter the width of cell R_1; dense, light coloured spinules covering whole membrane of fore wing except for narrow spinule free bands along the veins; height to basal width ratio of cell Cu_1 0.52-0.64. Hind wings membranous of typical *Psylla* form; hairs on either side of costal fracture arranged 1 (occasionally 2) + 6 to 9 in ♂♂, 1 (occasionally 2) + 6 to 10 in ♀♀. Fore and mid legs simple; hind legs saltatorial, mercanthi well developed; apex of hind tibiae with 4 or 5 (variable) thick black spines; basal metatarsi with 2 black spines.

Abdomen (Figs 11 to 16) lacking diagnostic features except for terminalia. Male proctiger simple, sparsely hairy basally, densely hairy on apical half. Male parameres (Figs 11 to 13) slightly shorter than proctiger, densely setiferous posteriorly and with a small posterior basal projection; in lateral view posterior margin convex basally, becoming straight in its apical two-thirds; anterior margin strongly concave in basal one-third, strongly convex in mid one-third and strongly concave in apical one-third; apex formed by a large asymmetrical



Figures 9 to 16. ***Psylla subspiculata*** sp. nov.: 9, fore win; dashed line represents the distribution of spinules and the bold line the distribution of clouded areas; 10, head dorsal view; 11, male terminalia lateral view; 12, male right paramere outer view; 13, male left paramere inner view; 14, female terminalia lateral view; 15, male penis; 16, male parameres dorsal view.

tooth which projects both anteriorly and posteriorly; thus the parameres consist of three distinct portions, a basal portion, a mid portion bearing a rounded anterior lobe and a subapical shank which bears the apical tooth; sub-genital plate large, moderately hairy; apical portion of penis (Fig. 15) characteristic, about three-quarters the length of the parameres.

Female terminalia (Fig. 14) slightly shorter than the rest of the abdomen, comparatively shorter than in most *Salix* feeding *Psylla* spp.; dorsal valve longer than ventral; perianal ring small, with two rows of oval pores.

Coloration. Teneral-yellowish white throughout. Mature—vertex brick red with white streaks along posterior margin and mid-line. Antennae with basal two segments yellow and apical two segments brown, remainder yellow basally, brown apically. Genal cones dirty yellow. Eyes and ocelli red. Pronotum white, often with red patches on the mid-line and lateral foveae. Mesothoracic prescutum red with mid-line and posterior margin streaked with white. Mesothoracic scutum red with six longitudinal white stripes. Legs generally dirty yellow, but femora and tarsal segments sometimes brown. Fore wing membrane transparent but with grey (younger specimens) or brown (older specimens) clouds present in the cells (Fig. 9) and a dark brown streak present on clavus; pterostigma concolorous with unclouded area of wing. Veins yellow to brown. Abdomen with plates of sclerotization brown, membraneous areas red. Terminalia yellow brown to brown.

Size. Length (with wings folded in the resting position) ♂♂ 2.7-3.0 mm, ♀♀ 2.7-3.2 mm. Head width ♂♂ 0.67-0.73 mm, ♀♀ 0.69-0.77 mm. Antennal length ♂♂ 1.08-1.15 mm, ♀♀,1.08-1.15 mm. Wing length ♂♂ 2.38-2.50 mm, ♀♀ 2.38-2.72 mm.

Host plant. Salix sp.

Holotype. ♂♂ mounted on slide in balsam (coll. I.D. Hodkinson), from *Salix* sp., Kananaskis Valley, Alberta, Canada, 4 October 1973.

Paratypes. 8♂♂, 7♀♀ (slide mounted) 4 October 1973; 4♂♂, 4♀♀ (dry mounted) 16 September 1972; 7♂♂, 5♀♀ (dry mounted) 11 September 1973; 3♀♀ (in alcohol) 25 May 1972; 1♀♀ (in alcohol) 7 June 1972; 5♂♂ 4♀♀ (in alcohol) 29 August 1973; 7♂♂, 1♀♀ (in alcohol) 2 September 1973; 4♂♂, 2♀♀ (in alcohol) 15 September 1972. Same locality as holotype.

Holotype and 30 paratypes are deposited in the British Museum (Natural History); the remaining paratypes are in the author's collection.

Comment

Psylla subspiculata is closely related to *Psylla spiculata* Jensen (1951) and *P. parallela* Crawford (1914). Jensen (1951) discusses the separation of the latter two species; the following table summarizes the main characters which separate ***P. subspiculata*** from *P. spiculata.*

P. subspiculata	*P. spiculata*
1. Male parameres with anterior lobe large: basal posterior process present.	Parameres with anterior lobe small: basal posterior process absent.

2. Antennae 1.5 times head width.	Antennae 1.33 times head width.
3. Spinules covering all cells of fore wing.	Spinules restricted to cubital area of fore wing.
4. Genal cones blunt.	Genal cones longer and more slender
5. Female genitalia relatively short.	Female genitalia relatively long.
6. Fore wing with grey or brown clouds in the cells.	Fore wings clear.

The stability of character 6 is not certain as the presence or absence of wing clouds in the Palaearctic *Psylla klapaleki/brunneipennis* complex has let to much taxonomic confusion (Heslop-Harrison, 1951; Vondracek, 1959).

Biology

Nymphs and adults of ***Psylla subspiculata*** were found in association with *Psylla hamata* Tuthill. ***Psylla subspiculata*** overwinters in the adult stage, as evidenced by the presence of highly pigmented female adults in late May and early June.

Psylla myrtilli canadensis ssp. nov.

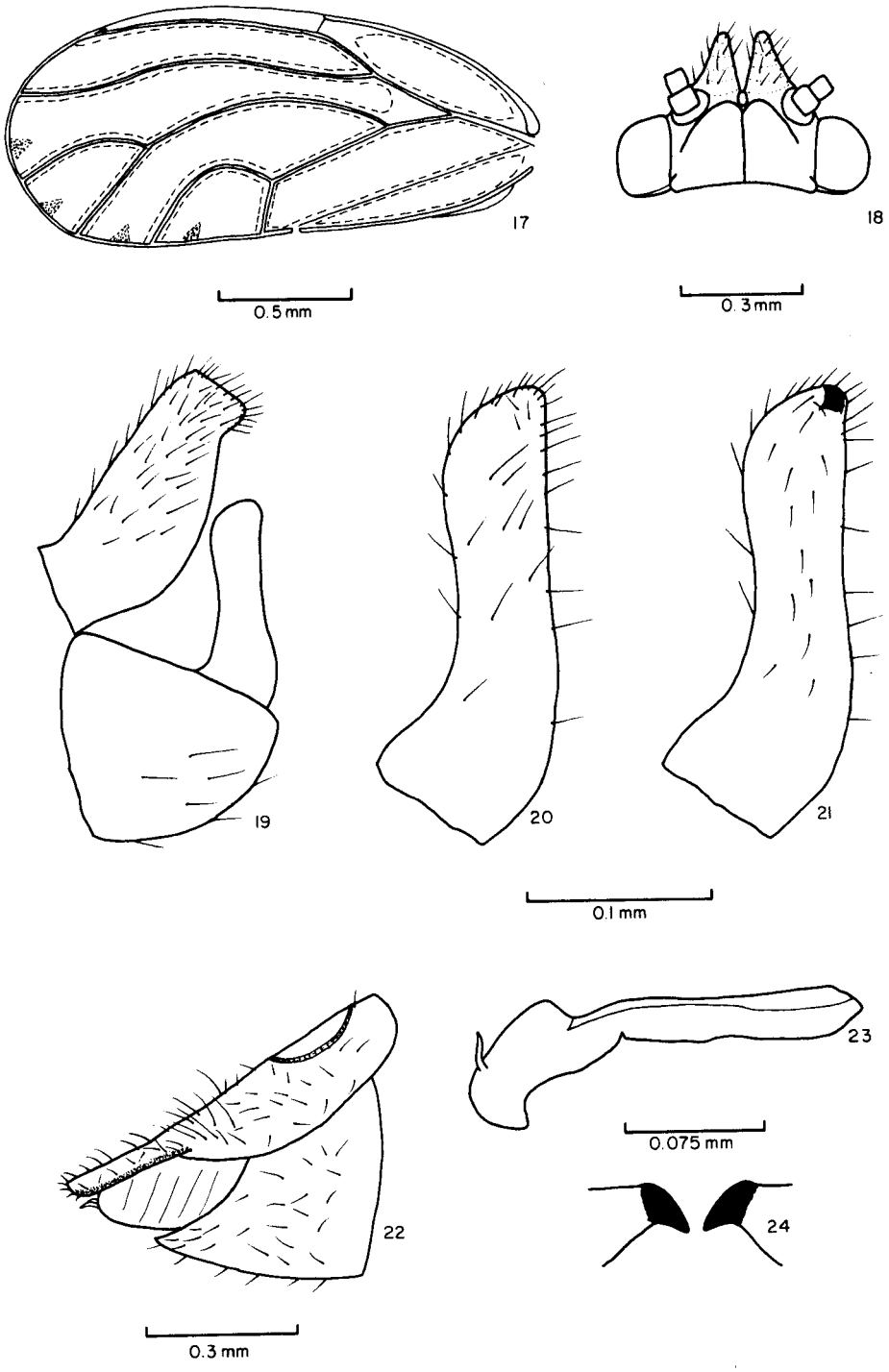
Head (Fig. 18) as broad as thorax; vertex 0.48-0.53 times as long as broad; genal cones widely separated, 0.81-0.93 times as long as the vertex; antennae 10 segmented, 1.70-1.92 times as long as head width, of typical *Psylla* form with sensorial pits on segments 4, 6, 8 and 9, two long apical setae on segment 10; ocelli small, borne on small tubercles close to the hind margin of the eye.

Thorax of typical *Psylla* form, moderately arched. Fore wing (Fig. 17) membranous 2.13-2.54 times as long as broad, with typical *Psylla* venation; pterostigma long, about one-third the width of cell R_1; height to basal width ratio of cell Cu_1 0.52-0.55. Spinules present in all cells of fore wing, leaving only narrow spinule free bands along the margins of the veins. Hind wings membranous of typical form, setae on either side of costal fracture arranged 2 + 6 to 7 in ♂♂ and 2 + 5 to 6 in ♀♀. Fore and mid legs simple; hind legs saltatorial, mercanthi well developed; apex of hind tibia with 4 black spines, basal metatarsi with 2 black spines.

Abdomen (Figs 19 to 24) lacking diagnostic features except for terminalia. Male proctiger (Fig. 19) simple, sparsely hairy basally becoming densely hairy apically; parameres (Figs 19 to 21) simple, with a small inner apical tooth; in lateral view posterior margin of parameres straight in apical two-thirds, anterior margin curved strongly to apex in its apical one-third; in dorsal view (Fig. 24) apex of parameres appears as two inwardly directed hooks. Subgenital plate small, sparsely hairy. Apical portion or penis (Fig. 23) highly characteristic, slightly shorter than the length of a paramere.

Female terminalia (Fig. 22) shorter than rest of abdomen; ventral valve shorter than dorsal valve; ovipositor strongly curved ventrally; perianal ring small, with a double row of oval pores.

Coloration. Teneral—reddish yellow throughout. Mature—genal cones and vertex bright rust red. Antennae yellow basally, becoming brown in apical half.



Figures 17 to 24. ***Psylla myrtilli canadensis*** ssp. nov.: 17, fore wing 18, head dorsal view; 19, male terminalia lateral view; 20, male right paramere outer view; 21, male right paramere inner view; 22, female terminalia lateral view; 23, male penis; 24, male parameres dorsal view.

Eyes and ocelli plum coloured. Thoracic tergites rust red. Legs brownish yellow, the hind femora often with a pronounced brown streak. Wing membrane transparent yellow, pterostigma concolorous; veins yellow to yellow brown. Abdomen with bands of sclerotization brown, unsclerotized areas yellow to rust red. Terminalia yellow brown to brown.

Size. Length (with wings folded in resting position) ♂♂ 2.1-2.7 mm, ♀♀ 2.5-3.3 mm. Head width ♂♂ 0.56-0.61 mm, ♀♀ 0.58-0.65 mm. Wing length ♂♂ 2.04-2.23 mm, ♀♀ 2.13-2.26 mm.

Host plant. Vaccinium myrtillus L.

Twelve type specimens of ***P. myrtilli canadensis*** have been deposited in the British Museum (Natural History). Data attached to these specimens are as follows: ex. *Vaccinium myrtillus* L., Barrier Mountain (1830 m a.s.l.), Kananaskis Valley, Alberta, Canada, 9 September 1973 (coll. I. D. Hodkinson).

Comment

Psylla myrtilli was described from Europe by Wagner (1947). His type series included a single male specimen which has subsequently been shown to be *P. corcontum* Sulc and hence not conspecific with the females in the series (Ossiannilsson, 1975). The male of *P. myrtilli* remains unknown in Europe where the species is probably totally parthenogenetic (Linnavvori, 1951; Lauterer, 1963). However, occasional males have been taken in the U.S.S.R. and China (Loginova, pers comm.; Kuwayama & Miyatake, 1971; Ossiannilsson, 1975).

The newly discovered Nearctic form of *P. myrtilli* is very similar morphologically to the Palaearctic form but differs in the length of the antennae. Furthermore it almost certainly reproduces sexually, as males and females occur in roughly equal proportions. Insufficient material is available to establish whether the two forms are specifically distinct and thus the Canadian form has been given subspecific status.

Two further *Vaccinium*-feeding species *P. vaccinii* Miyatake and *P. amabilis* Ossiannilsson occur in Japan and the U.S.S.R. respectively, but they are distinct from both subspecies of *P. myrtilli* (see Miyatake, 1964; Ossiannilsson, 1975).

Biology

The biology of ***Psylla myrtilli canadensis*** is unknown.

NEW RECORDS FOR CANADA

The following species are recorded for the first time from Canada.

1. *Aphalara nubifera* Patch. 1♂♂, 1♀♀ from *Rumex pauciflorus* Nuttall, 27 June 1972, Kananaskis Valley, Alberta.
2. *Craspedolepta alaskensis* (Ashmead). Abundant on *Epilobium angustifolium* L., 20 July 1973, Highwood Pass summit (2135 m a.s.l.), Alberta.
3. *Craspedolepta minutissima* (Crawford). Abundant on *Artemisia* sp., 16 June 1972, Drumheller Badlands, Alberta.

4. *Craspedolepta subpunctata* (Förster). Abundant on *Epilobium angustifolium* L., 6 June 1972 and 5 June 1973, Kananaskis Valley, Alberta. *Craspedolepta hebecephala* (Caldwell) is probably synonymous with this holarctic species.
5. *Trioza obtusa* Patch. Abundant on *Amelancher alnifolia* Nuttall, 27 August to 8 September 1973, Kananaskis Valley, Alberta.
6. *Trioza pletschi* Tuthill. 1♂♂, 1♀♀ from *Thalictrum venulosum* Trel., 26 August 1973, Kananaskis Valley, Alberta. 89♀♀ from *Thalictrum* sp., 20 July 1973, Highwood Pass summit, Alberta, are probably referable to this species.

ACKNOWLEDGEMENTS

I thank Dr L. M. Russell and Dr M. M. Loginova for comparing specimens with types deposited in the U.S. National Museum and the Zoological Institute, Academy of Sciences, Leningrad. Dr F. Ossiannilsson spent a good deal of time on my behalf tracing Wagner's type series of *P. myrtilli.*

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